DOCUMENT RESUME

ED 083 352 UD 013 873

TITLE Hearings Before the Select Committee on Nutrition and Human Needs of the United States Senate, Ninety-Third Congress, First Session. Maternal, Fetal, and Infant Nutrition--1973. Part 1--Consequences of Malnutrition; Part 2--Government Responses. Hearings Held Washington, D.C., June 5, 6, and 7, 1973.

INSTITUTION Congress of the U.S., Washington, D. C. Senate Select Committee on Nutrition and Human Needs.

PUB DATE Jun 73

NOTE 210p.; Committee Print, Senate Select Committee on Nutrition and Human Needs

AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Part 1, Stock No. 5270-01998, $1.05; Part 2, Stock No. 5270-02010, $0.80)

EDRS PRICE MF-$0.65 HC-$9.87

DESCRIPTORS Biological Influences; Environmental Influences; Federal Programs; Hunger; *Individual Development; Infancy; Infant Behavior; Infant Mortality; *Infants; Mental Development; *Mothers; *Nutrition; Physical Development; *Prenatal Influences; Scientific Research

ABSTRACT

Part One of these hearings before the Select Committee on Nutrition and Human Needs of the United States Senate includes the testimony of scientists and doctors engaged in research regarding the relationship between maternal, fetal, and infant nutrition and optimum mental and physical development of the child. In testimony it was shown that the effect of the mother's nutrition during pregnancy is of great importance to the birth weight and future health of the infant. Low-birth-weight babies are more susceptible to various health problems and enter the world with less of a chance. During the first year of life, the brain and other organs go through a vitally crucial stage of growth, and according to some of the previous testimony, malnourished infants may suffer irreversible mental and physical effects. Part Two of these hearings include the testimony from representatives from the Department of Health, Education, and Welfare and the Department of Agriculture. The testimony concerns [illegible] these two Federal agencies have done in the areas of research a[illegible]actual nutritional services to mothers and infants. Appended m[illegible]ials include statements, letters, tables and various publications [illegible]rtaining to the testimony. [Parts of this document may not be [illegible] legible on microfiche due to the size of the print in the orig[illegible] Pages 84-87 in Part One and 173-88 in Part Two have been deleted for copyright reasons.] (Author/JM)

MATERNAL, FETAL, AND INFANT NUTRITION—1973

HEARINGS

BEFORE THE

SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS

OF THE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

PART 1—CONSEQUENCES OF MALNUTRITION

WASHINGTON, D.C., JUNE 5, 6, 1973

Series 73/MFI1

Printed for the use of the Select Committee on Nutrition and Human Needs

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1973

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MATERNAL, FETAL, AND INFANT NUTRITION:
Part 1—Consequences of Malnutrition, June 5, 6, 1973.
Part 2—Governmental Responses, June 7, 1973.

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MATERNAL, FETAL, AND INFANT NUTRITION

Consequences of Malnutrition

TUESDAY, JUNE 5, 1973

APPENDIXES

SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
June 5, 1973.

HEARINGS ON MATERNAL, FETAL, AND INFANT NUTRITION

Senator George McGovern (D–S. Dak.), chairman of the Select Committee on Nutrition and Human Needs, announced today three days of hearings on the relationship between maternal, fetal, and infant nutrition and optimum mental and physical development of the child.

The hearings, to be chaired jointly by Senator Charles H. Percy (R–Ill), the Committee's ranking Republican, and Senator Marlow W. Cook (R–Ky), are scheduled for Tuesday, June 5, in Room 6202, Dirksen Senate Office Building, and in Room S. 407, The Capitol on Wednesday and Thursday, June 6 and 7.

In their letter to Senator McGovern requesting the hearings, Senators Percy and Cook said, "About 3.2 million babies were born in the United States during 1972. Eight percent of these births—about 256,000 babies—were low birth weight babies, infants weighing less than five and one-half pounds. . . . The major factor contributing to low birth weight appears to be inadequate and improper nutritional intake by mothers during pregnancy and probably before as well. (Since low birth weight babies often suffer birth defects), it seems entirely possible that we might have saved many of the approximately 32,000 babies born mentally retarded last year if we had provided their mothers with an adequate diet."

Senators Percy and Cook went on to say that a considerable body of data exists linking maternal weight gain during pregnancy with the chances for a successful outcome of the pregnancy. The greater the weight gain—up to an optimum of around 30 pounds—the higher the birth weight of the infant, and the greater his chances for a normal, healthy life.

"The tragedy," Senators Percy and Cook said, "is that prevailing obstetric practice in this country encourages a weight gain of no more than 20 pounds and some obstetricians are still restricting the weight gain of pregnant women to 10 to 14 pounds. The medical profession may actually be contributing to the birth of low birth weight babies through these outdated practices."

The letter went on to say that "more and more evidence is accumulating which explicitly links malnutrition in the last three months before birth and in the first year of life with arrested brain development." It cited studies showing that malnutrition at this age and even up to three years of age can result in "irreparable brain damage and permanently impaired intelligence."

Senators Percy and Cook pointed out that studies exist which "indicate almost without exception the great potential of nutrition intervention programs" in supplementing the diets of mothers and preschool children.

While noting that we spend over a billion dollars each year on feeding programs in schools, the Senators asked, "But what are we losing in the way of unfulfilled human potential because we are spending next to nothing to provide adequate nutrition to infants at the most crucial point in their mental and physical development?" The full text of the Percy-Cook letter is reproduced below.

The committee will hear from scientists and doctors engaged in research in the United States and abroad about the need for proper nutrition for pregnant and lactating women and about the consequences of malnutrition, the mental and physical development of the unborn and the newborn. The committee will also hear from representatives of the Department of Agriculture, the Department of Health, Education and Welfare, and the National Institutes of Health.

The witnesses who will testify are:

Tuesday, June 5

Dr. Myron Winick, Robert R. Williams, Professor of Nutrition and Professor of Pediatrics, Faculty of Medicine of Columbia University; Director, Institute of Human Nutrition, Columbia University. Dr. Winick is an expert on fetal malnutrition and has done extensive research with animals on the relationship of nutrition to the development of the central nervous system. He has written widely on the crucial importance of the timing of nutritional deprivation for its impact on mental development.

Dr. Jean-Pierre Habicht, Senior Scientist, Pan American Health Organization, Institute of Nutrition for Central America and Panama, Guatemala City, Guatemala. Dr. Habicht is a member of a research team which has been conducting an experiment in several Guatemalan villages, the results of which suggest (1) a food

supplement alone, without additional service to pregnant women, may be enough to assure a successful outcome, and (2) a calorie-protein supplement is no more effective than a calorie supplement in enhancing the chances for a successful outcome.

Dr. Bacon Chow, Professor of Biochemistry, School of Hygiene and Public Health, Johns Hopkins University. Dr. Chow has for a number of years been studying the short- and long-term physical and behavioral effects of maternal diet on offspring in rats. He has directed an experimental study in Taiwan which indicates that a maternal protein supplement can have a positive effect on a baby's birth weight and length. This study is the subject of a film entitled, "A Mother's Diet and Her Baby's Future," which will be shown in Room 3302, Dirksen Senate Office Building, on Monday, June 4, at 2 p.m. Dr. Chow will be accompanied by an associate, Dr. Andie Hsueh, Assistant Professor of Biochemistry.

Dr. Derrick Jelliffe, Professor of Maternal and Child Health, School of Public Health, University of California, Los Angeles; formerly Professor of Community Nutrition, and Director, Caribbean Food and Nutrition Institute, Jamaica. Dr. Jelliffe is an expert on the health and nutrition of young children in developing countries and particularly on the field assessment and evaluation of programs. He is concerned with promoting breast feeding as a practical solution to the problem of infant nutrition.

Wednesday, June 6

A panel including: Dr. Paul Zee, Associate Professor of Pediatrics and Physiology, University of Tennessee; Director of Nutrition, St. Jude's Hospital, Memphis, Tennessee. Dr. Zee has done an evaluation of the Memphis supplemental feeding program which shows conclusively that the program can raise the nutritional status of preschoolers. The Memphis program is the subject of a film entitled, "Prescription Food," produced by Ross Laboratories. Dr. Alvin Mauer, Children's Hospital, Cincinnati, Ohio; Member, Committee on Nutrition, American Academy of Pediatrics. Dr. Mauer will present the Academy's position on infant and preschool nutrition.

Dr. Roy Pitkin, Associate Professor of Obstetrics and Gynecology, University of Iowa Hospitals; Chairman, Committee on Nutrition, American College of Obstetricians and Gynecologists. Dr. Pitkin will present the views of the ACOG on maternal nutrition.

Dr. George R. Kerr, Associate Professor of Nutrition, School of Public Health, Harvard University. Dr. Kerr has done extensive research on fetal and infant primate nutrition. He is currently concluding a study in Tunisia on protein supplements for pregnant women and infants.

Thursday, June 7

Mr. Clayton Yeutter, Assistant Secretary of Agriculture; accompanied by Edward Hekman, Administrator, Food and Nutrition Service, and Howard Davis, Deputy Administrator, Food and Nutrition Service.

Representatives of the Department of Health, Education and Welfare, including the National Institutes of Health, will be announced later.

The full text of the letter from Senators Percy and Cook follows:

Hon. George McGovern
Chairman,
Select Committee on Nutrition and Human Needs,
Washington, D.C.

Dear Mr. Chairman: We urgently request you to schedule hearings on June 5, 6, and 7 on the subject of maternal, fetal, and infant nutrition.

About 3.2 million babies were born in the United States during 1972. Eight percent of these births—about 256,000 babies—were low birth weight babies, infants weighing less than five and one-half pounds. (About 14 percent of all births to nonwhite mothers were low birth weight babies.) As a group, low birth weight babies have more potential illnesses, child growth failure, neurological and physical handicaps, and mental retardation. The major factor contributing to low birth weight appears to be inadequate and improper nutritional intake by mothers during pregnancy and probably before as well. In other words, it seems entirely possible that we might have saved many of the approximately 32,000 babies born mentally retarded last year if we had provided their mothers with an adequate diet.

The latest scientific data available to us indicates that weight gain during pregnancy as well as a mother's weight before pregnancy are very strongly associated with the birth weight of the baby and thus his life chances. According to one recent study by a group at the National Institutes of Health, "There are striking reductions in the low birthweight rate with increased maternal weight gain and increased prepregnant weight. For Whites and Negroes of all prepregnant weights, the optimum maternal weight gains (in terms of highest birthweights) are 30–34 lb. or more." The tragedy is that prevailing obstetric practice in this country encourages a weight gain of no more than 20 pounds and some obstetricians are still restricting the weight gain of pregnant women to 10 to 14 pounds. The medical profession may actually be contributing to the birth of low birth weight babies through these outdated practices.

Of greater significance to us is that more and more evidence is accumulating which explicitly links malnutrition in the last three months before birth and in the first year of life with arrested brain development. To put the matter simply, the brain, as well as other organs, goes through two stages of growth. In the first stage growth is by increase in the number of cells; in the second stage, growth is by increase in the size of existing cells. Undernutrition during the first stage appears to result in a permanent deficit in cell number. Since the brain completes its growth first, it is at severest risk from fetal and infant malnutrition. Severely malnourished infants may have as many as 40 percent fewer brain cells than their well-nourished counterparts.

Nutritional deprivation can thus result in irreparable brain damage and permanently impaired intelligence. American scientists working in Colorado found that 20 children hospitalized for malnutrition before the age of one year had an average score 17 points lower than a matched group of healthy youngsters on a standard test of intellectual development. Another scientific group found significant effects on intellect in a group of malnourished children who experienced severe malnutrition not during the first year of life but rather when they were between 18 and 36 months of age.

All this suggests the overwhelming importance of adequate nutrition for an expectant mother and her offspring from the time of conception until the child is ready to enter school. And we know how successfully to provide wholesome nourishing diets to pregnant women and preschoolers. Evaluations of experiments conducted in Taiwan, Nigeria, the Caribbean and of the supplemental feeding program for mothers and infants conducted right here in the United States in places such as St. Jude's Children's Hospital in Memphis, Tennessee, indicate almost without exception the great potential of nutrition intervention programs.

We spend over a billion dollars annually for our school lunch and school breakfast programs because we know that children will be healthier and will learn better if they are well nourished. But what are we losing in the way of unfulfilled human potential because we are spending next to nothing to provide adequate nutrition to infants at the most crucial point in their mental and physical development?

We believe our Committee must try to find the answer to this question. We must bring before our colleagues and the public the latest and best scientific information on maternal, fetal, and infant nutrition and its relationship to optimum physical and mental growth. We must question the relevant government agencies about present and future public programs in this area. We can think of no more vital concern for this Committee at this time.

We are prepared to assist you in all possible ways in organizing these hearings.

Sincerely,

CHARLES H. PERCY.
MARLOW W. COOK.

MATERNAL, FETAL, AND INFANT NUTRITION

Consequences of Malnutrition

TUESDAY, JUNE 5, 1973

U.S. SENATE
SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
Washington, D.C.

The Select Committee met at 9:30 a.m., pursuant to call, in room 6202 of the Dirksen Building, the Honorable Charles H. Percy, presiding.

Present: Senator Percy.

Staff members: Vernon M. Goetcheus, chief, minority staff; Elizabeth P. Hottell, professional staff.

Senator PERCY. The committee will come to order.

OPENING STATEMENT OF SENATOR PERCY, PRESIDING

The Select Committee on Nutrition and Human Needs begins today 3 days of hearings on the subject of maternal, fetal, and infant nutrition.

I am pleased to be chairing these hearings with my distinguished colleague, the senior Senator from Kentucky, Senator Cook, and I know he joins me in acknowledging the support and encouragement we have received from our dedicated chairman, Senator McGovern, in scheduling and organizing these hearings.

No one would want a pregnant woman or her offspring to be hungry or malnourished. No one in either the public or private sector is in favor of hunger and malnutrition among new mothers and young children, or among any other segment of the population, for that matter.

On the other hand, in this time of Watergate and Cambodia, of rising prices and energy shortages, no other congressional committee is properly focusing public attention on the very significant relationship between undernutrition in infancy and retarded human development.

Consider these facts:

In 1972, 3.2 million babies were born in the United States.

Eight percent of all births (and about 14 percent of births to nonwhites) were low birthweight babies (under 5½ pounds).

Low birthweight babies face greater health hazards than do higher weight babies. Their death rate is some 30 times greater than babies who weigh more at birth. They suffer more postnatal illnesses, growth failure, neurological and physical handicaps, and mental retardation. They become our public welfare cases of tomorrow.

As many as 32,000 mentally retarded babies alone were born in 1972.

Now, consider that the single most important factor influencing the birthweight of a baby is the mother's weight gain during pregnancy.

Adequate nutrition, as measured by maternal weight gain, is crucial for a successful outcome of pregnancy. One major study sets the optimum weight gain at 30 to 34 pounds. Yet most obstetricians restrict the gain to 20 pounds and some limit it to 10 to 14 pounds.

It is possible that American women are being misled by their doctors' dietary advice and are thereby endangering the physical and mental well-being of their babies!

There is no longer any doubt that severe malnutrition during the last few months before birth or the first year of life results in stunted brain growth and impaired intelligence. In addition, there is some evidence that malnutrition during the first 3 years of life may result in intellectual abnormalities.

The tragedy is that while brain damage which occurs during infancy is apparently irreversible, the damage could be avoided in the first place by simply providing the expectant mother and the infant with food.

I believe this committee has the duty to bring to the public's attention the body of evidence which has been accumulated about the relationship of nutrition during pregnancy and infancy to the life chances of the child.

I believe we have the duty to ask what this body of scientific data implies about the need for action in both the public and the private sector.

And I believe we must ask these questions: To what extent do hunger and malnutrition exist among this segment of our population, and what can be done about it?

A partial answer at least is contained in a film which can be seen tonight on WMAL-TV, channel 7, entitled, "Prescription: Food." I believe that Senator Schweiker of Pennsylvania, a member of our committee, participates in the discussion panel on the film. This film describes the experience of St. Jude's Research Hospital in Memphis with a USDA-sponsored supplemental feeding program. An evaluation of the results obtained from this program indicates that it is possible to improve greatly the nutritional status of preschoolers. We shall hear more about this evaluation tomorrow.

Finally, we have to ask this question—and it is one that Senator Cook and I posed in our letter to the chairman requesting these hearings. We provide a billion dollars a year for school feeding programs because of the deleterious effects of malnutrition at that stage of development, but what are we losing in the way of unfulfilled human potential because we spend relatively small amounts to provide adequate nutrition to infants at the most crucial point in their mental and physical development?

We have a statement by Senator Cook which I am inserting in the record.

I want to thank all of our witnesses, some of whom have traveled exceptionally long distances to take part in these hearings. We deeply appreciate your coming here and we are anxious to hear your testimony.

STATEMENT OF SENATOR COOK

I am pleased to join the senior Senator from Illinois, Senator Percy, in conducting these very important public hearings on maternal, fetal, and infant nutrition.

For some illogical reason, minor emphasis has been placed on this vital area of nutrition in comparison with other Federal food or health programs. In communities throughout the country, we are facing ever-increasing costs for expanded service in our health facilities, mental institutions, court facilities, police forces, and welfare programs. Preventive efforts are far less expensive and far more effective than these "after-the-fact" services. I believe that these hearings will show how sound maternal and infant nutrition is a key element for physical and mental development and one means which can be used to greatly assist in the prevention of problems later in life.

As Senator Percy has previously pointed out, adequate nutrition is crucial for a successful outcome of pregnancy. Scientific research has shown that inadequate nutrition results in stunting, reduced resistance to infectious disease, apathy, and general behavioral unresponsiveness. During the first 4 years of life an individual may acquire 50 percent of the human intelligence that he or she will utilize for the remainder of his or her life. Consequently, the first years of life are the most crucial in cognitive development. An apathetic or unresponsive infant will most likely be unable to acquire the stimulus available to him for the optimum chance at life.

With these thoughts in mind I feel that these hearings are of vital national importance and hopefully will answer some of the questions posed by Senator Percy in his opening statement.

I also want to thank the witnesses for taking part in these hearings and informing the committee of their scientific observations in this priority area of nutrition.

Senator PERCY. Our first witness this morning is Dr. Myron Winick. Dr. Winick is Robert R. Williams professor of nutrition and professor of pediatrics, faculty of medicine of Columbia University. Dr. Winick is also the director of the Institute of Human Nutrition at Columbia University. Dr. Winick is an expert on fetal malnutrition and has done extensive research with animals on the relationship of nutrition to the development of the central nervous system. He has written widely on the crucial importance of the timing of nutritional deprivation for its impact on mental development.

Welcome, Dr. Winick.

STATEMENT OF DR. MYRON WINICK, ROBERT R. WILLIAMS PROFESSOR OF NUTRITION; PROFESSOR OF PEDIATRICS, FACULTY OF MEDICINE; DIRECTOR, INSTITUTE OF HUMAN NUTRITION, COLUMBIA UNIVERSITY

Dr. WINICK. Senator Percy, I wish to express my gratitude at being invited to testify before this committee, which I feel has been a major positive force in nutrition in America. As I understand it, today your hearings will begin to focus on nutrition and pregnancy and the effects of improper nutrition on the developing fetus.

I should like to outline some of the highlights of the scientific evidence that have recently become available implicating malnutrition during pregnancy in what may be a potentially dangerous outcome for the fetus.

We have known for some time that infant mortality increases as birth weight decreases. This increase in mortality rises sharply as birth weight drops below 5½ pounds. In America over the past few years we have had about 3.2 to 3.5 million births per year. About 8 percent can be classified as low birth weight. These low birth weight infants fall into two major categories: Those born too soon, the true premature; and those born on time but too small for their gestational age, the growth retarded infant.

More and more evidence is accumulating that this growth retarded infant may in many cases be an infant whose mother was improperly nourished both before and during pregnancy. The one single factor which correlates most strongly, in all types of populations, with infant birth weight is maternal weight gain during pregnancy. Statistically, the more the mother gains during pregnancy, the larger the infant.

Now, let me illustrate to you the importance of the difference in birth weight among different groups. The United States ranks about 14th among the nations of the world in infant mortality—13 nations do better than we do. Arguments concerning the reasons for this are numerous but certainly one of the strongest reasons is the heterogeneity of our population.

Poverty Is Significant Determinant

Infant mortality among the poor often reaches 2 to 3 times what it is among the more affluent. If we examine this fact more critically, an interesting picture emerges. Pound for pound the black baby does as well as the white baby. The difference in what we call perinatal mortality between rich and poor, between black and white, is based solely on the fact that poor infants and black infants are on the average about 5 ounces lighter than rich infants. We can translate this into numbers in our own country by observing that although 8 percent of the 3.2 million infants born each year are low birth weight, this figure is about 13 to 14 percent among blacks and roughly the same among poor people.

The data, when further examined, would indicate that poverty is the significant determinant. Similar data are available from the United Kingdom and from a number of developing countries throughout the world. In certain developing countries, for example, India, where mortality may be 5 to 6 times higher among the poor, the birth weight averages about a pound less than among the affluent citizens.

Based on Government estimates of poverty, about 750,000 births a year in the United States occur in poverty. Thus, about 70,000 low birth weight infants are born each year in our poorer communities who presumably would have been of normal birth weight had their mothers been more affluent. This number assumes frightening proportions if we realize that there is a direct statistical relationship between low birth weight and retarded development.

Now, how many of these low-birth-weight infants can be attributed to faulty maternal nutrition? We do not know the precise figure but

we are beginning to suspect that the number is significant. One way, then, to increase birth weight and therefore, presumably to lower mortality and the incidence of mental retardation, might be for mothers to gain more weight during pregnancy. This means better nutrition for pregnant women.

These, then, briefly are the statistical associations which have raised our concern about maternal diet and outcome of pregnancy. But our knowledge has progressed far beyond simple statistical analysis.

We now have what I would classify as direct evidence that malnutrition in the mother will affect the growth of the fetus and that not only is fetal body size reduced but fetal brain development may be curtailed.

Experiments in animals leave little doubt. For example, in the rat, cell division in the brain takes place during gestation and for the first 21 days after birth. Malnutrition imposed either to the mother or to the pup shortly after birth will retard the rate of cell division and result in a brain which contains fewer cells. This change in brain cell number has been shown to be permanent no matter what the subsequent nutrition of the animal may be.

In the human, brain cells divide most rapidly before birth, progressively more slowly after birth and stop dividing by about 18 months of life. We have all the brain cells we will have by 18 months of age. It has been shown that infants who die of malnutrition during the first year of life have a marked reduction in the number of their brain cells.

It has also been shown in animals that malnutrition imposed both before and after birth will result in a brain which contains about 40 percent of the number of expected cells. In a study done in Chile, some of the infants who died of malnutrition during their first year of life also had brains containing 40 percent of the expected number of cells. These infants all weighed less than 5 pounds at birth, suggesting that they had undergone malnutrition in utero.

Effects of Malnutrition on Brain Growth

I have tried to illustrate the effects of malnutrition on brain growth using the number of cells as an example. I have done this because cell number can be measured precisely by chemical means and because I am most familiar with the data having participated in its collection.

However, other changes occur in the developing brain when malnutrition is imposed during this critical period of brain growth. Myelin, the material insulating the nerve fibers and important in regulating the velocity of nerve conduction, is reduced in quantity and may be altered in quality. Neurohormones, important in mediating nerve impulses between nerve cells, are reduced in amount. Enzymes necessary for the synthesis and breakdown of protein, and nucleic acids, substances vital to all cells, are altered in activity.

Recently, the types of measurement described have been made in human placentas in malnourished populations. These measurements leave little doubt that the "tissue changes" characteristic of malnutrition can be demonstrated in undernourished populations in a variety of countries including our own.

Other studies have demonstrated changes in maternal blood in malnourished populations which are similar to changes in the infant's

blood and which are more severe the more the infant is retarded in growth.

Perhaps the most alarming findings in both animals and humans are those demonstrating persistent functional changes in the central nervous system. In animals prenatal restrictions either of total food intake or of protein intake will result in alterations in behavior which persist throughout life. Exploratory behavior is reduced, the animals are much more excitable, "overreact" to stimuli, extinguish conditioned reflexes and run mazes poorly.

In humans, the data are indicating more and more that children of low birth weight due to maternal malnutrition, especially when this malnutrition has been chronic, will be retarded in development.

Because of these and other results, a number of controlled attempts to influence birth weight by improving nutritional status during pregnancy have been attempted. Partial results are available from one such trial undertaken in rural Guatemala.[1]

These results are encouraging and I understand will be reported to you in some detail later on this morning. Suffice it to say here, that supplementing the diet of these women increased the birth weight of their offspring.

In summary we can say:

1. An association exists between the amount of weight gained during pregnancy and birth weight in all types of populations.
2. An association exists between maternal nutritional status prior to pregnancy and birth weight in poor populations.
3. The difference in birth weight between rich and poor accounts for the difference in mortality between rich and poor.
4. The larger the number of smaller infants the greater the chance of mental retardation.
5. Malnutrition retards infant growth producing smaller infants and organ growth producing smaller brains.
6. In animals, malnutrition results in behavioral abnormalities which may persist throughout life. In humans, early malnutrition results in similar abnormalities.
7. Feeding a better diet during pregnancy increases maternal weight gain, birth weight, and therefore, should decrease mortality and the incidence of retardation.

Many Questions Still Unanswered

We are still seeking the answers to many questions. For example, at present we are not certain what the optimum weight gain during pregnancy should be. Current recommendations of the National Academy of Science and of the College of Obstetrics and Gynecology are from 20 to 25 pounds. This may have to be refined somewhat but is a lot closer to optimal than the practices of the past which often limited weight gain to considerably less.

We must continue our efforts to find these answers, but while we try there is much we can be doing to feed pregnant women—especially those that are hungry. I fear that recently we have begun to do less in both of these areas.

[1] See statement of Dr. Habicht, p. 12.

Paradoxically, as we discover the importance of investigating certain still unknown facets of this problem we find research funds harder to get. The cry in some sources is that "We know enough," that "only action is necessary." This is untrue. However, we find that programs for action are also being cut back. What progress we have made in maternal and child health has been eroded. Both directions must be supported.

This problem is potentially more important than cancer or heart disease for it affects the quality of life from the cradle to the grave. Where we need answers, we should seek them; where we need food, we should supply it.

Thank you.

Senator PERCY. Dr. Winick, that's a very powerful statement and a lot of food for thought.

I recall that some years ago when Margaret Mead testified before this committee she indicated that in almost every area of human knowledge we have progressed as a people in the last several decades, but she feels in the area of nutrition education we seemingly, as a people, know less today or at least apply less than we knew during, say, World War II when we were so conscious of high nutrition for low cost or what food was available. Now we seemingly are less conscious of nutrition education.

Would this square with your own experience?

Dr. WINICK. Yes, it would. I think there has been a reawakening in interest in nutrition. I think the problem with nutrition education, Senator Percy, starts really with the professionals.

Nutrition education, for example in medical schools, is almost nonexistent. They are just beginning now to be part of the curriculum. We have very few departments of nutrition in medical schools and we have very little input in nutritional teaching in the medical school curriculum and this, then, filters right down through the health professions so I think if we are going to increase awareness of the public in the importance of nutrition in health, we have got to first start with the health professionals and begin to get some nutrition background in education to them and then have to move on to educating the general public.

Senator PERCY. Can you tell me what the optimum weight gain for a woman in pregnancy is? I suppose it varies with her own height and weight, of course, but——

Dr. WINICK. Well, I think that what we are saying now is that we think optimum weight gain is about 24 to perhaps 30 pounds. Now, this is on a statistical basis, given a population of women. For any one woman it's more difficult to come to a particular conclusion. This would be based on a number of things, one of which is her prepregnancy nutritional status.

For example, we know that birth weight in poor populations where nutrition is bad correlates quite well with maternal weight, which is a measure of the prepregnancy nutritional status, whereas in an affluent population birth weight does not correlate very well with maternal weight because they are well nourished prior to pregnancy.

These two populations need different kinds of nutrition during pregnancy and probably the woman with a poor nutritional history

before should gain even more weight but what we are saying now, and this may vary, is about 25 pounds on the average across the board.

Senator PERCY. Is there a tendency on the part of pregnant women to try to hold their weight down just for vanity purposes, would you say?

Dr. WINICK. Yes, I think there are two considerations here. One, they try to hold their weight down both for cosmetic purposes and second, because they have been told over the years that one shouldn't gain too much weight during pregnancy. Now ---

Senator PERCY. It's possibly easier to deliver a smaller baby.

BABY'S WEIGHT NO FACTOR

Dr. WINICK. Exactly. Early on this was done both for the mother and for the fetus. It was easier to deliver a smaller baby and it was safer from the standpoint of maternal health but now with obstetrical practice so much better than it was before it is no concern or shouldn't be a concern of the obstetrician to have to deliver a little bigger baby and the maternal health is not a factor either, so from the baby standpoint now it's better to be heavier than light.

Senator PERCY. I don't imagine there is much doubt that most dentists will tell children when they come to see them, "Brush your teeth three times a day." Is it the common practice for doctors, obstetricians, to advise their patients of the optimum weight, to advise them of the relationship between adequate nourishment and the care and feeding of the mother and its relationship to the development and growth, mental and physical, of the child?

Dr. WINICK. Well, it certainly should be. I can't speak for this, Senator Percy, because I am not an obstetrician. I am a pediatrician, but it certainly should be and I do know this: That the American College of Obstetrics and Gynecology now is certainly taking a rather strong position, which is quite different than simply a year or 2 ago, on the importance of nutrition during pregnancy so there certainly has been a turnaround at the higher levels of obstetrics.

Senator PERCY. You have drawn the distinction between the rich and the poor and obviously, if it's strictly a factor of poverty, this is harder to overcome. My observation of the well to do is that many of them have as poor dietary care with all their affluence, a tendency for overly rich foods, and possibly a greater increase in, say, suburban areas, of alcohol intake than you would find in lower income areas. It would seem to me that it's just not a matter of wealth. Isn't it possible even with high-food costs today, with proper nutrition education for a lower income woman to adequately feed herself during pregnancy if she knows what is required in the way of a balanced diet and knows where she can get, say, high-protein content at low cost other than just by the best cuts of choice beef?

Dr. WINICK. I think that's probably true, but then we are asking the low-income woman to be a very, very good shopper and perhaps even a better shopper than the higher income woman.

Senator PERCY. But my point is it might not necessarily just be a matter of dollars available.

Dr. WINICK. It isn't.

Senator PERCY. It may be that along with poverty is lack of understanding and education which could be overcome, then, more easily than you can overcome the poverty factor?

Dr. WINICK. Yes, I think you are quite right and we have a basic low-birth weight level in the most affluent and we hope that we can reduce that as well. In the poverty populations that level is higher, but certainly, a great deal can be done to improve the nutrition of the more affluent people of our country.

Senator PERCY. Yes, but I would agree both have to be done.

Dr. WINICK. Right.

Senator PERCY. But it's not just a factor of income, it's also a factor of nutrition education for the pregnant mother.

I'd like to pin down just as precisely as possible the dimensions of the problem that we are concerned with. In the 1972 figure of births, about 3.2 million, and the number of low-weight infant births, 8 percent of the total would be 256,000. In your testimony you said these 256,000 low birth weight babies may be divided into two classes: The true premature, and the growth retarded infant.

I know our twin daughters were 3 pounds, 13 ounces apiece and they turned out to be pretty fine children, but it took months of very hard work on the part of the hospital. I was happy I was in the Navy at the time. Mother's milk at a dollar an ounce for those twins for a long time was very expensive for the U.S. Government. I've felt better about paying taxes ever since then, but I don't know how we would have swung it if you are in a low-income private family and simply couldn't afford that kind of care.

Today we are concerned primarily with growth retarded infants. Can you estimate for us how many of these infants are ones, in your words, "whose mothers were improperly nourished both before and during pregnancy"?

GROWTH RETARDED INFANTS

Dr. WINICK. No, I can't make a really good estimate. What I can do is this: We know that in the more affluent parts of our society about 30 percent of infants who are of low-birth weight are normal for their gestational age, are growth retarded.

Now, what percent of that 30 percent is due to nutrition we don't know. We also know that in developing countries and in less affluent sections of our country the percentage of low-birth weight babies who are growth retarded rather than premature becomes even higher than 30 percent.

Senator PERCY. But we are dealing with some portion of 76,000, then; 30 percent of 256,000, and we don't know——

Dr. WINICK. We don't know that percentage.

Senator PERCY. Would you try to estimate at all what it might be?

Dr. WINICK. I really can't.

Senator PERCY. Fifty percent?

Dr. WINICK. I just can't do that because we don't know all the other factors which are involved in producing growth retardation. We know, for example, that there are other kinds of fetal malnutrition not due to lack of food in the mother.

For example, if the blood supply to the fetus is not adequate then we are not bringing enough food to the mother but it's not because the mother is not getting enough food and this is a significant cause of growth retardation.

Senator PERCY. Can we say with any degree of certainty however, how many of these infants have suffered physical or mental damage which may be considered irreversible?

Dr. WINICK. Well, these kinds of data are just becoming available and we don't have any to my knowledge here in the United States and that is precise data as to the numbers of children from this growth retarded group who are retarded later in development.

There have been some small studies down in the United Kingdom which would indicate again that a relatively high percent of these children are retarded in their development but to my knowledge we don't have such studies completed yet in the United States.

Senator PERCY. We seem to have two sets of factors, at least two sets of relationships that just about all the experts agree on. On the one hand we know that a mother's weight gain during pregnancy is directly related to the birth weight of her baby. On the other hand, we know that infants malnourished during gestation may suffer from a reduced number of brain cells.

Can we conclude the small weight gain means a malnourished mother and fetus and thus an infant who may be born with a deficit in brain cells?

Dr. WINICK. Well, I think, again, here we can conclude this on a statistical basis but not for any individual mother. Using large populations this would be a reasonable conclusion, but for any individual mother we can't make that conclusion.

Senator PERCY. I don't suppose, then, that on the other side of the coin we could conclude that a weight gain alone insures that the infant will be well nourished and born with a full number of brain cells?

Dr. WINICK. Not at all.

Senator PERCY. Do smaller brains mean intellectual impairment or actual mental retardation?

Dr. WINICK. Well, I think this is a very important question and I think, again, I am going to have to answer we don't know. We know that smaller brains statistically, again, can be correlated with reduced function in populations where malnutrition is prevalent. In populations where malnutrition is not prevalent, for example, there is very little relationship between the circumference of the head and intelligence, so we know the correlation exists.

We know there is a correlation of the amount of brain cells and function and many other things but we don't know causality. We don't know whether any of these things are causing the functional damage or whether the cause of the functional deficit is something that we haven't yet been able to put our finger on.

Senator PERCY. In discussing the degree of malnutrition you have used the term "chronic malnutrition." Others use the term of "severe malnutrition." Precisely what does this mean in terms of the mother's diet?

CHRONIC AND SEVERE MALNUTRITION

Dr. WINICK. Well, I think from the standpoint of severe malnutrition we are talking about the amount of calories and the quality of the diet. That is, the amount of protein, carbohydrates and fat, vita-

mins, and so forth during the period of pregnancy and a severely malnourished person would be one who is markedly curtailed in these things.

A chronically malnourished person is one who has perhaps been malnourished all of her life and then comes into pregnancy with this kind of a deficit.

Senator PERCY. I'd like to go back once again to the question I asked before on the practice of doctors with respect to advice to their patients. Is it your impression, Dr. Winick, that in general, doctors limit the weight gain of expectant mothers too excessively and thus actually increase the chances of retarded growth in their infants?

Dr. WINICK. Well, my impression is that at the present moment, again, this is becoming less and less than it was before. I think it's fair to say that certainly in the past this was quite true. I still think it's practiced in many sources at the present but I think that this practice is becoming less.

Limitation of weight gain at the present time, one would hope would be done only when weight gain is very, very excessive and when there is a specific indication. Some of the things which, of course, become a problem are it's very fashionable nowadays to lose weight, to control weight. As you know, a number of books and schemes are all available and it should be made clear, and it's not in some of these books, that this is not something that pregnant women should do certainly on their own.

To me, pregnancy is no time to go on a diet.

Senator PERCY. And I wouldn't recommend it from what I have heard, that they should take up Dr. Atkins' book either.

Would you say that there is a major problem of expectant mothers who simply cannot purchase a nutritionally adequate diet?

Dr. WINICK. Well, it's hard for me to say this, to know this, Senator Percy. I think with the cost of living going up the way it is, I think even if the purchasing power is there what we would then expect is that the poor mother would have to really be a very, very educated shopper and a very, very educated shopper in terms of nutrition and she just isn't, just as the more affluent mother isn't, but with her increased purchasing power she may still be able to get adequate nutrition and make mistakes which the poor woman can't afford to make.

Senator PERCY. There was a pioneer in the field, Dr. Tom Brewer, who has been campaigning a long time for the change in the medical profession approach to weight gain during pregnancy. He did seem to be ahead of his time and I just wondered whether you have shared his impressions on this point.

Dr. WINICK. Well, I think as you say, Dr. Brewer was ahead of his time. He is still in the forefront. He has certainly been doing for a long time what we are advocating doing now. I share a lot of Dr. Brewer's impressions but in that respect I am much more of a Johnny-come-lately.

Senator PERCY. I thank you very, very much indeed, Dr. Winick. We very much appreciate your thoughtful attention to this problem and we shall do the very best we can as a committee to see that your very sound findings and advice are given the widest possible distribution.

Dr. WINICK. Thank you.

Senator PERCY. Our next witness is Dr. Jean-Pierre Habicht. Dr. Habicht is a senior scientist with the Pan American Health Organization, Institute of Nutrition for Central America and Panama, Guatemala City.

Dr. Habicht is a member of a research team consisting of Aaron Lechtig, Charles Yarbrough, Herman Delgado, and Robert E. Klein, which has been conducting an experiment in several Guatemalan villages.

Dr. Habicht has found evidence which suggests that a food supplement alone without additional service to pregnant women may be enough to assure a successful outcome of pregnancy and I'm so grateful indeed that you have taken the time to be here. I think your work has been quite unique and will be very valuable indeed and if you would go right ahead and give your testimony I will withhold questions until you finish.

STATEMENT OF DR. JEAN-PIERRE HABICHT, SENIOR SCIENTIST, PAN AMERICAN HEALTH ORGANIZATION, INSTITUTE OF NUTRITION FOR CENTRAL AMERICA AND PANAMA, GUATEMALA CITY, GUATEMALA

Dr. HABICHT. Senator Percy, thank you for asking us to present evidence on the effect of malnutrition during pregnancy on survival of the newborn.

We are medical and scientific officers of the Pan American Health Organization, and we work in the Division of Human Development of the Institute of Nutrition for Central America and Panama.

In this testimony, I would like to focus on the effect of good nutrition, however it may be attained, upon the outcome of pregnancy and the survival of the child.

Preliminary findings of our research in Guatemala suggest that moderate, as opposed to severe, protein-caloric malnutrition during pregnancy prejudices the chances of survival of the newborn and that it is possible to reduce the high infant mortality rate seen in many lower socioeconomic groups, both in and outside the United States, through adequate nutrition programs directed towards future mothers.

RESEARCH SUPPORTED BY NIH

This research has been supported by the National Institutes of Child Health and Human Development, which are institutes of NIH. The results we are presenting here come from work done in four small isolated subsistence farming villages of the Central American Republic of Guatemala. Protein deficiency disease, Kwashiorkor, was prevalent among preschool children in the villages prior to the initiation of our research. These villages now receive free medical care[1] and food supplementation in conveniently located centers.[2]

[1] Reyna, Barrios, J. M., Guzmán, G., & Habicht, J.-P.: Medidas para ampliar la cobertura y mejorar la calidad de consulta externa en areas rurales de Guatemala empleando auxiliares de enfermeria. Paper presented at the Congreso Nacional de Salud, Guatemala, September 7–10, 1971, volume I.

[2] Lechtig, A., Habicht, J.-P., Yarbrough, C., Delgado, H., Guzmán, G., & Klein, R. E.: Influence of food supplementation during pregnancy on birth weight in rural populations of Guatemala. Paper presented at the IX International Nutrition Congress, Mexico, September 1972.

Paramedical personnel, trained on the job, provide curative and preventative medical services to all the villagers. This program is novel in its emphasis on and maintenance of quality through quality control methods. This outpatient care is made available at a fraction of the usual cost, even in underdeveloped countries, and has contributed significantly to the reduction of the child death rate to one-half of its level before this program was instituted.

We also dispense two kinds of food supplementation in these four villages. One supplement, which includes a nutritionally significant level of proteins, is used in two of the four villages while the inhabitants of the other two villages receive a protein-free supplement—table 1. Both supplements contain the minimum daily requirements of vitamins and minerals which the villagers might otherwise consume in inadequate amounts. In every other respect as well—the quality of the medical care, the supplementation schedule, the number of house calls, the measurement techniques—all four villages are treated identically.

TABLE 1.—*Nutrient content per cup (180 ml) of supplement*

	Formula 04 "Atole"	Formula 00 "Fresco"
Total calories (K calories)	163	59
Proteins (grams)	11.46	----------
Fat (grams)	.74	----------
Carbohydrates (grams)	27.77	15.30
Ascorbic acid (grams)	.02	.02
Calcium (grams)	.37	----------
Phosphorus (grams)	.31	----------
Thiamine (milligrams)	1.14	1.10
Riboflavin (milligrams)	1.50	1.50
Niacin (milligrams)	18.50	18.50
Vitamin A (milligrams)	1.20	1.20
Iron (milligrams)	5.80	5.00
Fluoride (F milligram equivalents)	.20	.20

Our study addresses the effect of malnutrition during pregnancy, lactation, infancy, and childhood on the mental and physical growth of children. We report here, however, only those results relating to pregnant mothers and the infants because our findings in this area have the clearest public health implications. The research design and variables measured are described elsewhere.[2] [3]

We have found a statistically significant association of full-term birth weight—(greater than or equal to 37 weeks gestation)—with maternal nutritional status before pregnancy[4] and with the total number of calories consumed during pregnancy under the supplementation feeding program. Thus, mothers who weigh more before pregnancy or who consume more supplement during pregnancy have heavier babies.[3]

[2] *Supra.*

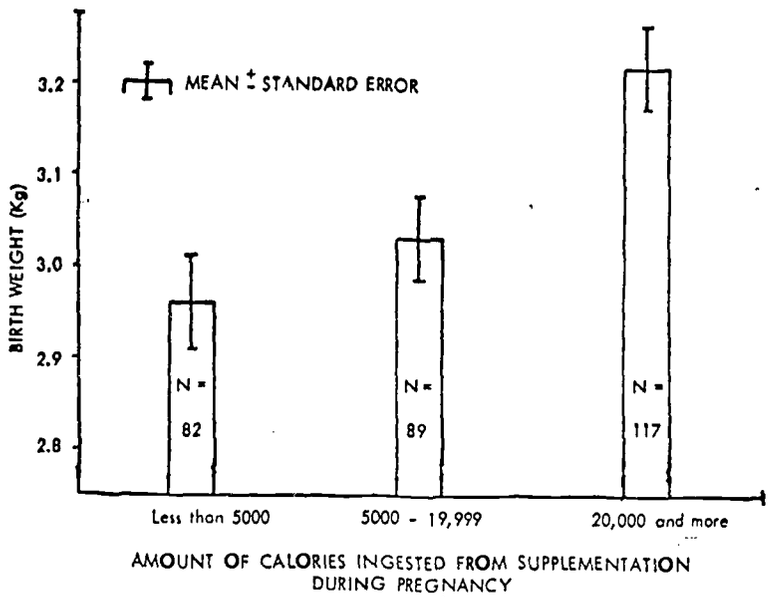
[3] Habicht, J.-P., Yarbrough, C., Lechtig, A., & Klein, R. E.: Relation of maternal supplementary feeding during pregnancy to birthweight and other sociobiological factors. Paper presented at the Symposium on intrauterine malnutrition, New York, November, 1972.

[4] Habicht, J.-P., Yarbrough, C., Lechtig, A. & Klein, R. E.: Relationships of birthweight, maternal nutrition, and infant mortality. *Nutrition Reports International*, May 1973, in press.

FIGURE I

ASSOCIATION BETWEEN BIRTH WEIGHT AND SUPPLEMENTATION

CALORIC INGESTION DURING PREGNANCY



From: "Relation of Maternal Supplementary Feeding during Pregnancy to Birthweight and other Socio-Biological Factors" by J-P. Habicht, C. Yarbrough, A. Lechtig and R.E. Klein. Proceedings of the Symposium on Intrauterine Malnutrition, New York, November, 1972

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While one supplement contains protein and the other does not, this fact did not affect the relationship between calorie ingestion from the supplement during pregnancy and birth weight. Thus, the nutrient which is most inadequate in the maternal home diet during pregnancy is calories and not protein. This contrasts with the diet of the preschool children in the study villages where protein (and not calories) is most inadequate in the home diet.[5 6] Thus, it would be important to clearly differentiate between the supplements when talking about preschool children but for pregnant women, because the supplements can be considered together, the effect on birth weight was similar for similar amounts of calories ingested from both supplements.

As you see in figure I, the more supplemental calories the mother ingested during pregnancy, the greater was the mean weight of the babies. In fact, the mean weight of the babies of mothers who consumed 20,000 calories is similar to that found among middle-class American women.

[5] Habicht, J.-P., Schwedes, J. A., & Arroyave, G.: Biochemical indices of nutrition reflecting ingestion of a high protein supplement in rural Guatemalan children. American Journal of Clinical Nutrition, 1973, in press.

[6] Habicht, J.-P., Lechtig, A., Yarbrough, C., and Klein, R. E.: The timing of the effect of supplementation feeding on the growth of rural preschool children. Paper presented at the IX International Congress of Nutrition, Mexico City, September 1972b.

Importance of Supplemental Calories

The difference in birth weight associated with differences in maternal ingestion of supplemental calories during pregnancy is about the same regardless of when during pregnancy these supplemental calories are consumed.[7] This is important because it means that nutritional intervention can be effective not only late but also early in pregnancy.

Table 2.—*Comparison of Caloric Ingestion From Maternal Supplementation With Birth Weight Distribution*

	Amount of calories ingested from supplementation during pregnancy		
	Less than 5,000 (N=82)	5,000 to 19,999 (N=89)	20,000 or more (N=115)
	Percent birth weight distribution		
Birth weights:			
3.0 kg.	41.5	41.6	54.7
2.6–3.0 kg	37.8	40.4	40.2
≤2.5 kg.	20.7	18.0	5.1

Now if you look at table 2, which shows a distribution of birth weights, the beneficial effect of nutrition during pregnancy is seen at all levels of birth weight. The most important group of babies to be considered in this table are those weighing 2.5 kilograms or less. As maternal supplementation increases from less than 5,000 calories to more than 20,000 calories during pregnancy, the proportion of full-term babies weighing 2.5 kilograms or less falls from 20 to 5 percent.[8] Thus, as table 2 shows, we can, by means of calorie supplementation achieve a 75-percent reduction of full-term babies who weigh 2.5 kilograms or less. This and other evidence[9] suggests that in the Guatemalan villages under study, about three-fourths of the low birth weight full-term babies born previous to our supplementation were of low birth weight because of inadequate maternal nutrition during pregnancy.

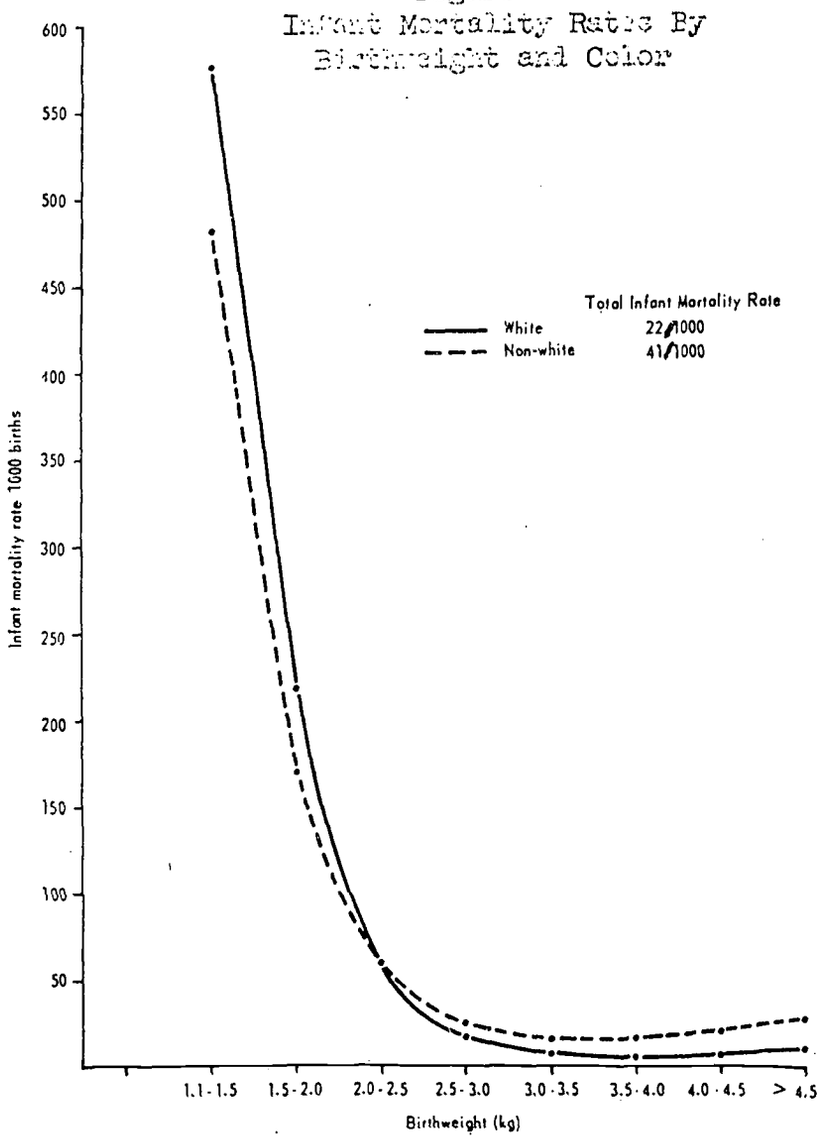
This reduction in low birthweight babies is important because it is well known that low birthweight is associated with higher levels of infant mortality. In this connection, data from the United States is instructive; it shows marked differences both in birthweight and in total infant death rates between U.S. white and nonwhite populations. The experience of the nonwhite population is interesting in the context of today's discussion because that population coincides substantially with the lowest socioeconomic level in the United States and is comparable to the Guatemalan population in question. As Figure 2 shows, the infant death rate rises dramatically among children weighing 2.5 kg or less for both whites and nonwhites. White babies who fall into this category die about as frequently as nonwhite. The overall infant death rate is higher for nonwhites than for whites because more nonwhite babies weigh 2.5 kg or less.

[7] Habicht, J.-P., Lechtig, A., Yarbrough, C., and Klein, R. E.: The effect on birth weight of timing of supplementation during pregnancy. Paper presented at the IX International Congress of Nutrition, Mexico City, September 3–9, 1972.

[8] *Supra.*

[9] Division of Human Development, Institute of Nutrition for Central America and Panama: Excerpt, Contract request from National Institute of Child Health and Human Development to study the influence of maternal nutrition on infant mortality, March 26, 1973.

Figure 2
Infant Mortality Rates By
Birthweight and Color



From: Chase H. C. Infant mortality and weight at birth: 1960 United States cohort. Amer. J. Public Health 59: 1618-1628, 1969.

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Similarly, the difference between the white United States and the Guatemalan infant mortality rate is associated above all with the difference between birthweight distribution between the two groups. As ıong U.S. whites and nonwhites, the Guatemalan birthweight

specific infantile death rates also decrease with birthweight. Therefore, increasing birthweight through better maternal nutrition, before or during pregnancy, should lower overall infant mortality, if birthweight is a major determinant of this infant death.

Figure 2 indicates that a hundred gram increase in birthweight around the optimum has a very small effect upon the infant death rate; maybe two deaths out of a thousand births could be prevented. However, at 2.25 kg which is about 5 pounds, there are 22 less deaths per thousand births with every hundred gram increase in birthweight.

Supplementation Lowers Infant Mortality

Using the actually observed birthweight distributions in the study villages for both those women who did not participate in the supplementary feeding program and are presumed to be undernourished and those who did and are known to have consumed at least 20,000 calories during pregnancy, one can calculate the expected differences in infant mortality. The mortality rate [8] of children born to well supplemented mothers would be 29.7 per thousand births while the expected mortality among the offspring of poorly supplemented mothers would be 53.2. The observed infant mortality rates seen to date in the study villages, albeit in a sample too small for statistical significance, is 24 babies born of well supplemented mothers and 55 for babies born of poorly supplemented mothers.

Thus, supplementing these undernourished mothers during pregnancy seems to reduce the mortality rates of their infants by about one-half. This is a substantial reduction in deaths and we are following these surviving children in a continuing study of their health, physical growth, and mental development. In the latter area we are paying particular attention to the possibility of a selective rather than a general impact of nutrition on behavior and mental development because we believe that the quality of life is almost as important as life itself. These studies and findings will have policy implications for all countries, including the United States.

Thank you.

Senator Percy. Well, I thank you very much indeed and, again, we wish to express deep appreciation to you for the long trip that you have had, and for sharing your very important studies with us.

Is there any doubt in your mind that what a mother eats during pregnancy and how much she eats has an effect on the birth weight of her infant?

Dr. Habicht. That depends upon her nutritional status upon entering pregnancy. If her nutritional status upon entering pregnancy is poor, as is true of our villagers, then there is no question in my mind at all that improving her nutrition during pregnancy is very important. If her nutritional status is good to excellent upon entering pregnancy, then a woman might be able to get by on a less than completely adequate diet during pregnancy.

Senator Percy. In Guatemala what could a pregnant woman living under conditions of extreme poverty do to adequately feed herself assuming she had sufficient knowlege of her nutritional requirements? Could she obtain the necessary nourishment at a cost she could afford?

[8] *Supra.*

Dr. HABICHT. I don't think so, although we haven't investigated this question in pregnant mothers yet. We have, however, analyzed the dietary pattern of the preschool children to see if it could be impr[illegible]y buying other foods with the same resources. In general, our c[illegible]on is that the food money is spent about as efficiently as it can be an[illegible] that the malnutrition is due, above all, to insufficient money for food.

Senator PERCY. Is there any doubt in your mind that low birth weight infants face greater risks to their health than do their heavier counterparts?

Dr. HABICHT. No doubt whatsoever. The data is clear.

Senator PERCY. It would seem to be very, very conclusive indeed. Is there any doubt in your mind that we can virtually eliminate low birth weight babies, at least those who are not premature babies, by insuring that their mothers are well fed during pregnancy?

Dr. HABICHT. Now, that's a different question. In the Guatemalan villages where we work, it is clear that most of the children who were of low birth weight before the intervention program began were of low birth weight because of malnutrition. In other populations that is not necessarily so. We know of a number of other factors such as smoking, intrauterine infections, toxemia of pregnancy, and other pathology not related to nutritional status which can contribute significantly to low birth weight babies.

Senator PERCY. What kind of a social welfare program exists in Guatemala?

Dr. HABICHT. For practical purposes, there is none in the rural areas where we work.

Senator PERCY. Virtually none. And what is your own observation of the degree of physical impairment and mental impairment that exists in these children when they are malnourished and are born and then have to somehow make out on their own? How do they make out when there isn't a social welfare program that would provide government support and protection? Are they just taken care of by the families?

NO IMMEDIATE MENTAL IMPAIRMENT

Dr. HABICHT. They are taken care of by the families. In moderate malnutrition, there is no immediately obvious mental impairment. Furthermore, it is very hard to separate what is due to malnutrition during pregnancy in the child and what is due to malnutrition in the preschoolers and what is due to the social interaction these children experience at home and in the community. Nevertheless, there is no question that these children perform less adequately on intelligence and behavioral tests than do well-nourished middle and upper class Guatemalans, and we have some evidence now that part of this difference in mental performance may be due to nutrition and not just to social factors.

Senator PERCY. What is the evidence concerning the effects of maternal supplementation on the intellectual development of infants in your study?

Dr. HABICHT: Because psychological testing results are only reliable in older preschool children (4–6 years of age) and the children born to supplemented mothers have not yet reached that age, we do not yet

have data bearing directly on the effect of nutritional supplementation during pregnancy on the mental development of the offspring. We have, however, found that children from 4 to 6 years old with small heads do less well on mental performance tests of language, memory, and perception than do their village playmates of the same age with larger heads (Klein, Freeman, Kagan, Yarbrough & Habicht: "Is Big Smart? The Relation of Growth to Cognition," *Journal of Health and Social Behavior*, 1972, *13*, 219–225). We have evidence that their heads were small because the children were nutritionally stunted at the time the head stopped growing—in other words, that head circumference reflects past nutrition early in life. Head circumference is, however, associated with nonnutritional social factors which also affect mental development. Therefore, it may be that these social factors and not nutrition are responsible for the statistical association of head circumference with mental performance. Preliminary statistical analysis trying to exclude the influence of these social factors would indicate that perception and to a lesser degree, memory, may be affected by nutrition while language performance may be more affected by social factors.

Senator PERCY. Dr. Habicht, you used two types of supplement—a protein-calorie supplement and a simple calorie supplement. Were there differences between the groups receiving the different supplements?

Dr. HABICHT. We found no differences between the two supplements where the same number of calories were ingested. Therefore, in this population which eats a diet based on corn and beans, it would appear that calories were the nutrient which was most inadequate for pregnant mothers in the home diet, and not protein. In a population eating other foods, maternal supplementation of some other nutrient might prove more efficacious. The important point to make is that maternal nutrition can, in spite of statements to the contrary, affect infant birth weight and survival.

Senator PERCY. Could you expand further on what your results suggest would be an optimum diet for pregnant women?

Dr. HABICHT. That's a remarkably difficult question to answer with our data. This is because our total nutrient intake data includes the home diet, which we can only estimate approximately from dietary surveys. Because of this, I cannot give you exact figures. We can say that these women are able to survive when not pregnant on a diet which provides 100 or so calories less per day than the number they they need during pregnancy. Calculations made with data from metabolic wards and more controlled experiments done by other investigators in other environments would suggest that a pregnant woman needs about 40,000 calories over her normal requirements during the entire pregnancy.

Senator PERCY. Anything further you'd like to add, Doctor?

Dr. HABICHT. I would just like to point out that food supplementation may not be a proper public health goal. We think we should be concerned with the total adequate nutrition of the mother as our public health goal, however that may be attained.

Senator PERCY. I thank you very much indeed. We are very grateful for your being here.

Our next witness will be Dr. Bacon Chow, a professor of biochemistry at the School of Hygiene and Public Health at Johns Hopkins University. Dr. Chow has for a number of years been studying the short- and long-term physical and behavioral effects of maternal diet on offspring in rats. He has directed an experimental study in Taiwan which indicates that a maternal protein supplement can have a positive effect on a baby's birth weight and length.

Accompanying Dr. Chow are three of his colleagues from Public Health, Dr. Roger M. Herriott, chairman of the Biochemistry Department; Mr. William E. Walch, director of Development; and Dr. Andie Hsueh, assistant professor.

We are pleased to have all of you here and we thank you very much indeed for coming. I wonder if your colleagues wouldn't care to join you right at the table, please.

We have a refusal. Dr. Chow, go right ahead; unaccompanied, alone, on your own.

STATEMENT OF DR. BACON CHOW, PROFESSOR OF BIOCHEMISTRY, THE JOHNS HOPKINS UNIVERSITY, SCHOOL OF HYGIENE AND PUBLIC HEALTH

Dr. CHOW. All right. Senator Percy, ladies and gentlemen: I am glad you prefaced by saying that I am from the department of biochemistry. Being a biochemist, we always start out with a hypothesis which we can test in animals and if we find some interesting lead we will try to determine whether these leads also work in human beings.

First, I wish to thank you for inviting my colleagues and also for the opportunity to talk to you about the results that we have obtained both in animals and in human beings. The conclusion which we can draw from both animal studies and human studies is that the diet of the mother during pregnancy is of profound importance in the future development of the offspring.

Furthermore, we found in animals that it is the protein that is important. When I say protein is a critical component, I do not mean that if women take protein that's all there is to it. In order to utilize protein efficiently one must have the supporting cast of calories, of vitamins and minerals, because it is only with these supporting nutrients that protein can be utilized by pregnant women or any other animals efficiently.

Now, let me tell you briefly some of our findings in animals. I am just delighted to hear, Senator Percy, about your remarks and the remarks of——

Senator PERCY. Dr. Chow, I think it is very hard for your audience to hear you. Would it be possible for you to pull the mike right up to your mouth? That would be better, I think.

Dr. CHOW. All right.

Senator PERCY. Would you try that and we will see.

Dr. CHOW. Can you hear me?

Senator PERCY. Yes, that's much better. Thank you. If you just remember that you do have to project into the mike. Thank you.

Dr. CHOW. Okay. I said I am delighted, Senator Percy, to hear in your opening remarks that it is now recognized that the diet of the mother during pregnancy is not——

Senator PERCY. Dr. Chow, I have an emergency telephone call here from out of town, one of our cabinet officers is calling. Could you just hold for a moment? It will just take me just a moment.

Dr. CHOW. OK. It will give me a chance to drink the water.

[Short recess.]

Senator PERCY. Dr. Chow, I apologize to you but the Governors Conference is going on, as you know, and we are very anxious to know whether the Governors intend to take action to supplement the incomes of elderly people who might lose benefits under the SSI program. We have only got until late this afternoon because the farm bill is coming to the floor. I had to take that call so that the substance of what we are talking about, supplementing the income of low income people, would not be destroyed through lack of knowledge as we deal with this bill on the floor this afternoon and tomorrow.

Would you proceed? Go right ahead.

RESULTS OF ANIMAL STUDIES

Dr. CHOW. Yes, Senator. I shall now describe to you some of the results of our animal studies. During the past 10 years we have found in laboratory animals like rats that restricting the diet of pregnant animals during pregnancy and lactation results in permanently damaged offspring. The newborn have high mortality. The offspring's growth rate is permanently stunted.

The offspring's need for food to grow and to maintain body weight is increased. The offspring suffers behavioral damages. That is, they learn very slowly, and they make mistakes while learning. Furthermore, the offspring of mothers whose diets have been restricted during pregnancy and lactation cannot produce antibodies as well as the controlled animals. Thus, they have lower resistance to infection.

Through other types of animal experimentation it was soon found that protein is the essential ingredient in the maternal diet. In fact, we found that mother animals fed adequate amounts of vitamins, calories, and minerals, but inadequate amounts of protein had all the problems that I have mentioned above. We, therefore, concluded that maternal diet has a profound influence on the development of the offspring and the mother must eat adequate amounts of protein in order that her babies can develop to the full expression of their genetic potentials. This much for our animal studies.

Now, I shall like to talk a little bit about human studies. As I said at the beginning, I am primarily a biochemist. Therefore, in order to find out whether dietary inadequacy of pregnant women has an effect on the babies we conducted what we call an experiment which is testing a given hypothesis. We are not here doing a correlation study.

Now, the findings I have described in animals prompted us to attempt to determine whether the same effects are true in human beings. For the past 8 years, we have studied pregnant women and we have studied rich and poor children in Taiwan, the Republic of China, in collaboration with Dr. R. Quentin Blackwell of the U.S. Naval Medical Research Unit No. 2 in Taipei. The first study was based on our animal findings that offspring of mothers who are inadequately fed during gestation and lactation had to eat more

food to grow as far as the normal control animals - that is, the group of mothers who were well fed during pregnancy and lactation. If this were true in humans, children from the so-called poo group and children from the rich families in Taiwan might show a difference in growth rate and in food utilization.

In this experiment we found that the food which is enough to support the growth of rich children is not enough to support the growth of poor children, reminding you that both groups of children have the same age, and are of the same genetics, a house together under the same conditions, eating the same amount of food. The poor group lost weight whereas the rich group was able to gain body weight under exactly the same conditions.

It was found further that the poor group excreted more nitrogen in their urine than the rich. We have tested different kinds of proteins during the past several years between these two groups of children. Some of the protein was of soy bean origin, others were of wheat origin with or without supplementation with the limiting essential amino acids such as lysine and threonine.

The findings that I describe on these poor and rich children are in harmony with our findings in rats. That is, the diet of the mother during pregnancy and lactation can affect the metabolism of protein by the pups regardless of what you feed them after weaning. These findings, then, encourage us to go on to a more difficult and sophisticated study in human beings by giving supplements containing protein and calories to pregnant women in Taiwan whose normal diet contains some 39 to 40 grams of vegetable protein and 2,000 calories.

In this study, we have given two types of supplements. One group of women, as I said, received a supplement containing protein, calories, vitamins and minerals, and the other group of women randomly selected from the same villages received what we call placebo. It contains no protein and fewer calories.

These supplements were distributed to these women two times a day and we see that the women drink these supplements under the surveillance of our nurses. In addition, we were fortunate enough to get the cooperation of the people so that we could send our survey nurses to their homes and survey the daily food intake on randomly selected pregnant women so that the daily intake can be obtained accurately and analyzed by chemical means.

We are not here using a table to approximate the food intake in terms of protein, in terms of fat or sugar. These determinations were made accurately in the chemical laboratory. I emphasize these conditions because they are of profound importance to answer some of the interesting and important questions, Senator, that you asked.

Now, each mother completing this study gave us two study babies during the study period. One was born before the supplement was begun and the other after supplementation. Birth weights, birth lengths, anthropometric measures, food utilization and results of psychometric tests were reported and were recorded for each child.

Improved Results Due to Dietary Intervention

Up to the present time we have only results that have been completed in terms of birth weights and birth lengths, and they show that protein and calorie supplementation produces an increase in birth weight and birth length in the males but not so markedly in females.

More significantly, we found that fewer infants were less than 2,500 grams with only 2½ percent born to mothers who received the protein-calorie supplement. The controlled women who had no benefit of protein, of fewer calories, had low birth weight babies totaling 8 percent. This, as you have already heard this morning, is a very important finding and here we can state with reasonable certainty that the effect that we have observed is due to dietary intervention (that is, supplementation with protein and calories).

Now we recognize that these studies do not provide absolute proof, the kind that biochemists would like to have, of the protein requirement of pregnant women, but since proof of this point is difficult and expensive to obtain, it may not be possible from here on for moral and ethical reasons to obtain such rigid proof, we know now that supplementation with protein and calories will benefit the infant and it may be an ethical and moral problem if for the sake of getting scientifically rigid proof we would have to deprive the other half of the babies from such benefits.

On balance, however, the study of several species of animals from different laboratories show definitively that the diet of the mother during pregnancy is important. Our own results, preliminary as they may be, also show the beneficial effect of supplementation. The one that is most noticeable now is the reduction of the incidence of low birth weight (that is, less than 2,500 grams).

With these findings before us, I feel compelled, Senator Percy, to make the following recommendation to the committee.

It is my considered opinion that the time has come for governments throughout the world to supply more protein and calories, to support more actively and more effectively programs to insure that an adequate protein, calorie, vitamin and mineral intake be provided to pregnant women throughout the world, if their intake is inadequate. We see no way in which this program can do anything but improve the health and happiness of the future generations.

On behalf of my colleagues I want to thank you for your kind invitation.

PREPARED STATEMENT OF DR. BACON F. CHOW

My associates and I are pleased to have the opportunity to testify today, and to explan that both our animal and human studies demonstrate that adequate levels of good protein in a mother's diet during pregnancy is critical for the subsequent full development of her offspring.

For the past decade one of the main areas of research in our laboratory has been the effects of maternal diet during pregnancy and lactation upon the growth and development of the offspring fed an adequate diet on an unlimited basis after weaning.

Our initial studies were made in laboratory animals. When promising leads developed they were followed up, where feasible, with suitably adapted studies in humans. I will summarize separately studies of animals and humans, what we believe the implications of our results are, and our recommendations for pregnant women on marginal diets.

Animal Studies

1. The restriction of food intake during gestation and lactation periods results in (*a*) high mortality of the newborn (1); (*b*) permanent growth stunting (2); (*c*) an increase in feed consumption for growth (3); and for maintenance of body weights (4); and in urinary nitrogen excretion (3) that is, feed wastage; (*d*) permanent behavioral aberrations (5) (they learn more slowly

and make more mistakes); (c) and a reduced capability to produce antibodies (6).

2. The restriction of food intake during gestation period alone results in delayed growth stunting (7) and permanent behavioral aberrations (1).

3. The restriction of food intake during lactation period alone brings about marked growth stunting (1) but no impairment in learning ability or conditioned emotional reflexes.

All of these damages to the offspring mentioned can be brought about by inadequate quantities of protein in the maternal diet (8). However, since proper, efficient utilization of protein also depends on presence of other nutrients in the diet, particularly calories, vitamins and minerals, these components must also be supplied to the pregnant animal. When such animals were fed a diet inadequate in protein either with respect to quantity or quality, but adequate in calories and vitamins, they gave birth to pups with behavioral damage (9).

On the other hand, dams fed adequate amounts of protein and vitamins but reduced calories gave birth to pups with no behavioral aberrations or reduction in efficiency in feed utilization (10). They did suffer from a slight growth stunting.

Thus, it can be concluded that maternal diet has a profound influence on the development of animal offspring even though the animals receive an adequate diet after weaning. The crucial point is that in animals, adequate intake of protein in quantity and quality must be assured in order to produce offspring which are capable of expressing their full genetic potential.

Human Studies

In collaboration with Dr. R. Quentin Blackwell of the U.S. Naval Medical Research Unit No. 2 (NAMRU-2) in Taipei, we have conducted several nutrition studies during the past 8 years on humans in selected villages in Taiwan, Republic of China. Subjects of the study have included school children and pregnant women.

1. Retrospective Study

A comparison of nitrogen balance in "rich" and "poor" children. Two groups of male school children were selected according to the economic status of the family and the estimated food intake (particularly protein) of the mothers during pregnancy and nursing periods. These two groups of children were housed in a school under metabolic-ward conditions and were given the same amount of soybean protein diet per unit body weight. On the average, the "poor" group excreted more urinary (11) nitrogen than those of the "rich" group. The "poor" boys also lost weight while on the diet whereas the "rich" ones did not. Similar results were obtained when wheat protein, with or without supplementation of the limiting essential (12) amino acids (lysine and/or threonine), were used. These findings led us to conclude that the metabolism of the two groups of boys was different and like that expected from animal feeding experiments. A given protein-containing diet may be adequate for the "rich" children born to "rich" families, but not for those from the "poor" families.

2. Prospective Study

Since January 1967, we have been carrying out a controlled prospective double-blind study (13) in Taiwan to determine the effect of maternal dietary supplementation during pregnancy and lactation upon growth and development of the offspring. The mothers studied had marginal diets with daily mean protein intakes (primarily of vegetable origin) not exceeding 40 grams and energy intakes of approximately 2,000KCal. Twice daily half of the mothers chosen randomly were given a liquid supplement containing protein, calories, vitamins, and minerals, and sugar, while other mothers received a comparable liquid supplement which contained no protein. The first type of supplement provided 40 grams of milk proteins and 800KCal daily.

Each mother completing the study had two study infants: one born before supplementation, and one after supplementation. Observations on babies include birth weights and lengths, periodic anthropometric measurements, nitrogen balance (males), and Bayley psychological tests for mental and motor development.

Our evaluations (14) to date include only birth weights (BW) and lengths (BL). However, they indicate an increment in both weight and length at birth in males but not in females from mothers receiving the protein-caloric supplementation (PCS). Mothers receiving PCS had fewer infants with birth weighs below 2,500 grams, which means fewer "high risk" children.

Some of the unique features of our study which are useful in drawing conclusions from our results are:

1. The genetic makeup of population of our study women is relatively homogeneous.
2. The design of experiment is such that one-half of the women within each village received the protein supplement as opposed to giving the supplement to all of the women in one village and another supplement to those in another village.
3. The actual daily intake of supplement was determined by the direct surveillance of our field nurses. Furthermore, food surveys of the study women by actual chemical analysis to determine their intake was also conducted. Urine collections were made for confirmation of the nutritional status.

These situations and the design of the study allow us to reach conclusions on the effect of dietary intervention by actual measurements, not by inference or correlation.

Recommendation

We recognize that rigid scientific proof of a dietary protein requirement by pregnant women for the benefit of her offspring is still lacking and may now be impossible for moral and ethical reasons. On the other hand, studies in several species of laboratory animals and available data in humans indicate the wisdom of providing an adequate amount of this nutrient during pregnancy. Inasmuch as the damage resulting from *inadequacy* of protein in the maternal diet in the offspring is so clear and irreversible, it is my considered opinion that the time has arrived for governments to support more active and effective programs to insure an adequate protein, caloric, and vitamin intake to women known to have low daily intake of good protein. In order to carry out such programs most effectively and economically, more information will be needed to determine the period of fetal development when there is need for the protein supplement, and to formulate an inexpensive but acceptable protein preparation, the efficacy of which must be determined in the populations for which the program is intended.

In summary, our animal experiments show that inadequate protein in the mother's diet led to offspring that have behavioral problems. In the human studies the birth weights suggest that "high risk" babies (those under 2,500 grams) have been reduced from 8 percent to 2.5 percent by the protein supplementation. The behavior and efficiency in food utilization of the babies are now being analyzed.*

This project is included under the United States-Republic of China Cooperative Science Program, administered by the National Science Council for the Republic of China and the National Science Foundation for the United States. It has been supported by the Johns Hopkins University, U.S. Naval Medical Research Unit No. 2, The Rockefeller Foundation, The Ambrose Monell Foundation, the Agency for International Development, the van Ameringen Foundation, and the Government of the Republic of China (namely, the Joint Commission on Rural Reconstruction and the National Science Council). In addition, acknowledgment is made for the scientific contributions in the design and operation of this project to our Chinese counterparts: Dr. S. C. Hsu, Dr. C. C. Hsu, Dr. K. K. Chang and Dr. Wang Chi-Wu, to name only a few. We also would like to thank the Chinese workers on our project who greatly contributed to the successful completion of this effort.

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Senator PERCY. Well, we thank you very much, Dr. Chow, and your testimony is important and we are appreciative of your colleagues being here with you.

First, I'd like to ask if you agree with Dr. Habicht that it is a balanced diet, no matter what its source might be, that is important rather than supplementation?

Dr. CHOW. I would agree that if women get good protein, no matter where it comes from, if it comes from nature food, it's fine, but I'm only saying that wherever you have a population where the protein intake is insufficient, where the caloric intake is insufficient, one should supplement, and whether you supplement it with food or something else makes no difference.

Senator PERCY. In your testimony, Doctor, you state that the mothers receiving the protein-caloric supplementation gave birth to fewer high-risk infants below about 5½ pounds. Was the same true for those who received the supplement containing no protein?

Dr. CHOW. That's not correct. The number of babies born to women who receive supplement with no protein-caloric is not reduced.

Senator PERCY. Do you have any evidence that having reduced the incidence of low-birth-weight babies with a protein-caloric supplementation, that you also reduced the incidence of mental retardation or learning disability in this population?

Dr. CHOW. Well, Senator Percy, if you would hold this hearing maybe a year from now we will have the answer, because we believe that we have two groups of infants who differ from one another only in the diet of the mother. Now, if we can get enough time and so forth we will have the data for you in about a year.

Senator PERCY. What would you say is the single greatest risk associated with a maternal diet deficient in good protein? Is it mental disability or some physical impairment, or just what?

BEHAVIORAL PROBLEMS DUE TO PROTEIN RESTRICTION

Dr. CHOW. I have to answer this question with our experience in rats. From Dr. Hsueh and Dr. Simonson's work, I would say that if you restrict the diet of the pregnant rats in terms of protein, you get behavior problems. Now, the size is not that different and in our lab our emphasis is primarily on physical and mental performance. Size, in our opinion, is much less important.

Senator PERCY. In your testimony, you indicated an astounding potential reduction of infant mortality, almost 65 to 70 percent. You state that through the use of the protein-caloric supplementation it appears possible to reduce the incidence of low-birth-weight babies from 8 percent to 2.5 percent. Is this 2.5 percent, in your opinion, an irreducible minimum? Do you think through further work and understanding and experimentation and program development it is even possible to reduce that figure?

Dr. CHOW. If you want me to guess, I would say yes; it can be reduced. It is not the irreducible minimum. I think we can improve that further through further experimentation.

Senator PERCY. Is the reduction you achieved in any way associated with weight gain in pregnancy or was it only a matter of protein supplementation?

Dr. CHOW. I presume you are referring to weight gain of the mothers. Now, we will have that type of data—we have accumulated the data on the weight gain of the mothers but we have not analyzed it. We hope that we will be able to do so soon. The data are there.

Senator PERCY. I notice, Dr. Chow, that the funding for your research as indicated on your paper has come from a number of sources but you have no support apparently from the Department of Health, Education, and Welfare or from NIH. I know that obtaining financial support for scientific research is a very complex matter, but I wonder why you may never have applied for or received financial support from NIH.

Would you care to comment on that?

Dr. CHOW. Well, Senator Percy, today we want to bring forth the facts about maternal nutrition. I would like to correct this information that I never applied. I did apply, but why I did not get it is not for me to answer. I do not know the reasons for that. But the fact is, we have not received any money for the human studies and we have received substantial support from the Chinese Government under their own two agencies; National Science Council and Joint Commission of Rural Reconstruction (JCRR).

Senator PERCY. Do you suspect at all that there is any politics played at NIH, if I could use that word?

Dr. CHOW. I don't know, but I think the results turn out that we have a study which produces good results, like others, and our budget I think is much less than other people and we have been able to do a lot of things with the limited funds. When you have limited funds you have to think very carefully about the next step. You are not going to do many things which are not quite pertinent.

Senator PERCY. Would you mind if I indicated my own surprise that in a field of tremendous interest to our own Government and cer-

tainly one for which Congress has provided funds and indicated that we feel it is an area of great importance, that the funding for your work that has been well thought of comes from Johns Hopkins University, from Rockefeller Foundation, and Monell Foundation, even AID, and the Government of the Republic of China, but does not come from our own National Institutes of Health. If you would not mind, I would like to make at least official inquiry as to why we have not provided any support and help for this work.

Dr. CHOW. Well, that, Senator is your prerogative, and I would like to know the answer.

Senator PERCY. Unless you are perfectly satisfied—and I have no desire to spend the taxpayer's money if we can find other sources for it, but if you feel your work would be strengthened and improved through NIH support, I certainly could at least make inquiry.

Dr. CHOW. I would like to say, Senator, it is your prerogative and I honestly think that we have accumulated a lot of good data and we need some money, not only for analysis, but also to work on a much more practical program for which we are getting some support from the Chinese Government. Now, to take the next step to make it a very practical program so it will benefit not only the curiosity of some of us in the laboratory, but people who really can utilize this information.

Senator PERCY. Thank you very much, Dr. Chow. We thank you and your colleagues very much for being here.

Our final witness today is Dr. Derrick Jelliffe, who is professor of pediatrics and of public health at U.C.L.A.; also head of the Division of Population, Family, and International Health, School of Public Health at U.C.L.A. Dr. Jelliffe was formerly professor of community nutrition and director of the Caribbean Food and Nutrition Institute in Jamaica. Dr. Jelliffe is an expert in the health and nutrition in young children in developing countries and is particularly well qualified in the field of assessment and evaluation of nutrition programs. We thank you for coming out from Los Angeles, Dr. Jelliffe. We look forward to your testimony today as our final witness.

STATEMENT OF DR. DERRICK JELLIFFE, PROFESSOR OF PEDIATRICS AND OF PUBLIC HEALTH, HEAD OF THE DIVISION OF POPULATION, FAMILY AND INTERNATIONAL HEALTH, SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF CALIFORNIA AT LOS ANGELES

Dr. JELLIFFE. Senator Percy, thank you.

The title of my testimony is "Some Key Issues in Infant Nutrition."

Before commencing to read this, I would like to stress that these are only some of the issues which seem to me to be of special relevance and by no means means that I feel that other aspects of this complex subject are not equally important.

SOME KEY ISSUES IN INFANT NUTRITION

Worldwide investigations since World War II have endorsed the commonness of severe malnutrition in young children, particularly *protein-calorie malnutrition* (PCM) in less developed countries. In the

last decade, evidence has accumulated that lesser degrees of PCM are common among the children of the poor and disadvantaged in industrialized countries, including the United States, with a substantial influence on child mortality and with long term ill consequences among survivors, especially interference with mental development.

Senator PERCY. Do you have solid research to support the fact that it especially interferes with mental development?

Dr. JELLIFFE. My research in this field, sir, is slight. I have been involved with studies in the Caribbean, but most of my comment here is based on the evidence which has been gained by other colleagues, such as Dr. Myron Winick and the like.

Senator PERCY. Fine. But there is adequate scientific data to support that contention?

Dr. JELLIFFE. In my opinion, sir, the data is so adequate that one can proceed on this assumption. I think it would be unnecessary to wait for the final scientific evidence to put an end to the question.

Senator PERCY. Go right ahead.

Dr. JELLIFFE. Still more recently, in the United States and other affluent countries, the "mirror-image" nutritional problem of infantile obesity has also become common[1]—with permanently increased extra fat cells and consequent augmented risk of adult obesity.

PREVENTIVE PROGRAMS

These need to be varied to match local causative factors and other circumstances. "Hand-out" food distribution programs play only a part. Nutrition education, health supervision, and health protection for both pregnant mother and child are needed.

Appropriate "package" programs are required covering maternal and child health, nutrition, and family planning, which are of low cost, adequate outreach and based on the use of auxiliaries. Suggested approaches have been given by the International Union of Nutrition Science in their "Zagreb Guidelines."[2]

IMPORTANT ASPECTS

Three aspects of such programs may be selected as needing particular emphasis, and some of these have already been touched on by colleagues who have previously given testimony.

1. *Nutrition Education.*—Guidance, convincing up-to-date information, and motivation are needed for mothers with regard to infant feeding and to help them through the welter of information and often slanted misinformation ceaselessly generated by the food industry, magazines, and food faddists. The high priority of this approach is ever increasing as the confusion and complexity of choice becomes greater with large numbers of difficult-to-categorize processed food mixtures continually becoming available.

2. *Education in Nutrition.*—For almost all schools of health personnel, from medical students to auxiliaries, the training is almost devoid of instruction in nutrition. This constitutes a major

[1] —— and Jelliffe, E.F.P. (1973) "Fat Babies: Prevalence, Perils and Prevention" in press.
[2] Zagreb Guidelines (1967) Nutrition Abstracts 1, 1. "Nutrition Programs for Pre-School Children", Report by IUNS Committee III.3.

bottleneck to any program to improve young child nutrition. Staff, who are trained in the scientific background of modern nutrition *and* in its application in the complex, constantly changing present-day scene, are essential to any form of nutrition program, or even to combat effectively the misinformation and persuasion continuously deluging the public.

3. *Infant Feeding.*—Recent investigations suggest that there is a need to reconsider present patterns of infant feeding customary in the United States,[1] with special relation to (a) *human milk (and breast feeding)* vs. *cow's milk formulas (and bottle feeding)* and (b) *weaning foods (both processed and home-made).*

(a) Human Milk. Scientific research in the past decade increasingly endorses the specific nutritional and antiinfective properties of human milk, which are quite beyond the possibility of replication in cow's milk formulas.[2 3] Likewise, the significance of close continuous mother-baby interaction following birth has been well recognized as very important for "bonding" and subsequent personality development in animals. Careful recent studies indicate a similar process in the human, and a major variable in intimate mother-baby contact is plain between the breast-fed and the bottle-fed baby.[3]

The convenience of breast feeding in the modern world has also been shown to be superior to bottle feeding, provided suitable clothes are worn by the nursing mother.

Human milk is also cheaper than formula feeding, as the additional nutrients needed by the lactating mother can be economically supplied by extra amounts of everyday foods. The economic drain posed for the parents by bottle feeding is indicated by the high and rising price of formulas, taking up a considerable percentage of the household budget in poorer families, so that dilute feedings are likely with consequent dangers of undernutrition.[1]

Conversely, in families who can afford unlimited amounts of cow's milk formulas, the mother is in control of the volume and concentration received by the baby. The resulting tendency to overfeed is one factor in the rising incidence of infantile obesity.[4] By contrast, breast feeding is a "supply and demand" system of constant composition regulated by the baby's appetite.

On a macroscale, human milk is a national resource. Its loss is not only an economic burden for poorer families, but it is a waste of existing high protein baby food, time tested over millenia, and has to be replaced by other protein-rich foods, usually based on cow's milk. In the developing countries, this has been calculated to represent a waste of millions of dollars annually. Similar, but lesser, losses are[5 6] occurring in poverty areas of industrialized countries, including the United States.

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[1] —— (1972) World Rev. Nutr. Diet. 16, 1, "Nutrition in Early Childhood".
[2] —— (1972), Nutr. Rev. 30, 199, "Commerclogenic Malnutrition?"
[3] —— and Jelliffe, E.F.P. (1971) Amer. J. Clin. Nutr. 24, 968, "The Uniqueness of Human Milk".
[4] —— and Jelliffe, E.F.P. (1973) "Fat Babies: Prevalence, Perils and Prevention" in press.
[5] Berg, A. (1973) "The Nutrition Factor". The Brookings Institute: Washington.
[6] Jelliffe, D. B. (1968), Clin. Pediat. 7, 96. "Breast Milk and The World Protein Gap".

The revival of breast feeding among educated families in Europe and North America is of the greatest nutritional and psychological importance but also represents a part of modern man's attempt to achieve a balance between the excessive dominance of technology and his biological heritage. The activities of such groups as La Leche League International[1] are of major significance as regards infant nutrition, child development, *and* economics.

It has been rightly said that a scientist who invented an infant food with the nutritional and antiinfective cost-effectiveness of human milk, which also solved the production and distribution problems in such an efficient way, would be considered as a candidate for a double Nobel Prize—in medicine and in economics.

(b) Weaning foods. Foods for young children during the transitional weaning period can be either *processed or homemade.*

Processed baby foods have the great advantage of convenience. However, recently they have correctly been much criticized. They have a high cost-nutrient value and are not geared to the best nutritional use of available foods, but to the mother's adult preferences ["the infant's diet reaches his stomach through the mother's mind"]. This has resulted in the quite unnecessary and possibly harmful addition of sugar and salt in infant foods. The former can be responsible for the early development of "sugar addiction," with later increased risks of dental caries and obesity. The addition of salt is not needed and, in view of a possible later relationship with hypertension, should be avoided.

Also, infant foods in the United States are not as yet labeled with the nutrients present. This contrasts rather strikingly with the detailed labeling of pet foods, so that it has been said that "children are treated as second-class goldfish."

Finally, the age at which such semisolid foods are introduced has progressively decreased during the present century, so that at the present time they are often commenced in the first weeks of life.

There are no valid reasons for this. Recent awareness of the increasing problem of infantile obesity has clearly shown that this early caloric overdosage is a main factor responsible, so much so that such overfed infants have been termed "*paté de foie* babies."

Nutritionally and physiologically, there is no need to introduce semisolids until 4–6 months. The Swedish system of labeling baby foods with the suggested month at which they can be introduced can be helpful.

Homemade weaning foods. There seems at present to be a revival of interest in the preparation of homemade weaning foods, especially based on the "principle of multimixes," in which a nutritionally complete mixture is made, usually based on a cereal grain staple.[2]

A disadvantage of such home preparations is, of course, the time taken. However, the convenience element may be introduced if a large quantity can be prepared and stored in small containers in a freezer.

The advantages are cost, certainty of nutrient composition, and lack of unwanted ingredients, such as sugar and salt.

[1] 9616 Minneapolis Ave., Franklin Park, Ill.
[2] Jelliffe, E. F. P. (1971) Journal of Tropical Pediatrics 17, 1. "A new look at multimixes in the Caribbean".

Basically, the best form of infant feeding to prevent *both* undernutrition (including the severe form, marasmus, and diarrheal disease) *and* infantile obesity is *breast feeding* (with no other food) for 4–6 months, followed by nutritious *semisolids* for 4–6 months, including both homemade and selected processed foods, preferably with continuing lactation.

This pattern of infant feeding is economical and represents the best use of available resources.

Senator Percy, in conclusion, I would like to emphasize that the three main points that I have tried to bring out in this brief testimony:

1. The need for nutrition education which has been endorsed already by other colleagues;
2. The crying need for education in nutrition for health professionals, including schools of medicine; and
3. In my opinion, the need to review the current practices of infant feeding in the United States and other technologically advanced countries to try to bridge between these technological and scientific advances, and the biological background of man.

Is Trend Toward Breast Feeding?

Senator Percy. Doctor, I found your testimony extremely interesting. First of all, with the younger people today so conscious of natural foods, I find myself coming from a State with very large cereal manufacturers and yet my daughter makes most of our cereal at home. She feels the natural ingredients she puts in provide a tremendously balanced nutritional diet in the morning. In fact, I sent a sample off to Quaker Oats, one of my constituents, and said, "This is what I am eating instead of Quaker Oats now. Why don't you get into this field?" And a year later, they came out with two packaged natural products, not quite as good in taste as my daughter's, I think.

But with this tendency on the part of young people, do you see any tendency on the part of young mothers now to breast feed their children?

Dr. Jelliffe. I think so, sir. There is a very definite tendency. I have noticed over the last 10 or 20 years in Western Europe and in the United States, that the situation has changed completely; and what is more, I think the change is occurring principally among educated young people. I think, this may have a tremendous effect—at least I hope so—on developing countries, because, rightly or wrongly, often wrongly, the model which is taken for infant feeding in developing countries tends to be that of industrialized countries.

Senator Percy. Now, can you give me any figures at all, proportions, as to what proportion of young children born today, infants born today, are breast fed?

Dr. Jelliffe. I think this varies a very great deal from one part of the country to another and also depends on your definition of breast feeding, whether completely breast fed or not. I would say in Los Angeles, probably it would be something of the order of 10 percent are breast fed.

Senator PERCY. Ten percent?

Dr. JELLIFFE. Yes, breast fed for 3 months that is.

Senator PERCY. Are there any figures in any other parts of the country? Is there any part of the country where breast feeding is more prominent?

Dr. JELLIFFE. I would prefer, if I may, not to give precise figures because I may get them wrong, but there are some areas of the country where breast feeding is less and more common. In some rural areas in the South, breast feeding is more common. Among the younger groups of people in, for instance, U.C.L.A.—I have not done a study, but I would guess that the wives of students and the like I would guess the percentage would be very, very much higher, but I can't give you figures I'm afraid.

Senator PERCY. Can you give us some of the reasons why—and here, I wonder if any of our other panelists—if any of our other panelists wouldn't mind just joining us for this final question session, you could come right up to the table if you feel you might have any information you could add to this.

What are the reasons why more mothers do not breast feed and can you give the reasons and then say whether or not, in your judgment, the reasons are valid, or whether there is something that can be done to overcome the objections that young mothers have to breast feeding?

Dr. JELLIFFE. It is an extremely complicated matter and it is related to many aspects of the social and cultural environment. I think that very probably it dates back, in my opinion, to the technological revolution in medicine in the middle of the last century when technology was so striking and outstanding—anesthesia, microbiology, X-rays and the like—that at this time probably the whole concept was that anything which was mathematical or man made was almost automatically better than anything that was natural.

I think, also, that there are some reasons why artificial feeding has to be undertaken in a percentage of women and this, of course, is if they are going out to work or if some situation in our culture makes breast feeding neither acceptable nor feasible.

Senator PERCY. Well, I would admit that for some women in my office who have infants at home, it is going to be a little difficult to breast feed, but that proportion would be relatively small (in Central America), would it not? Would as many as 30 percent of the women hold regular jobs? Would you care to comment, Dr. Habicht?

PROBLEM OF SOCIAL RESTRAINT

Dr. HABICHT. I have just been in Panama consulting with the health services there. In the last 4 years they have made significant advances in public health under Health Minister Dr. Jose Renan Esquivel. One of the major problems in Panama, as in most countries that are developing and urbanizing, is the fact that the women do go out to work. Indeed, it is often an absolute economic necessity that they go to work, and they cannot afford to sit around at home for 3 or 6 months.

We talked about this at great length, and Dr. Esquivel pointed out that, in fact, it is not a matter of economic restraint on the mother; it is, instead, a problem of social restraint imposed by a

society which does not permit the mother to breast feed in the office or factory. In the underdeveloped countries—in the buses in Guatemala or out in the villages where we work, for instance—when the child begins to cry, the mother breast feeds him immediately, and this is perfectly acceptable. The major problem is that the developed societies and developed sectors in underdeveloped countries do not accept this natural approach and therefore make it impossible for the mother to take her child to work with her.

Dr. Esquivel is trying to institute a system in Panama's children's hospital whereby the children of employees spend their days near the mother's place of work and the mothers are given time off every few hours to breast feed them. The idea is to increase the prevalence and duration of lactation. This is already the practice in certain Scandinavian countries.

The foregoing suggests that while many economic reasons are given for not breast feeding, in fact it is society that prevents breast feeding because of our attitudes toward it.

Senator PERCY. Doctor Winick, would you care to comment as a pediatrician?

Dr. WINICK. Well, yes. From the standpoint of developing countries, I think the point should be made that what is happening is that there is an uneven development of technology so that the technology for preparing sterile formulas just is not there, whereas as they begin to urbanize and as they begin to move into the city, the social reasons that Dr. Habicht has just pointed out, breast feeding becomes more difficult, especially if they have to work.

Consequently, what you find is that even if given milk, even if given formulas—for example, statistically, in Chile, for example, the milk program in Chile for children is very extensive; yet the infant mortality has been the highest in South America; and the reason for it is that milk brings diarrhea and it brings diarrhea because it is infected because you can't prepare a sterile formula under the conditions that these people live.

So technologically they are moving into industrialized areas; they are going out to work; and they don't have the technology to prepare sterile formulas.

Now, with this, you see, simply by allowing these women to breast feed within the confines of the job that they have to do, by organizing day care centers or these types of things, that problem could be solved.

There is a movement in this country, as you may know, also for day care centers to accomplish the same sort of thing so that the working mother can go out to work and still nurse her baby if she wants to; and again, I think there is more and more of a move toward this and I endorse it.

Senator PERCY. Does anyone disagree with Dr. Jelliffe at all on the emphasis he places here? Is there an objection raised by young mothers that it would impair their figures? Is this a commonly held belief that it would; and if so, would you care to comment on it and what the facts are against possible myth, if it is a myth?

Dr. JELLIFFE. May I comment on that, Senator Percy?

Senator PERCY. Yes.

Dr. JELLIFFE. I think that there has not been sufficient factual evidence produced on this particular point but I believe it to be a-

myth. I believe that the sagging of the breast, the loss of the figure, which is what we are talking about, is more a function of repeated pregnancies, possibly malnutrition, and certainly inadequate "support" during pregnancy. I think that an aspect of lactation which is not well known is that it has a slimming function, because normally during pregnancy there is physiologically a laying down of calorie reserves and lactation, of course, draws on these. So you can say that while the effect on the breast line is very unlikely in my opinion, the effect on the figure as a whole is that lactation has a slimming function.

Options Should Be Available Equally

Dr. Winick. Can I just make a comment because I think that we have to draw a distinction—at least I do in my own mind—between developing countries and the more developed countries. I think what is important in a country such as ours is that the options be available and that these options be available equally. Infant formula has reached the point now where certainly we can adequately feed babies with infant formula. The point is that the mother does not really have an option in our society any more because of the things that we have just talked about, and these options should be developed. If, after she has this option, if after she knows it may cost more to feed a child with an infant formula, I think it is perfectly appropriate when she has this information to choose that form of therapy in our type of society, but I would like to see the options available.

Senator Percy. Dr. Jelliffe, what are the relative costs of supplementing the mother's diet to assure adequate lactation and supplementing the child's diet to assure adequate nutrition during the first years of life? In other words, as against breast feeding, what is the additional cost?

Dr. Jelliffe. Perhaps if I could take one part of the question, and that is essentially what is the cost of the additional nutrients that are required for lactating women versus the cost for the equivalent amount of cow's milk formula. Well, the original studies which were done indicated that in fact cow's milk formulas were cheaper. However, this is not correct because there was a fundamental error, in my opinion and in the opinion of many people, in these calculations, in that it assumed the need for a mother during lactation to have an abundance of rather more expensive items. It is totally possible to get the items required, the increase in calories, the increase in protein, from much more everyday items than were previously appreciated, and it is much cheaper.

Senator Percy. You pointed out that overnutrition during infancy can be just as dangerous as undernutrition. Can you spell out in some detail the health risks involved in overfeeding?

Dr. Jelliffe. Yes. In infancy, you have a parallel situation to that which Dr. Winick has outlined in relation to brain development. During infancy and childhood—but infancy is particularly a special case because it is during that period that the individual diet is under the control of somebody else, his mother or caretaker—during this period the fat cells in the body are multiplying. Therefore, if a child is overfed during this period and becomes obese during infancy, you are saddling that individual with surplus extra fat cells which he will carry with him or with her for the rest of the individual's life.

In other words, there are risks of obesity in infancy, such as a higher risk of respiratory infection, for example; but the main risk is because of its association very commonly with continuing obesity or recurring obesity in later childhood or particularly in adult life, with all the hazards of obesity that we know of in adult life.

Senator PERCY. Could you estimate what the cost difference is for supplying extra amounts of everyday foods to the lactating mother instead of purchasing formula feeding?

Dr. JELLIFFE. I would like to make a guess.

Senator PERCY. I am sure there are differences, but just an average - - -

Dr. JELLIFFE. I would have said that a figure of 2-to-1 would be achievable. The reason why I am so hesitant is because the cost of formulas is continually increasing because cow's milk, as with any other animal product, is increasing in price and also because the nature of the supplementation that the mother could get from everyday foods would obviously vary from one part of the country to another.

Senator PERCY. I have here some of the typical processed baby foods that are purchased and you have commented on these. First of all, I wonder if you could comment more specifically on these foods. You say that they are not as nutritionally valuable as foods that could be prepared at home. Do you actually go so far as to feel that they could be harmful?

Dr. JELLIFFE. I think we are talking of two things, Senator. Certainly, I think that available foods anywhere, including the United States, could be used to make more nutritious baby foods either at home or in these processed forms. That is point 1.

Secondly, the question of harm—I think there are various aspects of this. As I have mentioned, the use of various additives—salt and sugar—these have been geared to the mother's palate and not to the baby's needs. And I think there has been considerable discussion on these and I believe everybody would agree that it is best that these not be included; although, of course, to be fair, the mother may then include them later herself.

PRESSURE OF PROMOTIONAL ADVERTISING

Another question about the harmfulness of this type of food is that with the pressure of promotional advertising there has been a tendency over the last decades for these foods to be introduced earlier and earlier, so that we get not a weaning process as in the past, but rather, a double feeding or an additive type of feeding. I believe the use of cow's milk formula where the strength and the volume is under the control of the mother and the early introduction of these semisolids are the principal factors responsible for infantile obesity, which is an increasing problem.

Senator PERCY. Do you believe there is excess salt and sugar in these sample foods? I am not saying these particular ones, but for the most part, in commercially processed baby food?

Dr. JELLIFFE. Yes, I do, because the sugar and salt, as I said, are geared to the mother's taste buds. Sugar is a very addictive nutrient and, of course, the end results may be an increasing tendency to take sugar, with its cariogenic potential and also its tendency to obesity in later life.

The effect of salt is less certain, in my opinion, but if there is a possibility that an increased intake of salt may lead to hypertension, well, then, why add it?

Senator PERCY. And is it true that excess salt will kill needed potassium in the body; and, if so, what does this mean in terms of the baby's health?

Dr. JELLIFFE. I wouldn't like to comment on that, sir.

Senator PERCY. Would anyone care to comment on that? The question is: Is it true that excess salt can kill potassium in the body; and, if so, what does this mean in terms of the baby's health?

Dr. HABICHT. I think the reason you are getting no answer is that the question you asked is not stated in the physiological terms we are used to. Salt (sodium chloride) is found in the extracellular fluids and potassium is found in the intracellular fluids. The body adapts to variations in sodium and potassium intakes by varying the kidney excretions of these substances. Newborns have less functional kidney systems than do older children and, therefore, high salt loads in these children can be detrimental to their health. As you probably remember, a few years ago infants died in a large U.S. hospital as a result of confusing salt for sugar in baby formulas; the children ingested a great deal of salt, which their kidneys could not handle and they died. These facts are, however, irrelevant to commercial baby foods, in which the salt content never reaches such high levels.

Senator PERCY. I want to thank all of our witnesses today very much indeed. I have become a firm advocate of breast feeding in young mothers. I will recommend it to the young girls who have just come in the room and to my own daughters and daughters-in-law now and I will send them a copy of your paper. I do feel that the members of the press that are here could point this out.

I would like to just make a comment in closing these hearings this morning. Certainly, there seems to be consensus that a malnourished mother may mean a malnourished baby. We know that a malnourished baby may be a low birth weight baby who faces health risks and may have retarded brain development. We know that it is possible to improve the diet of mothers and thereby reduce the incidence of low birth weight babies and all that that implies to unfulfilled human potential.

We have good evidence that good nutrition during the first year of life is equally important to the child's growth and development as good nutrition in later years, and I would say far more important actually, and it is very, very difficult to supplement and make up later for that loss and deficiency that occurs in infancy.

We know of a low-cost nutritious food that could reduce malnutrition among infants to next to nothing. That is mother's milk—very simple, readily available, a little inconvenient on occasion, but certainly far preferable to the very best processed foods that are available and formula supplements and formulas that are developed out of cow's milk.

Tomorrow, we will further consider infant nutrition and shall hear how this knowledge is being applied.

The committee is in recess, to reconvene on Wednesday at 9:30 a.m.

(Whereupon, at 11:45 a.m. the Select Committee was recessed, to reconvene at 9:30 a.m. on June 6, 1973, in room S-407 of The Capitol.)

WEDNESDAY, JUNE 6, 1973

U.S. SENATE
SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
Washington, D.C.

The Select Committee met at 9:30 a.m., pursuant to call, in room S-407 of the Capitol, the Honorable Charles H. Percy, presiding.

Present: Senator Percy.

Staff members: Kenneth Schlossberg, staff director; Alan J. Stone, counsel; Vernon M. Goetcheus, chief, minority staff; Elizabeth P. Hottell, professional staff.

Senator PERCY. The hearing will come to order.

OPENING STATEMENT OF SENATOR PERCY, PRESIDING

Senator PERCY. This is the second day of the Nutrition Committee hearings on infant and maternal nutrition. I would like to simply, for those who were not here yesterday, summarize in a few words what we learned yesterday from the very distinguished group of witnesses that we had.

We know that a malnourished mother may mean a malnourished baby. We know that a malnourished baby may be a low birth weight baby who faces health risks and may have retarded brain development. We know that it is possible to improve the diet of mothers and thereby reduce the incidence of low birth weight babies and all that that implies to unfulfilled human potential. We have evidence that good nutrition during the first year of life is equally important for the child's growth and development as good nutrition in later years.

Today, we are going to follow up on these relationships by hearing from members of the medical profession and from experts in infant and child nutrition. I believe the evidence that we shall hear today will clearly show it is possible to improve the nutritional status of infants and preschoolers through action programs such as the USDA's supplemental food program.

It is most interesting that we have as the pending business before the Senate today and for the next several days a major agriculture bill that does bear on nutrition questions.

We are pleased to call to the table our first witness this morning, Dr. George R. Kerr. Dr. Kerr, we welcome you very much indeed. Dr. Kerr is an associate professor of nutrition at the School of Public Health at Harvard University. He has done extensive research on fetal and infant primate nutrition. He is currently concluding a study in Tunisia on protein supplements for pregnant women and infants. We are very pleased Dr. Kerr has been able to find time in his schedule to come and appear before us this morning. Dr. Kerr, if you would just go right ahead with your testimony, we will go into questions after that.

STATEMENT OF DR. GEORGE R. KERR, ASSOCIATE PROFESSOR OF NUTRITION, SCHOOL OF PUBLIC HEALTH, HARVARD UNIVERSITY

Dr. KERR. Mr. Chairman, the testimony which I prepared is available and I would like to have that entered into the record.[1]

Senator PERCY. Without objection, so ordered.

Dr. KERR. After reviewing some of the testimony from yesterday's speakers, I would like to enlarge upon the scope of my testimony a little bit, particularly to consider some of the gray areas in developmental biology. My interests are particularly in the area of nutrition as it affects developmental biology. I would like to raise a couple of questions which no one has answers for, and which I think we have to keep as open questions.

First, people develop in discrete ways. They develop in cells, in biochemical measures such as proteins, in physical measurements such as inches and pounds, and, obviously most important, in behavioral measures. There are probably some relationships between these measures of development but they are far from clear.

As an example, an agent which changes the number of cells in the brain or kidney does not necessarily change the function of that organ, and anything that changes the size of an organ also does not necessarily change its function. A larger brain is not necessarily a more intelligent one, although it certainly may be.

Second, it is possible to compare the development of any individual with a group of peers if you can identify the true peer group to compare him with, and this, again, is very difficult.

In Tunisia, for example, children under 6 years of ago are below the third percentile value for height of American children. But is this a proper comparison to make? Is it really fair to compare many aspects of development of Tunisian children with those of American children?[2]

There is an additional conceptual problem here because of a natural tendency to say that a bigger individual is in some way "better" than a smaller one. Again this may be true, but I think the ways in which he is "better" need to be specified. It is undoubtedly true at some level: A large baby at birth has certain advantages over a small baby, and there is no question of this; but at some point, bigness per se stops being an advantage and becomes a problem. A baby that is large at birth may have more cholesterol in his brain, but he may also have more fat cells in his body which may doom him to a lifetime of concern for obesity.

So developmental biology is not a simple business, and it is very easy to make value judgments on the basis of very flimsy evidence.

Third, and probably most important for our concerns today, if anything interferes with the development of an individual and it can be corrected, you can expect a period of something called catchup growth where that individual will grow faster—in both biologic and behaviorial measures—his age-peer group. So while we would all agree that prevention of a problem is far to be desired, if you can't prevent it, at least there is reason to hope that intervention will result in a period of this catchup growth. If we are dealing with undernourished

[1] See prepared statement, p. 43.
[2] See Appendix, p. 88.

pregnant women or infants, there is no time when it is too late to try to correct the problem.

Because there are problems in interpreting data from malnourished children, most of my work has involved experimental malnutrition in monkeys. No experimental animal is comparable to the pregnant human or growing child, but at least we can measure very exactly the behavior and the physical growth of monkeys which follow specific nutritional changes.

Malnutrition in infant monkeys results in exactly the same type of problems as occur in starving children around the world. This is extreme malnutrition, it is not subtle. Growth failure, small head circumference, small brains, all the physical and biochemical measurements which you would expect, inability to tolerate infections, and so forth, are readily apparent. However, if the animals are allowed to recover, after a period of 2 or 3 years their stature in physical dimension and also in learning and behavioral dimensions, is difficult to distinguish from those of control animals. The resiliency of growing things to any insult is truly impressive if the insult can be corrected.

Malnutrition studies before birth are much more complex and I really get worried when I read sweeping statements that guarantee a healthy baby if only a certain type of diet is followed. It is just not that simple. It would be nice if it were.

The primate placenta is an extremely complex organ. It has built-in mechanisms which protect the fetus to some extent if the mother is undernourished, but clearly, it is not 100 percent effective in this protective function. Malnutrition—and again, extreme malnutrition—of pregnant monkeys results in the same type of problems as occur in famine areas of the world: marked increase in stillbirths, marked increase in premature births, marked increase in low birth weight babies, marked increase in perinatal death rates. Subsequent learning ability of some of the animals which survive the fetal malnutrition experiments has been reduced. I do not have complete data on this because funds for this type of research are becoming harder to find.

So severe nutritional disturbances in growing individuals can be devastating. Whether more subtle nutritional insults have a more subtle effect I think is probable, but is not by any means certain. Suboptimal nutrition is a fact of life for most of us. Most of us have occasional days when things just don't go right. For some people, however, these occasional days occur with such frequency that there is a real risk for clinical malnutrition.

Subtle Malnutrition in Our Society

As nutritional requirements are most specific and greatest in individuals who are growing at the most rapid rate, obviously these risks have to be greatest in fetal life, infancy, adolescence, and childhood. Maybe we don't see severe malnutrition often in our society, but we do see subtle malnutrition in these age groups and I think that is also a fact of life we have to accept. Once we accept its existence, we can identify the measures which have the greatest potential for solving the problem.

Even if we are unsure of the long-range consequences of this subtle type of malnutrition—even if we don't understand the relationship

between cell numbers and function, I think it would be improper to ignore the possibility—even if it is a remote possibility—that the most dire predictions which people are making could possibly be correct; as soon as we allow this possibility, then I think we have no choice but to go ahead and act with active intervention programs or continue the ones that we have. We must not be so naive, however, as to say that simply providing food is going to solve the problem. People have to be motivated to eat. Distribution systems have to be developed, and results have to be carefully evaluated.

There are some people who say that "protein" is synonymous with "meat." There are people who say protein is unfit for human consumption—and this is not a small group. Some way has to be found to resolve these misunderstandings.

There is also a real question as to whether acute intervention programs ever really solve the basic problem. Three and a half years ago, this committee heard the preliminary data on the National Nutrition Survey and testimony after testimony indicated that poverty and ignorance were the cornerstones of malnutrition. I have no meaningful suggestions as to the huge problems of poverty, but even with poverty, knowledge of foods can go a long way toward preventing malnutrition.

So while I would propose continuing active intervention programs and supplemental food programs wherever a need can be identified, I also believe that the greatest long-range returns will follow a national nutrition education campaign. A campaign which is not conducted in terms of nutrients, or in terms of the research interests of nutritionists, but in terms of food, and in terms of solving the food problems of the real world.

This campaign would have to be conducted at several levels. Obviously, television would have to be a major one. Obviously, lay journals; obviously medical and nursing and teaching college curriculums would have to be changed. Obviously, it would have to be coupled with continued research in the area, and training programs, and I am sure you are aware that these programs have received critical blows during the last few years. This campaign could be conducted in prenatal clinics and in day care centers. Obviously, it would also have to involve an increased use of the school breakfast and lunch programs. These have never really been touched as to their educational potential. The curriculums of primary and secondary schools would also have to be modified from their health aspects to incorporate an increased attention to the relationships between food and health in this country.

All of these institutions already exist. This campaign would not involve the development of any new organizations simply modifying organizations which currently exist.

I believe that increased nutrition education in the Nation's schools is the only sure way that you will reach all the pregnant women and mothers of the future. It may not bear fruit for several years but 10 years from now you could have reached the entire population at risk. This school campaign could be incorporated into the health and science curriculums of the various State boards of education, it would probably be welcomed by all but the most extremist nutrition groups, and I think it could have a positive influence on many of the other, even more serious, nutrition-related health problems which face our Nation.

So I urge your consideration of such an educational program as being a major step forward in assuring that the human needs for nutrition in our country are to be met.

PREPARED STATEMENT OF DR. GEORGE R. KERR

My name is Dr. George R. Kerr. I am a physician and associate professor in the Department of Nutrition at Harvard University's School of Public Health. I have clinical and research interests in the effects of nutrition on development during early life, and appreciate the opportunity to appear before this committee to discuss this topic.

During the past 2 years I have been involved in a study in Tunisia where our department is conducting an extensive survey of the socioeconomic and nutritional factors which influence the growth and development of children of the southern Saharic area. I believe that there are interesting comparisons between these children and our own.

These Tunisian families exist under the most severe economic conditions and the children are short by American standards—at least compatible with the effects of undernutrition. When compared with the increased standards of living in the United States, and the increased size of our children it is easy to conclude that our children are better nourished. It's not that simple and it's not necessarily true. First of all, I'm not sure that the physical growth of middle class boys and girls in Boston is an appropriate standard against which to judge the development of children from other countries or other populations. And second, in the area of nutrition, the children of Tunisian villages have little nutritional choice but their traditional diet of wheat, chickpeas, oil, sugar, onions, and occasionally small amounts of meat and eggs. Limited choices, but the staples of life in many parts of the world. They are not, however, penalized by our nutritional value systems nor do they have to make choices between real foods and a host of attractive but nutritionally limited convenience foods.

Our children are exposed from early life to a great variety of natural and processed foods from which they must learn to make choices many times each day. For some children this does not present a significant problem because they are exposed to sensible eating habits of parental example during their learning years. For others, however, the parental example may be lacking for a variety of reasons, and as less desirable eating habits are also learned early in life, they may also become ingrained and passed onto the next generation; after a certain period of time they may even become labeled as being "traditional" food habits.

Early learning experiences of children, including food experiences, are based on complex cultural and socioeconomic factors, and these often differ from one population to another. Only by defining the nutritional norms for each population subgroup can we determine just how significant these differences are. That people eat in different ways is no proof that one way is "better" than another: Nevertheless there is ample evidence that some segments of our population are exposed to real nutritional risk, and wherever there are people at socioeconomic disadvantage there will always be at least a small number who can be identified as being malnourished by established criteria. For a larger population, however, there is disquieting concern that they may be malnourished in ways which are not detected by present criteria, and this is witnessed by the many millions of dollars which are spent annually and unnecessarily on vitamin pills as a form of nutritional insurance.

Nutrition disorders which are based on cultural or socioeconomic factors are generally initiated during infancy and childhood, and the eating habits which potentiate them are often well established by the time formal health education begins with the primary school years. By this time only a concerted educational approach to food and health has any real chance of correcting the problem. There is much current speculation and some evidence that the optimal physical and behavioral development of such children may be permanently compromised by undernutrition early in life. I'm not at all sure that this is true; but the chance that it *may* be true, *may* be perpetrated in the form of eating habits from generation to generation, and *may* lead to a population which must be supported by society rather than contribute to it, should direct us to use all reasonable means to reduce the risk. By attempting to improve the food choices and eating habits of those individuals known to be a nutritional risk it may be possible to improve those of all segments of the population.

It is difficult to identify the best points at which nutritional habits may be influenced and improved. Eating is a very personal thing which is influenced on a minute-to-minute basis by many psychological and biological processes and these are difficult to modify. But our food choices are also influenced by environmental cues such as advertising, and by knowledge about foods—and these can be modified by legislative action. While active intervention must be implemented wherever a population with serious nutritional deficiencies can be identified, I would like to propose the less dramatic approach of food and health education during the years when eating habits are being established as having the greatest potential chance for long-range success.

There are many excellent tables and texts which are currently directed to this end. But these are generally written in terms of nutrients and are seldom interpretable in terms of foods—and only these latter terms are meaningful to most people. Most of the texts which do advise people on food choices are, while exciting reading, too often full of semiscience and half-truths and too thin in their content of sound nutrition. Accordingly, I believe that there is a need for a national program in nutrition education, food education, which can be directed, in appropriate terms, to the populations at greatest nutritional risk, and also to the total population whose eating habits are being formed.

It is generally accepted that nutritional needs are greatest and most specific during the years of development; accordingly the risk factors are greatest during the ages of fetal life, infancy, childhood, and adolescence. The most vulnerable age which can be approached directly is that of infancy, the first year of life. Most mothers derive their understanding of infant development and feeding patterns from cultural norms or from a system which "worked" for previous infants. Whether these patterns are in fact optimal should be able to stand the test of objective evaluation. In the absence of such evaluation we should provide the young woman and pregnant mother the best available knowledge upon which to base her own unique pattern of mother-infant relationships. A federally supported education program on the normal development of infants and the importance of proper foods could be incorporated into the program of prenatal care of mothers to be. During the few days of postpartum care in maternity wards of hospitals, such an educational approach should find new mothers at their most receptive state.

As infancy blends into the preschool years of childhood, dependence on the mother as the sole source of stimulation and learning gives way to more external influences and behavior becomes modified by a wider variety of people and pressures. Youngsters readily learn that some foods, while of limited nutritional value, are consistent signs of love or approval; and these are often particularly enjoyable on a taste basis. Those relatively unprocessed foods which are the staples of life in Tunisia often, for our children, become associated with pressure situations or parental discipline. If we are to influence nutritional or food choices during these years we must speak in the appropriate language and with an appropriate format. Television is an instrument which has never been fully explored as a vehicle for nutrition education: on the contrary, it's no news that many parents are concerned over the ease with which television commercials sell food products to children on the basis of nonfood rewards. Surely the same marketing skills which currently sell gimmickry could be directed to sell food products to both mother and child on the basis of entertaining but sound food education if legislators could draw public and industries' attention to the problem.

By the time formal education in school is started the child has probably completed most of the learning systems upon which his food choices of the future will be based. He can probably still be reached through a sensitive school breakfast and lunch program or through an education program which relates foods to health and science, can be directed to his interests, and which can mature with him in a sequential program, but these are uncommon. Most of his future food education will actually occur through the foods chosen by his peers, and by the machines which he finds all around him offering attractively packaged and tasty confections for the small amount of money which he has in his pocket. To be sure, many of these products can now be "fortified" by one or a few nutrients, implying nutritional value. But clearly, a large part of the rationale for these additives is based on the sale of the product. It's not always easy to detect an interest in the food industry for the long range health concerns of the young consumer, though some do an excellent job. Accordingly, the outlook for significant improvement in food education under the current system is not good.

These are the ages when the development of infants and children can be influenced directly, either positively or negatively, by the nutrition education system to which they are exposed. Probably of greater concern, however, is the age of most rapid growth where direct influence is not possible. This is the age of fetal development—when the nutritional state depends on the mother's nutrient stores and food intake. There is good evidence that serious malnutrition may occur in the unborn child as a reflection of maternal undernutrition. Reports from areas of acute famine reveal that babies born to clinically malnourished mothers have a birth weight about 5–10 percent less than normal. It's becoming apparent, however, that birth weight is a very insensitive reflection of the fetal insult. By the *time a weight loss of 10 percent has occurred, one must expect a marked increase in* stillbirths, premature births and serious neonatal problems, including death. There is also good evidence that the long-range future for physical, intellectual and social maturity of these infants may be permanently compromised. These are the concerns of low birth weight babies which are born to mothers with acute malnutrition. The pediatric community is becoming increasingly concerned, however, with the incidence of such low birth weight babies born to mothers in our country which are *not* clinically malnourished. How much of this problem is due to more subtle maternal undernutrition cannot be stated, but it is clear that the incidence is significantly greater in populations which are exposed to increased levels of socioeconomic problems—13.6 percent of nonwhite babies are classified as having "low birth weight" as compared with 7.1 percent of white newborns—and this is also the population most likely to have significant nutritional problems. That some *of these low birth weight babies are probably due to maternal nutritional factors,* and that our society has no current nutritional policy for pregnant women indicates that a concerted national attempt to remedy the potential problem is overdue. There are nutritional standards for pregnant women available in the Recommended Dietary Allowances of the National Academy of Sciences-National Research Council, but these are not interpretable in terms of *food* to the nutritional layman, including the medical professional layman who has received at best a limited education in nutrition.

For the population of women who are known to be at risk for increased incidence of low birth weight babies, some acute intervention legislation is in order. This group can be readily identified by socioeconomic or demographic criteria: they are exposed to the multiple insults of poverty, or by the age characteristic where the mother has just reached sexual but not physical maturity. For these high-risk *groups, food or financial assistance such as a doubled allotment of food stamps or* commodities could be provided where justified, and where the pregnancy was being attended by a physician; this would of course have to be in conjunction with increased attention to nutrition as part of the obstetric curriculum in medical and nursing schools. But even this approach would not reach the larger population at risk—the entire population of girls who are to become potential mothers in the future. For these the most appropriate solution would be a sensitive policy of food education which progresses and is constantly updated throughout the years of primary and secondary schooling. This will require national legislative action, change in curriculums for teachers colleges, and some method for assuring that the curriculums can be modified in response to changing times and student interests. But it is feasible and could be evaluated for its effect during pregnancy and child development, for its effect on food purchasing habits, and also for the response it creates from the food industry.

Almost 3½ years ago this committee reviewed the preliminary findings of the National Nutrition Survey and heard testimony after testimony that lack of knowledge about foods was a basic problem of this country and one which extended through all strata of society. The situation has not improved measurably during this interval. An attack on this problem through a national educational program in nutrition is now even more timely; it could be initiated through legislative action as part of the health and science curriculum of the various State boards of education, would reach the population at risk, would probably be welcomed by all but extremist nutrition groups and could have a positive influence on many of the other health problems which face our Nation. I urge your consideration of such an educational program as being a major step forward in assuring that human needs for nutrition are to be met.

What Benefits Are Derived From Vitamin Pills?

Senator PERCY. Dr. Kerr, I appreciate your comments very much indeed.

In your prepared text, I wonder if you could expand, first, on your comment about the nutritional insurance taken out by many people in spending millions and millions of dollars on vitamin pills and the lack of necessity for this. Could you give us the benefit of your experience as to how much value, if any, comes from vitamin pills for a person who has a balanced diet and eats well—not too much, but not too little, and the right foods?

Dr. KERR. I think you have already answered that question, Senator. Obviously, there is very limited, if any, benefit to be derived from them. But I am sure you are aware of the large number of people in our society—and, unfortunately, many of them are handsome movie stars and gorgeous movie starlets and people who write the most persuasive textbooks—to say that there are great benefits to be derived from mega-vitamin therapy.

There are also many people in society today who are not sure of their nutritional health. They say, "Look, there are people on one side who say we are being poisoned by food additives, and there are people on another side that say we only require simple foods supplemented with a large vitamin pill to obtain complete nutrition."

There are many people who are unsure of their nutritional health because they have limited nutritional knowledge. As a result they tend to fall into one of these two camps because of an emotional response or a belief in one of their philosophical positions.

Senator PERCY. Are you saying that the psychological advantage may be just as great if you took a pill that had nothing in it?

Dr. KERR. Yes. I am sure that is true.

Senator PERCY. But generally, you feel if I am getting a vitamin I must therefore feel better, feel peppier.

Dr. KERR. I am sure that is true. Many people have the impression that vitamins contain a certain amount of energy, perhaps "psychic energy," but unless we can talk these people's language it is no good for me to sit here and say these beliefs are nonsense because this would only turn off the audience that I really should be trying to reach. I think we have to, in some way, learn to talk with these people and try and come up with some factual, mutually agreeable, position.

Senator PERCY. Why is the vitamin pill so expensive? I am just amazed as I see the price in a drugstore for a little capsule bottle of vitamins is $8, $9, $10, and $11. What is there in the manufacturing cost that goes into the product or is the manufacturing cost relatively low and is it a high merchandising cost or high profit?

Dr. KERR. I am really not competent to comment on that, Senator. I think you will find, if you compare bottles of vitamins, that the nutritional differences between the cheapest preparation and the most expensive preparation are due to vitamin levels above the requirements of most people. The more expensive preparation may contain an additional one or two vitamins, but generally these are not associated with known human diseases. Rats fed a diet deficient in these vitamins may lose their hair or stop growing, but a clinical

problem in humans caused by their dietary deficiency is rarely recognized.

Senator PERCY. I have heard the statement made by many people that the reason our children are so big now as compared to their parents is that we now have vitamins and that we did not have vitamins in our day, at least they were not promoted as heavily. Is there any truth to that at all?

Dr. KERR. Well, our children are certainly bigger than they were a generation ago, and they were bigger that generation than the previous one, and this has probably gone on for 150 years. If you look at the sizes of children in our country and in England at the turn of the century, they were comparable to the current size of children in Tunisia. So something has happened over the past century which has influenced child development. Probably a combination of many things, of which nutrition is certainly a very important one. Immunization and pasteurization of milk have been terribly important. Labor laws for children have been terribly important and so have been improvements in housing. There are many, many things that influence child development.

Senator PERCY. You do not attribute it to just the presence of vitamins?

Dr. KERR. Absolutely not.

Senator PERCY. You indicated and I have heard you use the phrase, "It's never too late to catch up." Does this include mental development? We have heard testimony to the fact that in mental development some infants are permanently harmed because of malnutrition; that they never really later in life are able to catch up. You also say:

> There is much current speculation and some evidence that the optimal physical and behavioral development of such children may be permanently compromised by undernutrition early in life. I am not at all sure that this is true, but the chance is that it may be true.

And then you go on to condition it further.

Could you expand on your reasons for believing that you can? I would hope that you are right that you can catch up because we are never going to be able to reach all these infants who later in life may be able to have certainly some of the things in life they couldn't have when they were infants.

"CATCH-UP" GROWTH

Dr. KERR. Well, it is a conceptual problem again, Senator. If we say here is a child who is seriously malnourished, almost starving to death, and here he is 8 or 10 years later and he has an IQ deficit of 20 points, it is too easy to assume that these are cause-and-effectually related. This may be a true causal relationship, but many other things have happened in that house where a child was almost allowed to starve to death. Many things have happened in this 8- or 10-year interval which involved crowding and sleep, and involved a family where perhaps there were no models on which to base a more productive pattern of life. Maybe nobody read the Sunday papers to him. Maybe he couldn't take a drive out in the country to learn from new experiences and observations.

So our ability to measure intelligence at one point in time and relate it to an event which occurred many years earlier is a risky business.

"Catch-up" may be 100-percent effective if it can be started early. Obviously, the ability to reach where you would have been had the development insult not occurred depends on both the severity of the insult and its duration. After a period of time while some catch-up growth will occur, it may be far from complete.

Senator PERCY. In your prepared statement you say: "I would like to propose the less dramatic approach of food and health education during the years when eating habits are being established as having the greatest potential chance for long-range success."

I am sure that we have placed a great deal of emphasis and should place more on the education of the pregnant mothers. Do you also feel that that same kind of education is desirable in the elderly; that the eating habits of the elderly because of advanced years should be adjusted to those conditions and that they can stay healthier and in better shape, better mental and physical well-being, by education in connection with their nutritional needs?

Dr. KERR. I am sure that is true, Senator. The nutritional problems of older people are immense and they are immense because there are so many social and economic changes that go along with them. The friends with whom they have eaten are no longer there. It is difficult to shop. There may be great problems due to a fixed income. Many older people feel that they are imposing on their children and relatives when they eat with them. I don't see an easy solution for these problems.

Nutrition education which was directed to an older audience could be of value, but I would put an emphasis on programs like the "meals-on-wheels"[1] which could deliver food to older people and shut-ins. I think this is probably the most urgent need.

Senator PERCY. I wonder if you could provide, either through your own office or some of your colleagues, bibliographies on studies in connection with the elderly. We have a tremendous amount of material on infant nutrition and pregnant mothers, but I am not as familiar with the books on the elderly. I would very much appreciate having those sent to me if it is not too much trouble.

Dr. KERR. It won't be nearly as detailed or as complete as the information we have on infants and children.

Senator PERCY. But some material for my own use—I would like to go over it.

Dr. KERR. I will submit the information.

Senator PERCY. Your emphasis on nutrition education suggests that our infants will receive adequate nutrition so long as their mothers know the importance of nutrition and the meaning of a well-balanced diet. Is that your position?

EMPHASIS ON NUTRITION EDUCATION

Dr. KERR. It is the position that would have the best long-range chance of success. People's decision on what to eat at this moment or

[1] See also hearing of May 30, 1973; Select Committee on Nutrition and Human Needs; Nutrition and the Elderly, Part 1—Feeding the Elderly.

at this meal is going to depend on appetite, finances, and many social and cultural pressures; but I think an intelligent choice, a choice of food that is based on some nutritional knowledge, is much better than one that is based only on feelings.

There are always going to be problems in the nutrition of growing individuals as long as there is an inequity of wealth. I don't know any way to get around that. But I believe that, even with poverty, understanding of the relationships between nutrition, food, and health can prevent a great many of our current problems.

I have no difficulty in explaining nutrition to people who grew up in the same type of family situation, and were exposed to the same type of eating environment, as I was as a child. It has amazed me as I have spent more time talking with people from other backgrounds and from other races how totally out of touch I am with some of the beliefs that they grew up with, and they grew up with them because they were told them by their mother, who was told them by her mother, who received them from her mother; and some of the things that I accept as nutritional "fact" are not accepted at all as nutritional fact by other people. They have a different set of ground rules.

We have to find some way of communicating with each other and I think an educational system is the only way to do it.

Senator PERCY. To what extent, if any, do you feel, infants in this country are facing malnutrition or undernutrition? Is there any way, that you can measure that?

Dr. KERR. The traditional way of detecting malnutrition is by something you see with your eyes; once upon a time, you could see rickets and scurvy and pellagra. Ever since those days people have had the idea that we should be able to recognize malnutrition easily. The television shows a child from Bangladesh or a child from Biafra and the obvious and extreme malnutrition is painfully visible. I don't think we see that type of malnutrition.

What we see is inadequate physical growth, perhaps sleepiness in school, perhaps truancy, perhaps increased infections, perhaps low birth weight; but the nutritional basis is not something we "see" with our eyes. I think it is something we have to "recognize" because a child fits into a socioeconomic pattern in which subtle malnutrition is common. I can't give you a figure, but I think this type of malnutrition is very common.

Senator PERCY. Yesterday we had some criticism of processed baby foods by Dr. Derrick Jelliffe. This reminded me of the criticism we had of breakfast cereals in a committee some years ago that absolutely shook my faith in the American free enterprise system. I discovered then that shredded wheat that I had been chewing for years thinking that it is so dry in taste that it must be awfully nutritious and good for me, was next to the bottom out of the list of cereals. I am concerned to hear that behind these famous names that are on processed baby foods there may be some even harmful effects and certainly some of them are not as good as foods that could be prepared right in the kitchen.

Would you care to expand or comment or defend the American free enterprise system? What is your judgment on the quality of processed foods that are available now in the stores?

Baby Foods and the Consumer

Dr. Kerr. First of all, let me say that I am delighted to see that many of the young mothers I meet are actually preparing their own infant foods with their home blenders. Of course, that means they have a blender, and a market where fresh produce can be bought. And the required time and interest. If all of these requirements can be met, the mothers get great satisfaction. I am not sure that they are contributing all that much to the child's nutrition, but they feel they are, and I would strongly support their intentions.

The baby food industry really got started because there was a consumer demand for it, and the free enterprise system will always respond to a consumer demand. I think that the quality of most of these foods is very good. As I recollect, the economic price used to be about 11 cents for the small tins. I think the value received for the investment is very good.

The questions are: How about the added salt? Is this salt harmful from a hypertension point of view? I don't think there is any solid information about that. It conceivably could be, but on the other hand, the first thing a mother does is take a taste of the infant food, and if she doesn't like it because she is accustomed to a certain saltiness in her food, then she won't buy that product. I think this is a very understandable reason for adding salt to baby foods. Other additives, I think, have to face the same questions and criticisms that all the additives in our foods have to face.

I can't see any reason to be terribly critical of baby foods. For many women they have been of great value. You must remember that prior to these industries developing, and prior to pasteurization of milk, infant diarrhea was a major cause of death of infants. With this type of food packaging and pasteurization, that type of diarrhea death has become rare. I would think there has been a net benefit from the baby food industries rather than harm.

Senator Percy. I think for the record we should say that the purchase price on these, as I understand it, is still 11 cents which means they have been able to overcome through increased efficiency some problems because obviously their costs are higher. I am delighted to hear you say that.

I was also pleased to have shredded wheat reevaluated and it came up substantially in nutritional value in the second go-around so my faith was somewhat restored.

Do you have any evidence, doctor, from your Tunisia study which you can share with us at this time, particularly evidence about the influence of nutritional factors on growth and the development of children? I ask this because you seem skeptical of the proposition that undernutrition in early life may permanently compromise the physical and behavioral development of some children.

Influence of Nutritional Factors

Dr. Kerr. I don't have any solid information to give you at this point, Senator. It is a very tightly designed study. There is no way that the whole world can receive high quality protein in the form of meat and eggs and milk. It cannot be done. At least it cannot be done with present technology.

There is a possibility that by adding certain things to wheat, specifically amino acids and vitamins which are deficient in a wheat-based diet, the nutritional quality of that diet could be improved—at least on paper—to a level comparable to meat and eggs and milk.

This study[1] is designed to test that hypothesis: We are adding lysine and other nutrients to wheat in a particular area to see if, in the real world where there are diarrheas, and where there is limited stimulation, these additions can have a significant and beneficial effect on the biological development of children.

We should have this information in about a year. If they are shown to be of value, it will be of huge importance to the whole world. If they are shown to be of limited value, then each individual country will have to decide if it is really worth going to the expense of adding these nutrients to a diet. It is an important question to resolve.

Senator PERCY. Do you share the view of Dr. Winick, who says that nutrition education in medical schools is or should be a high priority?

Dr. KERR. Yes, I do.

Senator PERCY. We have a booklet prepared and distributed by the Department of Health, Education, and Welfare, entitled "Infant Care."[2] Are you familiar with that booklet?

Dr. KERR. Yes, I am.

Senator PERCY. There are several pages about food and feeding. What is your opinion of this material? Is it adequate to meet the educational needs of which you speak?

Dr. KERR. I can't recall in detail the contents of this book. Let me make one correction; I think increased nutrition education is important for medical schools, but I would go far further because there are many people who grow up without seeing physicians, If you limit this educational stimulus to medical schools, it is not going to reach those people. I think increased nutrition education has to be incorporated into nursing schools, schools of social work. I think it has to be part of the education of anybody who deals with people who may be in need of nutritional counseling.

Senator PERCY. I would very much appreciate for the record[3] and for the guidance of HEW, if you could glance through this and give us—we will hold this record open for 10 days or so—give us your considered judgment. We value your opinion very much indeed.

Dr. KERR. I would be glad to.

Senator PERCY. Finally, you indicate that it should take about 10 years before nutrition education programs would pay off in reaching the potential population of new mothers. Could you give us any suggestions as to what we should do in the meantime to prevent low birth weight babies?

Dr. KERR. Ten years would be the extreme long-range position. That would be achieved if nothing was done other than making a major change in the school lunch and breakfast programs and in the school health curriculum. I would hope that we could also start a

[1] See Appendix, p. 88.
[2] DHEW Publication No. (OCD) 73-15 Children's Bureau Publication 8-1973. Also available at Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price 75 cents. Stock No. 1791-0140.
[3] See Appendix, p. 106.

parallel program in educational television because television is going to reach every pregnant mother and every young girl who may be pregnant within the next year. This could be done this year, and this could produce positive results right away. I wouldn't wait for 10 years.

Senator PERCY. Thank you very much indeed, Dr. Kerr. We appreciate your being with us.

Our next two witnesses are Dr. Paul Zee and Dr. Alvin Mauer, both of whom are experienced with medical aspects of urban supplemental feeding programs for children. Dr. Zee is the chief of nutrition and metabolism at St. Jude Children's Research Hospital in Memphis, Tenn., and also associate professor of pediatrics and physiology at the University of Tennessee. He has done an evaluation of the Memphis area project called "MAP South," a supplemental feeding program for preschool children run by St. Jude's.

Dr. Mauer's testimony is based on his experience with the Mayor's Commission on Hunger and Malnutrition in Cincinnati, Ohio. Dr. Mauer is also professor of pediatrics at the University of Cincinnati School of Medicine and the director of the Division of Hematology, Children's Hospital Medical Center. He is also acting as an official representative of the American Academy of Pediatrics here today. He is a member of the Academy's Committee on Nutrition.

Dr. Zee and Dr. Mauer, we are very pleased to have you with us today and we look forward to your testimony on supplemental feeding programs. Dr. Mauer, I understand that your testimony will be a summary of your testimony plus the testimony of the American Academy of Pediatrics.

Dr. MAUER. Yes, sir. I would also like to introduce Miss Sallie Stemple, who is a research assistant with the Academy's Department of Government Liaison.

Senator PERCY. Very happy to have you.

STATEMENT OF DR. ALVIN MAUER, PROFESSOR OF PEDIATRICS, UNIVERSITY OF CINCINNATI COLLEGE OF MEDICINE, CINCINNATI, OHIO, ACCOMPANIED BY MISS SALLIE STEMPLE, RESEARCH ASSISTANT, ACADEMY OF PEDIATRICS, DEPARTMENT OF GOVERNMENT LIAISON

Dr. MAUER. I would, if I may, sir; summarize the three papers we presented you with and there are essentially two aspects we would like to review.

One is the work the academy has done with material in the Ten-State Nutrition Survey [1]; and second, we would like to focus on the problem of infant nutrition and specifically the problems of iron deficiency.

Now, concerning the Ten-State Nutrition Survey, perhaps it is worthwhile remembering that there were 22,000 children included in this survey, primarily of lower income groups. The income level—that is, the poverty level so defined—was set at one as a ratio, and there were about an equal number of children in this group who came from above and below. However, it is also worthwhile remembering that

[1] See Appendix, p. 109.

there were very few who were twice the poverty level, which would be an income of about $7,500 for a family of four. So essentially, when we are talking about comparisons I am going to discuss, we are talking about comparisons between very poor children and lower middle class.

Six-Point Summary

We think there are six points worthwhile summarizing. One is in the opinion of the committee that has reviewed this survey and we think it is a good survey and the information is valid and conclusions can be drawn from it which are useful.

Second, a point which has already been made by Dr. Kerr this morning, that in this survey there was little evidence of overt nutritional deficiency such as scurvy, rickets, beriberi, and protein malnutrition. However, there was widespread iron deficiency and specifically that about 70 percent of the black preschool children in the South were found to be iron-deficient and 30 percent of the white preschool children in the North in this group. So this was indeed a common deficiency.

Another point is that there was a correlation of stature and also the degree of fatness in these children with the economic status; and that is, the poor children were shorter and thinner than the group that were in the higher income group; but again, remember, we are only looking at the lower middle class as a comparison.

Another point is that, in addition—and I will bring this back again—is that there was a correlation of stature with hemoglobin values, so this was another correlation with evidence of nutritional status; and the feeling is that then the hemoglobin status and the degree of iron deficiency may really indicate a generalized nutritional problem perhaps more subtle in other aspects than the iron deficiency which is more easily defined.

And a final—and in the opinion of the committee—key finding was that there was not a qualitative inadequacy; that the diets actually, per calorie, had the same distribution of protein, fat, carbohydrate and vitamins; but the problem in the inadequate diets was a lack of total amount of diet, with one exception, and that was a relative deficiency of vitamin A in Southern Mexican-American children. But otherwise, it was a quantitative, not a qualitative, problem of diet.

Now, the committee continues to work with this data and will bring out by the end of the year more in the way of information concerning these data that were completed.

Now, what I would like to do is to focus specifically on the problem of infant nutrition and use as an indicator iron deficiency because, again, it is relatively easily defined and has some correlation with other indications of deficiency disease. I would like to talk some about our specific interest in Cincinnati and specifically with the development of this problem as a target for the Mayor's Commission on Hunger and Malnutrition.

Cause of Iron Deficiency

The reason for iron deficiency is fairly simple. Between birth and 1 year of age the infant has to have twice the amount of iron that he

has at birth. The only place to get this is from his diet. If he drinks only milk during that first year he will get only about one-fifth of the amount of iron he needs in his diet to give him enough at the end of 1 year. So that it is in almost all infants a problem of dietary deficiency.

I think one might ask the question: Well, how frequent is it? We have already talked about the high incidence in black children in the South. I think that there is some interesting correlations in urban areas with which I am most familiar. If you look at suburban practices of pediatrics the frequency of iron deficiency is less than 5 percent. However, in a study that we did during the early 1960's in Cincinnati looking at children between the ages of 1 and 3, 60 percent of the children some time during that time had iron deficiency anemia. In a study done in Chicago, they found it to be 70 percent, based on the Cook County Hospital Clinic population.

So in the inner-city areas we are talking about the same degree of iron deficiency as we are in the rural or the Southern black children. We are talking now about infants primarily, but actually it has been somewhat of a surprise to us to find that preschool children and a group of Head Start children studied and also children in the older age groups of 10–12, that we are finding degrees of iron deficiency as well, again related to the economic status.

So it is common and it tends to share an economic distribution pattern. Why is this economic distribution pattern so? Well, I think that there are probably several reasons that are fairly obvious. One is that in this group of people there is the least amount of nutritional education available. Another one is obviously a lack of money to buy appropriate foods and some of the supplements which are necessary. Another one is the fact that many of the women are, of necessity, working mothers. They leave their children with babysitters and certainly the easiest way to feed babies is to give them a bottle of milk, which again only provides them with one-fifth of the iron they need.

Sometimes large families can produce the same problem. That is, that the time that you take to feed a baby properly just is not there.

Already discussed is the problem of small babies or premature infants. These infants start off with smaller iron stores at birth. They have to have more iron during that first year of life because they have less at birth and, again, there is a direct relationship of frequency of prematurity to economic status.

Finally, there is perhaps in some situations, in severe nutritional deficiencies in mothers, a reflection of this in the infants.

So I think there are numbers of reasons why this does occur in this group.

What is the problem of iron deficiency? Well, an obvious problem is the fact that some of these infants become so iron deficient they become severely anemic and require hospitalization purely for anemia; and in the general experience in the group that we are dealing with, during the early 1960's, about two to four infants a month were admitted to our hospital wards for this purpose.

In addition to this, there are illnesses which ordinarily would not require hospitalization but, because of the additional factor of iron-deficiency anemia, these sick children need hospitalization. So the anemia itself can be a serious problem.

Now, the other problems are, again, the indication of the relationship of iron deficiency to growth, as we have talked about, and, again, perhaps reflecting general nutritional deficiency; and there are some recent studies available now which identify the iron-deficient child as having a lower school achievement and a shorter attention span. Again, the direct relationship of the iron deficiency to this problem is not an obvious one but the relationship certainly is there.

Prevention of Iron Deficiency

As far as iron deficiency is concerned, the thing is that it is an entirely preventable disorder and it is preventable under the circumstances of the inner-city children that we are talking about.

In a study done in Chicago, including a fair number of children using, in this particular instance, iron-fortified formulas, they were able to reduce the degree of iron deficiency to about 10 percent. In our experience in Cincinnati, we have used both in our Model Cities project iron-fortified formulas and also iron supplementation as supplement diets with iron drops, and in this case, we have been able to achieve a 90 percent reduction in this program through clinics.

The ideal perhaps really would be a good general diet, not the supplementation programs; but again, when we get into the problems of economics and some of the other things we have discussed, I think this is an ideal to be strived for but one that sometimes is very difficult to achieve.

Now, our conclusions, if I just might state them very briefly, is that indeed iron deficiency remains a common and serious problem in infants, especially in the inner-city areas. The most frequently affected are the infants of poor people; that iron-deficiency anemia in these circumstances can be completely preventable and I think methods of prevention have got to include health education as well as supplemental food programs.

In our experience again, the preventive programs are most effective when they are coordinated with health care facilities and community organizations, and I think one final point that concerns us is the fact that current funding cutbacks may affect programs which have been used in cities and successfully used to reduce the incidence of this nutritional deficiency disease.

I think in the statement that we have prepared for you we have identified some of these cutbacks which may affect this problem. One, of course, is the cutback in the supplemental food program initially designed to feed 450,000 people through providing supplemental foods which is now, in 1973, hitting only 175,000. That, in addition to this cutback in OEO funds, is going to reduce the availability of these foods because the OEO funds were used for delivery. These foods are exactly designed to get to the population that is nutritionally at greater risk. We think that there ought to be a greater effort made to monitor the distribution of some of these foods and, in fact, in some areas, for instance, they have been replacing powdered milk with canned pears in heavy syrup.

We also think that the special supplemental food programs, which is a 2-year pilot program authorized in September of 1972 by Congress, ought to be implemented. This is not designed to replace the programs,

but as we understand it, was designed to define better ways of distributing food. I am sure you are all well aware of the fact that this is not yet off the ground, in spite of the fact that it was authorized in 1972, and perhaps in this first year will not achieve full funding; and we are concerned again about the fact that it may not be designed in such a way to really answer the problems that we are looking for.

PREPARED STATEMENT OF DR. ALVIN M. MAUER

Mr. Chairman, I am Dr. Alvin M. Mauer, here today on behalf of the American Academy of Pediatrics, a professional organization of more than 14,000 board certified physicians providing health care to infants, children and adolescents. Accompanying me is Sallie Stemple, research assistant with the Academy's Department of Government Liaison.

The primary purpose of the American Academy of Pediatrics is to improve the health and welfare of children. We are present at these hearings to emphasize the absolutely essential role that adequate nutrition during the early years of life plays in the development and well-being of every individual and to recommend approaches whereby all children, regardless of economic background, may be assured of receiving sufficient quantity and quality of food. The need to accord special attention to pregnant and lactating women and to infants and preschool children is supported by biomedical data indicating that improper nutrition during gestation and during the first few years of life can adversely modify the course of a child's physical and mental development. Studies[1] have shown that iron, protein, and caloric deficiencies during the first 2 years of life are especially dangerous because of adverse effects upon the child's growth during a critical period of development.

By the same token, the nutritional experience of the mother is crucial to the child's development. There is increasing evidence that malnutrition in pregnant women contributes to the birth of premature and low-birth-weight infants. Prematurity and low-birth-weight contribute in turn to infant mortality and mental retardation. Seventy percent of all infant deaths in the first year of life occur in infants of low-birth-weight, and a disturbingly high proportion of the underweight babies who live have demonstrable intellectual or behavioral deficits when they reach school age.

We have learned much about the extent and nature of nutritional deficiencies among American children from the Academy's interpretation of data that were collected in the Ten-State Nutrition Survey. As a result of the desire to provide in-depth studies for those portions of the Ten-State data which pertain to 22,000 children under 17 years of age, the Academy initiated arrangements for a contract with the Center for Disease Control to prepare several reports on the various nutritional problems which are evidenced by the survey.

While the Academy's study of the Ten-State Survey is not yet complete, several major conclusions are apparent from the interpretation which has been done thus far. First, the survey provides ample evidence of retarded growth in children from low-income families. Relative to what would be expected for a well-nourished population, two times as many black and three times as many white children in families living in poverty (the lowest economic quartile) were below the 15th percentile for accepted American standards of height. With increasing family income there was a progressive decrease in the prevalence of undergrown children, and in certain age groups, children from higher income families were advanced in their height by as much as a year over children from lower income families.

The second major finding was the widespread prevalence of iron deficiency anemia throughout infancy, childhood and adolescence. For example, 70 percent of the black preschool children living in the South and 30 percent of the white preschool children in the North had unacceptable hemoglobin concentrations. This may be an indicator of a broader spectrum of nutritional inadequacies in American children since puberty is delayed in malnourished children.

Judging by the evidence of retarded growth and the prevalence of anemia, the Academy's committee which studied the Ten-State Survey concluded that "substantial numbers of the children examined in this large survey were indeed malnourished." Furthermore, the survey indicates that many pregnant and lactating women also suffer from low nutrient intakes. There was found to be a

[1] References at end of prepared statement.

widespread deficiency in protein and calorie intake among pregnant and lactating women in the lowest economic quartile. Women in all economic and ethnic groups were found to have insufficient dietary iron.

The fourth observation was that the diets of low income families did not differ in the concentration of essential nutrients from those of middle income groups, but that the amount of food available was directly related to family income. The total food intake of children in low-income families was limited, and this was reflected in growth performance. The first step, then, toward reducing malnutrition among low-income women and children is simply to make more food available to them.

Now that we have examined the parameters of the problem let us consider possible solutions. The Federal Government has ostensibly recognized the special nutritional needs of pregnant and lactating women and young children through the establishment of the Supplemental Food Program currently operated by the Department of Agriculture. The USDA's commitment to that program, however, is obviously not great. Originally designed to provide nutritious surplus foods to 450,000 people, the program had dwindled to 157,000 participants by the beginning of 1973. Now due to the elimination of OEO funds that had been used in many localities to administer the program and distribute the foods, one-third of the remaining supplemental programs are expected to close down by January 1974.

While the Supplemental Food Program is often cumbersome, it is a source of much needed food for thousands of people, and it is the only Federal feeding program currently in operation which focuses on the nutritionally vulnerable segment of our population comprising infants and mothers-to-be. The Academy though recognizing that this program is an interim solution, urges that the program be maintained through Federal efforts until a better means of feeding mothers and infants has been implemented. In the many areas where OEO funds had been used to distribute the surplus foods and where local communities cannot assume that responsibility, it is incumbent upon the Federal Government to lend its support.

We furthermore recommend that the USDA make some effort to monitor the quality of the foods distributed through the supplemental program. Some areas have recently reported that their supplies of powdered milk are being completely replaced by canned pears in heavy syrup. This kind of substitution indicates that the USDA is more concerned with agricultural and economic considerations than with nutritional need. We feel that it is clearly time for a change in that philosophy. We urge that the Congress and the Administration recognize that food and health are closely interrelated and that administration of feeding programs should therefore rest with the Department of Health, Education, and Welfare.

The other Federal program to which we will address ourselves is the Special Supplemental Food Program which is the 2-year pilot program authorized by Congress in September 1972. The $20 million a year pilot was designed, not to kill the current supplemental program, but to explore alternative approaches and to test the effects of those approaches. Unfortunately, the implementation of the pilot has been delayed for many months because USDA has not promulgated the regulations under which the program will operate. It is now apparent that none of the $20 million appropriated for fiscal year 1973 will be spent, and USDA's Food and Nutrition Service has stated that only about $5 million will be spent on the pilot in fiscal year 1974.

The Academy sees the pilot as an opportunity to assess various methods of providing nutritional supplements to a population at nutritional risk, under the assumption that the information derived from such an experiment would be used to expand maternal and infant feeding programs. Thus, USDA's waste of time and failure to use appropriated funds is not only detrimental to the success of the pilot but is a hindrance to the future development of feeding programs. We urge that program guidelines be issued forthwith and that the entire authorization of $20 million per year be appropriated and spent so that the pilot will be a meaningful tool for the collection of data and the fulfillment of nutritional needs, rather than a mere token exercise.

When USDA issues guidelines for the pilot, we would hope that those regulations will reflect the following concerns about the quality of the program. First, the Academy recognizes that providing extra food for pregnant and lactating women presents difficulties not encountered in the provision of formulas for infants, yet the mother's health is crucial to the development of the fetus and her needs must be addressed as well as those of the infant. We recommend that the pilot sites be selected such that all eligible groups—pregnant and lactating

women, infants, and children under 4 years of age—will be included at each site and a choice of foods will be available. We also recommend that the medical evaluation called for in the law which establishes the pilot (P.L. 92-433) not be emphasized to the point that a large percentage of the funds are spent on evaluation rather than feeding operations. We do not need to prove that food is good for children, but we do need to discover the most effective ways of getting nutritious foods to mothers and infants. Cost benefit studies are inappropriate. We feed children because they are hungry, not for any perceived or derived social benefits.

Looking toward the future, the Academy feels that a national commitment to the improvement of maternal and infant nutrition is needed. At the current time, we must focus a special effort on the needs of these particularly vulnerable segments of our population because our family feeding programs are not adequate to do so themselves. Ultimately, however, we must recognize that a mother's health during pregnancy and the health of her fetus is a function of her health and nutritional status throughout her entire life and that poor nutrition among all age groups helps to perpetuate poor health in succeeding generations. If we are to improve the health of our children, the total needs of the entire family must be met.

One step we would recommend in the fight to eliminate malnutrition among our total population is the revision of the Economy Food Plan, upon which eligibility for most of the USDA feeding programs is based. The economy diet provided by the Food Stamp Program, the Commodity Distribution Program, and so forth, may be theoretically adequate but is totally unrealistic in practice. With rising food prices, the nutritional needs of low-income families are becoming even more acute. We know that the Congress is well aware of the inadequacy of the Economy Food Plan and would hope that you might serve as our advocates before the USDA on this issue.

Finally, we wish to point out that meeting nutritional needs is only part of the solution to the health problems of our nation. In every community, nutrition programs must be coordinated with comprehensive health care and with community action efforts. Without intensive outreach activities and without follow-up and preventive health services, improvement of nutritional status cannot have its full potential impact upon improving the quality of life for mothers, for infants, and for all Americans.

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Dr. MAUER. Thank you.

Senator PERCY. Thank you, Dr. Mauer, very much indeed.

Dr. Zee, why don't we have you give your testimony and then we will ask a few questions of both of you.

STATEMENT OF DR. PAUL ZEE, ASSOCIATE PROFESSOR OF PEDIATRICS AND PHYSIOLOGY, UNIVERSITY OF TENNESSEE; CHIEF, NUTRITION AND METABOLISM, ST. JUDE CHILDREN'S RESEARCH HOSPITAL, MEMPHIS, TENN.

Dr. ZEE. I appreciate this opportunity to speak to you about the results of two nutrition surveys conducted in Memphis, Tenn., to determine the nutritional status of infants and children from im-

poverished families in this city. The first survey demonstrates that nutritional benefits have accrued in preschool children from south Memphis who participated in a USDA supplemental food program and other Federal food assistance programs over a 3-year period. The second survey revealed definite nutritional improvement in infants who received a warehouse-distributed iron-enriched formula during their first 6 months of life.

Results of Two Nutrition Studies

1. EFFECT OF USDA SUPPLEMENTAL FOOD PROGRAM FOR PRESCHOOL CHILDREN

For the past 3½ years St. Jude Children's Research Hospital, a private institution which conducts research in childhood diseases, has been actively participating with a black community organization, Memphis Area Project South (hereafter referred to as MAP South), in an effort to define and modify the prevalent nutritional problems existing in the area. In 1969 a supplemental food program for preschool children was initiated in south Memphis through a contractual agreement between the USDA—who would donate the food—MAP South—who would store and distribute the food—and St. Jude Hospital--who would provide medical authorization for the food. In the spring of 1969, 2,500 children were at that time enrolled in the program but only a few had begun to receive food. A survey conducted revealed that many of the children were stunted in growth, had deficient levels of vitamin A in their blood, and were anemic. In fact, the figures were almost the same as the figures in the Ten-State Survey.

A second survey was conducted 3 years later. By this time 56 percent of the families received food stamps, a fourfold increase since 1969 and 10 percent of the children received two meals every weekday at day care centers, as opposed to none at the time of the initial survey.

The results of this second study showed that the excess proportion of small children noted in 1969 was decreasing and that the distribution of heights and weights was approaching those of healthy white children. More specifically, in 1969, 50 percent of the preschool children were below the 25th percentile for height and weight on the growth chart of the Harvard School of Public Health—Stuart and Meredith. In 1972, however, only 29 percent of the children were below the 25th percentile for height and 39 percent were below this percentile for weight. These changes were statistically significant and similar changes were seen at most percentiles, indicating a shift in the overall population to more favorable heights and weights.

Iron-deficiency anemia, found in 28 percent of all children under 3 years of age in 1969, dropped to 11 percent in the 1972 survey. Iron deficiency was more extensively studied in the later survey by measuring the serum-iron content in 55 randomly selected children. Fifty-three percent of the children under 2 years of age and 37 percent 3 and 6 years old, were found to be iron deficient. Thirty-six percent of the children who were not considered anemic because they had normal hemoglobin concentrations in their blood did lack sufficient iron in their serum to build new hemoglobin, and therefore could be considered to be at risk for anemia.

Plasma vitamin A concentrations, low in 44 percent of the preschoolers in 1969, were now low in only 26 percent of the children.

Our general conclusion from this survey is that significant nutritional benefits can be achieved from Federal food assistance programs. Family interviews revealed no significant increase in annual income—$1,890 in both 1969 and 1972—in per capita income—$270 in 1969 compared to $275 in 1972—or in family size. Neither have we discovered any important economic improvements in the area. Thus, the main factors contributing to the improved nutritional status were:

1. Participation in the supplemental food program;
2. An increased use of food stamps; and
3. Meals provided by day-care centers. Although difficult to evaluate, it is possible that an increased awareness of the importance of food for children, and greater resourcefulness of the population associated with increasing political strength, may also have contributed to the observed nutritional improvements.

The program's apparent success should not obscure one important point: It can be made more effective. One way to achieve this goal would be to choose commodity foods in such a way that they will correct or prevent deficiencies existing in the population they serve. The supplemental food program, for example, does not provide enough iron to eradicate iron-deficiency anemia. Admittedly, iron is made available in the wheat cereal (Farina) now supplied but this food is not favored by many of the children. Other deficiencies are the lack of nutritional education, from which the program would greatly benefit, and transportation of the food package to the home is a frequent problem; and third, we also should have some kind of nutritional evaluation and monitoring of the program to make changes when deficiencies become apparent and to evaluate the program.

In summary, the Federal food assistance programs have proven effective in an urban black community in Memphis. They should be continued and improved to eradicate persisting deficiencies.

II. INFANT FORMULA PROGRAM

In seeking a practical solution to the high incidence of stunted growth and nutritional deficiencies in preschoolers, St. Jude has made available, through warehouse distribution, an enriched infant formula during the first 6 months of life and have determined how well it protects the infants against serious nutritional deficiencies. The warehouse provides no nutritional advice or medical care when dispensing food; rather, the families initiate medical care for their infants at the local public health clinic, as is customary in the area.

We focused on infants because it seemed that in this age group the greatest need could be met at the least expense. This assumption was based on the following facts:

1. A program directed toward the nutrition of the fetus would involve changing maternal food habits, an almost impossible achievement, and providing both food and prenatal care—all of which are expensive and frequently produce discouraging results.
2. Infants are more vulnerable to nutritional deficiencies because their brains and bodies grow faster than at any other time in their future life.

3. Infants need no education.

4. All necessary nutrients can be provided in a formula, thus requiring no nutritional acumen on the part of the mother.

5. Providing infant formula is an inexpensive method of improving the nutritional status of the recipient. The negotiated price in Memphis for 1 day's supply is 21 cents.

In the summer of 1971 we visited and examined all 1-year-old infants who had received the iron-enriched formula during their first 6 months of life. Results of this survey showed that the height and weight distribution of these infants resembled those of healthy white children (determined from the growth chart of the Harvard School of Public Health), despite the fact that they had started life with below-average birth weights. When we compared these infants with others in the same area who received only evaporated milk formula, we found that the incidence of anemia was sharply reduced in the former group (7 percent compared to 31 percent). Unacceptable vitamin A levels occurred in 13 percent of the children, but the incidence was twice as high in the evaporated milk group. On the basis of this pilot study and other information, Memphis instituted a citywide distribution of infant formula in September 1972. The effects of this program have been studied and found to be similar to those in the pilot survey.

One observation demonstrating the protective effect of the formula is of particular interest. Because the citywide program lacked sufficient funds, only the smaller infants, up to 7 pounds, were provided with the enriched formula. These infants were often the first child of a teenage mother. Yet, at the age of 1 year, these infants were in better nutritional condition than the infants fed evaporated milk. Their lengths and weights did not differ from the evaporated-milk group, whom we found to have higher birth weights and more experienced mothers (that is, the mothers were older when they delivered, they usually had other children, and they introduced solid foods earlier to the infant's diet). Despite the advantages with which they began life, the evaporated-milk babies were found to have more anemia and more vitamin A, B_2, and C deficiencies than the babies given the iron-enriched formula.

In summary, we conclude that warehouse distribution of an enriched formula is a realistic solution to the problem of anemia, lagging growth and vitamin deficiencies among infants living in poverty.

Senator PERCY. Dr. Zee, thank you very much indeed. You mentioned the absolute and measurable growth and progress in height and weight. Do you have any way, or any feeling, that along with this growth there was also mental development that might have been stunted otherwise?

Dr. ZEE. We have not studied this—we do not have the facilities to study the psychological effects. We have noticed that in 40 percent of these children the head circumference increased from a lower growth percentile to a higher percentile in the first 6 months of life and in 10 percent of the children the head circumference advanced three growth channels in the first 6 months of life.

Senator PERCY. Were there feelings or an indication that as a child progressed from a malnourished child into a healthy child that all of

their responses were better, their learning capability improved, and that that child's chances for success and keeping up with his contemporaries and so forth was materially improved?

Dr ZEE. We have no data on this, but we do get this impression at our home visits. This study is only 2 years old. We are only in the second year and we would like to do this. We have heard mothers complain that the children became more active and more mischievous, and therefore they stopped the vitamins.

Senator PERCY. I just assumed that malnutrition leaves a person, whether it is an adult or a child, in a condition of being much more placid than a healthy person who is more active and vigorous, and troublesome, as well, you might say, in a sense; but that is really what you are trying to develop in a child, an inquiring mind and an inquiring attitude.

Without objection, we will insert into the record an article "How To Save Babies for Two Dimes a day,"[1] based on this work.

I would ask Miss Stemple, is there anything you would like to comment on at this time?

Miss STEMPLE. Perhaps I could just emphasize a few of the points that we made in our written statement but did not bring out here orally, particularly in regard to the Federal programs that now focus on these vulnerable age groups.

THE SUPPLEMENTAL PROGRAMS

The academy has publicly supported the continued maintenance of the existing supplemental programs[2] because we feel that it is the only program at the current time that does focus on pregnant women, lactating women, infants, and young children. Where local areas are not able to take over the funding that has been cut off through the lack of OEO funds that were previously used to administer the programs, we feel it is incumbent upon the Federal Government to help those areas out.

With regard to the pilot supplemental program, we also think that there are some important points to be made. First of all, we hope that the guidelines under which this program will operate will be issued immediately, which we have been saying for some time, and we hope that the full funding for at least the next year will be spent.

We also hope that at each pilot site all eligible age groups, pregnant women, lactating women, infants through children 4 years of age are included. I think it is easier perhaps to design programs where just infants up to 1 year of age would be concentrated on, but the health of the mother is extremely important to the health of the fetus and we would like to emphasize this point and emphasize that perhaps a variety of foods be available to the mother.

Another point that we have made in the written statement is the danger of letting the medical evaluation that is called for in the pilot absorb funds that should be used in feeding operations. Medical evaluation has a place, but I think we know that food is good for children and I think what we need to know is how to get the food to mothers and children.

[1] See Appendix, p 115.
[2] See Appendix, p 113.

We made a statement in the written testimony that cost/benefit analyses are really inappropriate; that we feed children because they are hungry, not because of some perceived social benefit.

Senator PERCY. Well, I would like to say there, though, that as a practical politician and legislator, many times you have to put these things in terms that will not just be humanitarian. That doesn't touch the cockles of the hearts of some of my colleagues, and you have to find a way of putting this in a cost/benefit relationship here. You have to put it in terms so that they have to feel as though they are voting against high cost of Government, more welfare cases and so forth, to justify it in their own conscience in a period when budgets are tight and so forth.

So I have to always try to find a way to express it both to those for whom the humanitarian appeal is proper and right and will reach them, but also, for those who would have a tendency to feel that these programs—that the Government has no business in these programs. But we have to recognize Government is in them as a source of last resort for someone who can't make it on his own, and certainly for the mentally deficient, the physically handicapped and the poor, for whom we have assumed that we have a responsibility.

Now, our job is to try to prevent them from getting into that category if it is possible to do so through this kind of program.

Miss STEMPLE. I understand that, but it is the balance that I think is important. The academy's major function is to promote the health and welfare of children, and I think groups like ours—I know the Government is more concerned with the economics and we are more concerned with the humanitarian aspects. So we are just reminding you.

Senator PERCY. Very well.

Miss STEMPLE. The other point that I think we made in our paper is that ideally the family should be the basic feeding unit and that the problems of the needs of every member of the family should be met. A mother's health during pregnancy and the health of her fetus is a function of her health and nutritional status throughout her entire life span. So that poor nutrition at any age group contributes then to poor health in succeeding generations.

Along that line, I think we would recommend that the Economy Food plan on which many of the Department of Agriculture programs are based, seems unrealistic to us, which was corroborated by a study done by the staff of this subcommittee not long ago in 1972, and I think we urge the Congress to be our advocate before the Department of Agriculture in seeking to revise that food plan.

Senator PERCY. Well, I thank you very much for that valuable contribution.

Dr. Mauer, you are a member of the Committee on Nutrition of the Academy of Pediatrics. Has the academy taken any formal position with respect to nutrition during infancy or the place of Federal food programs in assuring adequate nutrition during infancy?

Dr. MAUER. The academy has, as Miss Stemple just brought out gone on record that we are in favor of these supplemental food programs as necessary at this time.

Senator PERCY. As a pediatrician, do you have any doubts whatsoever about the detrimental effects of malnutrition during infancy on the mental and physical health of the child?

NUTRITIONAL DEFICIENCY AND INTELLECTUAL ACHIEVEMENT

Dr. MAUER. Certainly, as far as the physical health of the child, I think there is no doubt that nutritional deficiencies, such as iron deficiency, can be a real detriment. I think that a very important problem obviously is the relationships which appear again and again between nutritional deficiency and poor school performance, for instance, and the evidence I think at this time is certainly far from conclusive, but I think it is to the point now that the burden of proof is on those who would say that indeed there is no relationship between nutritional deficiency and intellectual achievement; and I think that studies need to be done and I think they could be done, for instance, with the USDA program possibly, and I think that, as Dr. Zee has brought out, an obviously important part of that study is to evaluate these children now with their feeding programs who are now bigger as to whether they are also better achievers.

As I say I think the burden of proof is now on the other side.

Senator PERCY. Dr. Zee, is there any doubt in your mind that it is possible to improve significantly the nutritional status of pre-school children through the operation of the USDA supplemental food program?

Dr. ZEE. I think our data bear this out, Senator.

Senator PERCY. Is the fortified formula program a USDA supported one?

Dr. ZEE. It is not. The pilot program I discussed with you was privately funded. The city of Memphis funds the present citywide formula program.

Senator PERCY. Is there any doubt that this program can overcome some, if not all, of the health risks associated with a low birth weight?

Dr. ZEE. I cannot be sure about that because there are two kinds of low birth weight children. The true premature baby will benefit significantly and probably do well. The low birth weight baby who was born at term but suffered severe malnutrition during gestation may have special problems and may always catch up completely in future years. We see many small newborns, more than 50 percent are below the 25th percentile for normal birth weights (Boston chart). In our program, receiving the enriched formula, they had caught up at 6 months of age and the height and weight distribution was as expected from the Boston growth chart.

Senator PERCY. Is there any doubt in your mind that the malnutrition or undernutrition during the preschool years can seriously and permanently affect the physical and mental development of the child?

Dr. ZEE. I believe there is plenty of evidence now, especially from such studies done by Dr. Burch,[1] that there is indeed an association between malnutrition and decreased intellectual performance.

Senator PERCY. Do you feel that there is any alternative to the operation of the supplemental food program? In other words, can the same results be achieved solely through the operation of the family food assistance programs, that is, the food stamp and commodity distribution programs?

[1] Malnutrition, Learning and Intelligence; American Journal of Public Health 62, pp. 773–784, 1972.

Dr. ZEE. I doubt so and I know my view contrasts with the first speaker, but I believe nutritional education, although it is very important, will have a long range effect and no immediate effect. It would not help the children that are at risk right now.

Second, I feel that the health of small infants is so important from a public health point of view that it is cheaper to give the mother the formula than to wait until she is educated enough to buy and prepare the proper foods. It is like asking the mothers to take it on their own to get the child's immunization. It does work but we also find that many are delinquent and that there are epidemics of diphtheria in this country despite the immunization program.

Senator PERCY. Dr. Mauer, yesterday we had an interesting discussion on breast fed babies. I had a long talk with my wife about it last night just to be certain to emphasize it to our own children. I learned a lot yesterday as a result of it. I had kind of gone along with the habit or the feeling that this is something now that modern women haven't time for and all these convenient foods and formulas are available so why bother with it. But the evidence was really quite convincing.

Is there any difference, in your judgment, between breast fed babies and the nonbreast fed babies in the incidence of iron deficiency?

IMPORTANCE OF TOTAL DIET

Dr. MAUER. I think in both infants, whether fed formula or fed breast milk, if given an adequate diet, there will not be iron deficiency in either group. So the importance is not so much the milk—but I think the really important thing is the knowledge about the total diet for the infant during that first year.

Senator PERCY. Would it be possible to reduce the frequency of this deficiency if more babies were breast fed, or do you just feel that there wouldn't be any effect?

Dr. MAUER. Yes.

Senator PERCY. You say there is inconclusive evidence about the effect of iron deficiency on the growth and development of affected infants. Surely, as a pediatrician deeply involved with the health problem, you have formed an opinion about its most likely effects.

Could you share this opinion with us?

Dr. MAUER. I think I can speak first as a scientist and then as a pediatrician. As a scientist, we have relationships of iron deficiency to short stature, relationships of iron deficiency to poor achievement in school. I brought a paper along which is in the May 1972 "Journal of Pediatrics," by Webb and Oski, which shows a relationship. Whether it is a causal relationship is something else again. This is what has to be gotten to as a scientist.

As a pediatrician, I think that we have got to accept that this relationship is such that one would recommend good nutrition.

Senator PERCY. And, Miss Stemple, is the Cincinnati program—how is that program funded? Can you tell us?

Miss STEMPLE. I think Dr. Mauer should answer that one.

Dr. MAUER. The Cincinnati program is funded—well, it used to be funded partially through OEO. It has been funded partially

through Model Cities. The time is donated by members of the commission, and I will tell you, currently we are scratching.

Senator PERCY. Then it is not affected by the cutback in USDA budget?

Dr. MAUER. No. We have been trying to make ourselves available to the USDA in terms of contract application, but as you have already heard, these guidelines are not yet available.

Senator PERCY. And, Dr. Zee, do you believe the MAP-South experience with the supplemental feeding program can be duplicated elsewhere or is this program so unique that it actually is not applicable to the situation anyplace else?

Dr. ZEE. I believe it can be duplicated in other areas, too; especially when there is a motivated community organization such as MAP-South. We did not inject medical care into our pilot studies, which we did for realistic reasons. Many programs do not have additional health care or nutritional health care to offer. Our enriched infant formula was warehouse distributed, without nutritional counsel and without well child care. Consequently we have shown our improvements independent of medical care. I believe the program can be duplicated. The tools that we use, food stamps, supplemental foods, infant formulas, can be made available in such mixtures as we used—80 percent USDA supplemental foods, 56 percent food stamps, 100 percent formula participation—in almost any ghetto in the United States.

Senator PERCY. Do you believe that the nutritional deficiencies that you found in your 1969 survey are ones which are duplicated in similar preschool populations in other parts of the country?

Dr. ZEE. I don't know this for sure but when I see the figures of the Ten-State Survey I see great similarities, a similar incidence of anemia, vitamin A deficiency and so forth.

Senator PERCY. In your statement you talk about followup studies of iron deficiency. Have you or have you not been able to reduce the level of iron deficiency in the children participating in your program?

Dr. ZEE. There is a definite reduction in iron deficiency anemia, especially in the first year of life, and I think that is where the iron-fortified infant formula had its effect.

Senator PERCY. We are going to be dealing on the floor with amendments, I think today or tomorrow, in the Department of Agriculture program on commodity food distribution. I will be putting in amendments to provide authorization for the Department when they don't have surplus foods to buy what is needed and required certainly for those cities which depend entirely upon surplus foods. I have always criticized these programs as programs not designed for people but designed for farmers that dump whatever they have left over. I wonder, for instance, when there is no fruit juice available, no surplus of that commodity, what do the children do for the next few years then? It seems ridiculous. It ought to be really geared for the needs of people, not just to get rid of stuff that we had an abundance of in the 1930's but don't have in abundance today.

You say that the program could be made even more effective by better choice of the commodity foods included in the program. Are these the same commodities which are made available through the commodity distribution program now?

ADEQUACY OF COMMODITY PROGRAM

Dr. ZEE. Not exactly. It is not difficult to add some vitamin A to the program or more protein, and other nutrients that are demonstrated to be needed.

Senator PERCY. What do you find is your experience with commodity food distribution as to the adequacy of it and the balanced diet that it provides?

Dr. ZEE. The commodity program does not gear itself to the deficiencies existing in the community. We continue to find iron deficiency and vitamin A deficiency and so on. The supply of vitamin A for one child for 1 year, I am told, costs less than 1 penny. I am sure there is a possibility financially as well as technologically to incorporate this essential nutrient, and other critical nutrients into commodity foods.

Senator PERCY. Well, I think that cost factor is very important. I would like to ask you one question finally. Is it not true that the same effects could be achieved at lower costs by encouraging women to breast feed their infants? What is your feeling about advice to mothers about breast feeding?

Dr. ZEE. I think there are two distinct situations each requiring a different answer: One is—a public health problem—when dealing with a large undernourished infant population, an enriched formula is preferred, especially when few facilities are available to guarantee the lactating mother adequate nutrition or help with breast infections, encouragement, failure to nurse adequately, and with nutritional supplements. On the other hand, as a physician consulted by one mother for advice, I always suggest breast feeding and favor it very vigorously. We do so with our families at St. Jude Hospital and we encourage it in our prenatal clinic. We let Le Leche come in to discuss it with our mothers. On the other hand the trend in the population is not to breast feed. It is not practiced in the city hospital, I think because of personnel shortages since babies have to be brought out to the mother. When dealing with large populations where the trend is not to breast feed, I recommend an enriched infant formula, but by all means we should allow for the possibility of breast feeding. In this instance, the mother, instead of receiving infant formula, should get something for herself, such as a fortified liquid supplement, to provide the extra 1,000 calories a day she needs to sustain breast feeding. Also, the extra 1,000 calories and counseling it, exceeds by far the price to feed an infant.

Senator PERCY. Would you care to comment a little—either one of you—on the psychological aspects of breast feeding and what it does to the relationship between mother and child?

Dr. MAUER. Well, I am afraid I am really not an expert in that particular field and I know that there is considerable suggestion—I listened one evening to Margaret Mead tell me that the problems with today's youth stem entirely from the fact that they were not breast fed. Unfortunately, she was not able to reference this contention. But I think that that is exactly where we stand, that there is the suggestion that the psychological benefits are very important with breast feeding. I think there is, again, no question from studies that have been done with infant monkeys that the business of holding and fondling the

infant as it grows up is very important. Now, whether this can be accomplished by means other than breast feeding, of course, is something else. Sure, the indication is there, but I think that maybe Margaret Mead has gone a little bit far in her contention that this is that important.

Senator PERCY. Well, we thank the three of you very much indeed and you have been most helpful and interesting.

Our final witness today will be Dr. Roy M. Pitkin, professor of obstetrics and gynecology, University of Iowa College of Medicine. Dr. Pitkin is also chairman of the Committee on Nutrition of the American College of Obstetricians and Gynecologists and will represent the position of that group here today.

Dr. Pitkin, we thank you for coming in from Iowa to be with us today.

STATEMENT OF DR. ROY M. PITKIN, PROFESSOR OF OBSTETRICS AND GYNECOLOGY, UNIVERSITY OF IOWA COLLEGE OF MEDICINE; CHAIRMAN, COMMITTEE ON NUTRITION, AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS

Dr. PITKIN. Thank you, Senator Percy. I have a prepared statement which has been filed with the committee and which I would like to summarize.

The American College of Obstetricians and Gynecologists (ACOG) is the professional organization of specialists in obstetrics-gynecology. As such, it is dedicated to maintenance of the highest standards in patient care, medical education, and research in the discipline. The college views nutrition as an extremely important area of health concern, based on the recognition that the future health of mankind depends, to a very considerable degree, on nutritional foundations laid down during prenatal life. Tangible evidence of the college's concern and commitment in the area of nutrition is the policy statement on nutrition and pregnancy adopted by unanimous vote of the executive board in December 1972. To the best of my knowledge, the American College of Obstetricians and Gynecologists is the only major medical organization to have stated such a broad official policy with respect to nutrition. The ACOG policy statement affirms the importance of nutrition before, during, and after pregnancy in determining the health and well-being of women and their children. It further affirms the responsibility of the obstetrician-gynecologist in seeing that nutritional assessment, advice, and management are included in the care of patients under his supervision and it describes methods by which these may be accomplished. Finally, it lists general characteristics of optimal maternal diet in pregnancy and lactation, as best these can be determined in the light of present knowledge. Complete copies of this policy statement [1] have been distributed to the members of this committee and I hereby request that it be made a part of the permanent record of these hearings.

Senator PERCY. It will be done.

[1] See Appendix, p. 113.

Importance of Nutritional Influence on Pregnancy

Dr. Pitkin. Considerable evidence indicating the importance of nutritional influences on the course and outcome of pregnancy comes from animal experiments. Over the years, a large number of studies have been done, involving principally the rat. At the risk of oversimplification, the results may be summarized by stating that restrictions of maternal diet—particularly protein—during pregnancy results in diminution of number of young, size of individual young, proportion of liveborns, and survival and subsequent growth of the offspring. Not only is subsequent development impaired but there seem to be adverse effects on certain metabolic processes and intellectual function—as best this can be measured in the experimental animal—as well. Studies of the cellular aspects of growth utilizing determination of cell number and size offer an appealing explanation of how an insult—for example, nutritional deprivation—during development—that is, during intrauterine life—could have far-reaching and irreversible effects.

In interpreting such data, however, it is imperative to keep the matter of species variation constantly in mind. Reproduction is the one biologic phenomenon in which, more than any other, the human differs from lower animals. Comparing humans and rats, for example, there are obvious differences in usual diet, number of offspring, ratio of maternal size to size of either the litter or the individual young, and state of maturity and development at birth. I do not mean to denigrate the importance of animal experiments. They can be extremely meaningful in a number of ways. But a proper perspective is absolutely essential.

For obvious reasons, it is not possible to conduct experiments in the human such as those summarized above. The available information, while generally supporting the concept of nutrition as an important determinant of pregnancy outcome, indicates that the situation is an extremely complex one. The effect of nutrition during pregnancy on birth weight of the infant seems relatively clear. maternal weight gain in pregnancy has been demonstrated repeatedly to have a strong positive association with birth weight. At best, weight gain is a gross index of nutrition and birth weight a similarly gross index of intrauterine development; yet, the positive correlation between the two almost certainly indicates some degree of cause-effect relationship. Moreover, severe degrees of acute maternal starvation occurring during wartime have been studied extensively and found to be associated with substantial falls in mean infant birth weight. In addition, supplemental feeding programs during pregnancy in individuals of presumably deficient nutritional status have been reported to increase birth weight. In addition, supplemental feeding programs during pregnancy in individuals of presumably deficient nutritional status have been reported to increase birth weight.

Thus far, the human evidence as summarized above seems quite consistent with the animal experiments. There are other data, however, which do not fit quite so neatly. For example, a recent report [1]

[1] Stein, Z., Susser, M., Saenger, G., and Marolla, F.: Nutrition and mental performance. Science 178:708-713, 1972.

of intelligence tests in 19-year-old surviving male cohorts of the Dutch famine of 1944–45 showed no apparent difference in IQ between men whose mothers had been exposed to famine during pregnancy and those whose mothers had not. Another seeming inconsistency is the specific nutrient which is most critical; animal experiments indicate that it is protein but a recently reported nutritional intervention study[1] in Guatemala indicates that increased birth weight in a previously malnourished population will result from supplemental calories alone, just the same as from supplementation of calories and protein. At the present time, it is unclear how much of the explanation of these apparent discrepancies lies with species variation and how much with methodological inadequacy. Whatever the case may be, we can be reasonably confident in the relationship between maternal nutrition during pregnancy—as reflected by weight gain—and birth weight. This relationship, coupled with the well-documented handicaps imposed by low birth weight, is adequate reason to advocate comprehensive programs insuring adequate nutrition for all women during pregnancy.

Attempts to define precisely the composition of optimal maternal diet in pregnancy and lactation are severely limited by the numerous gaps in current knowledge as well as by the multitude of imponderables surrounding the physiology of human reproduction. Nevertheless, it can be stated with reasonable certainty that virtually all nutritional elements known to be essential in human nutrition are required in increased amounts in pregnancy and lactation. This applies particularly to calories, protein, iron, folic acid, and most other vitamins and minerals including sodium.

Because of the complexity of the reciprocal relationships between nutrition and reproduction, there exists an inherent danger of oversimplification. At one extreme is a body of opinion which holds that nutrition is not really of importance in determining the course and outcome of pregnancy. At the other extreme, some believe that nutritional inadequacy is responsible for virtually all reproductive casualties and that provision of optimal nutrition would totally eliminate complications of reproduction. Both of these simplistic philosophies I believe to be erroneous. Nutrition is one of several influences—in my opinion, the most important one—on reproductive performance, but I do not believe it to be the only one. Nor do I believe good nutrition to be a panacea for all complications of pregnancy.

In summary, a woman's nutritional status before, during, and after pregnancy quite clearly has a profound influence on the course and outcome of reproduction. Adequate diet is important in promoting fetal growth and development while, at the same time, preserving maternal homeostasis. There is no doubt in my mind that provision of high quality nutrition services as an integral part of complete maternity care would have far-reaching beneficial effects on maternal and child health and thereby on the health of our Nation, both now and in the future.

[1] Habicht, J. P., Yarbrough, C., Lechtig, A., and Klein, R. E. "Relation of Maternal Supplementary Feeding During Pregnancy to Birthweight and Other Socio-biological Factors." Paper presented before the Symposium on Intrauterine Malnutrition, New York City, November 1972 (Proc. in process) or Habicht, J. P.: Testimony before Select Committee on Nutrition and Human Needs, U.S. Senate, June 5, 1973.

Senator PERCY. Fine. Dr. Pitkin, could I ask you, first, for your observations on the advantages and disadvantages of breast feeding?

ADVANTAGES AND DISADVANTAGES OF BREAST FEEDING

Dr. PITKIN. I think these occur at two levels; physiologic and psychologic. Physiologically, there can be little question that breast feeding offers some advantages since all commercially prepared infant formulas are attempts to imitate mother's milk—rather good attempts with present technology.

The psychological advantages have been alluded to and I agree these are not really subject to qualification. One can speculate that the mother/child nurturing relationship established with nursing has a profound effect on subsequent child development, but it still represents a speculation.

Now, from a very pragmatic point of view. in counseling mothers and expectant mothers, I think that one runs a risk of overselling breast feeding and then, when breast feeding is unsuccessful, usually for emotional reasons, the woman experiences great guilt feelings. In other words, I think there is this risk of talking women into it and then having them be a failure at it, with resulting unhappiness.

Senator PERCY. Your comments would be appreciated on the disparity in optimum weights between the statement of the American College of Obstetricians and Gynecologists which suggests an average weight gain of 22 to 27 pounds during pregnancy and the figure I have seen of 30 to 34 pounds as the optimal weight gain—and that is taken from the book, "The Woman and Her Pregnancies," a collaborative perinatal study of the National Institute of Neurological Diseases and Stroke. This book also notes that prevailing obstetrical practice limits weight gain to 20 pounds. I understand that some obstetricians still limit the weight gain to 10 to 14 pounds.

Can you comment on this wide disparity? What is the confused mother, studying, reading, probing, digging, trying to get the best advice she can get—what is she to follow? Whichever book she happens to grab ahold of or what?

Dr. PITKIN. Well, there certainly is a great deal of confusion because more than anything else, thought has changed in this area of recent years. The concept that limitation of weight gain in pregnancy was desirable seems to have come from an observation—it was probably a chance observation—noted in certain areas of Europe subjected to widespread malnutrition following World War I. In these areas, the incidence of toxemia of pregnancy declined precipitously and the association was made that it was due to restricted caloric intake. In retrospect, it was most surely due to the fact that there were fewer women having their first pregnancies during this time of extreme deprivation and toxemia of pregnancy is, by and large, a complication of women who are pregnant for the first time.

Be that as it may, the idea grew up in the 1930's that a restriction of caloric intake would diminish the incidence of toxemia of pregnancy. This concept simply will not stand the scrutiny of more careful examination and has been pretty thoroughly discredited for the last 10 years or so. Yet people get into habits and I think a whole generation of physicians and indeed a whole generation of patients have grown

up with the idea that weight gain in pregnancy is dangerous. Moreover, obesity is viewed by many people as being in some way sinful, and I think that is a partial explanation for what I agree is a confusing situation.

Now, as far as the discrepancy regarding an absolute number, the policy statement of the ACOG does not state an optimal weight gain. It says the average weight gain is 10 to 12 kilograms, which is 22 to 27 pounds, and that is in fact the average weight gain that is reported in most series.

I think to ask what is the optimum number is to rather beg the question because I am not sure that there is a fixed and predetermined amount of weight gain that is optimal for all patients. I would rather stand on the statement as made in the policy statement that weight gain should not be restricted. It should be kept in mind, however, that if one adds up reproductive weight gain, one comes out with around 20 or 22 pounds. Theoretically, any gain in excess of this, if not lost by the woman after delivery, would be retained. So that in answer to the question of why should a woman not gain 40 or 50 pounds, the only reason for any limitation is the contribution that excessive weight gain during pregnancy—not lost after delivery—would make to the long-term complication of obesity and the detrimental health effects of obesity I think are quite clear.

Senator PERCY. What is the relationship between, let's say, the minimal weight gain that some obstetricians do recommend and the more optimal, and the difficulty of delivery? Is there a more painful delivery and is this a psychological factor that bothers the mother?

RELATIONSHIP OF WEIGHT GAIN IN DELIVERY

Dr. PITKIN. No, I don't think so. The relationship, as you indicated, between weight gain and birth weight would mean that the more weight a woman gains up to a certain point—and that point seems to be about 35 to 40 pounds—the larger the baby will be. But this is not a linear relationship. In other words, a 5-pound weight gain in the mother makes only a few ounces difference in the baby and it is a difference that requires large numbers in order to be recognized.

Regarding the difficulty in delivery, larger babies would result in some slightly greater incidence of feto-pelvic disproportion, but this would not be significant, given modern methods of obstetric management.

Senator PERCY. I certainly commend the ACOG for the policy that it has made and I think it is a very important thing that it has done this. What is ACOG doing to educate obstetricians throughout the country about these recommendations?

Dr. PITKIN. Well, first of all, this statement has gone to all members of the college; secondly, at about the same time, the statement——

Senator PERCY. How many obstetricians would belong and what proportion is that to the total?

Dr. PITKIN. Well, it depends on——

Senator PERCY. Obstetricians and pediatricians?

Dr. PITKIN. Only obstetricians belong. The total number of fellows of all categories is about 14,500, of whom more than 10,000 are board

certified obstetricians-gynecologists. Board certified refers to specialists certified by the American Board of Obstetrics and Gynecology, which is a different organization. The vast majority of these specialists are also fellows of the college. I do not have precise figures but my guess would be that well in excess of 75 percent of fully trained and certified specialists are members.

The efforts of the committee on nutrition in education of the fellowship consist of, first of all, a review article about certain clinical aspects of maternal nutrition that the committee prepared. This was published in the College Journal[1] and it has received rather wide attention, all favorable, I might add; secondly, a technical bulletin is in the process of development on assessment of nutritional status in the obstetric/gynecologic patient; and, thirdly, this policy statement that you have seen. There are a number of other items that we are considering. As a matter of fact, the committee is meeting tomorrow and we have a number of items on the agenda concerning education of both the public and the physician.

Senator PERCY. What proportion of the deliveries do you suppose would be made by members of the American College?

Dr. PITKIN. I don't know that any information is available on that point, at least of any degree of currency. There were estimates made in the late 1960's which suggested that approximately 65 percent of deliveries were conducted by fellows of the college or under their supervision. In addition, it was estimated that slightly over 50 percent of all obstetric-gynecologic care—including primary health care for women—was done, by or under the direction of, certified specialists.

Senator PERCY. Is something being done to provide them copies of the policy statement to give it as wide dissemination as possible throughout the profession?

Dr. PITKIN. Yes. It was published in the newsletter of the American College, which goes to every fellow. Copies were made available for dissemination by the Maternal and Child Health Services of HEW. The new edition of the ACOG publication, "Manual of Standards for Care of Ob-Gyn Patients" will contain the statement.

Senator PERCY. Do you concur with the statements made by our witnesses yesterday, particularly Dr. Myron Winick, that the crucial need is for nutrition education in medical schools; that this is the only sure way of changing the attitudes of the medical profession toward the role of nutrition in the outcome of pregnancy?

Dr. PITKIN. Although I have not seen Dr. Winick's testimony, I would certainly agree with that statement. Nutrition education in medical education has been deficient. I was taught little nutrition in medical school and as nearly as I can see the medical students I teach today are not taught very much more. I would like to think they are taught somewhat more about prenatal nutrition when they are exposed to me.

Senator PERCY. Because you have been conservative and cautious in not overstating the case for nutrition during pregnancy, I would like to phrase a question this way: Do you have any doubts about the relationship between maternal weight and the birth weight of babies

[1] Pitkin, R. M., Kaminetsky, H. A., Newton, M., and Pritchard, J. A.; "Maternal Nutrition—A Selective Review of Clinical Topics." Obstet. Gynec., 40:773-785, 1972.

or about the relationship of low birth weight and greater health risks? Is there a definite correlation?

RELATIONSHIPS OF MATERNAL WEIGHT AND BIRTH WEIGHT

Dr. PITKIN. In regard to the first, there is no doubt in my mind about the positive relationship between weight gain and birth weight of the infant, up to the point, as I said, of around 35 or 40 pounds; and at that point, I think the curve levels out and there is no further increase.

I am not sure, let us say, that a baby that weighs 8 pounds is any better off than a baby that weighs 7½ pounds. It is when one gets below a certain point that problems become more frequent.

Regarding the problem of low birth weight, I think it is terribly critical that the differentiation be made clearly between low birth weight and prematurity.

Prematurity actually refers to birth before full development. In general, this means before the end of the 37th week which is 3 weeks prior to term. Now, in 1945, prematurity was officially defined as birth weight of less than 2,500 grams—5½ pounds. This was an unfortunate choice, rather like defining the age of majority, the age when one can vote and enter contracts, on the basis of height and weight rather.

So in most public health figures prematurity is defined on a weight basis. It is much more logical, however, to define prematurity on the basis of gestational age and to use the more accurate term, to indicate a baby weighing less than 5½ pounds at birth.

The major cause of low birth weight is prematurity. Somewhere between two-thirds and three-quarters of babies of low birth weight—that is, babies weighing less than 5½ pounds—are premature. The rest are small because of intrauterine growth retardation. I know of no evidence indicating that weight gain during pregnancy influences gestational age. It is, as I have indicated, related to birth weight.

Senator PERCY. I want to thank you for responding to an inquiry of mine some time back when you were kind enough to send in some notes on the pregnant adolescent. The final question I would like to ask you, for the record, does the pregnant adolescent face particularly acute nutritional problems during her pregnancy?

Dr. PITKIN. She faces acute health problems, some of which are biological, some of which are psychological, and some of which are social; and I think she faces acute nutritional problems on the same grounds.

As an example of the biologic problems, she has increased nutritional needs to satisfy her own growth potential, to which pregnancy imposes additional requirements. Psychologically, pregnancy is an anxiety-producting situation in the adolescent and this anxiety may well be manifest as poor nutritional habits. Socially, because of the stigmata of adolescent pregnancy, teenagers often fail to seek, or are denied, optimal care, including good diet.

So I think in answer to your question, Senator, she has very great nutritional problems.

Senator PERCY. Thank you. I am very pleased to have our staff director with us today. Ken, do you have any questions you would like

to put to Dr. Pitkin or any of the other witnesses who have remained—which shows the interest in this particular field and I am very delighted at this. Usually witnesses bolt out the door the minute they finish their say, but it is a great tribute to you, Dr. Pitkin, that they would want to stay to hear you.

Mr. SCHLOSSBERG. I just have one question in view of the fact that we will have the Assistant Secretary of Health tomorrow, which is, if you are in a position to answer it: What is the status of Federal maternal and child care programs now?

FEDERAL MATERNAL AND CHILD CARE PROGRAMS

Dr. PITKIN. Well, speaking specifically in the area of nutrition—and your witness tomorrow will be in a much better position to answer this—it is my understanding that the maternal and infant care projects are in some degree of jeopardy. Now, the maternal and infant care projects I think have had a distinct and perceptible impact on maternal and infant care in the areas in which they have been in effect. Moreover, the ones that I am familiar with have had a distinct nutritional component—a formal nutritional component—and I think the likelihood is high that this has been in large part responsible for the salutary effects they have had. Therefore, it would seem logical that they be continued and, in fact expanded. This is not the time—in my judgment at least—for retrenchment.

Mr. SCHLOSSBERG. If you are sufficiently familiar with the question, could you sum up what the reasons are for the reduction or the cutback in those programs? What is the rationale for that?

Dr. PITKIN. I do not know the reasons for the reduction.

Mr. SCHLOSSBERG. Let me ask this one question which also refers to the previous testimony of Dr. Zee and Dr. Mauer. There is a debate that has been going on now for several years in the Government over the efficiency of providing income to people to do with as they wish as a solution to most of the problems, especially low-income people in the country, the theory being that instead of creating layers of bureaucracy and layers of services between people and what they need, that the most efficient use of the available income, which is not all that great, given other problems of priorities, is to just give them the income and that will be the best way of dealing with their problems; and this, of course, applies to the questions of whether to continue maternal and infant care centers or whether to establish a new, fairly significant program to intervene in terms of early childhood nutrition.

I just wonder if you care to comment on that debate.

Dr. PITKIN. Well, in the area of nutrition specifically, the point of view that as much redtape and bureaucracy as possible should be eliminated—that when the lack is money, people should be given money and they will provide themselves with what they need has to me at least a great deal of appeal.

Now, in terms of medical care, I am not so sure that the same reasoning applies because I am not so sure that such care would be available. Most of the maternal and infant care projects, as you know, have been centered in urban areas, particularly in the inner-city areas. In these areas, medical care—at least high quality medical care is

often simply unavailable, unless provided by something like an MIC project

So that I think in the area of provision of food, this kind of argument has a certain amount of appeal. In the area of providing medical care, I am not sure it does, at least in many areas of the country.

Mr. SCHLOSSBERG. It strikes me that while medical supervision or advice is important practicably for anybody, for any nutritional kind of problem that it may be especially important in the area of maternal and infant nutrition that if there is an area of providing services along with income it would be especially important in this area, I wonder if you would care to comment on that.

Dr. PITKIN. I certainly agree. First of all, nutritional advice is not generally available. Where would you go if you wanted advice about a nutritional question? Well, you might go to your physician and then you would quite likely run up against the fact, as Senator Percy said a moment ago, that nutrition education in medical schools is notably deficient and physicians often don't know very much about nutrition, There aren't many nutritionists out in practice that you could go to with these sorts of problems. So that in this particular area I would certainly agree with you that this should be provided as a direct service because I just don't think it is going to be available otherwise.

Mr. SCHLOSSBERG. Thank you.

Senator PERCY. Our chief, minority staff, Mr. Goetcheus, who has done such a good job in putting these hearings together——

Mr. GOETCHEUS. I have no further questions.

Senator PERCY. If not, the hearings will be recessed until tomorrow morning at 9:30 in this room. They will be under the chairmanship of Senator Marlow Cook of Kentucky. Our witnesses will be Dr. Charles Edwards, Assistant Secretary for HEW, accompanied by Dr. Robert Stone, Dr. John Zapp, Dr. Ogden Johnson, Dr. Charles Lowe, Dr. Arthur Lesser, and Miss Mary Egan; and they will be followed by Mr. Clayton Yeutter, Assistant Secretary of Agriculture and his associates from the Food and Nutrition Service.

These hearings are then recessed until 9:30 tomorrow morning. We thank our witnesses very much.

The committee is in recess, to reconvene on Thursday at 9:30 a.m.

[Whereupon, at 11:30 a.m., the Select Committee was recessed, to reconvene at 9:30 a.m. on June 7, 1973, in room S-407 of the Capitol.]

APPENDIXES

Appendix 1.

PERTINENT TO HEARING OF JUNE 5, 1973

FROM SENATOR RICHARD S. SCHWEIKER

MR. CHAIRMAN:

I want to commend the Senate Select Committee on Nutrition and Human Needs for holding hearings on Maternal and Infant Nutrition, to further demonstrate the need for proper dietary habits in pregnant and lactating women and in infants. Lack of vital nutrients during this period of child development has been linked with poor mental and physical growth.

I would like to bring to the Committee's attention an article written by Dr. David B. Coursin, Director of Research at St. Joseph's Hospital, Lancaster, Pennsylvania, which appeared in *Nutrition Today*. Dr. Coursin reports on an International Symposium held in High Wycombe, England, on maternal nutrition, attended by sixty scientists in the field of nutrition, some who are testifying before this Committee on Maternal and Infant Nutrition.

I ask that this article be included in the official hearing record, should there be no objections.

Sincerely,

RICHARD S. SCHWEIKER.

PHOTOS BY DAVID B. COURSIN FOR N.Y. [illegible] 1971

Maternal Nutrition and the Offspring's Development

A report of an International Symposium held at High Wycombe, Buckinghamshire, England sponsored by The Johns Hopkins University and The Lord Rank Research Centre with the financial support of The Rank Prize Fund and The Ambrose Monell Foundation

by DAVID B. COURSIN, M.D.

It has long been surmised that malnutrition during pregnancy can have deleterious effects on the offspring, but only within the last few years has objective proof of the seriousness of these effects been advanced. Today, it can be shown by laboratory means that malnutrition during pregnancy can affect the offspring at levels from the molecular to the behavioral. At the same time, if the process is reversed, supernutrition through the mother can produce "super" offspring. If this information can be correctly extrapolated to humans, it can lead to important changes in the diet guidance of pregnant women.

Last November, at High Wycombe, thirty miles northwest of London, a meeting was held of arresting importance to nutritionists and to those who determine priorities for research and nutrition programs. The participants were sixty scientists in the field of nutrition. Their purpose was to report their findings, to exchange viewpoints, and to discuss the ramifications of current research. For the most part, they were reporting previously unpublished findings, and the diversity in techniques, materials, and methodology discussed pointed out the extreme complexity of studying malnutrition in animals, let alone in man. Yet, despite these differences, the exchange of information led to general agreement that malnutrition during gestation, lactation, or both has adverse effects on the offspring with re-

Dr. Coursin is Director of Research at St. Joseph's Hospital in Lancaster, Pennsylvania.

gard to birth weight mortality morbidity growth and performance both physical and mental

NUTRITION BEFORE AND AFTER DELIVERY

A major highlight of the meeting was the presentation of the work being done in animal studies by Bacon F Chow and his associates at Johns Hopkins University Over the years Dr Chow's group has developed four groups of animals on the basis of normal (N) and restricted (R) diets in mothers and offspring N/N, N/R, R/R, and R/N The first letter in each group designates the diet in the mother before delivery and the second letter designates the diet in the mother during lactation At weaning, all the pups were fed a strict liberal diet The standard for the restricted diet (R) was a 50 percent overall reduction of nutrients Every effort was made to control the environmental parameters.

The group born to mothers who were fed normally during gestation were normal at birth If their postnatal diet remained normal (N/N) they developed normally If, however, they were fostered to a mother on a restricted diet (N/R) they soon exhibited the effects of malnutrition as evidenced by decreased physical growth and slower development

The offspring of mothers maintained on restricted diets had lower birth weights and even when fostered to mothers maintained on normal diets (R/N) they tended to be somewhat slower in development Furthermore, they were inclined to be smaller at maturity and demonstrated definite differences in their behavioral and performance competencies

Animals which were doubly restricted with poor nutrition during gestation and lactation (R/R) grew more slowly than those in the other three groups and showed distinct central nervous system dysfunction including convulsive seizures, tremors, and increasingly aberrant behavior. This was particularly significant because all the pups received adequate diets after weaning.

In searching for the key factor in the diet which might explain these results, the Hopkins group zeroed in on protein. To test their preliminary data, they set up an experiment in which the diet of the maternal animals was kept adequate in protein but reduced in calories. The offspring of these mothers remained small in size and somewhat slow in development, but they did not show the high infant mortality, metabolic anomalies, or behavioral aberrations exhibited by offspring of those maintained on diets restricted in both protein and calories

Closely allied to this is the question of zinc in the pregnant mother It has been shown that this trace element is important in growing children see NUTRITION TODAY Dec 1968 D F Caldwell of Lafayette Clinic in Detroit presented data on the role of zinc in the maternal animal diet and in the behavioral and learning performance of the offspring There is evidence that the importance of zinc may be due to its essential function in mediating RNA and protein syntheses. Apparently, it is not just a question of malnutrition in the mother, but of the quality of malnutrition as well.

TRANSMITTED DEFICIENCIES

Gross physical growth and development are by no means the only parameters affected by perinatal malnutrition, as was pointed out by R I C Stewart of the Institute of Tropical Medicine in London His group has been concentrating on the effects of malnutrition on brain development. By establishing low levels of malnutrition but successfully obtaining a reasonable survival rate Stewart has succeeded in maintaining a colony of experimental rats through eleven generations His results establish definitively that

Interesting lectures

Cocktail party discussions

physical and nervous system abnormalities are both perpetuated and in many instances, aggravated through succeeding generations of malnourished offspring.

This confirms the pioneering efforts of Stephen Zamenhof at the University of California at Los Angeles, who was the first to demonstrate the degenerative effects of maternal malnutrition on the brain as measured by cell size, cell number, RNA-protein ratios, and DNA-protein ratios. Using these criteria, he further proved that continuation of malnutrition into the post-natal period compounds these adverse reactions more severely than when the offspring are normal at birth but malnourished afterwards.

At High Wycombe, Zamenhof demonstrated how he has continued his investigation into an F_2 generation, where F_1 represents mothers who are themselves offspring of malnourished parents that had shown classic reductions in size and performance, and F_2 represents offspring born to them after mating with normal males. The results were impressive. Not only was the F_2 generation smaller in size and more erratic in performance, but their brain size and quality, as measured microscopically, diminished progressively according to his criteria. Apparently, this represents a residual effect of the maternal malnutrition. That this also represents actual genetic aberrations is unlikely. Persistence of these variations is probably due to changes in other systems, notably the endocrine system which controls growth through hormonal secretion.

Demonstrable brain changes such as those measured by Zamenhof undoubtedly represent a major consequence of malnutrition. Yet a casual link between specific structural changes, such as reduced cell number and size, and abnormal performance in malnourished animals has not been demonstrated. Indeed, most investigators are now concentrating on examining changes in dendritic arborization and in the formation of synapses as being, perhaps, the more important structural elements involved. Thus, the communication network within the brain may be much more important than the number or quality of cells being connected.

A close corollary to these microscopic changes taking place in the malnourished brain is that of changes in synaptic genesis. John Dickerson of the University of Surrey and his coworkers have begun measuring gangliosides as a means of estimating significant differences between the brains of normal and malnourished individuals. The ultimate solution to the problem of malnutrition, brain changes, and behavioral performance will no doubt depend on the integration of many approaches.

SOMATIC EFFECTS

Of course, tissues other than cerebral are affected by malnutrition. For example, E.J. Hawrylewicz of Mercy Hospital in Chicago drew attention to the significant changes in lung tissue which his studies have revealed. In his test animals, intrauterine malnutrition produced the usual changes in brain and body size but also led to marked structural and biochemical abnormalities in the respiratory system. There was conspicuous delay in the growth and development of fetal lung tissue characterized by reduced cell multiplication, decreased cell size, and a subsequent reduction in lung weight as compared to the increase in body weight during the post-natal period.

Moreover, light and electron microscopic evidence indicated that these changes involved several important types of lung cells including the alveolar epithelial cells which effect transfer of oxygen through the lung, and the pneumocytes which produce the surfactants necessary for normal expansion of the lung. At the same time, there were definite alterations in oxidative phosphorylation and in adenosine triphosphate (ATP) metabolism.

Similar findings involving structural abnormalities, deficiencies in physiologic functions, and biochemical abnormalities were reported for the skeletal system, for thyroid, liver, and kidney, for bone structure, and for the thymus and lymphatic tissues. In the latter case, reduced immunity was a concomitant feature. Clearly, individuals who survive malnutrition during gestation suffer serious impairment of all the major body systems.

We have mentioned how transmitted anomalies most probably represent hormonal deficiencies rather than genetic alteration. The pituitary, in particular, is extremely sensitive to intrauterine malnutrition. The Johns Hopkins group presented evidence that

Lively dinner speeches

administration of pituitary extract in the post natal period can improve the eventual growth, development, and performance of subjects malnourished *in utero*. The possibility of correction by the administration of a growth hormone alone is still another avenue of investigation, although the results in these cases have not been as spectacular as when pituitary extract has been administered. These findings introduce a whole new dimension in therapy and may provide a unique method for normalization of abnormalities resulting from intrauterine malnutrition.

Malnutrition can also lead to some interesting psychological changes in maternal interaction with the malnourished offspring. R.H. Barnes of Cornell University reported that from the evidence of his studies, mothers seem to recognize such differences as reduced size and temperature characteristic of the undernourished pup. She often responds with marked increase in attention to the newborn and greater concern for its well-being. She tends to keep it in the nest and attempts to feed it almost constantly.

This increased mothering helps solve the pup's immediate, post-natal problems but creates several disadvantages. The normal sequence of events by which the pup escapes from the nest and begins its learning experience is inhibited. Consequently, as the mother indulges it, the pup has less opportunity to respond to the natural environment and develops dependency.

Extreme malnutrition during pregnancy was not the only area under consideration at High Wycombe. Minor nutritional imbalance can also have profound effects on the welfare of the newborn. Work done by Bacon Chow and by R.L. Davis in Florida indicates that sucrose added to the diets of mothers during pregnancy may stimulate the development of metabolic systems that create predilection to obesity. We know that in humans there is a correlation between sucrose consumption and heart disease (see "Sucrose and Heart Disease," NUTRITION TODAY, Spring 1969). From the results of Davis' work, it may be that study of the whole pattern of obesity, diabetes, and cardiovascular disease should be extended to include nutrition during gestation.

"SUPER" OFFSPRING

Considering the extent to which malnutrition can influence the perinatal development of the young, we are led to wonder about the possible effects of supernutrition. In an extension of his studies, Zamenhof has examined this question. If the uterus of an experimental animal was opened during gestation and all but one of the fetuses removed, the placenta of the survivor increased in size by 105 percent. Furthermore, at birth, the survivor showed a 51 percent increase in body size and a 21 percent increase in brain size. The possibilities this opens up in terms of human gestation and development are intriguing.

The meeting offered an opportunity to present data from three human studies being carried out today in three distinct locations. The first report was from Taiwan where, in 1967, Dr. Chow set up a project at Sui Lin with the support of the Chinese Nationalist Government. The basis of the study developed as an outgrowth of animal studies by Chow in which he demonstrated that animals on a reduced dietary intake during gestation and lactation produced offspring which had not only reduced body size but also reduced ability to utilize food and a consequent wastage of nutrient intake. The results of the human studies at Sui Lin were presented by Quentin Blackwell, director of the Taiwan project.

The study area comprised a number of relatively poor villages in Taiwan where it was possible to get specific information on the number of women in the childbearing age and to identify mothers as soon as pregnancy was confirmed. Thus, even when choosing subjects at random, the subjects were uniform with respect to age and weight and genetically homogeneous. A double-blind procedure was followed wherein one group of pregnant women received nutritional supplements containing protein, vitamins, and calories, and the other group received a placebo containing calories and vitamins. These supplements were administered throughout pregnancy and lactation and were always consumed in the presence of a field nurse. When the full supply was not consumed, the amount actually ingested was measured, so that there was always a careful record of the actual amounts taken by the subject throughout the test period.

Data have been collected for five years which have allowed comparative studies between the children born to these mothers, and between these children and their younger siblings.

Informative speeches

Various parameters were measured starting with anthropometric assessments at birth, followed by complete physical examinations at regular intervals, behavioral testing, and determination of numerous biochemical functions. In particular, nitrogen balance studies have been carried out at specific ages in an effort to determine the children's utilization of protein.

The whole project has been a sizable undertaking. The full interpretation of the results will have to take into account the absence of extreme conditions such as can be established in laboratories working with animals. For one thing, the population under study had a reasonably good caloric intake with only a modest degree of protein malnutrition. Also, there was a small initial incidence of low birth weights (6 to 7 percent) suggesting that the population was at an almost irreducible minimum for demonstrating the efficacy of nutritional supplementation.

On the other hand, there is evidence that the children have fared well *in utero* as reflected by an increased birth weight averaging 150 grams for the children of mothers receiving the supplements as compared to the birth weights of their younger siblings. Moreover, the incidence of babies weighing less than 2,500 grams at birth has fallen significantly. It is too soon yet to make positive statements or to draw definite conclusions from these data, and much remains to be done in correlating the results from the behavioral studies which have also been carried out. Still, it is gratifying to know that the foundations have been laid for very important information, and the goal is closer by five years.

FOLLOW-UP FROM GUATEMALA

Much of the work done by Jean-Pierre Habicht in Guatemala has been reported in the literature, but the account of the specific results of his work with pregnant women was timely. In his study, it was shown that the higher the caloric intake during pregnancy, the lower the incidence of low birth weights. Moreover, in his subjects it did not matter appreciably whether the supplementation was in calories and protein or in calories alone.

Thus, when the mother received an additional 20,000 calories during pregnancy, there was a definite increase in the birth weight of approximately 20 grams per every 1,000-calories fed the mother. Moreover, this increase in birth weight occurred whether the mother was fed the additional calories during the final trimester of pregnancy or throughout the three trimesters, indicating that the mothers could store the nutrients as a reserve to be utilized gradually.

A third population study which is now under way was described by David Rush of New York who is currently working with nutritional risk populations in Harlem. In his study group there was a 15 to 16 percent incidence of low birth weight indicating it was statistically amenable to nutritional supplementation. Indeed, the effectiveness of his program was reflected in the definite improvement in the well-being of mothers and children, an improvement measurable in statistically significant terms.

Interestingly enough, Rush himself is a proponent of "biological significance" versus "statistical significance." This hypothesis holds that relatively small dimensions of change which are of only questionable mathematical significance may be of high biological significance to the organism. Thus, the differences resulting from improved nutrition are not necessarily measured in pounds and kilograms, but in ounces and grams. This would seem to be the case in the three studies in human nutrition discussed at High Wycombe, in which small magnitudes of difference proved significant in moving individuals from a situation of high risk due to poor nutrition into one of adequate nutritional protection.

One note that was repeated throughout the discussion of animal studies

Tête-à-tête

Some re

PHOTOS BY DAVID B. COURSIN FOR N.Y. [illegible] 1973

being done was the awareness of the differences between laboratory evidence in animals and clinical observations in man. The severity of malnutrition described in animals is rarely encountered in human populations. *Furthermore in* some animal studies the diets were manipulated in a way that reduced specific nutrients while maintaining the other elements at adequate levels. Again this circumstance does *not generally occur in human* populations except when the calorie intake is adequate but one or more specific nutrients is missing.

The correlation of malnutrition and *performance capability* is still *another* area which was discussed at length in animals but barely touched upon in human studies. At the present time, it would be hazardous to extrapolate too much from the *well controlled* laboratory experiments to clinical nutritional practice. Once the results of the Taiwan studies have been fully analyzed, specific references to human behavior may be more feasible. Even then, however, it may well be impossible to take into account all the variables, physical and psychological, which are involved in human behavioral response. There is no easy route to knowledge that can be safely used.

STANDARDIZATION LACKING

Even when making comparisons between the work being carried out in *different experimental laboratories*, the lack of uniformity in establishing controls can detract from the validity of the conclusions. The species and strain of species used, the environmental circumstances, *the composition of the* diets used, all of these introduce variables which make it impossible to establish a model for comparison.

Conditions within a specific laboratory may *also create a biased sample*. For example, when nutritional intake is sufficiently reduced, conception may not occur, or there may be a high incidence of stillbirths or resorption of the fetus. Consequently, *the number of* surviving animals decreases and the circumstances of survival may well represent a biased unknown factor.

Further problems crop up when trying to relate brain changes to *performance*. Each laboratory will develop and use those procedures best suited for its specific needs. These range from the standard passive avoidance response to diverse types of mazes. Also *the key* factors influencing performance, including time of onset of malnutrition, degree of malnutrition, duration of deficiency, and the quality of reduced nutrients, differed from one laboratory to another.

The discussions that developed during the several days of the meeting proved excellent forums for the exchange of ideas and for making resolutions to improve communications between *different laboratories*. It was agreed that development of uniform standards could be established without interfering with the autonomy of each laboratory. If necessary, laboratories *might be willing to exchange guiding* principles, animal stocks, and even personnel in order to achieve standards for comparison of data. In some instances, it might even prove advantageous to create *identical situations* in different laboratories. All present agreed that the sharing of information was a most important factor in furthering nutritional research.

Professor Yudkin is amused

SOME PRACTICAL ASPECTS

Some of the difficulties arising in the recognition of nutritional problems and their solutions were discussed by *Martin Forman* of the Agency for International Development in Washington. He described the possible approaches to solutions, the difficulties in selecting those most likely to succeed, *their implementation* with all their foibles, and the discovery en route, of innumerable issues not previously recognized which demand revamping of entire programs.

Forman also pointed out that serious problems can arise when attempting to apply new knowledge. Overwhelming difficulties may confront national policy makers and programmers who *must determine priorities. It is not that* different nations may lack concern for the problems of malnutrition during pregnancy, but they may have difficulty in getting them into perspective with respect to other pressing problems. Certainly, this is a point on which those interested in nutrition can have important influence.

Appendix 2.

PERTINENT TO HEARING OF JUNE 6, 1973

FROM DR. GEORGE R. KERR

Growth, 1972, 36, 407-424

NUTRITIONAL CORRELATES OF CHILD DEVELOPMENT IN SOUTHERN TUNISIA

I. LINEAR GROWTH*

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(Received for publication August 10, 1972)

Undernutrition is postulated to be the major cause of the short stature demonstrated by many children in developing countries. In order to determine if fortification of available foods with essential nutrients may be of value in increasing the stature of these children it is first essential to define the processes of growth in children fed the unfortified diet. As part of a battery of investigations, the length, sitting height, leg length and weight of all preschool children in the villages around the Chott el Djerid, Tunisia, were measured prior to a trial of fortification of wheat products with vitamins, iron, and lysine. After one year of age, the stature of children in this area is consistently below that of internationally accepted norms for child development. At this stage of the study it is not possible to determine whether genetic, nutritional, or other environmental factors are the cause of this pattern of development.

* Supported in part by Contract No. AID/afr-650 and the Fund for Research and Teaching, Department of Nutrition, Harvard School of Public Health.

Introduction

A wide variety of genetic and environmental agents are known to influence the rates of physical development and the ultimate stature of growing children. Undernutrition is postulated to be the major cause of the short stature and developmental delay demonstrated by children in many underdeveloped areas of the world (Hansen, Freesemann, Moodie and Evans, 1971; Scrimshaw and Behar, 1965).

The common diets in many developing countries are limited by socioeconomic considerations to those based on cereal and vegetable produce: such diets may be deficient in specific nutrients, and particularly in their protein content. Even when adequate in quantity, the dietary protein may have low biologic value due to relative deficiency of one or more of the essential amino acids required for protein synthesis and for linear growth (Munro, 1964; Rao and Swaminathan, 1969). Fortification of cereals with specific nutrients offers a potential and economically feasible solution to the nutrition-related world health problems of children. In order to determine if such fortification could increase the nutritional content of cereals to the point of producing a measurable increase in the processes of child development it is first essential to identify the processes of development of children fed the unsupplemented diet. This report will present data on the linear growth and weight of preschool children of the villages around the Chott el Djerid, Tunisia, prior to a trial of fortification of wheat products, the major dietary staple, with a variety of vitamins, iron, and lysine, the amino acid most limited in wheat protein.

Materials and Methods

The Chott el Djerid is a large salt lake in Southern Tunisia which is dry for about half of the year and is surrounded by unproductive desert periodically spotted with oases. The mean yearly rainfall is less than 100 millimeters, insufficient for any but the most limited forms of agricultur . The villages situated around the Chott have a population representing three ethnic groups, Arab, Negro and Berber. The economy of the villages is based primarily on the harvesting of dates which represents the only important cash crop. As the mean monthly income is roughly equivalent to 30-40 dollars per family, the ability to purchase high protein foods is obviously limited. Wheat products provide about 70% of the total caloric intake and practically

all the protein intake of this population. Breast feeding of infants is traditionally continued until they are about 2 years of age, but after one year other foods, part of the adult diet, are gradually added.

A large scale study is currently underway to determine whether fortification of wheat products with vitamins A, D, B_1, B_2, and Niacin, the mineral iron, and with or without the amino acid lysine can be of measurable benefit to the child population of this area, numbering some 2,853 out of the total study population of about 16,000 at the time of the 1970 census conducted as part of this study. Determinations of nutritional status are based on mortality rates, dental development, linear and mass anthropometric measurements, evaluation of bone maturation and linear skeletal growth, physical examinations and a variety of laboratory studies. All preschool children (3 months to 5 years 9 months of age) in each village are examined at 6 month intervals in order to determine maturational velocity. The methods utilized in this study, reliability trials, and training of personnel were evaluated in a pilot village representative of the area, but not included in the study. The design of the study provided for all measurements being performed at intervals of three months chronologic age. An error of ±3 days was permitted at the 3 month measurement, increasing to a permitted error of ±11 days chronologic age at the 5 year 9 month measurement. The mean difference between the nominal and real ages for each age group was never greater than 3 days.

Measurement Techniques

Height (length). Children 3 years and older were measured by a Harpenden stadiometer while standing, with the back as straight as possible in order to obtain the maximum stature. Slight upward traction was maintained on the mastoid processes, and the plane from the inferior margin of the orbit to the external auditory meatus (Frankfort plane) was kept horizontal. Children under 3½ years of age were measured while lying supine on a Harpenden infant measuring table; an assistant held the head of the child against the fixed support of the table in such a way that the Frankfort plane was vertical; the legs were held straight, a slight traction was applied to both the head and legs, and another assistant held the feet of the child so that they formed a right angle with the legs and were in firm contact with the mobile foot support of the instrument. Children between 3

and 3 ½ years were measured by both methods and the mean value was taken.

2. *Sitting height (crown-rump)*. Children 3 years and older sat on the base of the stadiometer with legs folded, and slight upward traction was maintained on the mastoid processes. If an anthropometer (Siber Hegner) was used because the sitting height was below the minimal range of the stadiometer, great care was exercised to assure that the instrument was held vertically. Children below the age of 3 years were measured on the infant measuring table, with an assistant holding the legs at right angles with the trunk while the examiner brought the mobile foot support of the instrument in firm contact with the child's buttocks. For children between 3 and 3 ½ years of age, this measurement was made using both instruments and the mean value was taken.

3. *Leg length*. Children 3 years and above stood erect and the examiner marked the highest point of the iliac crest of the left side with a dermographic pencil. With the anthropometer held vertically by an assistant, its straight arm was brought in contact with the marked point. If a child was tall enough for a stadiometer to be used, he assumed a profile position while standing on the base of the instrument and the head board was brought firmly into contact with the point identified on the iliac crest. Children under 3 ½ years of age were measured with the child lying on the infant measuring table. The examiner marked the highest point on the iliac crest on the left side with a dermographic pencil and brought the transverse arm of the anthropometer, held parallel with the table, into contact with the marked point. For children between 3 and 3 ½ years of age the measuring table and the stadiometer were used and the mean value taken.

4. *Weight*. Body weight was measured with Ohms beam balances with the child naked or clothed only in underpants. In the latter event, any clothing worn was weighed separately at the end of the examination and subtracted from the original combined weight. A variety of other mass measurements were taken and will be the subject of subsequent reports.

RESULTS

Values from the 3rd to 97th centiles and the numbers of subjects measured are presented in Tables 1-8. Data are presented separately for boys and girls. Means, standard deviation and stanine values for

TABLE 1
CENTILES FOR BOYS

	3	10	25	50	75	90	97
3 Months (n = 25)							
Length (cm)	56.7	59.4	62.3	64.3	66.5	71.0	74.6
Crown-rump (cm)	36.3	37.9	39.4	40.7	42.1	44.0	45.9
Leg length (cm)	27.1	28.0	29.3	31.1	33.3	35.1	38.7
Weight (kg)	5.4	5.7	6.3	6.9	7.5	8.3	9.3
6 Months (n = 59)							
Length (cm)	57.5	60.4	63.4	65.4	67.8	72.1	76.6
Crown-rump (cm)	36.5	38.4	39.9	41.3	42.9	44.7	46.8
Leg length (cm)	27.6	28.7	30.0	31.8	34.0	36.0	39.7
Weight (kg)	5.4	5.8	6.5	7.1	7.8	8.6	9.7
9 Months (n = 95)							
Length (cm)	59.8	62.8	65.7	68.0	70.6	74.7	80.3
Crown-rump (cm)	37.1	39.2	40.9	42.5	44.2	46.0	48.8
Leg length (cm)	28.9	30.2	31.6	33.5	35.7	38.3	42.6
Weight (kg)	5.5	6.1	6.9	7.7	8.5	9.4	10.7
12 Months (n = 67)							
Length (cm)	62.0	65.4	68.3	70.8	73.4	77.6	84.6
Crown-rump (cm)	37.6	40.3	42.2	43.8	45.5	47.6	50.8
Leg length (cm)	30.3	32.1	33.5	35.4	37.6	41.1	45.3
Weight (kg)	5.7	6.5	7.3	8.3	9.1	10.3	11.7
15 Months (n = 57)							
Length (cm)	64.6	67.9	70.8	73.4	75.9	80.5	88.1
Crown-rump (cm)	88.7	41.4	43.3	45.1	46.7	48.9	52.2
Leg length (cm)	31.4	33.6	35.2	37.2	39.4	43.6	48.0
Weight (kg)	6.1	7.0	7.9	8.9	9.7	11.1	12.7
18 Months (n = 57)							
Length (cm)	66.2	70.3	73.0	75.7	78.3	83.2	91.9
Crown-rump (cm)	39.4	42.5	44.5	46.2	47.9	50.2	53.7
Leg length (cm)	31.9	34.9	36.7	38.8	41.1	45.5	50.2
Weight (kg)	6.4	7.4	8.4	9.4	10.3	11.8	13.7

each measurement have been calculated, but are not presented here because of space limitations. They are available from the authors for any interested reader.

The comparability of the heights and weights of the child population to reference standards for normal growth of children (Stuart Norms—Nelson, 1969) are presented in Figures 1 and 2 and in Table 5. These indicate that at 3 months of age, the population under study had developmental measures at least equal to the mean value of the reference standards. By 1½ years of age, however, both height and weight

TABLE 2
CENTILES FOR BOYS

	3	10	25	50	75	90	97
21 Months (n = 95)							
Length (cm)	68.0	72.4	75.1	77.9	80.8	86.0	96.3
Crown-rump (cm)	40.6	43.4	45.4	47.2	49.0	51.4	55.1
Leg length (cm)	32.6	35.9	38.1	40.2	42.8	47.0	53.1
Weight (kg)	6.8	7.8	8.9	9.8	10.9	12.6	14.8
24 Months (n = 56)							
Length (cm)	70.1	74.6	77.1	80.0	83.4	88.7	98.5
Crown-rump (cm)	41.5	44.4	46.3	48.2	50.1	52.5	55.7
Leg length (cm)	34.2	37.3	39.4	41.5	44.3	48.1	54.6
Weight (kg)	7.4	8.4	9.4	10.3	11.5	13.1	15.4
27 Months (n = 64)							
Length (cm)	72.1	76.6	79.1	82.1	85.9	91.6	100.1
Crown-rump (cm)	42.3	45.1	47.1	49.1	51.3	53.8	57.0
Leg length (cm)	36.0	38.6	40.8	42.7	45.9	49.6	56.4
Weight (kg)	7.9	8.9	9.8	10.9	12.1	13.8	15.5
30 Months (n = 53)							
Length (cm)	74.1	78.2	81.0	84.2	88.4	94.0	101.1
Crown-rump (cm)	43.0	45.7	47.9	49.9	52.4	54.8	57.3
Leg length (cm)	37.5	40.0	41.9	44.0	47.2	50.6	56.3
Weight (kg)	8.5	9.4	10.3	11.5	12.7	14.2	15.6
33 Months (n = 63)							
Length (cm)	75.8	79.4	82.6	86.1	90.1	95.3	101.6
Crown-rump (cm)	44.0	46.3	48.6	50.6	53.1	55.3	57.6
Leg length (cm)	38.0	40.8	43.0	45.2	3.1	51.3	56.3
Weight (kg)	8.8	9.8	10.8	12.0	13.1	14.4	15.6
36 Months (n = 37)							
Length (cm)	77.6	80.8	84.1	87.6	91.6	95.9	102.6
Crown-rump (cm)	45.3	47.0	49.1	51.1	53.5	55.4	57.8
Leg length (cm)	38.8	41.5	43.9	46.5	49.1	51.5	56.8
Weight (kg)	9.3	10.1	11.1	12.4	13.5	14.7	15.7

measurements had fallen to the 3rd percentile level of the reference. The mean developmental quotients** for weight, height, and weight for height, indicated in Table 9, suggested that whatever the cause of their developmental delay, these children are generally underweight for their height, a crude measure of total nutritional status.

DISCUSSION

The major dietary protein sources of the world are derived from wheat, corn, and rice: the protein "value" of each is limited due to a

** Developmental Quotient expressed as per cent of the expected developmental measure for the 50 percentile value in the Stuart Norms (Nelson, 1969).

TABLE 3
CENTILES FOR BOYS

	3	10	25	50	75	90	97
3 years 3 mths (n = 46)							
Height (cm)	78.9	82.1	85.9	89.2	93.0	96.6	103.2
Sitting height (cm)	46.0	47.7	49.6	51.5	53.8	55.5	58.1
Leg length (cm)	39.0	42.4	45.0	47.9	50.0	52.2	57.0
Weight (kg)	9.8	10.6	11.6	12.8	13.9	15.0	16.1
3 years 6 mths (n = 45)							
Height (cm)	79.4	83.9	87.6	90.9	94.7	97.9	104.4
Sitting height (cm)	46.0	48.3	50.0	51.9	54.2	55.8	58.4
Leg length (cm)	39.6	43.5	46.2	49.3	51.4	53.5	58.1
Weight (kg)	10.2	11.2	12.1	13.2	14.3	15.5	16.6
3 years 9 mths (n = 66)							
Height (cm)	79.9	85.2	89.5	92.8	96.4	99.8	105.5
Sitting height (cm)	46.0	48.7	50.6	52.4	54.6	56.4	58.8
Leg length (cm)	40.0	44.5	47.6	50.6	52.8	55.3	59.2
Weight (kg)	10.4	11.7	12.6	13.6	14.8	15.9	17.0
4 years (n = 48)							
Height (cm)	80.4	87.0	91.2	94.7	98.1	101.6	108.7
Sitting height (cm)	46.0	49.2	51.2	53.0	55.1	57.0	59.6
Leg length (cm)	41.0	45.9	49.0	51.8	54.2	56.9	61.8
Weight (kg)	10.7	12.1	13.0	14.0	15.1	16.4	17.7
4 years 3 mths (n = 51)							
Height (cm)	82.1	88.1	93.0	96.7	100.0	103.6	109.3
Sitting height (cm)	46.3	49.5	51.9	53.7	55.6	58.0	59.9
Leg length (cm)	42.3	46.9	50.4	53.2	55.4	58.6	62.6
Weight (kg)	11.2	12.3	13.4	14.4	15.6	16.8	18.2
4 years 6 mths (n = 53)							
Height (cm)	84.4	90.0	94.3	98.6	101.9	105.3	110.4
Sitting height (cm)	46.4	50.0	52.3	54.4	56.2	58.7	60.5
Leg length (cm)	44.7	48.6	51.5	54.5	56.6	59.6	63.0
Weight (kg)	11.7	12.7	13.7	14.8	16.0	17.3	18.4

relative insufficiency of one or more of the essential amino acids (Munro, 1964). The protein of wheat is relatively lacking in lysine, and a variety of animal studies have suggested that addition of lysine to wheat improved its nutritive properties (Hutchinson, Moran and Pace, 1956). A few studies in small groups of children have provided confirmation of these results (Bressani, Wilson, Behar and Scrimshaw, 1969; Krut, Hansen, Truswell, Schendel and Brock, 1961; King, Sebrell, Severinghaus and Storvick, 1963), and large scale studies of the effects of increasing dietary protein have reported a reduction in infant mortality, even though no significant increase in physical growth rates could be documented (Baertl, Morales, Verestegui and Graham,

TABLE 4
CENTILES FOR BOYS

	3	10	25	50	75	90	97
4 years 9 mths (n = 50)							
Height (cm)	87.9	91.8	95.8	100.2	103.9	106.9	110.9
Sitting height (cm)	47.3	50.5	53.0	55.0	56.8	59.2	60.8
Leg length (cm)	47.3	50.0	52.5	55.5	57.7	60.3	63.3
Weight (kg)	12.1	12.9	14.0	15.1	16.4	17.4	18.7
5 years (n = 36)							
Height (cm)	90.6	94.0	97.3	101.5	105.5	108.8	112.7
Sitting height (cm)	49.0	51.5	53.6	55.6	57.4	59.8	61.4
Leg length (cm)	49.2	51.1	53.3	56.5	58.7	61.3	63.6
Weight (kg)	12.4	13.3	14.3	15.5	16.8	17.8	18.7
5 years 3 mths (n = 45)							
Height (cm)	93.0	96.2	99.3	103.0	107.2	110.3	113.7
Sitting height (cm)	50.6	52.4	54.4	56.3	58.2	60.2	61.9
Leg length (cm)	50.5	52.3	54.6	57.7	60.0	62.3	64.7
Weight (kg)	12.9	13.7	14.7	15.9	17.2	18.2	19.0
5 years 6 mths (n = 43)							
Height (cm)	95.2	98.5	101.3	104.8	108.1	111.2	114.8
Sitting height (cm)	51.8	53.0	55.3	57.0	58.8	60.6	62.3
Leg length (cm)	51.4	53.7	56.4	59.0	61.1	63.2	65.3
Weight (kg)	13.5	14.2	15.0	16.2	17.5	18.6	19.2
5 years 9 mths (n = 52)							
Height (cm)	97.1	100.7	103.9	107.6	110.8	114.0	117.3
Sitting height (cm)	52.3	53.4	56.2	57.7	59.1	61.5	63.0
Leg length (cm)	52.4	55.2	58.1	60.3	62.2	64.3	66.0
Weight (kg)	14.0	14.6	15.3	16.4	17.6	19.0	19.6

1970). None of these studies, however, have provided data or conclusions sufficient to induce governments of underdeveloped areas to initiate programs of food fortification on either community or national level as a means of improving the nutritional status of their population (Berg and Muscat, 1972). It was to provide further data on the feasibility and/or measurable value of such an approach that the current study was initiated. The investigation was limited to preschool children as such would theoretically be most sensitive to undernutrition, and most likely to demonstrate any beneficial effects of food fortification.

The 10 villages included in this study seemed ideal for evaluating the effects of nutrient fortification of wheat products on the growth and development of children. All children in the area were available for study and could be evaluated by serial measurements. Imported wheat

TABLE 5
CENTILES FOR GIRLS

	3	10	25	50	75	90	97
3 Months (n = 43)							
Length (cm)	55.7	58.0	59.8	62.0	64.5	67.3	71.8
Crown-rump (cm)	35.5	36.5	37.8	39.2	40.8	42.6	45.2
Leg length (cm)	26.2	27.3	28.7	30.2	31.8	33.6	37.0
Weight (kg)	5.3	5.4	5.9	6.3	7.0	7.7	8.3
6 Months (n = 64)							
Length (cm)	56.6	59.0	61.0	63.2	65.7	68.8	73.7
Crown-rump (cm)	35.8	37.0	38.3	39.8	41.4	43.3	45.9
Leg length (cm)	26.6	27.9	29.3	31.0	32.7	34.6	38.0
Weight (kg)	5.3	5.5	6.0	6.5	7.3	8.0	8.8
9 Months (n = 74)							
Length (cm)	58.4	61.4	63.8	65.9	68.7	72.2	78.3
Crown-rump (cm)	36.5	38.4	39.7	41.2	42.8	44.8	47.7
Leg length (cm)	27.5	29.3	30.9	32.9	34.6	37.1	41.1
Weight (kg)	5.4	5.7	6.3	7.0	7.9	8.7	10.0
12 Months (n = 71)							
Length (cm)	60.5	64.0	66.8	69.0	71.9	75.9	82.7
Crown-rump (cm)	37.5	39.8	41.2	42.8	44.4	46.4	49.3
Leg length (cm)	28.9	30.8	32.7	35.0	36.9	39.8	44.0
Weight (kg)	5.5	6.0	6.8	7.6	8.5	9.5	11.3
15 Months (n = 62)							
Length (cm)	63.4	66.7	69.4	71.7	74.9	78.5	86.8
Crown-rump (cm)	38.7	41.0	42.6	44.2	45.7	47.6	50.4
Leg length (cm)	30.6	32.2	34.3	36.8	38.7	42.0	46.7
Weight (kg)	5.8	6.4	7.3	8.2	9.1	10.1	12.1
18 Months (n = 64)							
Length (cm)	64.9	69.2	71.6	74.2	77.4	80.6	89.1
Crown-rump (cm)	39.5	41.9	43.8	45.4	46.9	48.6	51.3
Leg length (cm)	32.0	33.5	35.8	38.3	40.3	43.5	48.3
Weight (kg)	6.2	6.9	7.8	8.7	9.6	10.7	12.7

was the primary dietary staple, animal protein was consumed in extremely small amounts because of economic limitations, and the villages were situated in a geographic area where the importation and distribution of food could be controlled. Families were generally not of such extreme poverty that any beneficial effect resulting from improved quality of dietary protein on the processes of physical growth might be obscured by a lack of adequate caloric intake, and the population and economic characteristics were generally representative of the entire geographic area.

Although studies of children in underdeveloped countries have sug-

TABLE 6
CENTILES FOR GIRLS

	3	10	25	50	75	90	97
21 Months (n = 88)							
Length (cm)	66.4	71.0	73.5	76.4	79.6	82.6	90.7
Crown-rump (cm)	40.4	42.7	44.7	46.3	48.0	49.5	52.0
Leg length (cm)	33.0	34.5	37.1	39.5	41.7	44.6	49.1
Weight (kg)	6.5	7.3	8.2	9.2	10.2	11.2	12.6
24 Months (n = 46)							
Length (cm)	68.1	72.9	75.6	78.6	81.7	84.8	91.7
Crown-rump (cm)	41.1	43.7	45.5	47.1	49.0	50.4	53.0
Leg length (cm)	34.1	35.8	38.5	40.8	43.2	45.7	49.9
Weight (kg)	6.9	7.7	8.6	9.6	10.7	11.7	13.0
27 Months (n = 53)							
Length (cm)	70.3	74.3	77.8	80.8	83.9	87.6	93.1
Crown-rump (cm)	41.9	44.4	46.4	48.0	49.9	51.7	53.7
Leg length (cm)	35.2	37.0	40.0	42.2	44.6	47.4	50.9
Weight (kg)	7.3	8.2	9.1	10.2	11.2	12.1	13.3
30 Months (n = 45)							
Length (cm)	71.9	76.0	79.8	82.8	85.8	89.7	96.0
Crown-rump (cm)	42.7	45.3	47.1	48.9	50.7	52.6	54.9
Leg length (cm)	35.8	38.3	41.2	43.5	46.0	48.8	52.8
Weight (kg)	7.9	8.7	9.7	10.7	11.8	12.6	14.1
33 Months (n = 70)							
Length (cm)	72.8	77.1	81.3	84.5	87.6	91.4	96.5
Crown-rump (cm)	42.8	45.6	47.8	49.5	51.3	53.1	55.1
Leg length (cm)	35.9	39.0	42.1	44.7	47.2	49.8	53.0
Weight (kg)	8.3	9.2	10.2	11.3	12.3	13.1	14.6
36 Months (n = 56)							
Length (cm)	74.5	78.8	82.7	86.1	89.4	92.9	97.7
Crown-rump (cm)	43.0	46.2	48.3	50.0	51.9	53.5	55.3
Leg length (cm)	36.5	40.1	43.0	45.9	48.3	50.8	53.6
Weight (kg)	8.9	9.8	10.8	11.8	12.8	13.6	15.0

gested that anthropometric measures may be the most sensitive for detection of subtle undernutrition, there is uncertainty as to the relative merits of the various measures and to the interpretation of resulting data (Jelliffe and Jelliffe, 1971). Total length or height is the simplest measure of linear growth and subject to little error; it is, however, made up of several components each of which has a different growth velocity at different periods of childhood. For this reason, the crown-rump length, or sitting height was also determined as an indication of the proportion of the total height due to the head and trunk (which during early infancy grow at a much faster rate than do the lower

TABLE 7
CENTILES FOR GIRLS

	3	10	25	50	75	90	97
3 years 3 mths (n = 38)							
Height (cm)	76.6	80.7	84.6	87.9	91.4	95.2	100.1
Sitting height (cm)	43.9	46.9	48.9	50.5	52.5	54.1	55.9
Leg length (cm)	38.2	41.6	44.4	47.3	49.6	52.3	55.2
Weight (kg)	9.3	10.2	11.3	12.4	13.3	14.2	15.7
3 years 6 mths (n = 46)							
Height (cm)	77.1	82.9	86.5	89.6	93.3	97.1	102.9
Sitting height (cm)	44.7	47.6	49.3	51.0	53.2	54.8	56.8
Leg length (cm)	39.1	43.4	46.0	48.9	51.1	53.6	56.9
Weight (kg)	9.3	10.7	11.7	12.7	13.7	14.7	16.3
3 years 9 mths (n = 77)							
Height (cm)	77.8	84.1	88.2	91.3	94.8	98.9	104.0
Sitting height (cm)	44.9	48.0	49.7	51.4	53.6	55.4	57.5
Leg length (cm)	39.9	44.5	47.3	50.1	52.4	54.7	57.9
Weight (kg)	9.3	10.8	11.9	12.9	14.1	15.2	16.6
4 years (n = 52)							
Height (cm)	78.7	85.5	89.7	92.6	96.1	100.1	104.6
Sitting height (cm)	44.7	48.4	50.1	51.9	54.0	55.9	58.1
Leg length (cm)	40.5	45.5	48.4	51.1	53.5	55.5	58.5
Weight (kg)	9.3	11.1	12.2	13.1	14.4	15.6	16.9
4 years 3 mths (n = 61)							
Height (cm)	80.7	87.4	91.4	94.4	97.7	101.8	105.4
Sitting height (cm)	45.6	49.1	50.8	52.6	54.5	56.5	58.4
Leg length (cm)	42.0	46.7	49.6	52.2	54.6	56.6	59.2
Weight (kg)	9.5	11.4	12.6	13.5	14.9	16.0	17.0
4 years 6 mths (n = 48)							
Height (cm)	84.5	89.9	93.3	96.3	99.4	104.1	107.8
Sitting height (cm)	47.3	49.9	51.8	53.5	55.2	57.2	59.0
Leg length (cm)	44.8	48.6	51.1	53.5	55.8	58.0	61.1
Weight (kg)	10.7	12.1	13.0	14.0	15.4	16.5	17.6

limbs). Leg length indicates the proportion of total height represented by the long bones. Weight is the simplest measurement of mass, but represents the total composition of several elements, bone, muscle, subcutaneous tissue, and the internal organs.

Even with meticulous examination techniques it must be recognized that certain errors exist in collecting anthropometric data. Measures taken with the child erect give results which are less than those obtained when the child is measured supine, due to compression of the intervertebral discs. This error, while unavoidable, is not of major magnitude: when children were measured by both techniques, the

TABLE 8
CENTILES FOR GIRLS

	3	10	25	50	75	90	97
4 years 9 mths (n = 53)							
Height (cm)	87.4	91.5	95.0	98.4	101.7	107.2	110.6
Sitting height (cm)	48.8	50.6	52.8	54.5	56.2	58.2	59.6
Leg length (cm)	46.8	49.8	52.4	54.8	57.4	60.3	63.0
Weight (kg)	11.7	12.6	13.6	14.6	16.0	17.2	18.1
5 years (n = 56)							
Height (cm)	89.2	93.0	96.4	100.1	103.6	108.8	113.5
Sitting height (cm)	49.9	51.3	53.5	55.4	57.0	58.8	60.1
Leg length (cm)	47.7	50.9	53.4	56.0	58.8	61.8	65.2
Weight (kg)	12.2	13.0	13.9	15.0	16.5	17.8	18.7
5 years 3 mths (n = 51)							
Height (cm)	89.4	93.7	97.7	101.7	105.2	109.9	115.0
Sitting height (cm)	50.2	51.6	54.0	56.1	57.6	59.3	60.9
Leg length (cm)	47.7	51.2	54.2	57.0	59.8	63.1	65.9
Weight (kg)	12.1	13.2	14.2	15.4	16.7	18.0	18.9
5 years 6 mths (n = 52)							
Height (cm)	89.4	94.8	98.9	103.2	106.8	110.3	115.8
Sitting height (cm)	50.3	52.1	54.4	56.5	58.0	59.9	61.7
Leg length (cm)	48.1	52.1	55.2	58.2	60.7	63.5	67.0
Weight (kg)	11.9	13.2	14.5	15.5	16.9	18.1	18.8
5 years 9 mths (n = 78)							
Height (cm)	89.4	96.6	100.6	104.9	108.8	111.2	116.3
Sitting height (cm)	50.6	53.1	54.9	56.6	58.3	60.6	63.1
Leg length (cm)	48.3	53.7	56.6	59.7	61.9	64.5	68.3
Weight (kg)	12.0	13.5	14.9	15.[illegible]	16.9	18.1	18.7

difference between the two measures was less than 5 millimeters in 75% of the observations.

The accuracy of any developmental data depends upon the accuracy of the individual measurements, and on the reliability of the stated ages and birth dates. In a preliminary phase of the experiment, techniques were developed for assuring the accuracy and reliability of measurements, transcription, card punching and subsequent verification of data, and for excluding data from children whose stated ages were obviously incorrect. This latter procedure was necessary because once the subjects had been divided into three monthly age groups by sex, and by area of residence, each cell contained a small enough number that even one grossly unreliable measure might have considerably altered the mean value.

Determination of chronologic age is always difficult in a region where

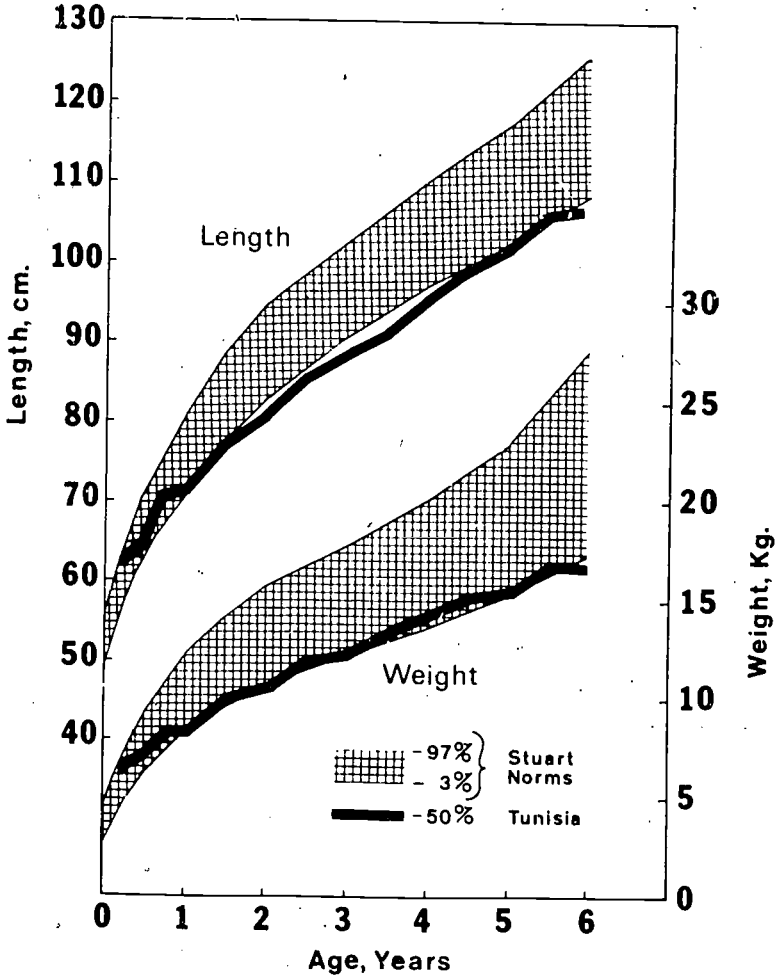

FIGURE 1
Child Development in Southern Tunisia. Physical Growth, Preschool Boys.

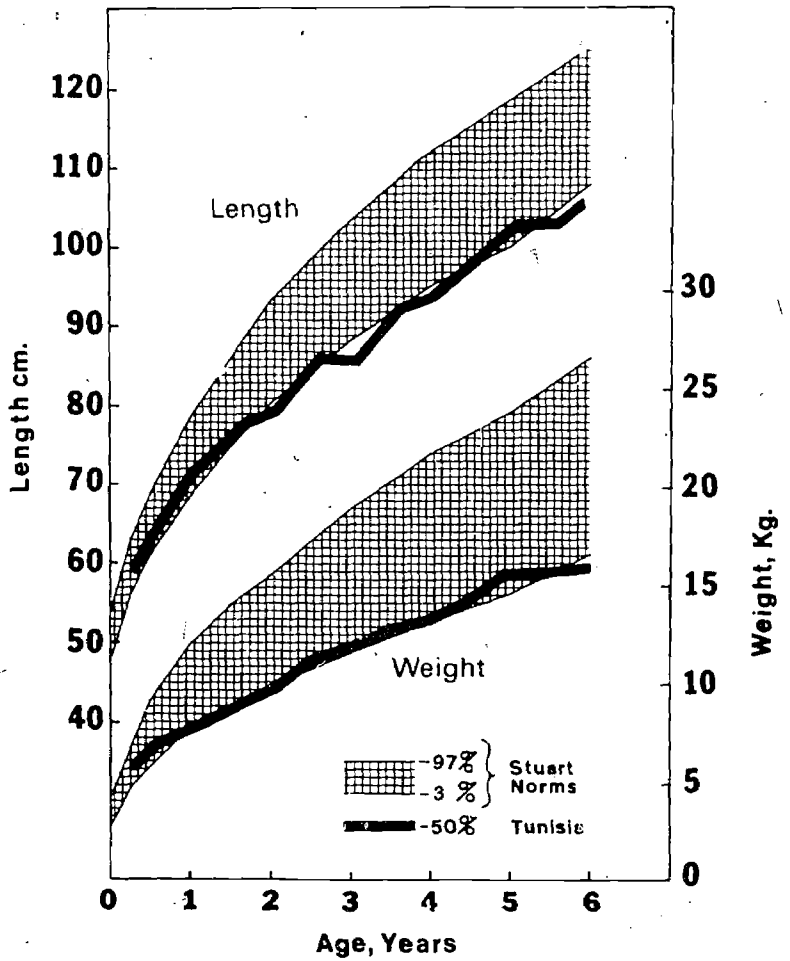

FIGURE 2
Child Development in Southern Tunisia. Physical Growth, Preschool Girls.

TABLE 9
DEVELOPMENTAL QUOTIENTS

	Age (months)											
	3	6	12	18	24	30	36	42	48	54	60	66
Male												
Height, % Standard*	1.064	.984	.941	.925	.914	.914	.910	.910	.915	.924	.933	.916
Weight, % Standard Weight	1.206	.936	.824	.822	.820	.844	.848	.848	.847	.849	843	.783
Weight Quotient/Height Quotient	1.133	.951	.885	.888	.897	.923	.931	.931	.925	.918	.903	.854
Female												
Height, % Standard	1.042	.969	.929	.917	.907	.905	.899	.900	.897	.901	.917	.914
Weight, % Standard	1.120	.895	.779	.783	.781	.796	.818	.825	.797	.801	.816	.776
Weight Quotient/Height Quotient	1.074	.923	.838	.853	.861	.879	.909	.916	.888	.889	.889	.849

* Developmental Quotient expressed as percent of value in Stuart Norms (Nelson, 1969)

registrations of births are often delayed. Techniques for detection of erroneous measurements and stated ages are generally based on the principle that a given measure or series of measures are not compatible for a given chronologic age. The problem to be faced in the current study was to define the limits for acceptability of anthropometric measures and stated age. Such limits may be derived from comparisons with pre-existing norms for child development, or by use of statistical criteria. Available norms have usually been derived from populations of relatively privileged children who are often of different racial origin. It also cannot be assumed that the distribution around the mean of an underprivileged group will follow the same trend as that demonstrated by a privileged sample. Moreover, if norms based on elite populations were used, most of the population in the current study would present a very high concentration in the lower percentiles, with a consequent underevaluation of improvement with time. For this reason, it was considered necessary to define developmental norms based on the evaluation of the entire population, and a statistical approach appeared to be more suitable.

The simplest technique for detecting such errors is to consider aberrant those values which depart by a certain number of standard deviations from the mean value, but this may present additional problems for two reasons:

1) a vicious cycle is established because standard deviations are affected by just those values which one wishes to eliminate, and
2) many distributions are strongly asymmetrical and one would have a high probability of cutting off extremes at one end of the scale to a greater extent than at the other.

One way of resolving this procedural problem, and still detecting and eliminating most measuremental and age related errors, is to interpolate curves of various types. On such curves one may choose two points for each variable measured in each age group beyond which the probability of a given measure being valid is extremely remote for that size sample. In our study, several types of adaptation curves were attempted, but a Pearson Type IV curve turned out to be the most suitable. First and 99th centile limits were thus obtained for each measure at each age. This approach eliminated aberrant measures only in a very few cases, however, because such errors were detected in

only two per thousand measurements; these were generally found far outside of the set limits, and were most likely due to transcription errors. By reviewing the original data sheets about half of such errors were traced and corrected. The technique proved more useful however in identifying erroneous birth dates. The subjects concerned were recognized because the whole constellation of anthropometric measures were outside of the set limits and, what is probably more important, dental or skeletal ages were also not consistent with the given chronologic age. Such subjects could not be used for the construction of age-related norms: the number of these values never exceeded 5% however, for a given age group.

From the first year of age, our figures are consistently lower than those given in the norms of Stuart and Reed. One might assume that this is due to nutritional deficiencies, but racial and other factors may play a major role (Garn, 1965). In addition, it should not be forgotten that the norms of Stuart (Nelson, 1969) were based on a relatively privileged population of North European extract. Comparisons of child development in which one set of data represents an elite population may have a purpose, however, by indicating to what extent the underprivileged group are deficient in the various growth measures, and to obtain an idea of the potential improvement or increase in growth which may occur if the underlying causes can be corrected. This, however, was not our purpose as it appeared most important to follow our field population through time and to identify eventual improvements due to fortification of wheat or other socioeconomic change. Inadequate data exist at this time to warrant any further speculation or discussion of the nutritional correlates of the growth patterns of children in Southern Tunisia: such considerations will form the basis for subsequent reports from the study. They will also present data on other baseline parameters of child development in this population, consider the implications when deviations from other populations can be demonstrated, and the results of the actual processes of wheat fortification.

Conclusion

Undernutrition is postulated to be the major cause of the short stature demonstrated by many children in developing countries. In order to determine if fortification of available foods with essential nutrients may

be of value in increasing the stature of these children it is first essential to define the processes of growth in children fed the unfortified diet. As part of a battery of investigations, length, sitting height, leg length and weight were measured in all preschool children in the villages around the Chott el Djerid, Tunisia; prior to a trial of fortification of all wheat products with minerals, vitamins and lysine. After one year of age, the stature of children in this area is consistently below that of internationally accepted norms for child development. It is not possible at this stage of the study to determine the cause of this pattern of development.

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Judgment of Infant Care

Senator Percy, this "Infant Care" booklet is one of many excellent information sources which have been prepared by the Childrens Bureau, or the Department of HEW on various aspects of normal and abnormal child development. Its nutritional content is confined to a "how to do it" approach to infant feeding. There is little, if any, mention of the sort of problems we are considering in this hearing.

It would be wrong to leave the impression that information on infant nutrition is not available to the public and to students of the health professions. In addition to this "Infant Care" booklet, there are numerous other excellent sources such as Dr. Benjamin Spock's "Baby and Child Care." These are familiar to pediatricians, to medical and nursing students preparing for examinations in pediatrics, and to mothers in the middle and upper socioeconomic brackets. They are generally not familiar to physicians as a group, and are not placed highly in medical school curricula. I am not competent to estimate the extent to which these materials reach mothers in the lower socioeconomic settings and in the teen years—and these are the populations at greatest risk.

The most glaring omission, to my mind, in these books is the lack of appreciation for the socioeconomic correlates of child nutrition, and particularly the problems of fetal and child development which occur with increased frequency in these high risk populations. Moreover, I'm not aware that including such information in the curricula of medical and nursing schools will really solve the problem, as these professions have limited contact with women who are in greatest need of nutrition counseling. A public health approach and a public nutrition and health education campaign would, I believe, be more likely to reach the total population at risk.

FROM DR. ALVIN MAUER

Concerning Iron Deficiency in Infants

In November 1971 the Mayor's Commission on Hunger and Malnutrition was appointed in Cincinnati. The commission was composed of representatives from 8 public agencies, citizens representing neighborhoods, physicians, and people involved in food programs. The formation of this commission followed a series of public hearings on hunger and malnutrition held by the City Council Committee on Employment and Human Resources. The objectives of the commission were:

(1) study problems of hunger and malnutrition in Cincinnati;
(2) identify individuals and groups affected most directly by hunger and malnutrition;
(3) coordinate the existing food programs;
(4) provide for maximal use of all State, Federal, and local resources available;
(5) develop proposals to fill gaps in existing programs;
(6) inform public officials of the extent of hunger and malnutrition in the city.

In its early meetings, the commission did identify target areas for further study and action. One of the target areas was the problem of nutrition in infants and preschool children. A committee was formed to investigate nutrition of infants with particular reference to iron deficiency. This deficiency state was chosen because it is the most common and most frequently serious dietary deficiency encountered in infants today. Its frequency furthermore is clearly related to social and economic factors. It is also completely preventable by methods currently available.

During the first year of life an infant triples his birth weight and doubles the amount of blood he has. Since iron is a necessary requirement for making red blood cells, he must have twice as much iron in his blood as hemoglobin at the end of his first year of growth. To accomplish this, he needs to have absorbed from his diet 150 mg of iron. Good sources of iron in his diet are: Iron fortified cereals, meats, green vegetables, eggs, and iron fortified milk formulas. However, many infants are raised during that first year of life primarily on noniron fortified milk with little additional iron containing solid food. These infants will be iron deficient at the age of 1 year of life and if the iron deficiency is severe they will be anemic.

There is inconclusive evidence and therefore controversy about the effects of moderate degrees of iron deficiency on the health, growth, and development of affected infants. However, with severe iron deficiency, anemia develops which in some infants is sufficient to necessitate hospitalization for treatment. If untreated, the anemia can progress to the point that heart failure and death occur. As a group, iron deficient infants are smaller than normal infants (1) probably indicating other dietary deficiencies as well.

How common is iron deficiency? In the private pediatric practices in suburban areas, less than 5 percent of children develop iron deficiency anemia during the first year of life (2). However, in a study done by Dr. Carl Weihl at the pediatric clinic of the Cincinnati General Hospital during the early 1960's, a much greater incidence of iron deficiency was found. Between the ages of 1 and 3 years, two-thirds of the children attending that clinic had severe enough iron deficiency to cause anemia. Dr. Weihl found that from two to four children were being admitted each month to the Cincinnati General Hospital pediatric ward because of iron deficiency anemia. Other children were admitted to the hospital because of illnesses which would not have necessitated hospitalization but for complications of associated iron deficiency anemia. In a study of a similar clinic population at Cook County Hospital in Chicago, three-fourths of the infants were found to have iron deficiency anemia (3). Therefore, infants raised in inner city poor populations have a significant degree of nutritional deficiency as judged by this one measure of dietary adequacy.

In a recent study from Gainesville, Fla., older children between 4 to 6 years of age being evaluated for the Head Start Program were not found to have severe degrees of iron deficiency anemia. Even in this group, a minor degree of iron deficiency existed which was demonstrated by the improvement of blood hemoglobin values during the administration of iron in school for a 5 week period (4). Thus, even these older children still showed residual evidences of iron deficiency so common at an earlier age.

Why does iron deficiency occur in these lower social economic groups? There are several reasons.

First, many of the children are raised by mothers who are working mothers of necessity. Thus, the infants are left with babysitters or relatives who find the easiest way to feed an infant is to give him a bottle of milk.

Second, certainly we have been delinquent in providing adequate nutritional education concerning the needs for growth of the infant.

Third, economics plays a strong role in that iron fortified formulas and some of the iron containing foods are expensive. Again, the cheapest way to raise a baby during the first year of life is to feed him milk only. Finally, a premature baby has a greater risk of developing iron deficiency because of his proportionately greater growth rate and smaller iron stores at birth. The lower socioeconomic groups also have the highest rate of prematurity.

Is it possible to prevent the development of iron deficiency anemia? At this time there is no question but that it is possible to prevent the development of iron deficiency anemia. In 1959, a study done in Kansas indicated that iron fortified formulas prevented the development of iron deficiency in children (5). A study done in Baltimore in 1964 further indicated that the same iron containing formula was capable of preventing the development of iron deficiency anemia in premature infants (6). A similar study has been done at The Children's Hospital of Cincinnati by Dr. William Schubert which certainly beyond all doubt indicated the value of iron containing formulas in the prevention of iron deficiency anemia. Of greatest importance for our consideration of the high frequency of iron deficiency in infants of the poor is the study done by Drs. Andelman and Sered (3) at Cook County Hospital in Chicago. They evaluated the results of giving iron containing formulas to 1,048 infants of a lower socioeconomic group. They found that in the group not given an iron containing formula, 76 percent of the infants developed iron deficiency anemia and had to be dropped from the study and treated for their anemia. On the other hand, in the group receiving iron containing formulas, only 9 percent of the infants developed anemia and it was found that these failures were caused by the mother stopping the iron containing formula too soon. Therefore, it is indeed feasible to prevent iron deficiency anemia.

Iron containing formulas are not the only means of preventing iron deficiency. Iron containing dietary supplements are also effective. An argument might be made that with proper nutritional education and the availability of other foods in

References appear on p. 108.

the infant's diet, the best method would be the provision of proper solid foods in the diet of the growing infant in addition to milk. In this manner better nutritional habits may be developed.

At the conclusion of their study, the Committee on Infant Nutrition of the Mayor's Commission on Hunger and Malnutrition felt that they had identified a frequent and major problem of malnutrition in infants of the poor in Cincinnati. A Model Cities project has been developed for the distribution of iron containing formulas to infants attending clinics within that area. The study is too recently begun to have an evaluation of its effectiveness. In federally and locally supported clinics an effort has been made to increase use of iron supplementation during the first year of life. In these clinics, iron containing dietary supplements have been used primarily. The success of the program is indicated by a survey taken by Carl Weihl of 109 infants attending two clinics during the month of September 1972. Ninty percent of these infants were receiving iron supplementation. Our concern now is that at a time that we would like to extend this program to all infants at risk in our city, the support for this program is dwindling and we may soon be back to the situation that prevailed 10 years ago.

The Committee on Nutrition of the American Academy of Pediatrics has recommended iron supplementation for the diets of infants. From the experience of the Cincinnati program several conclusions seem warranted concerning the problem of nutritional adequacy of infants' diets:

(1) Iron deficiency remains a common problem in infants.
(2) Most frequently affected are the infants of poor people.
(3) Iron deficiency anemia is a completely preventable disease.
(4) Methods of prevention include health education as well as supplemental food programs.
(5) Preventative programs are most effective when coordinated with health care facilities and community organizations.
(6) Current funding cut-backs may affect progress made so far in some cities to reduce the incidence of this nutritional deficiency disease.

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Newsletter Supplement - January, 1973

COMMITTEE STATEMENT*

American Academy of Pediatrics

"THE TEN-STATE NUTRITION SURVEY - A PEDIATRIC PERSPECTIVE"

HISTORICAL

In 1967 the 90th Congress of the United States attached an amendment to the Partnership for Health Act requiring the Secretary of the Department of Health, Education and Welfare to undertake a survey of "the incidence and location of serious hunger and malnutrition – in the United States." In response to the legislative mandate the Ten-State Nutrition Survey was conducted during the years 1968 through 1970. The sample was selected from urban and rural families living in the following ten states: New York, Massachusetts, Michigan, California, Washington, Kentucky, West Virginia, Louisiana, Texas and South Carolina.

The families selected were those living in some of the census enumeration districts that made up the lowest economic quartiles of their respective states at the time of the 1960 census. During the eight years after the 1960 census the social and economic characteristics found in some of the individual enumeration districts had changed, so that there was a significant number of families in the surveys with incomes well above the lowest income quartile. Thus it was possible in analyzing results to make some comparisons on an economic basis.

Thirty thousand families were identified in the selection process; 23,846 of these participated in the Survey. Data regarding more than 80,000 individuals were obtained through interviews and 40,847 of these individuals were examined.

The Survey included the following: extensive demographic information on each of the participating families; information regarding food utilization of the family; a twenty-four hour dietary recall for infants up to 36 months of age, children ten to sixteen years of age, pregnant and lactating women, and individuals over 60 years of age. In addition, physical examinations, dental examinations, and biochemical and anthropometric evaluations were performed on most of the individuals selected for examination.

During the formative portion of the Ten-State Nutrition Survey, the Committee on Nutrition of the Academy of Pediatrics assisted in program design and selection of biochemical standards. For the past two years another committee of the Academy has been reviewing the voluminous data accumulated during the Survey. The summary analysis which follows has been prepared by this committee and concerns those portions of the data which pertain to 22,000 children less than 17 years of age. Detailed review of the findings of the Survey will form the basis of additional reports to be published in the future.

INTERPRETATION

The goal of the Survey was to ascertain the extent of malnutrition in a sample population, and this was done. The nature of the sample, however, precludes estimating the nutritional status of any other population segment in the United States. Comparisons of various populations within the sample defined by ethnic, geographical, educational and economic variables permitted the identification of certain groups of children which were at particular risk to varying hazards of malnutrition. Although this massive Survey revealed much about the nutritional status of Americans, it also made clear that considerable research is needed in the development of useful methods and standards for evaluation of the nutritional status of children.

Dietary Intake

The Survey data demonstrated that the diets during early childhood and adolescence varied with geographic locale, economic status and race or ethnicity. The energy (caloric) value of the diets and the intakes of all nutrients studied were lowest for blacks and Mexican-Americans living in the southern states. The nutri-

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*Prepared by a special Committee of the Academy, appointed by the Executive Board, to review the data from the Ten-State Nutrition Survey – Contract No. HSM 21-71-526 USPHS.

The Committee wishes to express its warm thanks to Dr. Milton Z. Nichaman, Director, Nutrition Program, Center for Disease Control (CDC), Atlanta, Georgia, and his staff for their generous cooperation and assistance in making the survey data available to the Committee.

Much of the data upon which this statement is based appears in Ten-State Nutrition Survey, 1968-1970, DHEW, Publication No. (HSM) 72-8132, July, 1972.

tional quality of the diets, as calculated from dietary recall data and expressed as the amount of nutrients per 1000 kilocalories, showed surprisingly little variation in relation to family income or race, except as noted below for vitamin A. Variations in vitamin A intakes reflected the influence of both locale and ethnicity on diets apart from total energy intakes. Although the diets of low income families did not differ in the concentration of essential nutrients from those of middle income groups, the availability of calories, i.e. the amount of food available, was directly related to family income. The total food intake of children in low income families was limited and this was reflected in growth performance.

Of particular interest to the pediatrician was the dietary intake data for subjects less than 36 months of age and for children ten to sixteen years of age. In all age groups iron was the one nutrient for which mean intakes were uniformly below accepted dietary standards. These data were compatible with the prevalence of iron deficiency found in the population studied. As suggested above, average dietary intakes of iron per 1000 kilocalories were essentially the same regardless of economic status. Thus the diets of persons in very low income families contained on the average as much iron per 1000 kilocalories as did those of individuals in higher income families. The high prevalence of iron deficiency in adolescent boys from low income families in contrast to the very low prevalence for adolescent boys of higher income families appeared to result from restricted food consumption and not from a diet of poor quality.

It was of considerable interest to find that the mean energy intake and the mean dietary iron intake of adolescent girls varied little in relation to family income. This was in striking contrast to the findings for boys 13 to 16 years of age, whose energy and iron intakes increased directly with family income.

There were distinct differences in the nutrient intakes of pregnant women which were related to family income level. For example, the mean energy and protein intakes (1506 kcal and 60 gm/day, respectively) of low income black pregnant women were about 30 percent below those of pregnant white women of higher income (2127 kcal. and 89 gm. protein/day). On the average pregnant women in all economic and ethnic groups had insufficient dietary iron.

Plasma Vitamin A Levels

There was a general increase in plasma vitamin A concentrations with increasing age. In those states with the highest income levels (California, Massachusetts, Michigan, New York and Washington), mean values showed a progressive increase from about 35 μgm/100 ml. at one year of age to about 60 μgm/100 ml. for persons 45-59 yrs. of age. In the remaining five states representing the lowest economic level of the sample, the mean vitamin A levels for all age groups were generally lower. However, the change with age was present and followed a pattern similar to that noted for persons of higher income. Thus it appeared that slightly higher levels of plasma vitamin A were associated with higher family incomes.

A second major finding was that Mexican-Americans living in several southern states had lower levels of plasma vitamin A than did the black or white populations. The mean values at all ages were lower, approximating 20 μgm/100 ml. until adolescence, then rising to 30-35 μgm/100 ml. at age 45 and above. The slight increase in mean vitamin A values with increasing income seen in all groups was more pronounced in this population of Mexican-Americans.

From the age of one year through adolescence 50 percent of the Mexican-American children living in the southern states had plasma vitamin A values below 20 μgm/100 ml. This was in marked contrast to the Spanish-American population living in New York and California in which less than 10 percent of the children had plasma vitamin A levels below 20 μgm/100 ml.

Serum Ascorbate Levels

The vast majority of children studied in this Survey had serum levels of vitamin C (ascorbate) above 0.2 mg/100 ml. In those five states with higher mean family incomes less than two percent of the children had values below 0.2 mg/100 ml. In the other states in which mean family incomes of the sample population were distinctly lower, the percent of children with values below 0.2 mg/100 ml. approached ten. It was not possible to identify ethnic or economic factors associated with the observed differences in mean serum ascorbate levels. Of interest was the finding that females tended to have higher levels than males. There was no apparent relation between vitamin C levels in serum and reported dietary intakes of the vitamin, a relation unique for this nutrient in that it alone was independent of energy intake.

Hemoglobin and Iron Deficiency

Iron nutriture of children was evaluated in the Ten-State Nutrition Survey by determining hemoglobin levels. In those individuals found to have hemoglobin concentrations below selected values, determinations of serum iron and iron-binding capacity were performed to document the extent of iron deficiency. The available evidence suggested that essentially all anemia found in the Survey was due to iron deficiency.

Of particular importance was the demonstration of a high prevalence of iron deficiency in boys and girls of all ages, including infancy, childhood and adolescence. For example,

70 percent of black pre-school children living in the South and 30 percent of white pre-school children in the North had hemoglobin concentrations below 12.0 gm/100 ml. There were distinct ethnic differences in the distribution of hemoglobin values for pediatric subjects of both sexes and of all ages. Black children had the highest percentage of low hemoglobin values. There was less risk of iron deficiency in the Mexican-American children living in southern and western states than in Spanish-American children living in northern states.

The influence of family economic level on the extent of iron deficiency in adolescence was of particular interest. A limited segment of the data was analyzed in considerable detail and demonstrated this influence. The prevalence of iron deficiency in adolescent males in this sample was inversely related to family income. Adolescent males from low income families had a higher prevalence of iron deficiency than did adolescent females of similar economic status. Adolescent males in higher income families had a low frequency of iron deficiency. In striking contrast, the extent of iron deficiency among adolescent females bore no relation to family income. These findings were consistent with the iron intake data mentioned above.

Growth and Economic Status

As might be expected, a greater per capita income was associated with greater stature, greater body weight, a greater thickness of subcutaneous fat, advanced skeletal development, advanced dental development, earlier maturation and earlier attainment of maximum stature. The data showed that these differences were in large part established by the first year of life and were consistent thereafter. The data from the Ten-State Nutrition Survey provided a clear indication of the magnitude of the economic impact on dimensional, skeletal, dental and sexual development.

Growth and Ethnicity

Both on an absolute basis, and when corrected for income level black boys and girls in comparison to white and Spanish-American children, tended to have skeletal advancement (ossification), dental advancement (age at permanent teeth eruption) and earlier maturation and had some tendency towards greater body size, notwithstanding lesser body fat through adolescence. Black boys and girls evidenced a greater skeletal mass, both on a group basis and on an income-corrected basis. Therefore, genetic factors outweighed economic factors in explaining differences in skeletal and dental development. These findings suggest the need for different standards for black and white children when assessing nutritional status during growth.

Fatness and Obesity

From infancy through adolescence the median thickness of subcutaneous fat increased directly with income. The proportion of children defined as obese showed the same trend and this was particularly apparent in adolescent boys.

During adolescence median fat-fold thickness continued to be proportional to income level in males. However, for females the relation reversed during adolescence so that those of lower incomes were the fattest and became increasingly so in adulthood. At all ages black males were leanest, and after adolescence, black females were fattest. At least part of this (adult) black-white difference in fatness was related to income. The poorer the adult black, the more likely the male was to be thin and the female to be fat.

Dental Findings

With approximately 19,000 children examined, this was by far the largest survey ever conducted in this country. The criteria used to assess dental health, namely the DMF index in older children and adults and the *df* index in younger children (where *D* and *d* stand for decayed, *M* for missing, and *F* and *f* for filled) are primarily measures of caries prevalency.

Using the DMF index, white males and females from high income states tended to have slightly higher DMF values as compared with blacks or Spanish Americans, a trend repeated in low income states. The racial difference is also seen in *df* indices for the primary teeth in low and high income states, comparing white with black children.

The caries index could not be related to plasma vitamin A or serum vitamin C levels or to serum albumin concentrations. The one significant factor was the between-meal consumption of refined carbohydrate: in adolescent children of all races the caries index progressively rose as this dietary component increased. For example, in children 10-16 yrs. of age the effect of increasing the between meal carbohydrate intake from negligible amounts to 150 gm. or more per day was to increase the DMF index from 30 to 60 percent in different ethnic groups. It is thus apparent that this effect must be considered in any attempt to assess the influence of other factors on the caries index.

When only those adolescents who consumed no refined carbohydrate between meals were considered, Spanish-Americans living in higher income areas had the lowest caries index, and whites and blacks in low income areas the highest. Considering all racial groups together family income was not related to the prevalence of caries.

IS THERE MALNUTRITION AMONG THE CHILDHOOD POPULATION IN THE UNITED STATES?

Accepting a definition of malnutrition as faulty or inadequate

nutrition (Webster), the data from the Ten-State Nutrition Survey were unambiguous: substantial numbers of the children examined in this large survey were indeed malnourished.

In answer to the question of whether or not there is malnutrition among American children, one might begin by evaluating the findings for these variables which can be measured with most precision and for which experience allows the most confident interpretation. At the risk of being unduly simplistic in analyzing the mass of data now available, a mere look at measures of growth and prevalence of anemia will provide partial but confident answers to the question.

Evidence of retarded growth was apparent in children from low income families. Relative to what would be expected for a well-nourished population, two times as many black and three times as many white children in families living in poverty were below the 15th percentile for accepted American standards of height. There was a progressive decrease in the prevalence of undergrown children with increasing family income. Children in certain age groups from higher income families were advanced in their height by as much as a year over children from lower income families.

The widespread prevalence of iron deficiency anemia throughout infancy, childhood and adolescence was previously noted in this summary. That this may be an indicator of a broader spectrum of nutritional inadequacies in American children is suggested by the following observation. Boys seven through twelve years of age with high (normal) hemoglobin levels averaged three to four centimeters taller than those with low hemoglobin values.

Obesity in children and adolescents is a common nutrition-related health problem. The almost complete failure of programs to correct obesity once it is present in childhood and the potentially serious behavioral and health consequences of persisting severe obesity demand of the pediatric community a new level of concern for prevention of this condition and a recognition that obesity has in part a cultural base.

Some degree of malnutrition does indeed exist in a substantial number of the American children studied in the Survey. To a significant degree malnutrition in children appears to be a consequence of both the quality of life and the economic status of the family. Present information should prompt the pediatrician and other physicians caring for children to become increasingly aware, informed and concerned about nutritional problems in a population of growing individuals. While it is incumbent upon the physician to treat malnutrition in his patients, it must be noted that the limited approach entailed in assuming that the physician plays the only role in relieving malnutrition is not likely to succeed. Where malnutrition emerges as a consequence of impecunity, society as a whole must be involved in amelioration.

COMMITTEE TO REVIEW THE TEN-STATE NUTRITION SURVEY

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FROM DR. ROY M. PITKIN

Policy Statement on Nutrition and Pregnancy

AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS

A woman's nutritional status before, during, and after pregnancy contributes to a significant degree to the well being of both herself and her infant. Therefore, what a woman consumes before she conceives and while she carries the fetus is of vital importance to the health of succeeding generations.

Nutritional assessment and advice are essential components of good antepartal care. The obstetrician-gynecologist, as leader of the obstetric-gynecologic health team, is responsible for including these in the care of all pregnant patients under his supervision. He may do this personally or by insuring that qualified members of his team do so. Ideally, nutritional assessment should be made before conception. Failing that, it should be accomplished at the first antepartal visit. It should be repeated at regular intervals during and following pregnancy. A basic technique of nutritional assessment is to obtain and analyze a 24- or 48-hour diet history. This should be supplemented by clinical evaluation of possible nutritional deficiencies and, where indicated, appropriate laboratory tests.

Nutritional advice to the pregnant woman depends upon knowledge of sound nutritional principles. Although the components of optimal maternal diet have not been determined precisely, several important principles may be stated:

1. Adequate intake of protein, particularly protein from animal sources, should be insured.
2. Caloric intake approximately 10 percent above non-pregnant requirements is advisable.
3. Weight gain during pregnancy should not be restricted unduly, nor should weight reduction normally be attempted. The average weight gain in normal pregnancy is 10 to 12 kg [22 to 27 lbs].
4. Essential nutritional elements [such as sodium] should not be restricted during normal pregnancy.
5. Dietary supplements of iron and iron-containing foods are indicated during pregnancy. Other dietary supplements, such as vitamins or additional sources, may be helpful where deficiencies in nutritional status are determined.

Nutritional advice should be continued during the puerperium. Restriction of dietary intake should not be advised during the early postpartal course nor for the lactating mother.

In implementing these principles of good nutrition in obstetrics, the obstetrician-gynecologist may utilize written or pictorial materials. However, the most important factor in persuading a patient to establish sound nutritional habits before, during, and after pregnancy is continued personal encouragement by the obstetrician-gynecologist and the members of his health team, with emphasis on positive rather than negative aspects of nutrition.

Passed by the Executive Board,
December 1, 1972.

Committee on Nutrition of the American Academy of Pediatrics

SUPPLEMENTAL FEEDING PROGRAMS FOR MOTHERS AND INFANTS

The Committee on Nutrition of the American Academy of Pediatrics is seriously concerned about the fate of several thousand mothers and infants who may soon be denied further participation in a special feeding program designed to provide adequate nutrition for infants from low income families during the critical developmental period extending from pregnancy through the first few years of life. The Supplemental Feeding Program currently operated by the Department of Agriculture provides nutritious surplus foods to 157,000 program participants, which is less than ten percent of the women and children whose low incomes place them within the population of nutritional risks. According to recent surveys,

approximately 37 percent of that already dwindling program is likely to cease operation soon due to the elimination of OEO funds that had been used in many localities to administer the program and distribute the foods.

The need to accord special attention in federal feeding programs to pregnant and lactating women and to infants and preschool children is supported by medical evidence indicating that improper nutrition during gestation and during the first few years of life can cause serious damage in the course of a child's physical and mental development. Studies have shown that iron, protein, and calorie deficiencies are especially dangerous during the first two years of life because of adverse effects upon the child's growth during a critical developmental period.

The nutritional experience of the mother is crucial to the child's development. There is no doubt that malnutrition in pregnant women contributes to the birth of premature and low-birth-weight infants. Prematurity and low-birth-weight contribute in turn to infant mortality and mental retardation. Seventy percent of all infant deaths in the first year of life occur in infants of low-birth-weight, and a high proportion of premature babies have demonstrable intellectual or behavioral deficits when they reach school age. Optimal maternal nutrition and prenatal care should decrease the high incidence of low-birth-weight infants, and, since prematurity is correlated with mental retardation, relief of maternal malnutrition may have a long range effect upon the prevalence of mental retardation as well.

The special needs of mothers and infants, then, are well established. Solutions to the problem are perhaps less evident. Ideally, family feeding programs should be sufficient to assure that all members of the family get a nutritious diet. At the present time, however, this is simply not the case. The recently completed Ten-State Nutrition Survey conducted by the Department of Health, Education, and Welfare indicates that "substantial numbers" of American children are malnourished and that evidence of retarded growth is apparent in children from low income families. The survey further points to a widespread protein deficiency among pregnant and lactating women, stating that the problem demands special attention because of its relationship to the frequency of unsatisfactory pregnancies and the excess of low-birth-weight babies in low income groups.

While the current Supplemental Feeding Program is far from an ideal solution, it is a source of much needed food for some 157,000 people. Furthermore, it is a means of getting pregnant women to visit clinics where they get medical care they probably would not receive otherwise. The Committee on Nutrition therefore urges that the program be maintained through federal efforts to distribute the already available commodities until a better means of caring for mothers and infants has been implemented. In the many areas where OEO funds supported commodity distribution and where local communities cannot take over that responsibility, it is incumbent upon the federal government to lend its support.

The initial step toward improving nutritional services for mothers and infants was taken by Congress last year with the establishment of a $20 million pilot feeding program designed, not to kill the current supplemental program, but to explore alternative approaches and to test the effects of those approaches. Unfortunately, the implementation of the pilot has been delayed for many months because the Department of Agriculture has not promulgated the regulations under which the program will operate. Furthermore, the federal budget reflects a minimal interest in the pilot program. USDA's Food and Nutrition Service has estimated that $500,000 to $1 million will be spent on the new program in fiscal year 1975, and of the $20 million requested for the two supplemental programs in fiscal year 1974, about $5 million will be available for the pilot.

If the 2 year pilot is to serve its function as a means of evaluating special feeding programs for pregnant and lactating women and infants, it must get off the ground immediately. The Committee on Nutrition urges that the entire authorization of $20 million per year be appropriated and spent so that the pilot will be a meaningful tool for the collection of data and the fulfillment of nutritional needs rather than a mere token exercise.

Until more is known about control of the higher incidence of morbidity, mortality, and developmental problems among children from low income families, the special feeding programs are a rational response to at least part of the problem. From a practical viewpoint, we would point out that malnutrition leads to social and economic costs far beyond the expense involved in these programs. From a humane viewpoint, we should remind ourselves that, while federal programs may be expendable, our children are not.

FROM SENATOR CHARLES H. PERCY, PRESIDING

[From Redbook, April 1973]

How To Save Babies for Two Dimes a Day

By Virginia M. Hardman

Year after year a shocking number of infants continue to be crippled for life by malnutrition. But in Memphis, Tennessee, a dedicated group of doctors and citizens has proved that all it takes to save these babies is 21 cents a day—and the determination to keep poor children from starving

December. A raw day. I am in Tennessee, walking through the South Memphis slum neighborhood. My companion, Mrs. Johnnie Mae Jones, is a member of Memphis Area Project South (MAP-South), a community self-help organization. Working jointly with the St. Jude Children's Research Hospital, of Memphis, women like Mrs. Jones have brought large numbers of undernourished children into a special nutrition program. I have joined her to learn how the program operates.

Mrs. Jones seems to know almost every person, street and house in the area. We wait ten minutes at an unguarded intersection for a freight train to pass. She tells me that a child was killed here. In a half hour's walk, not a bus passes. Finally we reach our destination, a dilapidated frame house. It looks abandoned. Mrs. Jones knocks on the door.

"Come in," says the housewife, Mrs. Henry Trainer, who knows my companion well.

Inside, two little old men are sitting on a broken-down couch; the one sucking on a bottle is Bobby, aged three. He and his four-year-old brother, Ralphy, stare straight ahead. They have the glazed look sometimes seen in the eyes of the aged who have lost interest in life, who expect nothing good ever to happen to them again.

Usually I get along better with children than with adults. Not this time. All my overtures meet with no response, and the children finally retreat to the kitchen, leaning motionless against a table while I talk with their mother.

She tells me that Bobby and Ralphy were born in Memphis, the youngest of nine children, and she tells me a little about her struggle against poverty and despair. Although her husband works, the pay is so low and the family so large that it qualifies for food stamps, which are issued by the Tennessee Department of Public Welfare and bought at special branch offices in slum neighborhoods. Mrs. Trainer spends $49 for food stamps a month. Most months. With the stamps she can buy about $160 worth of food, which works out to less than 50 cents a day per family member.

As we sit there talking the wind blows through the flimsy walls of the five-room house. Mrs. Trainer explains that the family uses only three of the rooms in winter to save on heating. She ignores my next query, on the logistics of bedding down 11 people in three rooms. She has the strength of a countrywoman in imposing her silences. Then she opens a new subject, telling me what I already know—that Bobby and Ralphy are in the nutrition program.

"They much better than they used to be. Been on it 'most three years. They started giving me extra food for the five youngest all at the same time. Then coupla weeks later they took the older ones too for a while. The older ones don't get it any more. They over six years old and get school lunches instead—'cept these two."

Bobby was three months old and Ralphy 16 months when they came into the program. In Ralphy's case the underdevelopment of his brain, caused by malnutrition, may be permanent.

Only when we are at the door and I call out to the children, "We're going now—come say good-by," do they venture out of the kitchen. Bobby, in a hoarse kind of whisper, seems to be trying to say good-by.

Out in the street with Mrs. Jones, I think about what I have learned so far about the effects of child malnutrition and about this nutrition program in Memphis, which has already decreased the yearly infant death rate in one area of the slum from 84 per 1,000 live births to 20 per 1,000, the same as the over-all infant death rate in the United States.

Malnutrition can kill. That is terrible enough. But malnutrition in children who survive it can disable them for life. It not only stunts physical growth and makes its victims sickly, but also its effect on brain-cell development in the first six months of life can be disastrous.

These facts had been given me by Dr. Donald P. Pinkel, medical director of St. Jude Hospital, and his associate, Dr. Paulus Zee, the hospital's nutrition director. It is their concepts in relation to nutrition that are being tested in the remarkable program operated jointly with MAP-South in the effort to save the lives and intelligence of preschool children in this Memphis slum.

The MAP-South project has a history dating to 1964, when the people of the area formed a community organization to find ways of breaking the poverty cycle in their neighborhood. This group evolved, with the support of the U.S. Office of Economic Opportunity, into a highly effective institution that today includes full-time specialists, part-time neighborhood aides (recruited from impoverished families and counseled by professional social workers), as well as VISTA and citizen volunteers from the community at large. In the four years MAP-South has been working with St. Jude's, the program has restored some 4,000 children to health. And it was done by "prescription"—prescription for the only cure and prevention there is for malnutrition: food.

Special "prescriptions," signed by St. Jude physicians or specially trained nurse practitioners, are taken by poor mothers to a warehouse filled with surplus and donated foods and run by MAP-South personnel. There the mothers are given evaporated milk, enriched farina, a corn-syrup blend, canned juice, canned meat or poultry, canned vegetables, milk-beverage mix and instant nonfat dry milk

And for infants there is Similac, a special formula reinforced with iron and containing protein, lactose, calcium, phosphorus and all the vitamins a baby needs, from A through E. Cost of the proper dosage for a baby? Twenty-one cents a day—$37.80 for each child in the crucial first six months of life—$37.80 to support the brain during its most critical growth period, to assure good physical growth, to prevent anemia and vitamin deficiency. This immensely valuable St. Jude-MAP-South nutrition program is a pilot project, and it may pattern a pioneering new approach to the care and well-being of the infants of this Nation.

Mrs. Jones and I continue on our way. Our next stop is the warehouse. I watch as the mothers hand in slips for their month's supplies and sign receipts. Sometimes the process is slow as a name is laboriously printed, or quick when an *X* is the signature; only a few seem to write with ease. The women wait on a bench while their orders are packed into cartons by two friendly and businesslike men.

"How do they get those heavy cartons home?" I ask.

"We're all apples off the same tree," says one of the men cheerfully. "We help each other manage."

In an adjacent office two women—employees of MAP-South—maintain the records of families with children on the nutrition program. They tell me that about 140 people a day come in for prescribed food. I leaf through a few case histories. I find that in a surprising number of families the husband is employed, but his wages are pitifully low.

There are the Fishers, for example. Mr. Fisher is a day laborer for a large barge company. He earns $2.26 an hour. Mr. and Mrs. Fisher and their eight children occupy a four-room apartment. The eight-year-old twins each are blind in one eye. Both have been hospitalized for pneumonia at St. Jude. The other children have been treated there for an assortment of illnesses, including malnutrition.

Winter is especially hard for the Fishers because it is the off season in Mr. Fisher's work and he gets only two or three days of work a week. Sometimes he's laid off for a week or more. At such times, says Mrs. Fisher, the family would starve if St. Jude and MAP-South did not help with emergency food.

Mrs. Jones and I leave the warehouse and pay a visit to Mrs. Daisy Leonard. Daisy has worked hard most of her life. Her smile and slim body are girlish, but her eyes and hands belong to a woman of 50. In fact, Daisy is 26, and the head of a household of four small children. She has what she calls an "income" of $1,740 a year—just $33.46 a week to house, feed and clothe a family of five.

Daisy's schooling ended with the sixth grade, when she went into the fields and picked cotton with other members of her family, sharecroppers in Arkansas, who worked from dawn to dusk like beasts of burden. Seven years ago an older sister broke away and moved to Memphis, a distance of 150 miles. A year later she sent for Daisy, who was then 20 and the mother of two babies.

"It was another world. We stayed on because we have a better chance in the city. Everything's better here, especially for the kids. I did day work—cleaning

houses and going out to chop cotton just over the border, in Mississippi. Me and my sister lived together, took care of each other's kids. But she got married and moved out, so now I can't work. Don't have anyone to mind my little ones."

There are four children now, Letty, Danny, Frankie and Ginny.

What does Daisy want for her children?

"The first thing, I want them to have a good education and stay out of trouble. That's why I scrimped and saved to get this TV; children gotta have something to do. Then I want them to be able to get good jobs and keep them. I want them to be happy. Strong too.

"My two youngest was real sick awhile back. If it wasn't for the hospital, I don't know if Ginny'd be here today. They took care of Frankie, too—operated twice for his eyes. They still feeding both children."

The two youngest children seem lively and healthy enough now. But Ginny was an undersized, irritable three-month-old with a swollen belly and spindly legs when a St. Jude nurse first visited the household, 3 years ago last summer. She was promptly hospitalized for treatment for severe malnutrition. Frankie's malnutrition was less critical. A nourishing high-protein diet with plenty of minerals and vitamins was prescribed for him.

"I knew something was wrong with the baby—she never acted right. Same with Frankie. But I didn't know what to do. Then that hospital came and found us like we were lost. They kept Ginny in St. Jude's awhile. I was scared just thinking about that tiny little baby of mine without her mother. I knew they were good to her. But I missed her. So I used to walk there every day to see her."

Isn't there a bus?

"Costs 35 cents. Each way."

So Daisy walked 6 miles in the blazing heat of a Memphis July to be with her baby. Every day for 10 days.

The room in which we are sitting is the only warm one in the ramshackle house. A gas heater is going, and on top of it is a skillet of rice "because the kitchen is too cold to cook in." The stuffing is coming out of the couch, but the bed is carefully made up. The only other furniture in the room are a chair and a TV set.

Mrs. Leonard's monthly income of $145 comes from the Aid to Dependent Children welfare program. She pays $40 a month for rent. Gas and electricity run between $30 and $40 in this unheated place. After rent and utilities are paid, $70 is left. Thirty-six dollars goes for food stamps, with which Mrs. Leonard buys some $115 worth of food each month. With today's high prices, the food is insufficient to feed the family of five. If it were not for the nutrition program, Mrs. Leonard couldn't manage.

While we talk, Ginny and Frankie play cowboys. Daisy interrupts them to give Ginny a spoonful of peanut butter. Frankie claims and gets a spoonful too.

"They eat it like candy," Daisy tells me. "For a while, when we couldn't get it from the warehouse, I had to scrape up the money to buy it because the nurse said the children need it. It makes them grow."

I look at this young mother trying so hard—and alone—to bring up her children and at the roaches boldly crawling along the walls. Suddenly the vermin and the dilapidation sicken me. I want out. Instead I ask; "Wouldn't you like to move?"

"Into what? This here is the best place I ever had. We got our own toilet and running water—they're indoors and just for us. I'm happy here. I'm treated good, especially the children."

Danny Thomas Boulevard connects two worlds, the South Memphis slum and St. Jude, which is at the opposite end of town. The hospital was built in fulfillment of a vow to the patron saint of the hopeless made in 1940 by a young man desperately struggling to break into show business. Many people helped entertainer Danny Thomas build the hospital that is the fulfillment of that vow.

St. Jude Children's Research Hospital opened its doors nearly 11 years ago as a research center for catastrophic childhood diseases, including leukemia and other forms of cancer, malnutrition and muscular dystrophy. No fees are charged. Patients come from all over the country, but only on referral by their own doctors. To Danny Thomas, "St. Jude Hospital is what democracy is all about—caring for each other regardless of race or creed, not thinking of pay."

On my second day in Memphis, late in the afternoon, I am in the office of the hospital director, Dr. Pinkel. He is a barrel-chested man in his mid-40s, with blue eyes as inquisitive as a small boy's. He seems like an athlete eager to get back to the game. Despite his courtesy, it's clear that he doesn't enjoy talking to visiting journalists, just as it was clear in the clinic where we've already met that he very much enjoys children. He has nine of his own. After this one item of personal information is elicited from him, Dr. Pinkel takes over the interview, plunging into the subject of our meeting.

"Malnutrition is unconstitutional. It's also unethical and immoral.

"Every American child has a constitutional right to be adequately nourished. Life, liberty and the pursuit of happiness are impossible if you're stunted in infancy, physically and mentally. I don't understand why the American Civil Liberties Union doesn't take this up."

This is no radical firebrand talking, as I already know, but a rather conservative, churchgoing pillar of society with impeccable scientific credentials. Everything about Dr. Pinkel seems conventional except his rage against malnutrition and his battle to save the children.

"Adequate diet is more important than compulsory education. For if the brain cells don't develop in the first six months of life, they never will. And without enough brain cells you can't learn. If you're anemic, as almost all malnourished children are, you don't even have the energy to try. Some folks opposed free schools a hundred and fifty years ago. Today some fol oppose free food for children. Yet an infant's diet determines his life. Poor diet [illegible] s for poor people."

How widespread is malnutrition among preschool child

"Nobody's ever taken a census. But if you consider the number of working poor and welfare families and add to that the unemployed, and allow a margin for poor eating habits in the middle class, you'd get a high estimate."

As high as a million?

"I'd say many millions. There's probably no community in America in which some children are not suffering from malnutrition. It's a disease, a widespread disease. We need state laws guaranteeing every child's nutrition. There's enough inborn, genetic retardation about which nothing *can* be done. But the brain damage caused by poverty is preventable. All it takes is food. There are Federal standards for animal care, none for child care."

How did St. Jude get started on its nutrition program?

"We started by asking the community what was needed and then did a study. Once the facts were clear, we devised a method—food by prescription. We left initiative and control to the MAP-South people. They receive the food and distribute it and they maintain a constant alert for malnourished children. We provide the expertise—medical personnel, nurse practitioners, hospital facilities, medicine, vitamins, infant formula."

Can the Memphis program be duplicated elsewhere?

"Yes. And it should be. We've proved that nutritional needs of a low-income population can be defined and met—and at very low cost—if the community itself is enlisted from the start. Memphis isn't unique. Nor are the affluent immune to the effects of malnutrition, here or anywhere. Many middle-class people don't know the facts about good nutrition. Besides, no matter how far away you move from the source of infection, the economically comfortable family in East Memphis gets sick too, and often from a disease that began in the South Memphis slum. Poverty anywhere is a threat to everybody's children. The point is to go out into the community and do something there, where the trouble starts.

"We're dealing with a catastrophic disease. And as we've proved, it costs very little to save the body and mind of a child. Why, it's the bargain of the century. In human terms the social costs of malnutrition are devastating. They're cumulative. If nothing is done, your kids and mine will have to pay the bill."

Dr. Zee, whom I meet next, looks like a Dutchman—the lean, intense sort often seen in student cafes near the University of Amsterdam, from which Zee himself was graduated with an M.D. degree in 1954. He then came to the United States, acquired a Ph. D. in biochemistry, specialized in pediatrics and in 1963 became St. Jude's chief of nutrition.

Dr. Zee says that the big push for the nutrition program came after the assassination of the Reverend Dr. Martin Luther King, in 1968.

"We'd been working on the nutrition problem since 1964. But Dr. King's murder right here in our town was a kind of catalyst. People were in a state of shock. Then they said, 'Let's do something.' Med students volunteered. We went into the homes of the people—we were appalled by what we saw. And we started a clinic for poor families.

"Almost half the kids—forty-four percent—had vitamin-A deficiency. That can be corrected—we *are* correcting it—for pennies a day. We began in a small way with whatever donated foods we could get. Then in 1969 the U.S. Department of Agriculture supplemental-food program enabled us to start a program for preschool children and for mothers who were nursing their babies. We still get donated food from time to time from private companies.

"Pregnant women began to concern us too, since brain damage can start before birth. We now have an arrangement with St. Joseph Hospital, about two hun-

dred yards from here; they provide the facilities and we provide prenatal care, delivery of the babies and postnatal care.

"Children treated in early infancy do best," Dr. Zee continues. "Two- and three-year-olds, already stunted and debilitated by malnutrition, are difficult to treat and must often be hospitalized for a month or more. Half the indigent babies in the South Memphis area get Similac with iron, which means that anemia could be virtually eradicated in Memphis. It's ironic to be spending sometimes up to a hundred and fifty dollars a day on hospital care for a baby that has been damaged by a disease that can be prevented for a dollar fifty a week.

"It has been proved that with early treatment, two years' catch-up growth can be achieved in one year. But all indications are that if the children are not reached until after infancy, they will require help for five years or more to correct damage often caused by only brief periods of malnutrition. Infants respond rapidly to food; children over three do not.

"Let me show you some slides. You'll see what food can do."

I see and I am condemned by what I see. Some of the slides could have been made in Biafra. Through some curious transposition, we who eat three meals a day have convinced the hungry that it's shameful to be poor in rich America. Now it's I who am ashamed.

Dr. Zee, misreading my silence, tries to explain to me how it feels to go hungry day after day.

"Believe me, malnutrition is an affliction. I know. It happened to me when I was twelve, in the Second World War, just before the Allied breakthrough at the Ardennes. We lived in Hoorn, north of Amsterdam. My father was a physician, the family well off. We had books, records—Shakespeare, Beethoven, all the classics. But none of us read or listened to music. We sat in gloom, apathy. All we could think of was food, how to steal or beg something to eat."

Dr. Zee abruptly changes the subject. Two years after the event, he is still incensed at the Department of Agriculture for removing peanut butter, scrambled-egg mix and dehydrated potatoes from the supplementary-food program. "That one act took out one third of the proteins and calories."

Peanut butter and scrambled-egg mix have since been restored, but from time to time other crucial foods, such as canned meat, canned vegetables and instant dry milk, disappear from the list.

The regional office of the USDA holds that such items can be purchased with food stamps.

Dr. Zee points out that many mothers can't buy the stamps because their husbands may earn a fraction more than is permitted to qualify for the program, or because they cannot afford to spend for the stamps the minimum number of cash dollars per member of the family required under the program. Many who *can* buy stamps don't know enough about nutrition to buy high-protein foods.

The doctor's argument for education in nutrition as well as for more free, nourishing food for the poor is persuasive, but unfortunately the U.S. Department of Agriculture food program was designed primarily not to feed the hungry but to remove farm surpluses and support farm prices.

The Administration itself has bluntly observed: "Their [surplus foods] primary thrust is to help balance the agricultural economy. . . ."

In contrast the U.S. Congress has given priority to nutritious food for infants, regardless of farm interests, and there is hope today that at least a beginning can be made to eliminate malnutrition in the children of the poor through projects similar to the St. Jude-MAP-South nutrition experiment. This hope is contingent on new legislation, enacted last fall, which enables local health or welfare agencies and private nonprofit groups to provide food to needy pregnant and lactating women and to infants who are "nutritional risks."

The Department of Agriculture is in charge of the operation, but the new program is not limited to surplus foods. The emphasis rather is on *special* foods that, as defined by the Congressional act, contain "high-quality protein, iron, calcium, vitamin A and vitamin C." Perhaps with reference to such products as Similac, the bill also specifies that at the discretion of the secretary of agriculture the program will also include any commercially formulated preparation designed specifically for the nourishment of infants.

Twenty million dollars is authorized for this purpose for each of two years—the fiscal year ending June 30, 1973, and the one ending June 30, 1974. This clearly is insufficient to solve the national problem of malnutrition, which affects millions of our children, but it could be a beginning—the start of what might be a great experiment.

The Department of Agriculture's lack of enthusiasm for this experiment, however, was made evident when by late January of 1973 it had failed to set up the necessary machinery for the special infant-feeding projects.

The success of the program authorized by Congress thus depends heavily on efforts by Americans to bring pressure on the Department of Agriculture; letters should be addressed to Secretary of Agriculture Earl L. Butz, urging an end to delays in feeding hungry children. Americans can also write to the President, their congressmen and senators in support of this special $20-million infant-food legislation, which has bipartisan support. Women can help directly by stimulating the creation of projects similar to the St. Jude—MAP-South effort in their own cities and towns.

If you want to help, send to your congressman for a copy of Public Law 92–433. Read Section 17, entitled "Special Supplemental Food Program." Contact your local health or welfare department or hospital, or other social agency, and urge it to help you begin a community rescue operation in your town.

The legislative go-ahead from Congress is clear; citizen initiative and support can move that act into action. Successful feeding programs this year and next could be the basis for an ongoing national effort to give every baby in the nation a healthful diet.

What a way to celebrate America's upcoming 200th anniversary?

Editor's Note: Names of families on the nutrition program have been changed to protect their privacy.

A Message From Danny Thomas

Malnutrition is not confined to any one section of the country or to any particular group of people. It is a national problem and a common one. The St. Jude–MAP-South nutrition program is a working model that can be adopted by any community in the country willing to use existing facilities to save its children from the disability and death caused by malnutrition. Requests for information on setting up such a program may be sent to St. Jude Children's Research Hospital, Dept. RB, P.O. Box 318, Memphis, Tennessee 38101. Contributions to St. Jude for its battle against malnutrition and other catastrophic childhood diseases may be sent to the same address, checks made payable to St. Jude Children's Research Hospital.

—Danny Thomas.

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MATERNAL, FETAL, AND INFANT NUTRITION—1973

HEARINGS

BEFORE THE

SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS

OF THE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

PART 2—GOVERNMENTAL RESPONSES

WASHINGTON, D.C., JUNE 7, 1973

Series 73/MFI2

Printed for the use of the
Select Committee on Nutrition and Human Needs

U.S. GOVERNMENT PRINTING OFFICE
20-246 O WASHINGTON : 1973

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 80 cents
Stock Number 5270-02010

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MATERNAL, FETAL, AND INFANT NUTRITION:
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MATERNAL, FETAL, AND INFANT NUTRITION

Governmental Responses

THURSDAY, JUNE 7, 1973

U.S. SENATE
SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
Washington, D.C.

The Select Committee met at 10:30 a.m., pursuant to call, in room S-407 of The Capitol; the Honorable Marlow W. Cook, presiding.

Present: Senators Cook, Percy, and Humphrey.

Staff members: Kenneth Schlossberg, staff director; Alan J. Stone, counsel; Marshall L. Matz, assistant counsel; Vernon M. Goetcheus, chief, minority staff; Julia C. Bloch, professional staff; and Elizabeth P. Hottell, professional staff.

OPENING STATEMENT OF SENATOR COOK, PRESIDING

Senator COOK. For the past 2 days of hearings, this committee has had the opportunity to hear testimony from scientists and doctors engaged in research in the United States and abroad regarding the relationship between maternal, fetal, and infant nutrition and optimum mental and physical development of the child. In testimony, it has been shown that the effect of the mother's nutrition during pregnancy is of great importance to the birth weight and future health of the infant. Low-birth-weight babies are more susceptible to various health problems and enter the world with less of a chance. During the first year of life, the brain and other organs go through a vitally crucial stage of growth, and according to some of the previous testimony, malnourished infants may suffer irreversible mental and physical effects. And, as a matter of fact, we saw a very descriptive analysis of this problem on television Tuesday night, for those of you who saw it, and I hope everybody did.

Today the committee is pleased to have the opportunity to hear from representatives from the Department of Health, Education, and Welfare and the Department of Agriculture. We will hear what these two Federal agencies have done in the areas of research and actual nutritional services to mothers and infants. Several of the previous witnesses in these hearings felt that high quality nutrition services as an integral part of maternity and infant care would have far-reaching beneficial effects on the future health of our Nation. Are we providing such services? Are we actually using accessible and fairly inexpensive means to prevent costly health services? Or are we failing to provide proper nutrition services to mothers and infants and, in effect, costing the taxpayers millions in health care, which these citizens will need later in life?

I want to thank our distinguished witnesses from HEW and USDA for appearing before the committee today. I also want to commend the senior Senator from Illinois, Senator Percy, for his tremendous job in chairing the hearings during the past 2 days on this issue which concerns all of us.

I will first introduce this morning Dr. Charles Edwards, Assistant Secretary of Health; and, Dr. Edwards, if you will please introduce everybody with you for the record, you may proceed.

STATEMENT OF DR. CHARLES C. EDWARDS, ASSISTANT SECRETARY FOR HEALTH, DHEW

Dr. EDWARDS. Thank you, Senator. I would like to introduce my colleagues. On my immediate left is Dr. Charles Lowe, who is the Scientific Director for the National Institute of Child Health and Human Development. Next to Dr. Lowe is Dr. Robert Stone, who is the new Director of the National Institutes of Health and Miss Mary Egan, Chief, Nutrition Section, Division of Health Services and Maternal Child Health, Health Services and Mental Health Administration. On my immediate right is Dr. John Zapp, who is the Deputy Assistant Secretary for Legislation, HEW. Next to Dr. Zapp is Dr. Arthur Lesser, who is the Director of Maternal and Child Health Services. And next to Dr. Lesser is Dr. Ogden Johnson, who is the Director of the Office of Consumer Sciences in the Bureau of Foods, Food and Drug Administration.

We are very happy, Mr. Chairman, to have this opportunity to comment on the interest and activities of the Department of Health, Education, and Welfare relating to a better understanding of the need for proper nutrition for pregnant and lactating women and their offspring, and of the consequences of malnutrition on the mental and physical development of the unborn, the newborn, and the growing child. As you know, the health agencies of the Department do not have responsibility for the direct operation of any feeding programs. Rather, the concerned health agencies of the Department provide support for biomedical research on the nutrition process and technical assistance and information which can be utilized in a variety of ongoing food service programs.

NATIONAL INSTITUTES OF HEALTH

Within the National Institutes of Health, the National Institute of Child Health and Human Development is the Institute which is responsible for organizing and supporting studies on maternal, fetal, and infant nutrition and child development. At present, NICHD's budget provides more than $11 million annually for support of about 180 individual grants and contracts concerned with nutrition and human development. Within this total the majority of studies are concerned with the role of nutrition in pregnancy, fetal development, infancy, and childhood.

IMPACT OF MALNUTRITION

Malnutrition is recognized, as you know, as a critical factor during early life which, in company with infectious disease and social deprivation, limits human achievement. Increasingly, it is becoming

apparent that maternal nutrition may influence the development of the human fetus, birth weight, and perhaps prematurity. Neurologic deficits, including mental retardation, occur more frequently in premature or low-birth weight infants. The frequency of low-birth weight infants is from two to five times more common among those living in poverty, the population in which malnutrition is known to be most prevalent. Low-birth weights, higher frequency of prematurity, and greater delivery difficulties are seen in pregnancy during adolescence, where nutrient needs for maternal growth are complicated by the needs of the developing fetus. Retrospective studies in post-World War II Japan have shown increased birth weights as nutrition and medical care have improved. Until recently, however, few well-controlled studies of the impact of maternal malnutrition or of maternal nutritional supplementation on subsequent child development have been reported.

Current Research Activities

As I have indicated earlier, our research activities are designed to expand and further develop our understanding of the role of nutrition in human development. To gain greater insight into the consequences of malnutrition for the human during fetal development and early life, the National Institute of Child Health and Human Development has organized a coordinated grant and contract program concerning the effects of malnutrition at different developmental stages in experimental animals coupled with studies of human populations where malnutrition is known to be present. Investigators supported by this program were among the first to show consistent effects on birth weights, growth rate, and behavior of rat offspring who were malnourished either during gestation or lactation or both. An unexpected finding was that severe dietary restriction during these periods permanently altered the rat's ability to utilize dietary protein so that about one-third greater protein intake was required to maintain just a normal growth rate. This group has gone on to report a similar difference in protein utilization in children born to undernourished mothers.

Two laboratories also have obtained data indicating that protein-calorie malnutrition during pregnancy and/or early infancy in rats may have long-term adverse effects on growth and behavioral development in two subsequent generations in spite of adequate nutrient intakes following weaning. These effects are not genetic, but rather appear to be mediated through nutrition-induced changes in the developing endocrine system.

Trace Minerals and Vitamins

Trace minerals and vitamins also have been found to be essential for perinatal development in rats. NICHD supported investigators have shown that giving pregnant rats a zinc-deficient diet for only 8 days resulted in low-birth weight, a high rate of stillbirths, a high incidence of congenital malformations, and very poor survival to weaning. They also report that a diet moderately deficient in magnesium given throughout pregnancy resulted in 30–50 percent fetal mortality, congenital malformations, and anemia in those rat pups born alive.

Another laboratory has found that a riboflavin-deficient diet fed to female rats for 4 to 5 weeks before pregnancy or during a critical phase of gestation produced fetal malformations, primarily of a skeletal nature, in the offspring. Zinc deficiency in children delays growth and sexual maturation, but congenital malformations in children born of mothers living in zinc-deficient environments have not been reported.

A particularly provocative series of animal studies have sought to more precisely quantify which behaviors may be affected by malnutrition during pregnancy and infancy. In rats and pigs, significantly decreased exploratory behavior has been demonstrated in gestationally and/or lactationally malnourished young. These animals become more emotional when confronted with new or frustrating experiences. Another investigator is working with the rhesus monkey. Malnutrition during infancy does not appear to affect the problem-solving ability of these animals, but it does very seriously impair social behavior and heightens emotionality when the monkey is confronted with new tasks. The rehabilitated malnourished monkey has been described by the investigator as ill prepared to adapt to a changing environment, particularly in a social situation. The concept is most provocative; should it be confirmed in the monkey's closest relative—man—it will assume even greater importance. Attempts to push the nutritional insult back into the pregnancy period in monkeys have been hampered by our almost total lack of knowledge of nutrient requirements for subhuman primates; several NICHD supported projects have made major studies in this area and are now exploring the consequences of specific deficiencies on development of neurologic, endocrine, respiratory, and other tissues.

Obviously, the problem of fetal malnutrition is very important. Fetal malnutrition may be due to factors other than poor maternal diet, however. There is a critical need to develop methods for assessing nutritional status of the fetus and the mother during pregnancy and before developmental aberrations are irreversible. One of the investigators reports a similarity in certain cell energy functions in the leukocytes of the mother and the blood of the infant with fetal malnutrition which were similar to those found in young infants with severe postnatal protein-calorie malnutrition.

This is only one example from a number of studies seeking to identify possible markers of fetal malnutrition.

Major emphasis in human population studies is currently being given to the impact of chronic moderate malnutrition during pregnancy on the development of the child. For instance, a major multidisciplinary study is underway in an undernourished rural Guatemalan population utilizing nutritional supplements during pregnancy and the preschool years. It is of interest that following initiation of supplementation, the rates of prematurity, stillbirths, low-birth weight, and neonatal death declined Furthermore, birth weight appeared to correlate with the amount of supplementary calories consumed during pregnancy.

It is still too early to reach conclusions regarding the impact of supplementation on behavior of the children supplemented from early pregnancy.

Mr. Chairman, I am going to delete and hopefully, with your permission, provide for the record the pages, approximately 7 through 18,

and read merely our conclusion. These pages deal primarily with the role of the Food and Drug Administration in labeling and consumer education as it relates to nutrition.

Senator COOK. Let the record show that the balance of the statement will be included.

Dr. EDWARDS. It also deals with the Maternal and Child Health Services and the nutritionist's role in education and other activities.

CONTINUING STATEMENT OF DR. CHARLES C. EDWARDS

In a related small study in rural Mexico, maternal supplementation during pregnancy and lactation has not only produced larger, more rapidly gowing infants but also ones who are physically more active and demanding of maternal attention. By the age of 2 years the supplemented children were six-fold more active than their unsupplemented counterparts. Studies in Uganda, India, and the Northeastern United States have confirmed the relatively low level of activity of undernourished children and their reduced interactions with their mothers and peers. The improved interactions could be due to increased energy on the part of the infant, the mother, or both. In any case, a child who fails to interact with others is often one who fails to learn. Thus these findings suggest that the inactive undernourished infant demands less and gets less attention, leading to worsened nutritional status and to retarded behavioral development.

Another recent finding from NICHD-sponsored research may be of interest here, particularly in terms of planning rehabilitation programs. A group of 74 boys who had been malnourished during the first 2 years of life were compared to better nourished siblings and to same age and sex classmates who had not been malnourished at any time. This approach was an attempt to equalize environment, family, and genetic factors to the greatest extent possible. The results show that malnutrition in early life did adversely influence school and test performance at ages 6–10 years. Malnourished boys from homes with low levels of intellectual stimulation did the poorest. However, malnourished boys with an educationally stimulating environment did as well on tests as well-nourished boys from nonstimulating environments. As was to be expected, the best scores were obtained by well-nourished boys living in educationally stimulating environments.

Little is known of the effects on behavioral and intellectual development of the moderate or subclinical undernutrition identified in U.S. populations in the Ten-State Nutrition Survey. Iron-deficiency anemia was the most frequently encountered nutrition problem in infants and young children. Any effect of anemia on IQ of children appears to be marginal. However, anemic preschool children exhibit apathetic and irritable behaviors. They also differ from nonanemic preschool children in attentativeness, distractability and attention span. Well controlled studies are needed as to whether these behavioral differences interfere with learning in a school setting, and whether they are solely the result of iron deficiency. It has long been reported that severely malnourished children exhibit increased susceptibility to some infections which may lead to death. Modern techniques are being applied to the possible relation between malnutrition and the development of immune competence.

The NICHD has a contract to study nutrition-infection relationships with special emphasis being given to humoral and cellular immune responses. Age-matched U.S. and Ghanian children with or without malnutrition show differences in the ability of their white cells to engulf bacteria.

REGULATION AND STANDARD ACTIVITIES

While the Food and Drug Administration (FDA) does not have direct program activities related to the problems of maternal, fetal and infant nutrition, special attention has been given to the development of regulations and standards which will assure that the nutrition requirements of these special groups are adequately considered in terms of product composition and labeling.

The vitamin and mineral standards used for many years, the Minimum Daily Requirements (MDR's), have recently been replaced by the U.S. Recommended Daily Allowances (U.S. RDA's), a more comprehensive listing of 19 vitamins and

minerals. Included in the U.S. RDA's are specific requirements for standardizing and labeling products which are promoted as being of special value in meeting the nutrition needs of infants and pregnant or lactating females.

Recently, the FDA published definitions and standards of identity for dietary supplements for both infants and pregnant or lactating women. These standards define the nutrients which must be present in such products and establish lower and upper limits for each nutrient present. The standards are designed to assure that supplements provide adequate nutritional support when needed, but do not result in excessive intakes of the nutrients.

HEW regulations for infant foods were established in 1971. These were based on recommendations of the American Academy of Pediatrics. Since these products are used as the major or often sole source of food for infants, the regulations establish protein and other nutrient composition and levels which must be present in such products.

The addition of nutrients to foods (fortification) is provided for by several FDA regulations and is directly related to the nutritional needs of infants and, in a more general way, to the pregnant women. Provision for the addition of vitamin D to fluid milk and to nonfat dry milk is specifically included in proposed and existing regulations as a means of preventing the development of the deficiency disease, rickets, in infants and small children. The addition of vitamins and iron to cereal products provides nutrition support to the diets of the pregnant women. A recent proposal to increase the iron levels in flour and bread was based on the increased need for iron by women.

The FDA continuously reviews the situation in regard to the nutritional needs of special groups in the population (the pregnant women, infants, aged, and those with special dietary requirements) and seeks to establish regulations or standards to assist persons in these groups to meet their nutritional needs.

Maternal and Child Health Activities

The Maternal and Child Health Service is the agency within the Public Health Service responsible for administering health services for mothers and children, including services for crippled children, authorized under Title V, Social Security Act.

This legislative authority makes it possible through annual formula grants to the States, to extend and improve health services for mothers and children and to find children who are crippled or who are suffering from conditions leading to crippling and provide them with medical, surgical, corrective, and other services. Project grants for maternity and infant care and intensive care of infants have provided health care to high-risk mothers and their infants in order to help reduce the incidence of mental retardation and other handicapping conditions caused by complications associated with childbearing and to help reduce infant and maternal mortality. Also project grants for comprehensive health care of preschool and school-age children have been available to support health care services for children and youth, particularly in areas with concentrations of low-income children.

Nutrition services are an important part of all of these formula grant programs and projects. The major kinds of nutrition services provided include:

Diagnostic and evaluative services to determine nutritional status and detect nutritional problems;

Treatment and follow-up services including dietary counseling on normal nutrition, diet therapy, feeding techniques; provision of dietary supplements or special dietary products which might be prescribed for treatment of inborn errors of metabolism, iron-deficiency anemia, etc., and nutritional care as a part of hospitalization;

Nutrition education for children, parents and other child takers such as day-care staff, hospital food service personnel, and so forth;

Assistance to families in obtaining adequate food or special feeding equipment which might be needed;

Guidance in home management practices such as budgeting, marketing, meal preparation and other areas of home living which affect the health of the family

Formula and project grant funds for maternal and child health are used to employ public health nutritionists, dietitians, and other levels of nutrition personnel in State and local health programs. Of the nearly 1,000 nutrition positions budgeted in the State and territorial health agencies, maternity and infant projects, children and youth projects, and other special service projects including adolescent clinics, mental retardation diagnostic clinics and family planning

clinics, a major proportion of them are supported by MCH funds. These nutritionists assist in the planning and development of the nutrition component of health services, provide technical assistance to the staff of health and other community agencies, give direct nutrition services to patients and conduct in-service and preservice training in nutrition for a wide variety of health and other workers. With leadership and technical assistance from these nutritionists, thousands of physicians, nurses, social workers, health aides and other health workers help assess nutritional needs and problems and provide nutrition counseling and education to expectant mothers, infants, and children served in maternity and family planning clinics, pediatric clinics, crippled children's programs, school health programs, physicians' offices, special clinics such as adolescent medicine and mental retardation, intensive care projects for high-risk infants and dental health services as well as hospitals and other group care facilities such as day care centers and residential homes, and so forth.

To assure that the nutrition services provided through maternal and child health programs are based on current scientific knowledge, relevant to current needs and developments in nutrition and health care and make the best use of scarce resources, the Maternal and Child Health Service provides the following types of assistance to State and local health agencies, private physicians, voluntary and professional organizations and agencies, educational institutions and other Federal agencies.

Development of Guidelines and Standards for Nutrition Services

In 1967 when iron-deficiency anemia was observed as a common problem of expectant mothers, infants, and preschool children, guidelines for the *Prevention of Iron-Deficiency Anemia* were developed and health workers were encouraged to give more attention to the diagnosis, prevention and treatment of this nutritional problem.

Other nutrition guidelines and standards developed by MCHS and used widely as a basis for licensing laws and regulations, consultation, et cetera, include *Suggested Guidelines for the Evaluation of the Nutrition Status of Preschool Children* (1966 and revised in 1967, 1970); *Nutrition and Feeding of Infants and Children Under Three in Group Day Care* prepared in 1971 in cooperation with the American Academy of Pediatrics; *Guidelines for the Nutrition Component of Comprehensive Health Care Services for Mothers and Children and Addendum on Nutrition in Family Planning*, and many others.

Provision of Technical Assistance in Maternal and Child Nutrition

The Maternal and Child Health Service uses many different approaches to bring current research information in nutrition to health practitioners and others responsible for the health of mothers and children and to help them apply it in such a way that it will benefit mothers, children and their families. Some of these approaches include:

The development and maintenance of a *Nutrition Exchange* which assists State and local health agencies, educational institutions training nutritionists for maternal and child health programs and concerned Federal agencies to keep informed about materials published by each and alerts them to current events and articles in the scientific literature of significance to maternal and child nutrition.

The planning and support of workshops, institutes and seminars for nutrition personnel and other disciplines involved in maternal and child health care. In fiscal year 1973, for example, in response to requests from nutritionists employed in a variety of health care delivery systems for mothers and children, Maternal and Child Health Service gave high priority and support to four regional workshops on Program Planning and Evaluation of Nutrition Services in Maternal and Child Programs; nearly 75 nutritionists and 35 physicians participated in the three intensive courses in pediatric nutrition offered annually at the University of Iowa; and a multidiscipline *Workshop on Nutrition in Maternal Health* was sponsored in cooperation with the American College of Obstetricians and Gynecology, the American Public Health Association, the National Academy of Science and various departments of the schools of medicine and public health at Harvard University.

The publication of informational materials on aspects of maternal and child nutrition which require further interpretation and application to service programs, for example, in fiscal year 1973 the first issue of Commen-

taries on Infant and Child Nutrition discussed *Skim Milk in Infant Feeding* since this was a subject of controversy and major concern in child feeding. *Practices of Low-Income Families in Feeding Infants and Small Children With Particular Attention to Cultural Sub-Groups* provided "hard to locate" information on child feeding practices which would help workers to understand the feeding practices in different cultural groups in the United States and adapt their counseling and teaching.

The provision of consultation to other Federal agencies administering programs related to health of mothers and children.

Stimulating, Supporting and Implementing Nutrition Research Which Shows Promise of Advancing MCH or CC Services

In fiscal year 1967 the Maternal and Child Health Service awarded a 3-year research contract to the National Academy of Sciences and a research grant in fiscal year 1972 and fiscal year 1973. The purpose of the research supported was to evaluate current knowledge about problems, practices and research that bear on the relationships of nutrition and the course and outcome of pregnancy, identify areas requiring further research and make recommendations to facilitate planning of more effective services in maternal nutrition. The Committee on Maternal Nutrition which was established with the support of these research funds published four reports which provided a basis for improving the quality and quantity of nutritional care provided to women in the childbearing years.

As an outcome of this MCHS supported research effort, the American College of Obstetricians and Gynecology established a Committee on Nutrition to give more leadership and assistance in nutrition to their members and issued their first *Policy Statement on Nutrition and Pregnancy*. Recommended changes in clinical practice have been widely implemented as illustrated by the increasing use of the gain in weight grid to improve patient management and the revision of policies related to sodium and caloric restriction during pregnancy, for example, the New York City Maternity and Infant Project reported that obstetricians now refer fewer patients for excessive weight gain with over 6,000 diet orders for weight reduction of pregnant patients in 1970 while in 1971, this figure was reduced to nearly 3,000.

Public and private health agencies, industry and many others have revised their prenatal education materials on the basis of the NAS report. The services of nutritionists have been extended to provide more help to particularly vulnerable groups, such as pregnant teenagers and to women during the later-conceptional period, a time when it is possible to improve nutritional problems which cannot be handled during pregnancy.

In addition to this significant effort in maternal nutrition research and utilization of the findings and recommendations to improve the delivery of maternal health care, MCHS research grants have supported studies of the nutritional status of preschool children in the United States which involved a national, cross-sectional sample of preschool children, early detection of children at risk for iron deficiency as well as many others related to the nutrition of mothers and children.

Conclusion

In summary, the adverse effects of severe malnutrition on physical growth have long been known. The relation between malnutrition and mental development has been investigated more recently. The results of experiments in animals are clear and dramatic: Body and brain growth can be slowed, and behavioral patterns and learning ability can be impaired by severe malnutrition. The kinds of disabilities produced, the degree of severity, and reversibility depend upon the types of malnutrition imposed, the length of the deprivation period, and the developmental stage at which malnutrition occurs.

Extrapolation from animal experiments to humans in this area is extremely uncertain. However, evidence accumulating from studies with unfortunate infants severely malnourished in early life or suspected to have suffered intrauterine malnutrition strongly suggests that at some level malnutrition during the gestational period and in very early life adversely affects child health and development. The

results of intervention studies currently in progress are providing much needed information on the adverse role of malnutrition during the perinatal period. Methods are now under development to pinpoint nutritional problems during pregnancy before they cause irreversible damage.

In closing, I would like to emphasize how important it is that nutrition and other stresses be constantly viewed from the perspective of the life cycle. An undernourished mother probably will give birth to a low-birth weight infant at high risk of failure. Raised under poor nutritional and hygenic conditions, this child does not develop to its full potential. Sexual maturation may be delayed and the female reaches the reproductive period with low body reserves at the outset of pregnancy; the cycle is repeated.

Obviously nutrition is an important part of medicine. This is particularly true in terms of pregnant and lactating women, young children, and the adolescent in the final formative stages for parenthood. Good nutrition, as a central component of preventive medical care, can help assure that each child enters life with a real chance to achieve his innate potential.

The information being generated by ongoing and future NIH research programs will assist in continuing the identification of facts and the development of improved strategies for better nutrition as part of better medical care.

Mr. Chairman, we would be delighted to answer any questions that you and Senator Percy might have.

Senator COOK. Thank you very much, Dr. Edwards. In all fairness and honesty, this is my first day here, and I am going to turn the hearing over to Senator Percy since he has been here for the last 2 days. I am going to let him proceed with this panel and hope that I can gain some knowledge not only from the panel members, but from him.

Senator PERCY. Mr. Chairman, I went in the Navy as a 90-day wonder, now I am a 2-day expert.

Senator COOK. I didn't make you an expert.

Senator PERCY. I trust that my five children and three grandchildren make me more an expert than the last 2 days have.

But I would like to express on behalf of myself and the chairman today our great appreciation for your being with us. And, I must say that when the two of us proposed these hearings we recognized that this is not a matter of burning urgency—there are other problems that will grab headlines more than this one and are more on the minds of people. But I was deeply impressed with the last 2 days hearings as to the need for more public knowledge in this area, the needless cost in the way of human misery that we sometimes have just as the result of lack of understanding.

SUMMARY OF EIGHT POINTS FOR CONCURRENCE

There are eight points of summary that I pulled out of the hearings, and I would like to just ask whether the findings of all of those experts that have come to us from across the country and from Guatemala in the last 2 days, do conform to your own expert analysis of the problem?

The first seemed to be quite clear: A malnourished mother may mean a malnourished baby. Does this concur with your judgment?

Dr. EDWARDS. Senator, I would like to, if I could, have Dr. Lowe answer some of these questions because he is our real expert in this field. Would you like to have these answered as you go along?

Senator PERCY. Yes, anyone that you would so designate, Dr. Edwards.

Dr. LOWE. Thank you, Dr. Edwards. Senator Percy, I would answer this by saying the best knowledge currently available supports this conclusion, but I don't think it is a final statement. There is still a lot of information to be developed.

Senator PERCY. The question is: Is it a true statement that a malnourished mother may mean a malnourished baby?

Dr. LOWE. If it is "may," I would agree completely, sir.

Senator PERCY. The second conclusion we seem to get out of the 2 days of hearings is that a malnourished baby may be a low-birth-weight baby and a low-birth-weight baby faces greater health risks than a high-birth-weight baby.

Dr. LOWE. I would agree completely.

Senator PERCY. Third, the greater the weight gain during pregnancy, the higher the birth weight of the infant; and thus by implication, the healthier the offspring—although there is some disagreement about setting an optimal weight gain as a target.

Dr. LOWE. Senator Percy, on the second part I would agree completely. The first part is not so clear. We do know that if you take well-nourished women and arbitrarily reduce their weight gain and compare the weight of the offspring to an infant that that mother had produced during adequate nutrition, the former infant is smaller. The converse, however, is not equally clear—that simply providing food for mothers automatically increases the birth weight of the infant. There are good studies relating the weight gain of individual women to the weight of their offspring. But we have no evidence that giving more food to a given woman will increase the birth weight of her infant. Studies now in process will, I hope, clarify this issue.

Senator PERCY. When do we expect the result of those studies?

Dr. LOWE. Probably within 18 months.

Senator PERCY. Would you care to comment on the question of optimal weight gain? The range varies all over the lot, and the tendency seems to be among some obstetricians and some women, expectant mothers to feel that delivery may be somewhat easier, and certainly her figure may turn out better if a weight gain were held down to 14, 15 pounds, something like that. What advice would you give to expectant mothers in contrast to that?

OPTIMAL WEIGHT GAIN

Dr. LOWE. There are three separate issues, I believe, to be considered. One is the weight gain of the mother. Second is the prepregnancy weight of the mother. And third is a statement—I believe that has come before this committee which may or may not be correct—the suggestion exists that the more weight the mother gains the larger her infant. There actually is a diminishing return on weight gain. The statement is most true for a very small woman, a woman between 90 and 100 pounds. As a woman's prepregnancy weight reaches between 140 and 160 pounds the relationship between her weight gain and the infant's weight begins to be less clear. And finally for women weighing over 160 pounds before pregnancy there is a

negative correlation between the mother's weight gain and the infant weight.

So I have qualified the answer. It isn't quite as simple as we would like.

Senator PERCY. Is there a correlation between holding weight down and ease of delivery?

Dr. LOWE. Within very broad limits, yes. But most women who are sexually mature and have not had debilitating illnesses in their childhood, particularly rickets, reach pregnancy with a pelvis sufficiently large to permit the passage of their fetus. I believe the folklore on this issue developed during a period when rickets was a fairly common illness and the pelvis became compressed as the young child began to walk, and the woman grew up with a distorted pelvic outlet. I think this is less true now than it was a generation ago.

Senator PERCY. The fourth—I am not sure I can use the word "consensus" because there are always variations of viewpoint, but I think generally speaking—the conclusion that seemed to be reached was that the supplementation of the mother's diet can sometimes dramatically reduce the incidence of low birth-weight infants and can have a beneficial impact on the physical and mental development of the child. Would you generally say that was true?

Dr. LOWE. I would like to believe it without equivocation, but I am not sure particularly that the second part is yet tested in the appropriate fashion. That is that the nutrition of the mother bears a precise or at least a definable relationship to the ultimate development of her infant. The best data available is limited to birth weight and perhaps the first 6 to 9 months of life. But what happens to the infant beyond that we simply haven't had time to find out. So in a general way there is a correlation immediately, but ultimately we don't know, sir.

Senator PERCY. I think what is new, Mr. Chairman, coming out today, is the humility with which we approach this whole subject. It certainly is a field of knowledge in which we still are in the learning process, and we are still somewhat humble about how little we know about this miracle of life.

Fifth, we certainly had witnesses take the position that adequate nutrition during infancy can have a dramatic impact on the physical growth and development of the child, and may also reduce the likelihood that they may suffer from learning disabilities.

Dr. LOWE. That is another tough one.

Senator PERCY. I am not throwing you easy ones. I tried to seek them from the 2 solid days of testimony and concisely put them down, to be absolutely certain we are not arriving at any false conclusions.

Dr. LOWE. Let me say as a professional in the field—and I admire the way you have crystallized the issues, but that doesn't necessarily make the response simple. Let me say that——

Senator PERCY. Well, you can hedge your response any way you want. You recognize that we may probe a little more to try to pin you down. But to the extent that you can find a correlation with that, or take sharp disagreement, we would appreciate it.

CHILDHOOD NUTRITION CAN RELATE TO ACHIEVEMENT

Dr. LOWE. I approach my answer this way because I think the greatest disservice that either government or science can do to the

public is overpromise. It is in this context that I believe it might be injurious were we to be emphatic in responses to your question and the public be led to believe that only by doing one small act we can wipe out inadequate intellectual development. I do think there emerges an increasingly clear picture relating nutrition during childhood to ultimate intellectual achievement. Unfortunately, the majority of studies that we can rely upon have been conducted in this country. Children in this country who are malnourished also live in the midst of a whole host of adverse environmental conditions, and until we can clearly factor out all the environmental effects from malnutrition I think it would be overpromising to say that this is the single effect. I believe it is a very important one.

Senator PERCY. Well, I think that is strong enough, and I think that is quite consistent with our other witnesses.

Sixth, nutrition intervention programs such as the USDA supplemental food program can dramatically improve the nutritional status of preschoolers. The American Academy of Pediatrics strongly endorses this program, the so-called special supplemental food programs authorized by Public Law 92–433.[1] Do you concur with their findings?

Dr. LOWE. It would follow directly from my answer to your fifth question that any way that we can get food to children is good. I would prefer not to get involved in the discussion of specific legislation or mechanisms for getting food to children.

Senator PERCY. Surely. I think that is our job and the USDA's to find out the best way to do it. But as far as we know, that is the best kind of a supplemental food program we have been able to develop. But, I presume you ultimately come down to the fact that proper education plus adequate cash for all American families is the best way way to do it.

Senator COOK. May I add Senator—and I feel this is important—that whatever Congress may do, it is going to have to absolutely rely on many major decisions that are going to be made by HEW and USDA. In proposing legislation, we should look to your Department and the facilities of your agencies to best find the means and the most effective program by which national goals may, hopefully, be obtained. Don't you agree with this, Senator Percy?

Senator PERCY. Yes.

Dr. EDWARDS. I would certainly agree with the Senator, and I think that is why today to be responsive to your request, we brought along not only our scientists from the National Institutes of Health, but also our people from the Food and Drug Administration who are very much involved in the quality of the labeling that people can follow in terms of purchasing food, and also, of course, the educational programs of our other activities.

Senator PERCY. Then perhaps we should yield and instead of Dr. Lowe having that particular question put to him, have Dr. Johnson. Would you be the most appropriate person to comment on whether or not our present programs, the so-called special supplemental food programs authorized by Public Law 92–433, endorsed by the American Academy of Pediatrics, have your support and represent in your judgment the best kind of programs we know how to design now, or can you tell us what better type of programs we should work toward as legislators to have the optimum?

[1] See Appendix, p. 189.

Dr. JOHNSON. Well, I would just like to comment on one thing that the Food and Drug Administration is doing, and I think Dr. Lesser and Mary Egan, who has joined him, are better prepared from the maternal and child health program standpoint.

EASY IDENTIFICATION OF FOODS

I think the Food and Drug Administration is concerned that within the food consumption patterns of all segments of our population, much of it is purchased in the normal marketplace and this food needs to be identified, particularly foods that are designed and used in the feeding of children. During the past 2 years we have been working toward mechanisms to improve this aspect so that the education programs can call attention to this kind of a program.

I think food feeding programs need to be using foods that can be readily identified, whether they come thorugh the normal chain or whether they are part of the program.

But I think in terms of the usefulness of these, I think Dr. Lesser and Mary Egan can speak to this. My feeling is that, as Dr. Lowe said, getting food into children who have a very definable nutritional need is a key factor, and we do need to look at many ways to do this. But if you would, I think that Dr. Lesser can speak to this more specifically.

Dr. LESSER. I think it represents a very good opportunity to combine our nutritional educational services with the broader health services for mothers and children, together with actual provision of food, which has not been an easy thing to do. I think our experience with this on the whole has been very good, particularly in our maternal and infant care and children and youth projects authorized under Title V of the Social Security Act, which provide medical care for children of low-income families. We are finding through this means that patients coming in for medical care are enabled to obtain these supplemental foods frequently by prescription from the clinic.

In addition, the projects provide some nutrition instruction to women of low income, have food demonstrations, assist mothers actually by going with them to grocery stores and learning what is the best buy for the money that is available.

In some of the more rural parts, there are problems with transportation, and with the availability—where is the food available, and where do people have to come to get it. In some parts of the country this does still create some difficulties.

Senator COOK. Dr. Lesser, would you also comment on how effective you think those programs under Title V really are and whether you feel that they should be continued or expanded.

Dr. LESSER. I will be very happy to do it since it is one of my favorite subjects.

Senator COOK. Then we asked the right man.

RURAL AND URBAN PROGRAMS

Dr. LESSER. These programs which have been in operation since 1935 currently have both the rural and the larger city emphasis. The more rural programs are carried out with formula grants from the Maternal and Child Health Program and Crippled Children's Services.

Through our project grants authority, many of the programs have been instituted in our larger cities. These programs have been effective in the reduction of infant mortality, particularly among low-income infants. We see in the last few years for the first time the beginning of the narrowing of the gap between the infant mortality of white infants and of black infants.

There is a certain amount of misunderstanding about the future of these maternal and infant care projects, and I see that it was referred to by a witness earlier this week. The expiration of our direct project grant authority as of June 30 does not mean that these projects are terminated. What the law provides for, and has since 1967, is that effective July 1, each State health department must provide a program of maternal and infant care projects, children and youth and other projects. The $90 million we currently have in our appropriation for this purpose is added to the $60 million for the maternal and child health formula grants program, so that the money becomes part of our formula distribution. All States now will have as part of their maternal and child health care programs, programs of comprehensive maternal care for low-income mothers and for children. At the present time, 36 States have programs of this kind. So we see this as a definite opportunity to extend our excellent results from these projects into greater parts of the country.

I think if I might just conclude on this point, it also represents a valuable lesson that when you provide individuals with the kinds of medical services that are needed at that particular time—for example, a pregnant woman—this is also an excellent opportunity for health education of a variety of kinds, and in particular, of course, nutrition, where she is concerned not only about herself, but about her infant.

Senator PERCY. I think this has been a very valuable contribution at this point, but I think it might also be well to interject a very strong point that Dr. Kerr of Harvard made yesterday, in which he said that the best long-range approach is nutrition education in the elementary and secondary schools as well as medical schools. So it is a package program, really, that we are talking about.

The seventh point that we brought out in the last 2 days is a very interesting one: In summary, there is a low-cost nutritious food that can perhaps reduce malnutrition among infants to next to nothing, and that is mother's milk through breast feeding.

Would any of you care to comment on breast feeding? And I ask this because a large part of the purpose of these hearings is better public understanding and education. It is an educational process. The figures that were brought out are of our births—3.2 million last year—about 8 percent, or 256,000, were underweight children, less than 5½ pounds; double the number of nonwhites as for whites, with a figure as high as 14 percent there.

I think the best estimates we were able to pull out on low birth-weight babies, due to malnourishment—and we were considering that they are not all because of malnourishment—from my own personal knowledge I know our own twins were 3 pounds 13 ounces when they were born, and they weren't because of a malnourished mother—took into account that prematurity is one reason for low birth-weight. But I think we figured that about 30 percent of those born under 5½ pounds might be considered malnourished for one reason or another.

Would you care to comment on breast feeding—which is now a practice engaged in, as I understand, by only about 10 percent of new

account that women who are not working—and there is a large body of them—that they should be under normal conditions encouraged then whenever possible to breast-feed?

Dr. LOWE. And not only encouraged, but with increasing importance breast feeding emerges for those families who do not have adequate access to the relatively expensive market of proprietary foods, proprietary formulas. What the family tends to do when they don't have enough money to buy enough proprietary milk is cut down the amount of milk they buy to meet their budgetary constraints. So the infant simply doesn't get enough to eat.

Senator PERCY. For low-income families where the incidence of malnourishment is greater and where malnourished children are certainly substantially greater in number, if the mother who is not working and just taking care of her children then certainly there is no more economical way that she could feed that child and have whatever food allowance she has available to spread among the other children to get a higher quality of food for them.

Dr. LOWE. And no sounder way for the emotional health of her infant because there is evidence, and increasingly provocative, that the breast-fed infant has fewer infections during the first year of life. There are a variety of medical reasons to endorse it.

Senator PERCY. The last point I would like to make is that we do have certain things in common with the elderly, as well as the very young. I serve on the Special Committee on Aging, and one of the early conclusions we came to is that the best way to prevent illness among older people was to see that they had an adequate diet and adequate nourishment. But many times, because of pride and many other reasons, they have to cut down, and they cut down on food because they wouldn't cut down by taking the telephone out or by moving out of the little apartment they might have, or something like that. That is why we fought so hard—and certainly no one could have supported us more helpfully than our chairman today, Marlow Cook, who has taken a great interest in this field—and we now have some magnificent programs starting for the feeding of the elderly who are in very, very low-income areas.

Would you say also that here even more so, that whatever money we invest in supplementing the diets of low-income people to see that the pregnant mothers get adequate food and children get adequate food early in life, that there is no better protection then that for their physical and mental development? You can really look on it, if someone is really concerned on a dollar and cents basis, not humanitarian, which should be an overriding concern, that looking at it on a dollar and cents basis there is no better investment that we can make than in nutrition for infants and for pregnant mothers, in getting nutrition to them and getting nutrition education to them as early in life as possible?

HIGH PRIORITY OF GOOD NUTRITION

Dr. LOWE. I agree, but I would like to rephrase it in a way which I believe is consistent with the evidence available. Good nutrition is basic. We can provide all the other ancillary and supportive services we choose; whether we modify education, housing, job opportunities, health care, if we don't give good nutrition the rest are like sowing seeds on sand. But if we begin with good nutrition we can then construct a sound national commitment to children.

Senator PERCY. So you assign it very high priority?

Dr. LOWE. I would indeed, sir.

Senator PERCY. Your rephraseology I accept 100 percent—not 1,000 percent, but 100 percent.

Mr. Chairman, I thank you very much indeed, and I am most grateful for the support of our witnesses today.

Senator COOK. Thank you, Senator Percy.

Dr. Lesser, on Title V programs, do you have or could you supply the record with the number of M&I programs that will be continued?

Dr. LESSER. Yes.[1]

Senator COOK. We will then have those for the record?

Dr. LESSER. Yes. Let me say at this time that it is our expectation that all[2] will be continued, at least from the information we have available at this time. But in some of our larger cities because of this redistribution of money where they receive less funds there may be a cutback in the level of service. I think the existing ones will be continued, some at a lower level, but those States that do not now have them will develop them.

Senator COOK. Along that same line about cutbacks, I want to read a remark that Dr. Winick made to the committee. He said:

> Paradoxically, as we discover the importance of investigating certain still unknown facets of this problem we find research funds harder to get. The cry from some sources is that we know enough, that only action is necessary.

I think certainly you all have indicated that this is not correct. Certainly Dr. Lowe has indicated that a great deal of research is still to be done. He continued:

> However, we find programs for action are also being cut back. What progress we have made in maternal and child health has been eroded. Both directions must be supported. This problem is potentially more important than cancer or heart disease, for it affects the quality of life from the cradle to the grave. Where we need answers we should seek them, where we need food we should supply it.

I think this committee wants to know what the commitment of the Department is, Dr. Edwards, to really fight for these programs, not only at the research level, but at the accomplishment level; I think you will find a very delightful ally in the Congress if we know that the Departments truly are going to fight for these programs.

So I address to all of you just really what is the commitment? When do you feel that serious recommendations can be made, when do you feel that we can move in the direction of accomplishment while we maintain a high level of research and development, which we should?

Dr. EDWARDS. Well, Mr. Chairman, I would certainly agree with you. I think you recognize our position, those of us in the health establishment of HEW. We have limited dollars, and, of course, each of these programs takes—for instance, each of the research programs of the National Institutes of Health has high priority, and we have to in some way, in various ways have to make certain priority judgments. I think that we can give you 100-percent assurance of our dedication to this particular cause, and I think that overall the activities in the health field over the last several years in the nutrition field would bear out what I have said. I am not by any stretch of the imagination suggesting we have done all we should, that we have all of the resources that we need to carry out what needs to be done in

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[1] pendix pp. 199-211.

[2] te: Transcript correction received Sept. 14, 1973, noted [all] "59 projects."

this area, but I think that what we have done would certainly indicate our dedication to this particular subject; namely, nutrition.

Senator COOK. I might say that I have often felt that probably the most reactionary body in the whole world has been the Congress of the United States. But it seems to me that this is one field where to be reactionary is to be too late. To be reactionary really is to play with life. To not face this problem is eventually needing to build institutions and is to have to provide services for those unfortunate by birth, as seen with the birth defects caused by malnutrition of a pregnant mother. It appears to me that this is one of these problem areas where at the research level and at the implementation level we really have to be the aggressor, because again to be reactionary is just to be too late.

Dr. EDWARDS. I think you are absolutely right. I think unfortunately in the past—and I hope we can avoid it to a degree in the future—some of the disease categories have gotten more attention than some of the more important areas such as nutrition.

YEARS OF NEGLECT

I think any of us here today would certainly concur with you that the whole field of nutrition has been badly neglected over the years. The average physician in his medical school training gets very little in the way of nutrition education. He is not a nutritional expert when he gets out of medical school. This whole area needs much in the area of resources and emphasis.

Senator PERCY. What you are saying is we are the most fed but not the best fed.

Dr. EDWARDS. Absolutely.

Senator PERCY. To repeat Margaret Mead's statement—I don't recall whether you were in the room at the time she made it several years ago, but I thought it was quite a remarkable statement—she said that in almost every field of human endeavor we have added to our knowledge but in the field of nutrition education we have actually regressed as a people. We are less conscious of it and as a people we seem to be guided less by it than we were in World War II when everybody was conscious of nutrition because there was a food shortage, when we were trying to make ends meet and looking for high nutrition and also growing our own vegetables and so forth.

So we have a long ways to go to catch up with where we were.

Senator COOK. In relation to this commitment, what are the nutritional services that are provided in comprehensive group health programs outside maternal and child health services? Are you moving in this direction for example in medicaid? I will give you these together because I think they are important. In your dealings, what proposals have you seen that have been provided, for instance, in the administration's national health insurance program regarding the continuation and expansion of nutritional services?

Are you going to answer this one, Dr. Lesser?

Dr. LESSER. Apparently. I will try. I would say that with respect to your last point about national health insurance, the preliminary proposals made by the Department do not reflect within them a lot of the points that we are making today because at this point it seems to me we are approaching it from a rather basic premise.

Dr. EDWARDS. May I interject, Mr. Chairman, as far as our position in terms of nutrition in national health insurance. We are working on that right now and we are well aware of what you are saying, but we are not in any position to be specific.

I was more interested in having Dr. Lesser discuss what he knows about the role of nutrition in some of our community health programs. I think that is what you were referring to, our neighborhood health center programs and programs of that kind.

Senator COOK. Yes. That was my first question. The second one dealt specifically with the proposals for national health insurance.

Dr. EDWARDS. I really don't think the group here today has been involved yet because we are still trying to conceptualize exactly the direction in which we want to go. Once that has been decided, then some of these other issues will have to be worked into the plan.

Senator COOK. Let me say this: I would hope—in light of your opening statement in which you made it very clear that this particular facet of your operation was of high priority—that any involvement that you might have legislatively, either you or any other panel member, certainly will reflect this commitment.

Dr. EDWARDS. It will.

Senator COOK. Go ahead, Dr. Lesser.

Dr. LESSER. Nutrition services and nutrition education in its various forms are provided in a variety of other programs other than those that have been the major subject of discussion today. For example, State health departments employ about 1,000 nutritionists, most of whom are supported with maternal and child health funds, and many of whom work across the board at all ages. One of their most effective means of working is the cooperative relationships that many of them have with welfare departments dealing more directly through referrals with mothers and children who are on AFDC. Some of them also serve as consultants to various kinds of State institutions with regard both to nutrition as well as to the feeding of the people in those institutions.

We are, in the health part of HEW, at the present time working together with the Medicaid people on the development of their guidelines for the early screening and case-finding regulations which have been recently issued; and I am gratified to see that in quite a few States the State health departments have developed contractual relationships with the State Medicaid people to actually carry out the screening. These guidelines do provide an appropriate emphasis on looking for malnourished children using various indices. They emphasize referral for diagnosis and treatment so that something is done after the screening and case-finding provisions have been carried out. I think this relatively new, early and periodic screening provision provides us with another new opportunity to bring together health resources with an already identified group in our population who are at the lowest economic level; namely, those who are receiving public assistance. I have a good feeling of optimism that this new requirement will be effective in locating children a lot earlier than we have been able to in the past.

Senator COOK. Thank you very much, Dr. Lesser.

Do you have any more questions, Senator Percy?

DISTRIBUTION OF FUNDS FAVORS RURAL STATES

Senator PERCY. I have just one where Senator Cook and I may have a conflict of interest or a difference of approach on it. The formula grant funds under Title V of the Social Security Act provided for a distribution in favor of rural States, a factor of two actually. The reduction therefore will greatly reduce the share of maternal and child health funds of some urban States. I do not have the figures for California, New York or other States, but I do have Illinois' figures. Illinois' share will be reduced by 42 percent, from $8.4 million to $4.9 million.

What do you estimate will be the effect of such a reduction?

Dr. LESSER. I am not familiar with those figures, Senator, but what you are referring to is something that I spoke of before. In accordance with our 1967 amendments to Title V of the Social Security Act and as amended last year, the project grant authority which had a focus on big cities—this project grant authority expires June 30 and the $92 million we have of those projects are added to the maternal and child health formula funds which have a rural emphasis. This is done without a change in the formula.

The result is that the more rural Southern States will receive a larger share of this than the Northern industrial States. When you add together the amount of maternal and child health funds Illinois now receives—together with the project money going into the city of Chicago—Illinois will receive I think about $2 million less than they are getting now.

There are analogous reductions in Michigan, in New York, in Maryland, and Florida, and I think in Minnesota and one or two other of the Northern industrial States. This formula that we use is prescribed for the most part in our statute. We have a certain amount of discretion with regard to it. Title V says especially in rural areas, so that we have always given an emphasis to rural areas and we count a rural child twice to every urban child.

The programs are principally operative at least in the nonmetropolitan counties. We have tried some changes in the formula within our discretion and we find that it really did not make that much difference. In order to prevent the significant losses in States like Illinois and New York, it would actually be necessary to have some kind of a technical amendment to this statute.

Senator PERCY. I do now have the figures for all the States. For example, the District of Columbia would lose $4,077,000; Illinois, $3,463,500; Massachusetts, $2,145,300; New York, $7,979,200. And I am happy to report that Kentucky would gain $1,176,100, which, however, does not overcome or balance my grief at the loss for Illinois.

Senator COOK. I should not have brought that to your attention.

Senator PERCY. Looking at it from the standpoint of high-risk mothers and their infants, would they have access to alternative forms of care and services when special project grants are terminated?

Dr. LESSER. Well, I think in the larger cities there are, of course, more hospitals, more clinics, more outpatients than in other parts of the country. I must say, at the same time, however, that the reason we obtained authority from the Congress in the first place for these programs is that the hospital outpatient departments and emergency

rooms are considerably overcrowded in the big cities, making it very difficult to emphasize preventive care and health education such as we have been talking about.

I think that these programs, the maternity care, have been in operation for 10 years. It seems to me that additional sources of funds should be sought in our larger cities, but I will not attempt to minimize the adverse impact that this change will make.

More Equitable Balance Needed

Senator Cook. Let me suggest Dr. Lesser, don't you think that your department could work with the Senate staff to formulate some kind of a technical amendment that would more equitably balance this distribution by their amalgamation? In all fairness, even speaking of my own State, I think it really would be a more equitable way to do it. I am not sure if we are going to resolve all of the inequities, but it would seem to me that if technical language is all that is required, that it would be far better to work within the framework of the two funds.

So, at this point, if your office and the Senate staff could work together on technical language to resolve this problem, we might find that we are going to prevent more serious arguments in the future.

Senator Percy. I think this is an excellent suggestion. It makes worthwhile all of our hearings on this subject. First, the States that are being cut back actually have special projects in being, are ready to go, and have matching money available. The States are willing to put that money in and yet they are being cut back.

Second, for many of the rural States increased funding is going to be meaningless to them because some of those very same States—and I am not speaking about Kentucky but certainly some of the rural States—Senator Cook would know—do not have adequate available matching funds nor do they have the required special projects actually in operation. So the extra funds are being made available to some places where they can't possibly be used.

From the standpoint of technical language, I think we have saved you some time. Senator Mondale and I have introduced S. 1543 [1] to extend special project grants for 2 years, and on the House side, a not unimpressive congressman, Congressman Wilbur Mills, has introduced similar legislation to extend these grants for 1 year. So we do have legislators working on it. We would be just delighted—I think Senator Cook's suggestion is excellent. Let's work together on this. We would a lot sooner support an administration bill than our own legislation in this field. It makes it easier all the way around.

Thank you very much, Mr. Chairman.

Senator Cook. One last question on my part, Dr. Edwards. In regard to the special supplemental program, as you well know, under Public Law 92-433 it is required that in formulating the regulations that HEW and USDA consult with each other. How often do you meet to resolve problems regarding the present program and the new special supplemental program? Has there been input from both of the respective Departments before these regulations are promulgated and how is it handled?

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[1] Appendix, p. 197.

Dr. EDWARDS. Certainly as far as the Food and Drug Administration is concerned there is practically constant communication with USDA. I don't know whether we have had——

Miss EGAN. We have continuing dialog, Senator Cook, with the Department of Agriculture, both in relation to the present supplemental food program and the development of the new legislation going to be called the WIC program, as I understand. We have been involved in working with State and local health departments in developing resources for the program, in developing nutrition education materials, and providing technical assistance in relation to specific aspects of the program, yes.

Senator COOK. And that is on a coordinated basis?

Miss EGAN. We hope it is, yes.

Senator COOK. Thank you, Miss Egan. Any further questions, Senator?

Senator PERCY. No.

Senator COOK. I wish to thank all of you and we appreciate you being here. Dr. Lesser, we will look forward to the information that I requested of you to be a part of the record, and I wish to thank you, Dr. Edwards, and your colleagues very much.

Dr. EDWARDS. Thank you, Mr. Chairman.

Senator COOK. Mr. Yeutter, I assume that you have your colleagues with you. Mr. Yeutter is the Assistant Secretary of Agriculture. Mr. Yeutter is accompanied by Mr. Edward Hekman, Administrator of the Food and Nutrition Service, and Mr. Howard Davis, Deputy Administrator for Food and Nutrition Service.

STATEMENT OF CLAYTON YEUTTER, ASSISTANT SECRETARY OF AGRICULTURE; ACCOMPANIED BY EDWARD HEKMAN, ADMINISTRATOR, FOOD AND NUTRITION SERVICE; HOWARD DAVIS, DEPUTY ADMINISTRATOR, FOOD AND NUTRITION SERVICE; DR. STEPHEN HIEMSTRA, WIC TASK FORCE; AND DR. CARO LUHRS, MEDICAL ADVISER TO THE SECRETARY OF AGRICULTURE

Mr. YEUTTER. Joining me, Senator Cook, to my right, will be Dr. Stephen Hiemstra, who is heading the task force that has been working on the so-called WIC program to which we have referred; and over to the left will be Dr. Caro Luhrs, who is a medical adviser to the Secretary of Agriculture.

Senator COOK. I am dying to know what WIC stands for. It is an alphabetical life we live in.

Mr. YEUTTER. I have the same problem as you do with those cases of identification, Senator Cook. WIC stands for Women, Infants, and Children.

Senator COOK. All right.

Mr. YEUTTER. Senator Cook, would you like me to rapidly read the statement?

Senator COOK. You may proceed, Mr. Yeutter.

Mr. YEUTTER. Mr. Chairman and members of the committee, we welcome this opportunity to discuss with you some aspects of the Federal food assistance programs in meeting the nutrition needs of mothers and infants.

The U.S. Department of Agriculture administers its food assistance through a network of State governments and local public and private agencies. There are two basic systems or channels through which food is delivered to low-income individuals:

1. The family or household, which receives food stamps or donated foods to be shared by all family members.
2. Schools and institutions, which receive Federal money and foods toward the delivery of meals to children in day care and preschool centers, summer recreation programs, and, of course, some 85,000 public and private elementary and high schools.

In the late 1960's, amid growing awareness of poverty-related hunger and malnutrition in this Nation, special concern focused on people who appeared to be particularly vulnerable to malnutrition, most notably low-income pregnant women, lactating mothers, and their infants.

In 1968–69, working with public health agencies, the Department set up a Supplemental Food Program as an adjunct to the ongoing Food Distribution Program. Eligible women, upon certification by medical personnel of public health clinics, were given baby cereal, evaporated milk, corn syrup, and juices for their infants and canned vegetables, juices, protein foods, and milk for themselves. If these clients were from households already participating in a family food assistance program, the supplemental food allotments were, of course, over and above the regular monthly allotments of donated foods or food stamps. Of course, the facilities to receive, store, and distribute the food already were in place in many of these areas.

Health officials report that the supplemental food plays a role in attracting the target group to the health clinics earlier and over a longer period; this is seen as a definite plus factor in the overall health and welfare of these women and children.

High Cost of Distribution

In food stamp areas, however, the local agencies were faced with problems of establishing a new system to ship, handle, and store the supplemental food supplies. These logistics problems increased as more and more localities shifted from food distribution to food stamps. The special handling of a variety of foods in relatively small quantities carries a high price tag; a study in the District of Columbia, which has been totally food stamps since 1965, found average distribution costs equaled 35 percent of the cost of the supplemental food itself.

In an effort to find a workable alternative, the Department launched the pilot food certificate program in early 1970. Test projects were set up in five States: Illinois, Georgia, Texas, Washington, and Vermont. Eligible women received special certificates good for the purchase of infant formula, infant cereal and milk in different forms at authorized local stores. Local welfare departments certified program participants, based on referrals from public health clinics, or on the basis of eligibility for food stamp or local public assistance benefits.

Women taking part in the program were provided $5 worth of food certificates per month for themselves during pregnancy and for 12 months afterward. In addition, they got $10 in certificates a month for each of their infants under 1-year-old.

To evaluate the effectiveness of the program, the Department contracted with Cornell University to make a study of the projects in Bibb County, Ga., and Chicago, Ill. The findings showed that while the program was well accepted by the target group, it had little or no nutritional impact. There was no measurable increase in the amount of milk and formula the infants consumed. While their mothers and others in the household got somewhat more milk, that increase was not significant, either. At the same time, the key nutrient which needs special emphasis in maternal and child feeding—iron—was the one nutrient found below recommended allowances in the diets of program participants.

Overall, the participants who used food certificates on top of food stamps fared no better nutritionally than did those relying on food stamps alone to better their diets.

In the face of these results, the Department put the emphasis on expansion and improvement of food assistance for the entire household. This, in our opinion, is ultimately the best way to improve the nutritional levels of mothers and their infants.

Thus, the special feeding programs for women and infants have remained limited activities. The Food Certificate Program continues operating in the five original test areas, reaching some 10,000 women and infants a month. The Supplemental Food Program has 248 projects, reaching some 161,000 recipients, and the number gradually declines as food distribution areas shift to food stamps and close out their food handling and distribution systems.

In contrast, the regular ongoing family food assistance activities have expanded significantly in recent years, allowing for substantial improvements in the diets of the needy in all age groups.

The major thrust has been in the Food Stamp Program, which in fiscal year 1969 was reaching only 2.9 million recipients with $6.60 per person in monthly benefits. Since then the per person benefits have more than doubled to an average of $14.50 a month, and the number of people using food stamps is now up to 12.6 million.

Program Has Built-In Bonus

The Food Stamp Program has what might be called a "built-in bonus" for infants. As a child is added to the household the additional actual food cost for the infant is about $13 a month according to the Department's economy food plan. However, when the four-person household, for example, becomes a five-person household, that additional child entitles the family to an extra $20 worth of food coupons, currently; and effective July 1, the amount will be $22.

There has been a decline in the number of people getting direct distribution of food—from 3.8 million in 1969 to 2.6 million currently as food distribution areas steadily switch over to food stamps. Despite this decline in geographical coverage, food distribution for the needy has also been substantially updated and improved since 1969. Of particular help to mothers and infants was the addition of evaporated milk and corn syrup to the widening selection of donated foods.

While family food assistance is clearly the major channel of food help to infants, the Department's child feeding programs also have a bearing on this discussion. School food service activities are by far the largest of these. But the special food service program for children,

particularly the year-round operation, counts preschool children as a primary audience. Given today's innovations in day care and nursery centers, it would seem apparent that some number of infants are among the 200,000 or more children benefiting from the year-round food service program.

The committee has asked for a report on the Department's progress in implementing Section 9 [1] of Public Law 92-433, which authorizes a new special Supplemental Food Program for women, infants, and children.

In planning for the new program we have proceeded with care and thoroughness in order to produce a sound pilot activity that will yield the full scientific evaluation that Congress intended. Department officials have consulted repeatedly with maternal and child health experts in the Department of Health, Education, and Welfare. Outside medical professionals have been brought in to assure that proper evaluation criteria are built into the program structure.

The pilot program will be limited in scope in order to meet these goals. Cash grants to participating State health departments will be used to provide food to the target groups found to be at nutritional risk by competent medical professionals.

Generally, pilot areas will be selected from those not now providing special assistance to the target population, although some areas will be selected that wish to transfer from the existing Supplemental Food Program.

Possible delivery systems include donations of food at health clinics, issuance of food vouchers redeemable at retail stores, or any other method the State may select. Alternative delivery systems will be carefully evaluated from an administrative point of view.

As a condition for operating the program, a project area will be required to submit basic data on the results of various standard clinical and biochemical tests recommended by medical consultants. To evaluate the data, the Department intends to employ a medical school or other institution with capability for scientific analysis.

Proposed regulations for the pilot program should be published within the next few weeks, with a period of 30 days allowed for public comment.

The final regulations will be issued shortly after that, and the designation of pilot project areas, based on applications from State agencies, may be made by September 1.

Thank you.

Senator COOK. Thank you very much, Mr. Yeutter.

Again, I will yield first to Senator Percy because of his last 2 days of activities.

Senator PERCY. Thank you very much, Senator Cook.

First, I would like to say I never heard a witness, Mr. Secretary, give testimony in as rapid fire as you did. I was looking up to see whether our very able stenographer was able to take it down and she very wisely was reading along with you and you stayed with your text.

I certainly commend the Department on conducting this experiment. Many times we go ahead on hunches and it is just simply not wise, and to prove it out this way and come up with solid conclusions on something that might sound very good but which did not work out

[1] See Appendix, p. 194.

in practice I certainly feel is a wise course for the Department to follow.

I am sure that your Department has followed closely the testimony that we have heard the last 2 days and the points which were made by our various witnesses.

First, do you doubt that malnutrition or undernutrition of the mother during pregnancy may result in a low birth weight baby? Certainly, Mr. Secretary, you can just turn to any of your colleagues, Mr. Hekman or any of the other witnesses, and their testimony will be accepted as the position of them as individuals or for the Department.

Mr. YEUTTER. Thank you, Senator Percy. Not being a nutritionist or a physician, I think I would rather refer that to Dr. Luhrs.

EFFECTS ON MALNOURISHED FETUS

Dr. LUHRS. You have already talked to physicians more knowledgeable about this particular subject than I. The research evidence presented to you by others suggests that women who are poorly nourished during pregnancy do tend to have lower birth weight babies than those who are well nourished.

Senator PERCY. Now, Dr. Luhrs, do you doubt that a malnourished fetus may suffer a permanent deficit in brain cells and may indeed suffer from learning abnormalities after birth?

Dr. LUHRS. The evidence indicates that severe malnutrition may cause those effects.

Senator PERCY. There was a question raised as to whether the deficiency can ever really be made up later in life. Do you have a feeling on that as to if the child is malnourished for his first few years of infancy what are the chances later to make up, say, in brain damage?

Dr. LUHRS. Well, again, you have heard testimony from people more knowledgeable about this than I. I believe Dr. Winick has some data on rats indicating that with adequate feeding of malnourished animals after birth, recovery of brain growth can occur, but he is the expert in that.

Senator PERCY. And you tend to support his position on that?

Dr. LUHRS. I would have to yield to his opinion.

Senator PERCY. Do you doubt the evidence that nutritional supplements or rather a wholesome well-balanced diet can greatly reduce the incidence of low-birth weight babies?

Dr. LUHRS. Data derived from animal studies show the maternal diet to be important in the postnatal development of the offspring. Data in humans have been less conclusive with some studies demonstrating, and other failing to demonstrate, an association between maternal nutrition during pregnancy and birth weight of the infant.

Preliminary results from a well-designed, prospective Guatemalan study by J. P. Habicht and others [1] indicate that caloric supplementation of chronically malnourished women during pregnancy may have a positive effect on the birth weight of the newborn. Precisely what effect such supplementation might have on a U.S. population of pregnant women is still undetermined. Studies funded by the National Institute of Child Health and Human Development are in progress to attempt to clarify this point.

[1] Contract No. PH43-65-640—National Institute of Child Health and Human Development.

Senator PERCY. Do you doubt the evidence presented by Dr. Zee and Dr. Mauer yesterday that programs on the order of those available under the Supplemental Food Program or likely to be available under the new Special Supplemental Food Program are able to reduce the incidence of malnutrition among infants?

Dr. LUHRS. I did not hear their testimony yesterday.

Mr. YEUTTER. I would like to comment on that one. I have read every paper that you have received thus far. The question that you have just asked is difficult to answer because now one is in the area of the impacts that these programs can and do have in terms of actual consumption of foods and the impact on the nutritional well-being of the people who are participants; and that evidence is, at this point, very cloudy.

Senator PERCY. Do you have any estimates about the number of pregnant women and the number of infants whose diets may be suboptimal in the country?

Mr. YEUTTER. Dr. Luhrs, do you have any?

Dr. LUHRS. No.

Mr. YEUTTER. Apparently nobody is willing to offer any estimates, Senator Percy. If you wish, we will ponder that question to see whether it is possible to provide you with an answer.

Senator PERCY. All right. Fine. We would like to define what our target is. We know we will never be able to achieve total abolition of suboptimal diets, but what is our goal and what are we shooting for? Then, also supplementing that, would be an estimate as to how many of these individuals—what proportion of them are actually participating in a USDA program or at least have access to one. Do you have any estimate now as to how many we are actually reaching?

Mr. HEKMAN. We are currently serving about 30,000 infants, 105,000 children, and 30,000 women under the Supplemental Food Program. The family feeding programs, Senator Percy, are available to 99.7 percent of the population. There are only five counties in the United States that do not have a family feeding program.

HOW CAN WE ASSURE FULL PARTICIPATION?

Senator PERCY. So they are available if the individual is motivated to or has knowledge of them, and it is just simply a matter then of trying to bring the program together with the individual, The individual may not even have a knowledge that they are either eligible or in need and that may be the problem then.

How can we assure as full a participation as possible in order that effects of malnutrition or physical or mental development will not result in wasted human lives? What more can we do to reach out now in these programs? We have had a magnificant demonstration of our ability to reach out in the field of the elderly and actually let people know what is available to them, and we always use the comparison that is we can find everyone so that we can get their 1040 form to them and let them know that they owe an income tax, we ought to try to get to them and say what the benefits are that are available to them if they are eligible.

Mr. YEUTTER. This is the issue on which we focused part of our time the other morning, Senator Percy, as you know, the matter of

outreach. I don't have a lot to add to what my testimony was at that time except to say that we have some recent figures from the State of Iowa which, if you wish, we will include in the record,[1] which indicate that in that particular State at least we are already reaching—in terms of information—very close to everyone who is eligible.

Now, this does not necessarily mean that all States of the Union are equivalent to Iowa in this respect because the very fact that we have malnutrition is some indication that either there is unawareness or if there be awareness there is, for some reason, the lack of motivation to participate.

In a nutshell, as we indicated the other morning, it becomes a question of how far does one go in outreach in terms of expenditures of dollars either at the Federal level or by State and county units of government.

The answer I suppose as to where we are at this point is that we are a lot farther than we have ever been in the history of this country. There is some question how much further we should go beyond that in terms of commitment.

Senator PERCY. Lastly, I think we all agree that given a fully knowledgeable and well-educated public, that simply giving cash is the best way to do it. It is the simplest, the easiest; we can get it out faster; it requires less regulation and so forth. But we don't have that set of conditions today so we use food stamps as a means of hoping that that is going to at least be put in the direction of food and nourishment and it can't be used for other things.

We did hear some very strong words of support for the Supplemental Food Program, however, by the American Academy of Pediatrics yesterday and, in general, all of our testimony from scientists and doctors concerned with maternal and infant nutrition has tended to support the continued operation of this program.

You are phasing it out in favor of attacking the problem through the Food Stamp Program. The effectiveness of this approach was questioned because of the burden it places on the shopper who must choose very carefully on a very limited budget.

What are your objections to a direct intervention program to benefit mothers and infants? Are they philosophical ones, economical ones, some other alternative, or all of them?

Mr. YEUTTER. Well, that is a tremendous question, Senator Percy, and one which could readily consume an hour in response, but I will try to boil down my reaction to say it a bit more quickly.

OBJECTIONS TO DIRECT INTERVENTION PROGRAM

Part of my reactions to that, Senator Percy, also come in reactions to all the testimony I have read that has been presented to you thus far. As I went through all of this material last night at home, my reaction when I finished was that, my, there are a lot of unanswered questions, perhaps even more than we have addressed thus far in the testimony at these hearings. I think I could sit down in the next couple days and enunciate 50 questions or something of that magnitude for a research project that perhaps would go beyond the research that is encompassed in this particular program.

[1] See Appendix, p. 167.

There are all kinds of facets involved—philosophical, economic, and I suppose motivational or psychological. The critical question is: Even if we, all of us, agree that we do have a problem of malnutrition in these age groups or beyond these age groups in this country, how do we go about dealing with it? This question is not addressed by the medical research that has been presented to you thus far, and this is not criticism of that research because it is excellent as far as I can determine. That question is not really the function of the researcher, of course. It is the function of the Congress and the administration to make decisions as to how we deal with that problem. So far, I suppose we have not dealt with it as well as we should have.

We need to answer a great many questions and one of them to which you refer in these particular programs is that even if we make supplemental foods available as we have for the past few years, there is really no guarantee or assurance in that availability that those foods will be consumed. We have a real substitution effect. The experience with the Supplemental Food Program is that when those commodities have been made available they have not gone, in many cases, to the member of the family that should consume them. They have either been consumed by someone else in the family or they have not been consumed at all.

To the extent, though, that those particular commodities are literally consumed, the family may merely change its expenditure pattern. The increase that occurs by virtue of these products being made available results in a decrease elsewhere, and the total nutrient consumption changes little and perhaps none at all.

So we need to address the problem, Senator Percy, of finding out what we can do to make sure that the foods these people need are actually consumed.

Nutritional Education and Motivation

You mentioned shortly after I walked in this morning, as Dr. Edwards was testifying, the matter of nutritional education, and my thought at the time was that it is really broader than that. It is not only nutritional education but nutritional motivation, because though one may be able to teach good nutrition to the people of this country, this does not necessarily mean that the food consumption patterns will change. I am sure there are many nutritionists who do not consume the foods that they ought to consume, even though they may have the best training in the world. What one knows and what one does is sometimes two different things.

Most of us now know that consumption of cigarettes may not be very desirable for us. Fortunately, that is not a habit which plagues me. Senator Cook may debate that, being from Kentucky. But accepting for the purposes of argument that fact, that does not necessarily mean that all of us will give up cigarette smoking tomorrow.

So it is a complex question. The HEW representatives were saying to you that the questions are difficult to answer because of their complexities, and in philosophizing here with you I concur in that. They are very complex and we don't know nearly enough today.

Senator Percy. One last question, sort of a basic question. In the reorganization of the Federal Government proposed by the President,

the President proposes creating a Department of Human Resources which would then take over all of these programs. In view of the fact that if we are lucky, and I hope we are, we will create a new Department of Energy and Natural Resources, and if we are still going along well that we may get the Department of Community Development, but I just would doubt there is any chance in this Congress to create a Department of Human Resources.

Do you feel or does the administration have any position as to whether or not there is a desire to turn over some of these programs to HEW in the meantime and free the Department of Agriculture from these problems that are not exactly in the direct line of your overall major thrust and responsibility?

Mr. YEUTTER. Well, this subject has had a lot of discussion over the past 2 or 3 years, Senator Percy, as you know. It first began in seriousness during the time when I was administrator for the Consumer and Marketing Service in USDA, which only relates peripherally to this program. It has continued over the last year or so. Now, of course, I am involved more directly.

Since I have returned to the Department in January, there have not been any discussions of that possibility. The official administration position as far as I know, Senator Percy, is that we are desirous for the creation of a Department of Human Resources. You can appraise the political possibilities of this perhaps much better than I, but I would share your viewpoint that it is probably unlikely to occur in this session of Congress.

Then you are asking what about the alternative of bringing these sorts of programs together on a functional basis by administrative decision, and I can't comment on that. I will just answer philosophically, expressing only my own personal viewpoint, and that is that I would like to see some of those programs brought together from a functional standpoint. The ramifications go much beyond that philosophical commentary, of course.

With respect, however, to perhaps the underlying thought there, Senator Percy, meaning that perhaps they could operate more efficiently if they were brought together—and I may be putting words in your mouth here—perhaps the commitment to these programs would be greater in HEW than in the Department of Agriculture. All I would like to say to that is that so long as I am Assistant Secretary for Marketing and Consumer Services I doubt very much the commitment will be any greater anywhere else than it will be here.

Senator PERCY. I think that is a very important contribution for the record and I don't doubt it for a moment. Thank you, Mr. Chairman.

Senator COOK. Mr. Yeutter, let's get down to some questions relative to your statement.

You state that in 1969 we had 2.9 million recipients on food stamps and we have 12.6 now. I assume from that there is an absolute strong commitment on the part of the Department that the Food Stamp Program is a good program; that it is a tremendously strong, ongoing program, and that you feel that it has been very worthwhile and successful. Is that correct?

Mr. YEUTTER. I would say that is a fair statement Senator Cook.

Many County Officials Uncooperative

Senator Cook. Well then if that is a fair statement why have you not recommended that the authority be extended to the Department to implement these programs in areas where you think it is necessary? For instance, you stated that you made an analysis of the State of Iowa. Now, maybe the Department is lucky with Iowa in the fact that all county officials in the State of Iowa have accepted and adopted a Food Stamp Program.

I am not that fortunate in my State. Now, if you are going to make an analysis of my State, you are going to find a number of county judges and fiscal courts that absolutely have not and refuse to adopt a Food Stamp Program. So therefore, that refutes just a little bit that you are getting to everybody that you ought to get to and they are all aware of it and those that are aware of it can have it; because they can't.

Now, I know this is an effort on the part of Congress and Congress should face it, but I must say to you that we are faced in many counties nationwide where the Food Stamp Program is very knowledgeable on the part of the recipient, but he can't have it because his county officials refuse to do it.

We are also talking about food supplement programs and we are concerned with whether the ultimate recipient who they are intended for gets them. Many recipients go to the food distribution centers and are given particular commodities that are available and if they get something they don't like they have to take it anyway, because the county food coordinator wants to get his inventory down on that particular item.

Now, why don't we get down to the idea that if you are going to have this program and if you are going to administer this program and you think it is by far the best program for the benefit of the individual recipients, why don't we make it mandatory? If we are going to have a food program under your jurisdiction shouldn't the Department offer the best food program available?

Mr. Yeutter. Well, Senator Cook, the Congress may certainly do that if they wish.

Senator Cook. We would get it done a lot better if you would recommend it. Don't you agree, Senator?

Senator Humphrey. Yes.

Senator Cook. If you would recommend it as being the best program, I think we could find that job a little easier to tackle.

Mr. Yeutter. Not every county, of course, would agree. I presume that many of your counties in Kentucky, the county officials, at least prefer the Food Distribution Program to food stamps, and there are pros and cons to both programs.

Senator Cook. It is a matter of expense. They have to find the facilities for a Supplemental Food Program. They have got to pay for it out of their county budgets and they feel they do not have that You are looking at a county executive who had to find all of these facilities for the regular Food Distribution Program, who had to find refrigerator facilities, who had to contract for services for major refrigerator corporations to keep butter and other things, to keep eggs, and so on. So I have been all through that.

If county judges feel that the supplemental program is an expensive item to put on their county budget, they can't handle it.

What you are in effect saying in your statement is that a supplemental food distribution program, in many instances increases the cost 35 percent by reason of a distribution program. Now, it seems to me we ought to sell these local officials on that idea, that actually whether they know it or not, it may well be costing them more money for the food distribution than the Food Stamp Program.

Mr. YEUTTER. OK. The costs that you were enunciating a minute ago are costs of commodity distribution rather than food stamps. They can save those costs.

Senator COOK. Another point regarding the problem with such a program is that county officials find themselves using nothing but dry and canned items and not taking the refrigerated items because they haven't got any way to keep them and, therefore, they don't accept those items and, therefore, they can't distribute them.

LOCAL DECISIONS AFFECT NUTRITION REQUIREMENTS

Mr. YEUTTER. That is very true. At this particular point in time, that has been a local decision. That has not been a Federal decision. It is a decision that could be federalized. Now, it has some implications, obviously, both in terms of the requirements to the participants, in terms of the total Federal program and so on.

For example, under commodity distribution, there is no cost at all to the participant. Those commodities come free. There is no financial participation by the person who is the recipient of those products. In some areas, that is considered to be a major disadvantage of the Food Stamp Program because the Food Stamp Program does require that these people pay something depending on their income range.

One of the other disadvantages from an agricultural viewpoint, Senator Cook, is that the Commodity Distribution Program provides an outlet for surplus agricultural commodities. Right now we don't have much in the way of surplus agricultural commodities. Maybe we never will again. But if we do, certainly if that outlet is not available, we have some problems on the farm front. This is not to suggest that the problems on the farm front are of higher priority than the problems on the nutritional front. It is just to suggest that that is an element of consideration.

Senator COOK. Let me just say one other thing to you and I think this is a recommendation that the Department of Agriculture could make and it could help us immeasurably. That is, under the present regulations, you can't have both. You have either got to have one or the other.

Now, if we have a hangup with the cost of food stamps, then why couldn't we provide the Food Distribution Program as an outlet for surplus, if that is the case? There isn't any reason why a county couldn't operate in the alternative. That certainly would be no great hardship on the Department.

Mr. YEUTTER. Certainly, counties could be operated in the alternative. The question there is whether the taxpayer would be willing to absorb that additional cost. Obviously, you very nearly double the administrative cost of the program if both programs are offered in a particular county and, of course, that is a major consideration both

to the Federal Government and to State and local governments that are involved. In other words, virtually the same people participate but the administrative costs double. It just doesn't seem to me that that is good government. For that reason, I personally would be more favorably disposed toward having one program or the other but not both. The additional cost increase, it seems to me, far outweighs the benefits of having both.

Senator COOK. But, Mr. Secretary, maybe in the operation of the system it might be of necessity to have both. It might be of necessity to distribute surplus commodities throughout the United States as an outlet and it obviously is necessary, if we move from 2.9 to 12.6 million recipients on food stamps, that the Food Stamp Program be continued.

The point I am saying to you is that from an administrative standpoint in the Department of Agriculture, you have both.

Mr. YEUTTER. Yes.

Senator COOK. And you have to administer both.

Mr. YEUTTER. Yes.

Senator COOK. So, therefore, that cost factor as it applies to you seems to be no problem because we have not had any basic recommendations from Agriculture that we either move totally to one or the other or that we allow a community to have both because obviously the Department operates under both.

Mr. YEUTTER. Well, Senator Cook, all of us are State and local taxpayers as well as Federal taxpayers. So, even though I am a Federal official, I feel some sense of obligation toward the tax burden of State and local governments and certainly that tax burden will increase vastly if both programs are operated.

Senator COOK. I have got the notion that we haven't got very many taxpayers who are going to object to people who need to have facilities and need to have food. They are not going to object to the increased cost of a program administered on a local level that will see to it that those needs are met.

Mr. YEUTTER. Well, that depends on the opinion of the local units of government and may vary from Kentucky to Nebraska.

Senator COOK. I should be more frightened to say that than you, Mr. Yeutter. I am supposed to be a politician and you are in the Department of Agriculture, and you can say that with some degree of immunity, but I think it is an obligation of people at local levels to understand the problem as well as people at the national level.

LIMITED DUAL PROGRAM UNECONOMICAL

Mr. YEUTTER. As a practical matter, Senator Cook, what is occurring is that we are undergoing a shift from food distribution to food stamps, less perhaps in Kentucky than other States. We are now 80 percent on food stamps and down to about 20 percent on food distribution. It may well be, as a practical matter, desirable within the next few years—how rapidly this will occur, I don't know. It could be 5 or it could be 10 years—that we will have to switch entirely to one program simply because the administrative inefficiencies of operating a very limited Food Distribution Program will not make it worthwhile to have.

Senator COOK. Well, the reason that I brought this whole thing up is that I think when you establish a national program in such a manner as this with the choice of either food stamps or commodity distribution, you are leaving it up to the philosophical determination of a local official.

In reference to this philosophical decision of local officials, I want to get into the WIC program. What is your commitment under the law? What do you intend to expend within the framework of that commitment and that mandate from Congress? What do you mean in your statement when you say, "possible delivery system includes donation of food at health clinics, issuance of food vouchers redeemable at retail stores or any other method the State may select?"

Within the framework of the WIC program under the law, how much of a commitment in relation to the mandate of Congress are you going to fulfill? Also, how much philosophical authority are you going to leave at the State level? If we do this to such an extent, are we not undermining the significance of the whole program? Then I will turn it over to Senator Humphrey.

Mr. YEUTTER. That is a long question, Senator Cook, but, in essence, the response would be we don't have any intentions of turning this program over to the States in terms of the content thereof. The project proposals will not come from us. We will not generate the WIC programs. They will be generated elsewhere and they will be evaluated by the Department of Agriculture and then the contracts or the grants will be awarded. So the decisionmaking role is ours. It is not the role of the State. The States will obviously play a very important role in carrying out these programs because the grants will go to them and from them down to the counties or whatever the entity is that will be carrying them out.

In terms of a commitment of the program,[1] Senator Cook, to be very precise and succinct, we intend to carry out the mandate of the Congress as it is delineated in the law.

Senator COOK. I hope so.

Mr. YEUTTER. We will try.

Senator HUMPHREY. On that point, I wish to pick up the question. I want to thank Senator Cook for his interrogation and I want to concur with the emphasis that Senator Cook has made on these food programs in relation to the Commodity Distribution Program and the Food Stamp Program.

Let me emphasize if you want us to move toward an overall Food Stamp Program that we ought to get that recommendation from you very promptly so we can prepare the way for it. It seems to me that we might well want to sponsor an amendment which makes it mandatory by either 1974 or 1975, to permit counties or local governments to have the alternative that Senator Cook has suggested. I think his point is well-made about the administrative cost at the Federal level. Really, the local people are rather ingenuous in devising ways to administer programs if you insist they be administered, and if you don't leave a lot of escape hatches.

So I would urge that we get a recommendation from you about a mandatory phaseout of the Commodity Distribution Program and phase-in of the Food Stamp Program—what would be your judgment on that? Would the Department support a position of a mandatory program on food stamps?

[1] See Appendix, p. 167.

TOTAL ISSUE UNDER CONSIDERATION

Mr. YEUTTER. I was thinking about Senator Percy because Senator Percy commented earlier that, in his judgment, the proper route to go is an all-cash program which would eliminate food stamps as well as food distribution. Right now, we could not take a position on this point. For this reason: The whole issue of welfare reform, of course, is under study within the administration and this is an integrally related issue to the issue of welfare reform. It seems to me unlikely the administration would take a position on this particular issue as long as the total issue of welfare reform is under consideration.

It would probably be a mistake to do what you suggested unless it were done as an interim measure on the road to whatever it is that will ultimately be recommended in welfare reform.

Senator HUMPHREY. If you had no evidence to the contrary about the willingness of local governments to administer an alternative program of either commodity distribution or food stamps, would your Department support such a move?

Mr. YEUTTER. My reaction, Senator Humphrey, is that we probably would not support an alternative distribution system, not only because it would be somewhat more expensive for us—not a lot because we have got both systems of administration already in existence as you point out—but simply as a question of principles of government. The increased costs come down at the local level rather than at the top level.

It just seems to me that we ought not to foster duplicate programs as a principle of good government.

Senator HUMPHREY. I want to say, as one who has worked with the commodity programs over a long period of time from a legislative level, I consider them rather unsatisfactory because it really depends on what is available, not what is nutritionally desirable. You might be strong on beans one time and strong on turkeys another time, or strong on butter another time. What happens is that the Government makes commodities available to people on the basis of surpluses accumulated by Government. Nutrition is second to that. Distribution and getting rid of surpluses gets first priority.

That is why I have long supported the Food Stamp Program and had the privilege back in the late 1950's, with Senator Aiken, in sponsoring the pilot program. We started out with just six counties, as you may recall, after the early period of the depression, and it has become a magnificent program. I want to follow through very briefly here on——

Senator COOK. Senator, would you yield for a minute?

Senator HUMPHREY. Yes.

Senator COOK. Mr. Yeutter, the thing that bothers me about your remark is that it does not constitute good government. In the WIC program, for instance, you are going to move into some form of food provision, some type or form of prescription food, whatever the case may be, so actually, you are still going to continue to be in this business. Now, you say that somehow or other it doesn't seem to be feasible or governmentally sound to have these duplicate programs, and yet, actually, this falls apart when we understand that the programs that we are moving into, and the pilot programs that we are giving consideration to call for direct supplementation on the basis of food

items, so therefore, we are still in that business and you are still going to be in that business.

Mr. YEUTTER. Senator Cook, I have no objection at all to pilot programs like WIC. It seems to me that is the way we learn. But we are not talking about pilot programs in terms of food distribution vis-a-vis food stamps—two national programs—and imposing both of them nationwide.

Senator COOK. I suggest that when you get WIC started it is no longer going to be a pilot program.

Mr. YEUTTER. Well, if that be the will of the Congress, then as a portion of the executive branch of the Government we will carry out that will. However, the same point applies in terms of principles of good government, Senator Cook, if WIC turns out to be purely a duplication of what we already have—and I am not suggesting it will or won't; we will learn that through the WIC evaluation. But if it turns out to be a duplication, I doubt very much if either you or Senator Humphrey would recommend that we simply duplicate what we now have.

Senator COOK. Only one other comment. I think you ought to seriously consider a recommendation that it be mandatory if localities are going to take a Federal program within that State on a food supplemental basis that it be mandatory they move to the Food Stamp Program because the commodities you are getting down to now are so scarce and of little significance in regard to an overall sound diet that you are really running out of food to distribute anyway.

Mr. YEUTTER. I would like to comment on that, if I may. Senator Humphrey, I am sorry to interrupt your line of questioning. It is an important issue because as you well know we have had very great difficulty in purchasing the commodities under the surplus removal authority of Section 32 over the last several months. It is difficult to find surpluses of agricultural commodities these days.

TWO OPTIONS OPEN

There are really two options open to deal with that problem. Assuming that it will continue to be difficult to purchase at least some of these commodities we would like to provide in a Food Distribution Program, there are really two options:

1. Changeover to food stamps and simply eliminate the problem by eliminating the program; or
2. Broadening the purchase authority under Section 32 so that it applies not only to surpluses but simply providing whatever commodities are necessary.

Senator COOK. But then you would be in the direct market and you would be in competition with all of the consumers which would have a direct reflection conceivably on price and on scarcity of products.

Mr. YEUTTER. It could very well be the case. That depends, of course, on how the amendment might be worded. There are some options as to how one might word that kind of change to the law.

Senator HUMPHREY. What bothers me about the WIC program and your office is the fact that—I was the author of that section, that the Special Supplemental Program was authorized and funded under funds from Section 32 which were reimbursable over 9 months ago, and it still does not exist anywhere in the country.

Now, it isn't as if there had been no experience under it because at St. Jude's Hospital in Memphis there has been experience under this program, at Johns Hopkins there has been experience, and I think at Ford Hospital out in the Detroit/Dearborn area there has been some experience under this program. That is, a pilot program of supplemental feeding for pregnant and lactating women.

Now, you have stated that regulations may be available in September, I believe.

Mr. YEUTTER. They should be official by then. They will go into the Federal Register within the next 10 days or thereabouts.

Senator HUMPHREY. That would be 1 year after authorization and half-way through the life of the 2-year project. I think it is fair to ask what has been the delay? What has caused all the delay in writing these regulations?

Mr. YEUTTER. That is a fair question, Seantor Humphrey. It has been raised in some of the previous testimony.

Senator HUMPHREY. Well, if it has been answered——

Mr. YEUTTER. No; by others who have testified here. It has not been commented upon by the Department of Agriculture. If you wish, Senator Humphrey, we will provide a chronology of events[1] that have taken place since last September when you secured passage of this law. Some of this precedes my arrival on the scene.

In a nutshell, the principal segment of the delay, if one can consider this period a delay, was the determination as to who within the U.S. Government would carry the lead role; whether it would be HEW or USDA. The reason that was an issue, of course, was because the medical aspects of this study are extremely significant.

It was the judgment of the USDA immediately subsequent to passage that the medical aspects were probably predominant over the feeding aspects of the program.

Senator HUMPHREY. That is what the Special Supplemental Program under Section 17 states quite categorically.

Mr. YEUTTER. Yes, sir.

Senator HUMPHREY. The law was clear. What always bothers me is that people in these departments get to messing around and reinterpreting the law. Why don't they counsel with those of us who authored the act? We went through this same thing with the Hathaway amendment to the Economic Stabilization Act, where a bright young legal counsel decides he knows more about what that law says than those of us who authored it. I was available and Senator Aiken was available as was Senator McGovern—I am not sure of other Senators here, but we could have given you that information. There was no need for that kind of bureaucratic delay I might say. It is right there. It says, "health departments."

USDA "GETS" KEY ROLE

Mr. YEUTTER. Yes. Well, at any rate, Senator Humphrey, in February, the Department—and I do not wish to in any way chastise my fellow colleagues in the Department of Health, Education, and Welfare because they have been exceptionally cooperative in working with USDA on this program—but it was in February that the Department of HEW concluded that they should not play the key role in this

[1] See Appendix, p. 168.

program and therefore it fell upon the Department of Agriculture to carry out that role.

Since February we have been very actively involved—or our Food and Nutrition Service has been very actively involved—in determining all of the parameters of the program, developing the regulations for proceeding, and so on. That was approximately the time of my arrival on the scene and I have to say, Senator Humphrey, that I believe that our people have proceeded with all due diligence subsequent to that time.

Senator HUMPHREY. Well, it's sort of a tortoise speed rate that you have had on this. Let me ask you now, the law specifies in the word "shall." This is not optional. It says that in order to carry out the program provided under subsection 8 of this section during fiscal year ending June 30, 1973, the Secretary shall use $20 million out of funds appropriated by section 32 of the act of August 24, 1935; and then in fiscal 1974, there shall be again $20 million available to be used.

Now, my question is: What does USDA plan to do with the unspent amount of the $20 million for fiscal 1973? Will it be returned or will it be used next year? In other words, will you double up?

Mr. YEUTTER. Senator Humphrey, you are asking a question of budgetary practices that I simply cannot answer. I don't know what the law provides with respect to whether those funds carry over or whether they revert back. I am sorry. I can't answer that question. We don't have a budgetary expert here with us to answer it. I would be glad to provide you with a response [1] to that.

Senator HUMPHREY. You see, what has really happened, for all practical purposes, is a veto of the first year. We passed the law. It is mandatory. It is obligatory, but nothing has happened. I don't think that's the way we ought to run things. We knew what we were doing. I think you could come in and say very candidly, "Look, it took a couple months to get things operating here but we have stepped up our program and we are going to use those funds for fiscal 1973." But nothing has happened and it isn't as if it was a brand new system. It is not innovative. It was an extension of what had been tried privately under foundation funds.

Now, in fiscal 1974, I thought you had about $8 million set aside for this, but there is some differences of opinion among staff on this committee and others. For fiscal 1974, anywhere from $5 to $8 million is being requested for the program. Well, now, the law says $20 million. What goes on here?

Mr. YEUTTER. OK. First, may I comment as a former researcher. I would like to say, Senator Humphrey, that if our people or anyone else put together a program like this that would not provide a defensible research result upon termination—defensible not only in terms of public policy but defensible in terms of the scientific community—I would chastise them vigorously. It just seems to me that paramount in this is proper design of this project.

Now, I suppose that with USDA or whoever might have done this, they could have thrown together a research program very quickly and gotten it into effect and expended $20 million in fiscal year 1973, but I believe that they would have been subject to criticism had they done so in that manner.

[1] See Appendix, p. 169.

Senator HUMPHREY. I disagree with that and I'll tell you why, because there are doctors in areas where this has been tried on an experimental basis with private funding. These efforts have demonstrated the efficacy and desirability of this program. However, I don't believe that any of these people have been called in by us to really help implement this program.

DELAYS IN IMPLEMENTING PROGRAM

Now, Dr. Edwards has testified that Maternal and Child Health Services at HEW administer many programs providing health and nutritional services for mothers and children, and he has testified as to the extensive experience in planning and development of such projects and their experience in coordinating activities at State and local authorities. It seems to me if we don't have expertise in this Federal Government after these many years in this field that we have been wasting a lot of time and money. I just can't believe it takes a year to gear up, Mr. Secretary. I just can't believe it. And then, after the year goes by, you only ask for approximately 30 percent of the program ~~funding available~~ for fiscal 1974. Now, why of the $40 million of funding provided are you only to use $8 million? That is only about 20 percent of the funds that were mandatorily dedicated to this program.

Mr. YEUTTER. Senator Humphrey, I don't think any of us know at this point how much we will expend because the projects are not selected yet. The regulations are not even out yet. So there is no way that we can tell you how much money will be expended.

The answer to your question, though, Senator Humphrey, is that there is no point in spending $40 million if the job can be done with $10 million. I don't believe you would want us to waste $30 million.

Senator HUMPHREY. We didn't think that you would waste it at all. As a matter of fact, Mr. Secretary, I think $20 million was a pittance that was needed in terms of the nutritional supplemental foods, a pittance. This was just to start the program in a few places in the country in order to develop the basis for a national program. Also as you know, the law provides that there had to be a report of medical records of State and local agencies and groups carrying out any program under this section—"*shall maintain adequate medical records on the participants assisted to enable the Secretary to determine and evaluate the benefits of the nutritional assistance provided under this section.*" [Emphasis supplied.]

Now, the people with whom I talked before this amendment was offered told me that $20 million was far too little, but I said, "We are dealing with the realities here, a budget and the Congress. We have got an experimental program here. Let's try it." And that is the way we sold it to the Senate and to the House; namely, that this is a minimum beginning, an initial experimental effort, $20 million. And $20 million of food for special supplemental feeding is really chicken feed in terms of the nutritional needs. I don't really believe you should give the impression that $20 million annual expenditures in this case would be wasteful.

Mr. YEUTTER. I agree, Senator Humphrey, if the intent of your legislation here—and it was your legislation, so you know your intent

much better than I do—I assume that your intent was what you just said; that it was a pilot program and was not intended to feed all the needy children in the United States; that it was a pilot program designed to learn answers to some important questions.

Senator HUMPHREY. Correct, relating to both medical answers and program delivery alternatives, existing or new.

Mr. YEUTTER. If that be the intent, then it seems to me the relevant factor is how much need be spent in order to determine the answers to those relevant questions.

Senator HUMPHREY. And it was our judgment, rightly or wrongly—and Members of Congress have no unique wisdom or monopoly on good judgment—but it was our judgment as the elected Representatives of the American people that you needed to try at least $20 million worth of it.

Now, I don't believe the Department has the right to impose its judgment over ours. Now, you may turn out to be right, and you can come back after a while and say, "Well, you made us waste it," but I don't want you telling us that "you will decide" what's best despite our directions. If we had given you what we call optional authority, then you could have said, "Well, you gave us authority up to $20 million, Mr. Senator, but we don't think we really needed that." Now, you could have come back here and said, "Senator Humphrey, you had a $20 million program that you pushed down the throats of the Members of the Congress"—and we didn't have to do much pushing, I might add—"and we found out because we were required to spend $20 million due to your obstinacy and your lack of good judgment, we wasted $10 million." I would have had to stay here and take it and have the writers say over here, "Humphrey wasted $10 million."

REQUIRED MINIMAL AMOUNT WAS TO BE $20 MILLION

But the fact of the matter is, that you didn't give me the trial run. And the doctors and the nutritionists that I talked to said that $20 million was a minimal amount to run any kind of adequate experimentation; that to run it on less would not give us the real kind of broad-base statistical evidence from a medical and delivery system point of view that we need. Now, that is why we settled on a $20 million figure—actually, they wanted $40 million. We cut it in half on the basis of sheer budgetary concerns. You know, we face real problems.

Now, my point is, you are now preparing for only an $8 million program in fiscal 1974. Now, what evidence do you have that $8 million is better than my $20 million?

Mr. YEUTTER. All right, sir. Well, we need to have the scientists here really to answer that question, Senator Humphrey. Perhaps we have a difference of opinion among the scientific community as to whether it requires $8 or $20 million, but the task force that has been developing this project in the last several months has concluded that they need x number of participants and that the cost of having x number of participants—I believe the figure they have in mind is 10,000 mothers and 10,000 children—and that the approximate cost of running a program at that level is something like $7 or $8 million annually, and their judgment is that that would be adequate.

Senator HUMPHREY. So you are asking, in other words, for an amendment to the law, because the law is mandatory, but I did not

notice that the Office of Management and Budget is asking for any amendment to the law. They are just having their judgment supersede ours.

I am really on a principle here of relationships between the executive and the legislative.

Mr. YEUTTER. Yes, I am aware of that.

Senator HUMPHREY. Now, when we authorize you, and give you optional bases upon which to operate, then I think you are perfectly within your rights to come in and say, "Look, we don't need $20 million. We only need $8 million." But you are not authorized in this case to have that option. The Congress, in its collective wisdom, or lack of it—whatever you wish to interpret—said $20 million is a reasonable figure for a reasonable experiment over a year's time. Now, 1 year's time has already gone out. You just ignored us. It was just futile on our part to pass that law. I might as well have gone on home and sat on the side of the lake, because you apparently pay no attention to the laws we pass.

I mean, if the whole country did that—this is what I am arguing about in this Government—if the whole country did this, there would be unbelievable lawlessness. We don't pass a tax law and say the taxes must be paid only to have you or someone else come around and say I just think Congress was kind of foolish and I don't think I ought to pay in 1974, or I ought to think about paying 20 percent of what I owe in 1975. You would go to jail.

Now, what gives an officer of government, who is under obligation to execute this and other laws of this land, more leeway than a citizen who says, "Well, I just don't think I'm going to pay anything in 1974 or 1973"? I don't mean to put you personally on the spot on this because this is not just you, but such contempt for the law in this Government cannot be permitted to continue. When the Congress authorizes and directs, that's what it means.

Now, we authorize and direct conscription—up until June 30 we did—and if a young man didn't turn up, we prosecuted him because he didn't fulfill the requirements of the Selective Service law. He wasn't asked, "Do you want to?" Because if that had been the case, there would have been a lot of lonely people at the conscription office.

MUST FAITHFULLY EXECUTE THE LAW

But when we come to the departments of Government, we have people over here that just look at the Congress and say, "Well, that's a bunch of boobs over there. They don't know what they are talking about. They say that the Secretary shall." They take a look at the word "shall" and they say that doesn't mean anything. "I am the Secretary. I don't have to do that." Now, I think such a position is wrong, wrong, wrong. I believe that you and other members of the executive branch have an obligation, whether you like the law or not, you are required under the Constitution—the President is—to faithfully execute the laws. That does not mean kill them. That means administer and enforce them.

We are not talking about impoundment now. This is not impoundment because impoundment relates to optional authority where the Congress has appropriated within an authorization. I happen to think it is wrong for the Government to impound, but here is a directive

where the funds do not even have to be appropriated. The funds are in Section 32.

Now, what are you going to do about giving me a program for this year that is a program and not one of these little skiddy ones that's lined up here at 20 percent of its value with inflation besides? Since then, 6 percent of this money has eroded anyway. I want to know what you are going to do. When am I going to get the $20 million program?

Mr. YEUTTER. Senator Humphrey, as you pointed out, you have raised a constitutional question of the relationship of the executive and legislative branches, and I am an attorney and I could argue the other side of that question now, too, but that is only peripherally related to the issues that are before us.

With respect to the specific question involved in the size of this program and the scope of expenditures for these 2 fiscal years, I suppose, Senator Humphrey, that in some manner, the Department of Agriculture could have expended $20 million in fiscal 1973. I believe personally that it would have been a grave error for the Department to do so.

Senator HUMPHREY. Then I think they should have come to us, the authorizing committee, and just in common decency said—at least to the author of the law—"Look, the law passed in September. It is late. It takes us some time. Now, we know it is a $20-million program, Mr. Senator, but we are not going to be able to get this program going until about January. Now, we think that if we take $10 million of it this year, that that would be a fair program." I think we are all reasonable men. I recognize what you are saying has merit. But then, when you come to year No. 2, I think you've got one or two choices: You either do what we tell you to do, or you come in and make a recommendation to the contrary. I don't like the business of the executive departments just willy-nilly deciding what they are going to do and what they are not going to do. That is permissiveness that the President has condemned, and I don't like that permissiveness.

When we say, "You shall," you shall. Now, if you don't think we should, then I want you to come before the Committee on Agriculture and make your recommendation and say that that funding is too large. Because the law doesn't leave any leeway now, you see. That is the point. Now, we maybe should have left some leeway. I think you could maybe make a case. I would like to hear the doctors that came to me originally that wanted the $40 million. Doctors are prone to want a little extra once in a while, as we all are. But I would have liked to have heard the testimony, and if the testimony—if you can demonstrate we only need $8 million, I am for you. I don't want to waste the money. But I don't believe you have the right—I am going to conclude my part of this on this—I don't believe you or any other official of this Government has the right, when the law says, "You shall," to determine that you shall not, without paying the consequences. That is what has gone wrong around this town. People are deciding what they are going to do regardless of what the law says, and some people have found out that that doesn't work as well as it should.

Mr. YEUTTER. Senator Humphrey, I happen to personally believe in the proper and close working relationship between the executive and the legislative branches of Government. I have spent some time in State government as well as in the Federal Government.

Senator HUMPHREY. Yes, I know that.

Mr. YEUTTER. And I feel that I had a superlative working relationship with the legislative body in my years in local government, and I hope to have that relationship here. It doesn't bother me one bit to confer with Members of the Congress. I have done it on many, many occasions since I have been here in the last 4 months, and I hope to do it on many other occasions in the future.

I would be glad to come back to you or the committee with what we feel the expenditures should be. I think that is premature now. The regulations are not out for comment. We don't know what the comments are going to be. Those who believe we ought to have a $20 million expenditure level or a certain number of participants will have an opportunity to comment when the regulations are out within the next 10 days or so. Once the regulations are finalized, of course, we will have a chance to see the proposals which come in, and we will really not know what kind of interest we have in this program until the proposals come back to us. Once we have a better feel of that total situation, it seems to me that then we can give you a much better appraisal of what the expenditure load should be. As to whether that should be $7 or $8 million, as seems to be the general consensus among our task force now, or whether it should be $20 million or more than $20 million, it seems to me is something that we can analyze at that time, and I would be more than pleased to give you the full benefit of that analysis [1] and the way in which we feel that we should proceed.

CUTBACKS IN SUPPLEMENTAL FOOD PROGRAMS

Senator HUMPHREY. What disturbs me basically is that the supplemental feeding programs are being cut back. The OEO emergency program with the commodities is being cut back. This program wasn't funded at all in fiscal 1973. It is going to be funded at about a third its level in fiscal 1974. I just don't like the pattern.

Now, speaking of you personally, my relationships with you have been sincere and deep. I know you are a competent man, but that doesn't change my point of view with reference to policy here. Now, this program is not to supplant—this was not a program to supplant the supplemental programs we already had. Even the Bureau of the Budget, mind you, has come around to agreeing that this is not a program to supplant. I seldom pay compliments to the OMB on these things, but it says here in the letter to Senator Beall that the special supplement would be in addition to a similar nutrition program for infant feeding currently budgeted at $16 million. That was on May 22, the letter. But the fact is, from all the testimony that has been held thus far, the OEO emergency-type program using commodities is being phased out, and this one is being phased in as if to supplant the other. But that wasn't its purpose. That is not what the law says. Even if you are doing it to supplant it, you are coming in on one leg and you are limping on that one.

So this is our concern. Now, we want a supplemental feeding program and if we have to pass a law to just push it down your throat we are going to do it, because the Congress wants a supplemental feeding program and we are not going to let somebody over there who is appointed—with all due respect to his capability—tell the elected representatives of the country who have to go out and face the public

[1] See Appendix, p. 167.

that your decision is better than ours. Now, you are entitled to your point of view and I hope you can convince me—as a matter of fact, you may very well be able to convince me that this is more than we need. That is possible. But until you do, I think you are required under the law to do what the law says and I don't think it is a good pattern when we see this tremendous need for supplemental feeding, when we see the malnutrition in this country, when we see a pattern developing in our feeding programs, particularly for children, that is a pattern of recession, of retreat, rather than of advance. That is my view and I think that is pretty much the view that has been expressed here by Senator Cook and Senator Percy this morning.

Mr. YEUTTER. My final comment to that, Senator Humphrey, is that in my personal judgment we need to answer some questions that are not even included in the WIC program. I think we need some research that goes beyond what is included in this one. I think we need some answers that the WIC program will not provide. This is something I haven't even discussed with our own people because I have been thinking about this—concentrating on it, of course, in the last couple days prior to coming here.

There are a lot of unanswered questions, not only with respect to how one can best handle the malnutrition problems of infants and pregnant and lactating females, but also in terms of questions of priorities in food programs in general. As you know, we are spending $1.5 billion on school lunch programs. We are spending a much, much smaller amount for the group of people that are involved here. One must evaluate those priorities it seems to me. That's something you must do and we must do. You have before you in the Senate—or the House—at the moment, a bill that will increase the Federal Government's commitment to school lunch and school breakfast programs by something like $300 million a year or thereabouts. Well, one must then decide whether an additional $300 million should go into that age of children or into this age of children. What are the priorities and the potential payoffs in terms of human health and in our humanitarian considerations and compassion in terms of productivity of people in this country and all those sorts of things?

Senator HUMPHREY. Yes, but now, that decision will come after discussion, dialog testimony, and you will give your point of view. But once the decision is made, right or wrong, you have got to carry it out. Now, the Congress, I repeat, will make mistakes, and undoubtedly makes a lot of them, but they are the elected representatives of the people and they make the policy. The Congress makes the policy. What I do not like is when the Congress has made the policy and someone who feels that he's got sort of a pipeline to the eternal wisdom of God Almighty decides whether we are going to implement the policy or not.

Now, I think you have every right to come back and say, "You have made a mistake, ladies and gentlemen. You have made a mistake, Senator. We think you are wrong. We are going to implement this program but we think that you have made a serious mistake, but we are going to recommend in the next bill or an amendment"—that is the way we should proceed. I do not want somebody at the White House or in the Department of HEW or Agriculture deciding to superimpose their wisdom over that of the Congress because I don't

think theirs is superior. I think they are good. I have a great respect for our people in the executive branch in terms of their competence. I think the people who come to us are generally very dedicated and very competent. But I will tell you, I sure have some thoughts about OMB—and I think they are competent, too—but they are deciding priorities. That is not their job. Their job is to recommend priorities. Our job is to decide them. And once we have decided them, then it is their job and the agencies' jobs to implement them. We have a process, you see. You know, it is really embarrassing—I have had people say, for example, people out in St. Jude's Hospital, "What's happened to your program, Senator?" My very good friend, Danny Thomas, who is very interested in the program at St. Jude's, I called him up and said, "We have a new program to help malnourished infants. We passed it. You will be happy to know we were able to get it passed because of the work your hospital in Memphis has done in this field. We are really on the beam." I talked to him just 3 or 4 days ago on another matter. He is coming up to our State for a convention soon. And he said, "Whatever happened to your food program?" I said, "Oh, it is working, isn't it"? He said, "If it is, it is a well-kept secret."

Now, you know, that is a small item. It is personal. But I just feel if you weren't going to do it somebody could have dropped us a post card. I think we ought to let each other go home and have lunch.

Thank you very much.

The committee is in recess, to reconvene at the call of the Chair.

[Whereupon, at 1 p.m., the Select Committee was recessed.]

APPENDIX

ITEM 1—SUBMITTED BY WITNESSES

FROM THE U.S. DEPARTMENT OF AGRICULTURE

RESPONSE TO QUESTION FROM SENATOR PERCY

STATISTICS ON STATE OF IOWA OUTREACH PROGRAM [1]

The Iowa State Agency implemented its Outreach Program on February 1, 1973. The administrative responsibility has been delegated to the Outreach Director, Food Programs Office, Iowa Department of Social Services. The Outreach Director supervises the development and direction of overall functions of all assigned personnel with outreach responsibilities.

The State agency plans to place an outreach officer in each of their area and subarea offices (12). In addition, they also expect the larger counties to designate an employee or employees to carry out outreach activities at the local levels.

In order to inform low-income families of the availability and benefits of the FSP, Iowa established its priorities consistent with the severity of need. They are:

A. Public Assistance Households
B. Low-Income Groups in Urban Areas
C. Low-Income Groups in Rural Areas
D. Senior Citizens
E. Form Related Workers Including Migrants

Some of the activities now being undertaken on an ongoing basis in an effort to fulfill their outreach goals are as follows:

A. Media appearances regarding new regulations and new groups of eligibles (TV interviews, telephone call-in shows, discussion programs).

B. Newsletters to community agencies and referral workers concerning new regulations, emphasis on new tables of eligibility and income deductions, etc.

C. Visual presentations and talks to church groups and service clubs.

D. Bi-lingual service brochures including information on food stamps will be distributed in Spanish speaking areas.

E. Coordination with summer adult programs and special events.

The cost of planning, organizing, and initial implementation of the Outreach effort at State level and for the first year is estimated at $55,924.00 of which $34,952.50 of that amount will be claimed from the USDA.

RESPONSE TO QUESTION OF SENATOR COOK

THE WIC PROGRAM GOAL [2]

The goal of the WIC Program is to provide for the delivery of supplemental food, as prescribed by medical personnel in public health clinics, to those women who are pregnant or lactating and to those children under 4 years of age who are residents of low-income areas and are determined by medical personnel to be at nutritional risk.

[1] See testimony, p. 148.
[2] *Ibid.*, p. 154.

Response to Questions From Senator Humphrey

SPECIAL SUPPLEMENTAL FOOD PROGRAM (WIC)—CHRONOLOGY [3]

September 26, 1972—P.L. 92-433 signed into law.

October-November: FNS preliminary program design, after discussions with HEW.

November 24, 1972—Assistant Secretary Richard Lyng (USDA) wrote to Under Secretary John Veneman (DHEW) regarding administration of the WIC Program.

December 15, 1972—Mr. Veneman responded to the Lyng letter.

February 2, 1973—Acting Assistant Secretary Richard L. Seggel (DHEW) wrote to Assistant Secretary Clayton Yeutter (USDA) to provide a written summary of oral comments made to Mr. Edward J. Hekman and his staff during two meetings regarding the WIC Program. In this letter it was stated:

> In response to your proposal that DHEW take over responsibility for this program, our Office of General Counsel has advised us that there does not appear to be any legal authority for transferring the responsibility for the administration of this USDA program to DHEW.

March 6, 1973—FNS announced by FNS Notice the establishment of a Task Force to design the WIC Program.

March 22, 1973—WIC Program Task Force met with Samuel J. Fomon, M.D., Department of Pediatrics, College of Medicine, University of Iowa, and Milton Z. Nichaman, M.D., Director Nutrition Program, Center for Disease Control, DHEW. Dr. Fomon is an outside medical consultant engaged to assist the Task Force in developing the evaluation. Dr. Nichaman was representing DHEW in providing technical assistance.

April 3, 1973—WIC Program Task Force met with David M. Paige, M.D., Associate Professor, Johns Hopkins School of Hygiene to review progress on the Maryland food program serving a similar target population.

April 19, 1973—WIC Program Task Force met with Mary Egan, Maternal and Child Health Service, DHEW, Helen Ger Olson, Indian Health Service, DHEW, Frederick Trowbridge, M.D., Nutrition Program, Center for Disease Control, and Dr. Fomon to obtain further medical assistance as well as DHEW administrative assistance.

April 26, 1973—WIC Task Force met with Dr. Fomon.

May 8, 1973—WIC Task Force met with Roy M. Pitkin, M.D., Department of Obstetrics and Gynecology, College of Medicine, University of Iowa, also engaged to assist the Department in developing the medical evaluation, Dr. Fomon and Mary Egan.

May 23, 1973—WIC Task Force met with Vincent Hutchins, M.D., Maternal and Child Health Service, Health Services and Mental Health Administration, DHEW, and Mary Egan to obtain program data from DHEW.

May 25, 1973—WIC Task Force met with Drs. Fomon and Pitkin to finalize the Request for Proposal for the evaluation and the technical aspects of the regulations.

May 30, 1973—Draft of proposed regulations for implementation of a pilot WIC Program was completed. Draft of Request for Proposals for a medical evaluation of the pilot WIC Program was completed.

FNS PLANS FOR WIC PROGRAM IMPLEMENTATION [4]

FNS plans to implement the WIC Program in FY 1974 in accordance with Congressional intent to design a program that will be amendable to careful medical and biochemical evaluation as well as administrative evaluation. Such a program will need to be operated only in a limited number of carefully selected project areas. Selected areas must satisfy the requirements for coverage of urban, rural, racial and ethnic differences and will service areas at most nutritional risk. Areas without existing programs of a similar nature will lend themselves best to evaluation by allowing measurements before and after the period of feeding.

The unspent portion of the $20 million authorized for the WIC Program in FY 1973 will be carried over by the Department with other unspent Section 32 funds to be used in subsequent years for the purposes of financing activities from Section 32 funds.

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[3] *Ibid.*, p. 157.
[4] *Ibid.*, p. 158.

ANALYSIS OF SUPPLEMENTAL FOOD PROGRAM UNDER SECTION 32 FUNDS [5]

A supplemental food program funded by Section 32 funds and with the objective of reducing the nutritional risk of a poverty population should include the following elements:

1. Identification by professional medical personnel of individuals who are part of a poverty population at nutritional risk and therefore in need of supplemental food.
2. Identification also by medical personnel of the supplemental foods needed to reduce or alleviate the nutritional risk.
3. A method of prescribing for the needed supplemental food.
4. A method for delivery of the prescribed supplemental food items either through a distribution center established for such purpose or through the use of purchase authorization redeemed in the existing food distribution system.
5. An efficient program providing a maximum of service to recipients with minimum delays.
6. A concern for the responsibilities associated with the expenditure of public funds and maintenance of a clear audit trail in all fiscal activities for maximum accountability.
7. A method of evaluating the impact of the Supplemental Food Program on the nutritional risk of participating groups of individuals.

[5] *Ibid.*, p. 163.

Shall I Breast Feed My Baby?

BY NILES NEWTON, PH. D.

There is great pressure on each of us to bottle feed. Demonstrate this to yourself by looking over baby care magazines. How many pictures are there of formula equipment and bottle feeding babies as compared with pictures of breast feeding babies? Then, if you have the chance, look over a medical journal when you next go to the library. You will be surprised to see the number of full-page advertisements there are for artificial feeding compounds. No one spends thousands of dollars a year advertising breast feeding.

Both breast feeding and bottle feeding can produce fine babies that are both emotionally and physically healthy. However, there are certain differences between them which you will want to know. These are:

1. Newborn babies scream with hunger because their immature bodies cannot easily wait for food. Breast milk is available immediately; formula must be warmed.

2. Breast milk is always at body temperature—the perfect temperature for the baby. Formula is warmed to approximately the right temperature, and then cools steadily throughout the feeding.

3. Night feedings are easier for parents of the breast-fed baby. No trip to the refrigerator; no fuss about warming the bottle and holding it for the baby.

4. Breast milk is raw and fresh; formula is made of older milk that has been heated. Heat and storage are known to destroy many important nutrients. We know enough about a few of the vitamins to add these to formulas—but there are other substances like hormones and enzymes that we know too little about to add to all formulas.

5. Breast milk digests rapidly and easily. Formula digests more slowly.

6. Babies fed entirely on breast milk do not get constipated. They may go for two or three days without bowel movements, but the stools come out soft. Formula babies are sometimes troubled with painfully hard bowel movements.

7. Breast milk promotes the growth of desirable bacteria in the baby's digestive system. Formula promotes the growth of less desirable bacteria.

8. Breast-fed babies are less likely to have serious digestive upsets and disorders.

9. Breast-fed babies are less likely to get skin disorders. They have less eczema and less diaper rash.

10. Breast-fed babies get fewer serious respiratory infections. Bottle-fed babies are more likely to have repeated attacks of bronchitis and pneumonia.

11. In case you go to an undeveloped country or your region is disrupted by war, your breast-fed baby has a better chance for survival. Safe artificial feeding is impossible without ample bottles, pure animal milk, sterilizing arrangements and other items available only in a highly organized society. Furthermore, the artificially fed infant is more susceptible to diseases and cannot be protected from exposure under primitive conditions.

12. Breast feeding and the sucking exercise it entails spurs good facial development. Persons bottle fed from birth are more likely to have poorly developed dental arches, palates and other facial structures in adulthood.

13. Breast feeding is a natural method of spacing babies. An extensive study found that mothers who fed their babies artificially were about twice as likely to get pregnant before the baby was nine months old.

14. Breast feeding may help to prevent the possibility of breast cancer. Statistics show that women who have never breast fed are more likely to get breast cancer.

15. Breast feeding may help build motherly love. The hormone, prolactin, is active in breast feeding mothers. The hormone causes unmotherly animals to act motherly, and there is some evidence that it has the same effect on human beings.

16. Feeding time brings physical enjoyment to mother and baby alike. Too long a gap between breast feedings brings discomfort to both mother and baby alike. Both members of the breast feeding couple want and need each other physically as well as mentally. This helps to build a secure and loving relationship.

Dr. Niles Newton's FAMILY BOOK OF CHILD CARE ($8.95), from which the preceding sixteen reasons are taken, can be obtained from La Leche League International. This book is most helpful on the subjects of pregnancy, childbirth, and breastfeeding and includes also an excellent chapter on nutrition, as well as sections on exercises, relief of discomforts, clothing, housekeeping. The relaxed attitude of the author (mother of four) is contagious and makes the tremendous vocation of parenthood seem just a little less overwhelming. Her book makes a wonderful baby-shower gift.

Additional copies of this reprint are available from La Leche League at a cost of: 10 for 15¢; 100 for 85¢; 500 for $4.00. If you are interested in knowing more about breastfeeding and about La Leche League's free service to mothers, write to:

LA LECHE LEAGUE INTERNATIONAL, INC.
9616 Minneapolis Avenue
Franklin Park, Illinois 60131

Reprint No. 102

ITEM 3 – LAWS AND LEGISLATION

Public Law 92-433
92nd Congress, H. R. 14896
September 26, 1972

An Act

86 STAT. 724

To amend the National School Lunch Act, as amended, to assure that adequate funds are available for the conduct of summer food service programs for children from areas in which poor economic conditions exist and from areas in which there are high concentrations of working mothers, and for other purposes related to expanding and strengthening the child nutrition programs.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 13 of the National School Lunch Act (42 U.S.C. 1761) is amended by adding at the end thereof the following:

Child nutrition programs. Continuation and expansion.

"(i) Notwithstanding any other provision of law, the Secretary of Agriculture is authorized to utilize, during the period May 15 to September 15, 1972, not to exceed $25,000,000 from funds available during the fiscal years 1972 and 1973 under section 32 of the Act of August 24, 1935 (7 U.S.C. 612c), to carry out the purposes of this section. Funds expended under the provisions of this paragraph shall be reimbursed out of any supplemental appropriation hereafter enacted for the purpose of carrying out section 13 of the National School Lunch Act, and such reimbursements shall be deposited into the fund established pursuant to section 32 of the Act of August 24, 1935, to be available for the purposes of said section 32. Funds made available under this subsection shall be in addition to direct appropriations or other funds available for the conduct of summer food service programs for children."

82 Stat. 117; 85 Stat. 86.

Summer program.

49 Stat. 774.

SEC. 2. (a) The first sentence of section 13(a)(1) of the National School Lunch Act (42 U.S.C. 1761(a)(1)), as amended, is amended to read as follows: "There is hereby authorized to be appropriated such sums as are necessary for each of the fiscal years ending June 30, 1973, June 30, 1974, and June 30, 1975, to enable the Secretary to formulate and carry out a program to assist States through grants-in-aid and other means, to initiate, maintain, or expand nonprofit food service programs for children in service institutions."

Grants-in-aid.

85 Stat. 86.

(b) Section 13(a)(2) of such Act is amended by inserting a new sentence at the end thereof as follows: "To the maximum extent feasible, consistent with the purposes of this section, special summer programs shall utilize the existing food service facilities of public and nonprofit private schools."

SEC. 3. (a) The first sentence of section 4(a) of the Child Nutrition Act of 1966 (42 U.S.C. 1773(a)) is amended to read as follows: "There is hereby authorized to be appropriated such sums as are necessary for the fiscal years ending June 30, 1973, June 30, 1974, and June 30, 1975, to enable the Secretary to carry out a program to assist the States through grants-in-aid and other means to initiate, maintain, or expand nonprofit breakfast programs in all schools which make application for assistance and agree to carry out a nonprofit breakfast program in accordance with this Act."

School breakfast program, appropriation.

85 Stat. 85.

(b) Section 4(b) of the Child Nutrition Act of 1966 (42 U.S.C. 1773(b)) is amended to read as follows:

80 Stat. 886.

"APPORTIONMENT TO STATES

"(b) Of the funds appropriated for the purposes of this section, the Secretary shall for the fiscal year ending June 30, 1973, (1) apportion $2,600,000 equally among the States other than Guam, the Virgin Islands, and American Samoa, and $45,000 equally among Guam, the Virgin Islands, and American Samoa, and (2) apportion the remainder among the States in accordance with the apportionment formula

Post, p. 726.

contained in section 4 of the National School Lunch Act, as amended. For each fiscal year beginning with the fiscal year ending June 30, 1974, the Secretary shall make breakfast assistance payments, at such times as he may determine, from the sums appropriated therefor, to each State educational agency, in a total amount equal to the result obtained by (1) multiplying the number of breakfasts (consisting of a combination of foods which meet the minimum nutritional requirements prescribed by the Secretary pursuant to subsection (e) of this section) served during such fiscal year to children in schools in such States which participate in the breakfast program under this section under agreements with such State educational agency by a national average breakfast payment prescribed by the Secretary for such fiscal year to carry out the purposes of this section; (2) multiplying the number of such breakfasts served free to children eligible for free breakfasts in such schools during such fiscal year by a national average free breakfast payment prescribed by the Secretary for such fiscal year to carry out the purposes of this section; and (3) multiplying the number of reduced price breakfasts served to children eligible for reduced price breakfasts in such schools during such fiscal year by a national average reduced price breakfast payment prescribed by the Secretary for such fiscal year to carry out the provisions of this section: *Provided*, That in any fiscal year the aggregate amount of the breakfast assistance payments made by the Secretary to each State educational agency for any fiscal year shall not be less than the amount of the payments made by the State educational agency to participating schools within the State for the fiscal year ending June 30, 1972, to carry out the purposes of this section."

State disbursement to schools. 80 Stat. 886; 85 Stat. 85.

(c) Section 4(c) of the Child Nutrition Act (42 U.S.C. 1773(c)) is amended by adding at the end thereof the following sentence: "Breakfast assistance disbursements to schools under this section may be made in advance or by way of reimbursement in accordance with procedures prescribed by the Secretary."

(d) Section 4(e) of the Child Nutrition Act of 1966 (42 U.S.C. 1773(e)) is amended to read as follows:

"NUTRITIONAL AND OTHER PROGRAM REQUIREMENTS

"(e) Breakfasts served by schools participating in the school breakfast program under this section shall consist of a combination of foods and shall meet minimum nutritional requirements prescribed by the Secretary on the basis of tested nutritional research. Such breakfasts shall be served free or at a reduced price to children in school under the same terms and conditions as are set forth with respect to the service of lunches free or at a reduced price in section 9 of the National School Lunch Act."

Post, p. 726.

Nonprofit private schools. 80 Stat. 887.

(e) Section 4(f) of the Child Nutrition Act of 1966 (42 U.S.C. 1773(f)) is amended to read as follows:

"(f) For the fiscal year ending June 30, 1973, any withholding of funds for and disbursement to nonprofit private schools shall be effected in the manner used prior to such fiscal year. Beginning with the fiscal year ending June 30, 1974, the Secretary shall make payments from the sums appropriated for any fiscal year for the purposes of this section directly to the nonprofit private schools within a State, that participate in the breakfast program under an agreement with the Secretary, for the same purposes and subject to the same conditions as are authorized or required under this section with respect to the disbursements by State educational agencies."

Reimbursement rate.

SEC. 4. (a) Notwithstanding any other provision of law, the Secretary of Agriculture shall until such time as a supplemental appro-

priation may provide additional funds for such purpose use so much of the funds appropriated by section 32 of the Act of August 24, 1935 (7 U.S.C. 612(c)), as may be necessary, in addition to the funds available therefor, to carry out the purposes of section 4 of the National School Lunch Act and provide an average rate of reimbursement of not less than 8 cents per meal within each State during the fiscal year 1973. Funds expended under the foregoing provisions of this section shall be reimbursed out of any supplemental appropriation hereafter enacted for the purpose of carrying out section 4 of the National School Lunch Act, and such reimbursements shall be deposited into the fund established pursuant to section 32 of the Act of August 24, 1935, to be available for the purposes of said section 32.

49 Stat. 774.

Infra.

(b) Funds made available pursuant to this section shall be apportioned to the States in such manner as will best enable schools to meet their obligations with respect to the service of free and reduced-price lunches and to meet the objective of this section with respect to providing a minimum rate of reimbursement under section 4 of the National School Lunch Act, and such funds shall be apportioned and paid as expeditiously as may be practicable.

(c) Section 4 of the National School Lunch Act is amended effective after the fiscal year ending June 30, 1973, to read as follows:

Apportionment to States.

"SEC. 4. The sums appropriated for any fiscal year pursuant to the authorizations contained in section 3 of this Act, excluding the sum specified in section 5, shall be available to the Secretary for supplying agricultural commodities and other food for the program in accordance with the provisions of this Act. For each fiscal year the Secretary shall make food assistance payments, at such times as he may determine, from the sums appropriated therefor, to each State educational agency, in a total amount equal to the result obtained by multiplying the number of lunches (consisting of a combination of foods which meet the minimum nutritional requirements prescribed by the Secretary under subsection 9(a) of this Act) served during such fiscal year to children in schools in such State, which participate in the school lunch program under this Act under agreements with such State educational agency, by a national average payment per lunch for such fiscal year determined by the Secretary to be necessary to carry out the purposes of this Act: *Provided*, That in any fiscal year such national average payment shall not be less than 8 cents per lunch and that the aggregate amount of the food assistance payments made by the Secretary to each State educational agency for any fiscal year shall not be less than the amount of the payments made by the State agency to participating schools within the State for the fiscal year ending June 30, 1972, to carry out the purposes of this section 4."

76 Stat. 944.
42 USC 1753.
84 Stat. 208.
42 USC 1752.
60 Stat. 231.
42 USC 1754.

Infra.

(d) Section 10 of the National School Lunch Act of 1946 (42 U.S.C. 1759) is amended by striking "section 7." at the end thereof and inserting in lieu thereof the following: "section 7: *Provided*. That beginning with the fiscal year ending June 30, 1974, the Secretary shall make payments from the sums appropriated for any fiscal year for the purposes of section 4 of this Act directly to the nonprofit private schools in such State for the same purposes and subject to the same conditions as are authorized or required under this Act with respect to the disbursements by the State educational agencies."

Nonprofit private schools, disbursement.
60 Stat. 233;
84 Stat. 208.

SEC. 5. (a) The first sentence of section 9 of the National School Lunch Act is designated as subsection (a) of that section.

(b) The second through the seventh sentences of section 9 of the National School Lunch Act shall be designated as subsection (b) of that section and are amended to read as follows:

Program requirements.
60 Stat. 233;
82 Stat. 117.
42 USC 1758.
84 Stat. 210;
85 Stat. 420.

Income poverty guideline.

"(b) The Secretary, not later than May 15 of each fiscal year, shall prescribe an income poverty guideline setting forth income levels by family size for use in the subsequent fiscal year, and such guideline shall not subsequently be reduced to be effective in such subsequent fiscal year. Any child who is a member of a household which has an annual income not above the applicable family-size income level set forth in the income poverty guideline prescribed by the Secretary shall be served a free lunch. Following the announcement by the Secretary of the income poverty guideline for each fiscal year, each State educational agency shall prescribe the income guidelines, by family size, to be used by schools in the State during such fiscal year in making determinations of those children eligible for a free lunch. The income guidelines for free lunches to be prescribed by each State educational agency shall not be less than the applicable family-size income levels in the income poverty guideline prescribed by the Secretary and shall not be more than 25 per centum above such family-size income levels. Each fiscal year, each State educational agency shall also prescribe income guidelines, by family size, to be used by schools in the State during such fiscal year in making determinations of those children eligible for a lunch at a reduced price, not to exceed 20 cents, if a school elects to serve reduced-price lunches. Such income guidelines for reduced-price lunches shall be prescribed at not more than 50 per centum above the applicable family-size income levels in the income poverty guideline prescribed by the Secretary, except that any local school authority having income guidelines for free or reduced price lunches which exceed those allowed by this subsection may continue to use such guidelines for determining eligibility until July 1, 1973, if such guidelines were established prior to July 1, 1972. Local school authorities shall publicly announce such income guidelines on or about the opening of school each fiscal year and shall make determinations with respect to the annual incomes of any household solely on the basis of a statement executed in such form as the Secretary may prescribe by an adult member of such household. No physical segregation of or other discrimination against any child eligible for a free lunch or a reduced-price lunch shall be made by the school nor shall there be any overt identification of any such child by special tokens or tickets, announced or published lists of names, or by other means."

Discrimination, prohibition.

(c) The eighth through the thirteenth sentences of section 9 of the National School Lunch Act shall be designated as subsection (c) of that section and the last sentence of such subsection shall be amended by deleting the phrase "under the provisions of section 10 until such time as the Secretary" and inserting in lieu thereof the following phrase "under this Act until such time as the State educational agency, or in the case of such schools which participate under the provisions of section 10 of this Act the Secretary".

Ante, p.726.

Appropriation. 84 Stat. 208. 42 USC 1774.

SEC. 6. (a) The first sentence of section 5(a) of the Child Nutrition Act of 1966, as amended by section 2 of Public Law 91-248, is amended by deleting the phrase "for the fiscal year ending June 30, 1973, not to exceed $15,000,000 and for each succeeding fiscal year, not to exceed $10,000,000" and inserting in lieu thereof the following phrase: "for each of the three fiscal years ending June 30, 1973, June 30, 1974, and June 30, 1975, not to exceed $40,000,000 and for each succeeding fiscal year, not to exceed $20,000,000".

Apportionment to States.

(b) Section 5(b) of the Child Nutrition Act of 1966 (42 U.S.C. 1774(b)) is amended to read as follows:

"(b) Except for the funds reserved under subsection (e) of this section, the Secretary shall apportion the funds appropriated for the

purposes of this section among the States on the basis of the ratio that the number of lunches (consisting of a combination of foods which meet the minimum nutritional requirements prescribed by the Secretary pursuant to section 9 of the National School Lunch Act) served in each State in the latest preceding fiscal year for which the Secretary determines data are available at the time such funds are apportioned bears to the total number of such lunches served in all States in such preceding fiscal year. If any State cannot utilize all of the funds apportioned to it under the provisions of this subsection, the Secretary shall make further apportionments to the remaining States in the manner set forth in this subsection for apportioning funds among all the States. Payments to any State of funds apportioned under the provisions of this subsection for any fiscal year shall be made upon condition that at least one-fourth of the cost of equipment financed under this subsection shall be borne by funds from sources within the State."

Ante, p. 726.

(c) Section 5(d) of the Child Nutrition Act of 1966 (42 U.S.C. 1774(d)) is amended to read as follows:

Nonprofit private schools.
80 Stat. 888.

"(d) If, in any State, the State educational agency is prohibited by law from administering the program authorized by this section in nonprofit private schools within the State, the Secretary shall administer such program in such private schools. In such event, the Secretary shall withhold from the funds apportioned to any such State under the provisions of subsection (b) of this section an amount which bears the same ratio to such funds as the number of lunches (consisting of a combination of foods which meet the minimum nutritional requirements prescribed by the Secretary pursuant to section 9(a) of the National School Lunch Act) served in nonprofit private schools in such State in the latest preceding fiscal year for which the Secretary determines data are available at the time such funds are withheld bears to the total number of such lunches served in all schools within such State in such preceding fiscal year."

Ante, p. 726.

(d) Section 5 of the Child Nutrition Act (42 U.S.C. 1774) is amended by adding at the end thereof the following new subsection:

Supra.

"RESERVE OF FUNDS

"(e) In each of the fiscal years ending June 30, 1973, June 30, 1974, and June 30, 1975, 50 per centum of the funds appropriated for the purposes of this section shall be reserved by the Secretary to assist schools without a food service. The Secretary shall apportion the funds so reserved among the States on the basis of the ratio of the number of children enrolled in schools without a food service in the State for the latest fiscal year for which the Secretary determines data are available at the time such funds are apportioned to the total number of children enrolled in schools without a food service in all States in such fiscal year. In those States in which the Secretary administers the nonfood assistance program in nonprofit private schools, the Secretary shall withhold from the funds apportioned to any such State under this subsection an amount which bears the same ratio to such funds as the number of children enrolled in nonprofit private schools without a food service in such State for the latest fiscal year for which the Secretary determines data are available at the time such funds are withheld bears to the total number of children enrolled in all schools without food service in such State in such fiscal year. The funds reserved, apportioned, and withheld under the authority of this subsection shall be used by State educational agencies, or the Secretary in the case of nonprofit private schools, only to assist schools without

a food service. If any State cannot utilize all the funds apportioned to it under the provisions of this subsection to assist schools in the State without a food service, the Secretary shall make further apportionments to the remaining States in the same manner set forth in this subsection for apportioning funds among all the States and such remaining States, or the Secretary in the case of nonprofit private schools, shall use the additional funds so apportioned or withheld only to assist schools in the State without a food service. Payments to any State of the funds apportioned under the provisions of this paragraph shall be made upon condition that at least one-fourth of the cost of equipment financed shall be borne by funds from sources within the State, except that such condition shall not apply with respect to funds used under this section to assist schools without food service if such schools are especially needy, as determined by the State."

Equipment survey.

(e) To assist the Congress in determining the amounts needed annually, the Secretary is directed to conduct a survey among the States and school districts on unmet needs for equipment in schools eligible for assistance under section 5 of the Child Nutrition Act. The results of such survey shall be reported to the Congress by June 30, 1973.

Ante, pp. 727, 728.

Report to Congress.

Regulations.

SEC. 7. After the first sentence of section 10 of the Child Nutrition Act of 1966 (42 U.S.C. 1779) add the following new sentence: "Such regulations shall not prohibit the sale of competitive foods in food service facilities or areas during the time of service of food under this Act or the National School Lunch Act if the proceeds from the sales of such foods will inure to the benefit of the schools or of organizations of students approved by the schools."

80 Stat. 889; 84 Stat. 212.

60 Stat. 230; 85 Stat. 85. 42 USC 1751 note.

SEC. 8. Section 8 of the National School Lunch Act (42 U.S.C. 1757) is amended by deleting the phrase "reimbursing it for" in the second sentence thereof and inserting in lieu thereof the following: "assisting it to finance" and by adding at the end of such section the following sentence: "Lunch assistance disbursements to schools under this section and under section 11 of this Act may be made in advance or by way of reimbursement in accordance with procedures prescribed by the Secretary."

60 Stat. 232.

84 Stat. 211. 42 USC 1759a.

SEC. 9. The Child Nutrition Act of 1966 is further amended by adding at the end thereof a new section as follows:

80 Stat. 885. 42 USC 1771 note.

"SPECIAL SUPPLEMENTAL FOOD PROGRAM

"SEC. 17. (a) During each of the fiscal years ending June 30, 1973, and June 30, 1974, the Secretary shall make cash grants to the health department or comparable agency of each State for the purpose of providing funds to local health or welfare agencies or private nonprofit agencies of such State serving local health or welfare needs to enable such agencies to carry out a program under which supplemental foods will be made available to pregnant or lactating women and to infants determined by competent professionals to be nutritional risks because of inadequate nutrition and inadequate income. Such program shall be operated for a two-year period and may be carried out in any area of the United States without regard to whether a food stamp program or a direct food distribution program is in effect in such area.

"(b) In order to carry out the program provided for under subsection (a) of this section during the fiscal year ending June 30, 1973, the Secretary shall use $20,000,000 out of funds appropriated by section 32 of the Act of August 24, 1935 (7 U.S.C. 612(c)). In order to carry out such program during the fiscal year ending June 30, 1974, there is authorized to be appropriated the sum of $20,000,000, but in

49 Stat. 774.

Appropriation.

the event that such sum has not been appropriated for such purpose by August 1, 1973, the Secretary shall use $20,000,000, or, if any amount has been appropriated for such program, the difference, if any, between the amount directly appropriated for such purpose and $20,000,000, out of funds appropriated by section 32 of the Act of August 24, 1935 (7 U.S.C. 612(c)). Any funds expended from such section 32 to carry out the provisions of subsection (a) of this section shall be reimbursed out of any supplemental appropriation hereafter enacted for the purpose of carrying out the provisions of such subsection, and such reimbursements shall be deposited into the fund established pursuant to such section 32, to be available for the purpose of such section.

49 Stat. 774.

"(c) Whenever any program is carried out by the Secretary under authority of this section through any State or local or nonprofit agency, he is authorized to pay administrative costs not to exceed 10 per centum of the Federal funds provided under the authority of this section.

Administrative costs, limitation.

"(d) The eligibility of persons to participate in the program provided for under subsection (a) of this section shall be determined by competent professional authority. Participants shall be residents of areas served by clinics or other health facilities determined to have significant numbers of infants and pregnant and lactating women at nutritional risk.

Eligibility.

"(e) State or local agencies or groups carrying out any program under this section shall maintain adequate medical records on the participants assisted to enable the Secretary to determine and evaluate the benefits of the nutritional assistance provided under this section. The Secretary and Comptroller General of the United States shall submit preliminary evaluation reports to the Congress not later than October 1, 1973; and not later than March 30, 1974, submit reports containing an evaluation of the program provided under this section and making recommendations with regard to its continuation.

Medical records.

Reports to Congress.

"(f) As used in this section—

Definitions.

"(1) 'Pregnant and lactating women' when used in connection with the term at 'nutrition risk' includes mothers from low-income populations who demonstrate one or more of the following characteristics: known inadequate nutritional patterns, unacceptably high incidence of anemia, high prematurity rates, or inadequate patterns of growth (underweight, obesity, or stunting). Such term (when used in connection with the term 'at nutritional risk') also includes low-income individuals who have a history of high-risk pregnancy as evidenced by abortion, premature birth, or severe anemia.

"(2) 'Infants' when used in connection with the term 'at nutritional risk' means children under four years of age who are in low-income populations which have shown a deficient pattern of growth, by minimally acceptable standards, as reflected by an excess number of children in the lower percentiles of height and weight. Such term, when used in connection with 'at nutritional risk', may also include (at the discretion of the Secretary) children under four years of age who (A) are in the parameter of nutritional anemia, or (B) are from low-income populations where nutritional studies have shown inadequate infant diets.

"(3) 'Supplemental foods' shall mean those foods containing nutrients known to be lacking in the diets of populations at nutritional risks and, in particular, those foods and food products containing high-quality protein, iron, calcium, vitamin A, and vitamin C. Such term may also include (at the discretion of the

86 STAT. 731

Secretary) any food product commercially formulated preparation specifically designed for infants.

"(4) 'Competent professional authority' includes physicians, nutritionists, registered nurses, dieticians, or State or local medically trained health officials, or persons designated by physicians or State or local medically trained health officials as being competent professionally to evaluate nutritional risk."

60 Stat. 232; 84 Stat. 212.

SEC. 10. Section 7 of the National School Lunch Act (42 U.S.C. 1756) is amended by inserting the words "for the preceding fiscal year" after the phrase "per centum of the matching requirement" each time such phrase appears in such section.

Approved September 26, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 92-1170 (Comm. on Education and Labor) and
No. 92-1387 (Comm. of Conference).
SENATE REPORTS: No. 92-1027 (Comm. on Agriculture and Forestry) and
No. 92-1120 (Comm. of Conference).
CONGRESSIONAL RECORD, Vol. 118 (1972):
June 29, considered and passed House.
Aug. 16, 17, considered and passed Senate, amended.
Sept. 13, Senate agreed to conference report; House agreed to conference report, receded and concurred in Senate amendment.

93d CONGRESS
1st SESSION

S. 1543

IN THE SENATE OF THE UNITED STATES

APRIL 11, 1973

Mr. MONDALE (for himself, Mr. BAYH, Mr. HART, Mr. HUMPHREY, Mr. JAVITS, Mr. KENNEDY, Mr. MATHIAS, Mr. MOSS, Mr. PASTORE, Mr. PELL, Mr. PERCY, and Mr. WILLIAMS) introduced the following bill; which was read twice and referred to the Committee on Finance

A BILL

To amend the Social Security Act to provide for extension of authorization for special project grants under title V.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That (a) so much of section 502 of the Social Security Act
4 as precedes the sentence beginning with "Not to exceed" is
5 amended—
6 (1) in clause (1), by striking out "next 4 fiscal
7 years" and inserting in lieu thereof "next 6 fiscal years";
8 (2) in clause (2), by striking out "June 30, 1974,"
9 and inserting in lieu thereof "June 30, 1974,".
10 (b) (1) Section 505 (a) (8) of such Act is amended by

1 striking out "July 1, 1973" and inserting in lieu thereof
2 "July 1, 1975".
3 (2) Section 505(a)(9) of such Act is amended by
4 striking out "July 1, 1973" and inserting in lieu thereof
5 "July 1, 1975".
6 (3) Section 505(a)(10) of such Act is amended by
7 striking out "July 1, 1973" and inserting in lieu thereof
8 "July 1, 1975".
9 (c) Section 508(b) of such Act is amended by striking
10 out "June 30, 1973" and inserting in lieu thereof "June 30,
11 1975".
12 (d) Section 509(b) of such Act is amended by striking
13 out "June 30, 1973" and inserting in lieu thereof "June 30,
14 1975".
15 (e) Section 510(b) of such Act is amended by striking
16 out "June 30, 1973" and inserting in lieu thereof "June 30,
17 1975".

93D CONGRESS
1ST SESSION

S. 1543

A BILL

To amend the Social Security Act to provide for extension of authorization for special project grants under title V.

By Mr. MONDALE, Mr. BAYH, Mr. HART, Mr. HUMPHREY, Mr. JAVITS, Mr. KENNEDY, Mr. MATHIAS, Mr. MOSS, Mr. PASTORE, Mr. PELL, Mr. PERCY, and Mr. WILLIAMS

APRIL 11, 1973
Read twice and referred to the Committee on Finance

Maternal & Child Health Service Programs

Administering Agencies and Legislative Base

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE *
Public Health Service
Health Services and Mental Health Administration
Maternal and Child Health Service
Rockville, Maryland 20852 ● February 1973

* See transcript, p. 137; following information received Sept. 19, 1973.

When the Social Security Act was passed in 1935, the Federal Government, through Title V, pledged its support of State efforts to extend and improve health and welfare services for mothers and children.

This landmark legislation resulted, in some States, in the establishment of State departments for health or public welfare, and in other, more advanced States, facilitated the efforts of such units.

Title V of the Social Security Act has been frequently amended, in ensuing years, to reflect the expansion of national interest in maternal and child health and welfare. The most recent amendments clearly reflect the national intent to reach out more effectively to the disadvantaged urban poor, who are in most urgent need of health services.

This booklet is designed as a ready reference to the administration of both the State maternal and child health and crippled children's programs of Title V and the special projects in health services, which Title V now embodies.

The Maternal and Child Health Service, which administers Title V, was a part of the Children's Bureau until it was transferred to the Health Services and Mental Health Administration in September 1969.

The MCHS regional offices listed in this booklet are responsible for working regularly with the States to improve their programs of health services for mothers and children. In the central office, communications may be addressed to:

Dr. Arthur J. Lesser, *Director*
Maternal and Child Health Service, HSMHA
5600 Fishers Lane, Rm. 12-05
Rockville, Md. 20852

CHILDREN AND YOUTH PROJECTS†

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
ALABAMA		
University of Alabama Medical Center Birmingham, Ala. 35233	The Children's Hospital	
ARIZONA		
Maricopa Co. Health Dept. Div. of Public Health 1825 East Roosevelt Phoenix, Ariz. 85006	Maricopa County Hospital	715 S. 1st Ave. HC (Leap Area, Phoenix)
ARKANSAS		
U. of Arkansas Medical Center Little Rock, Ark. 72201	Medical Center Hospital Children's Hospital	N. Little Rock HD College Sta. Econ. Opp. Ctr. Cramer School
CALIFORNIA		
Mt. Zion Hospital & Medical Center 1600 Divisadero St. San Francisco, Calif. 94115		

Key:
*–Also clinic site
NHC–Neighborhood Health Center
DHO–District Health Office
HD –Health Department
HU –Health Unit
HP –Housing Project
HC –Health Center

†Grants authorized under Sec. 509, Title V, Social Security Act.

Project Grantee Project Site	Participating Hospital	Satellite Clinics
CALIFORNIA (*cont.*)		
Los Angeles Co.—Univ. Southern Calif. Medical Center 12000 North State St. Los Angeles, Calif. 90033	Los Angeles Co. General Hosp.	E. Los Angeles Child & Youth Clinic 959 N. Bonnie Beach Pl. Los Angeles, Calif. 90063
Alameda Co. Health Dept. Oakland, Calif. 94609		
COLORADO		
Tri-County District Health Dept. 4857 S. Broadway Englewood, Colo. 80110		
Dept. Health & Hospitals Denver, Colo. 80204	Denver General Hospital Colorado General Hospital Children's Hospital*	Hyde Park HS Eastside NHC
Colorado Dept. of Public Health Denver, Colo. 80220		Las Animas-Huerfano DHO Trinidad Walsenberg HD
CONNECTICUT		
Yale University School of Medicine New Haven, Conn. C&Y Project Site: Hill Health Center 428 Columbus Ave. New Haven, Conn. 06519		
DISTRICT OF COLUMBIA		
Children's Hospital Washington, D.C. 20009		Comp. Health Care 1116 W St. N.W. Child Care Ctr. 1307 W St. N.W.

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
DISTRICT OF COLUMBIA (*cont.*)		
		Morgan Clinic 2320 17th St. N.W.
D.C. Health Services Admin. Washington, D.C. 20001		Health Ctr #17 702 15th St. N.E. Health Ctr. #18 4130 Hunt Pl. N.E.
FLORIDA		
Florida State Dept. of Health & Rehabilitative Services Jacksonville, Fla.		
C&Y Project Site: Dade Co. Health Dept. 6125 S.W. 31st St. Miami, Fla. 33155	Variety Children's Hospital	S. Miami Downtown Perrine HU Derrick Park HU
University of Miami School of Medicine P.O. Box 875 Miami, Fla. 33152	Jackson Memorial Hospital	
GEORGIA		
Medical College of Georgia Augusta, Ga. 30901		
HAWAII		
Hawaii Dept. of Health Honolulu, Hawaii 96801	Children's Hospital	Waimanalo HC
ILLINOIS		
Illinois Dept. of Pub. Health Springfield, Ill.		*Board of Health Stations No.:* 9, 15, 23
C&Y Project Site: Chicago Board of Health Chicago Civic Center, Rm. 230	Children's Memorial Hosp. Wyler Children's Hospital	

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
ILLINOIS *(cont.)*		
Chicago, Ill. 60602	Mt. Sinai Hospital La Rabida Jackson Pk. Sana. Cook County Hospital University of Chicago Hosp.	
KANSAS		
U. of Kansas Medical Center Kansas City, Kans. 66103		Model City Area Clinic
Topeka-Shawnee Co. Health Dept. Topeka, Kansas 66606	Stormont Vail Hospital	HD Clinics
KENTUCKY		
U. of Louisville School of Medicine Louisville, Ky. 40202	Louisville General Hospital	
MARYLAND		
Baltimore City Health Dept. American Bldg. Baltimore, Md. 21202		
C&Y Project Site U. of Maryland Community Pediatric Center 414–420 W. Redwood St. Baltimore, Md. 21201	University Hospital	
C&Y Project Site: Sinai-Druid Community Pediatric Center 1515 W. North Ave. Baltimore, Md. 21217	Sinai-Druid Hosp.	
C&Y Project Site: Greater Baltimore Medical Ctr. 1017 E. Baltimore St. Baltimore, Md. 21202	Greater Baltimore Medical Center	

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
MARYLAND (*cont.*)		
C&Y Project Site: Baltimore City Hospital 4940 Eastern Ave. Baltimore, Md. 21224	Baltimore City Hosp.	
The Johns Hopkins Hospital Edwards A. Park Bldg., B-179 601 N. Broadway Baltimore, Md. 21205		Comp. Child Care Program Dental Clinic 406 N. Bond St.
MASSACHUSETTS		
Children's Hospital Boston		Martha Eliot Family HC
St. Elizabeth's Hospital Boston		Storrow School HC
Beth Israel Hospital Boston		Dimock Community HC
Boston Dept. of Health and Hospitals		Harvard St. Neighborhood HC Whittier St. Neighborhood HC E. Boston Neighborhood HC
Massachusetts General Hospital Boston		Bunker Hill HC Chelsea Clinic
MICHIGAN		
Michigan Dept. of Public Health Lansing, Mich.		
C&Y Project Site: PRESCAD 3800 Woodward Ave.	Wayne Co. Gen. Hosp. Elois, Mich.	*Child Health Center* Sumpter Belleville Franklin Settlement

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
MICHIGAN *(cont.)*		
Detroit, Mich. 48201	Detroit General Hospital Children's Hospital of Mich.	Down River Inkster North Central
MINNESOTA		
Minneapolis Health Dept. Minneapolis, Minn. 55415	Hennepin Co. Gen. Fairview Hospital	*Child Health Clinics*: Margaret Barry, Northeast Neighborhood Public Hlth. Ctr. Simpson St. Mary's Trinity Deaconness *Child Health Centers*: Glendale Luxton Park 31st St. & Chicago Ave. Community-University Health Center
MISSOURI		
Children's Mercy Hospital 24th at Gillham Rd. Kansas City, Mo. 64108		Richard Cabot Clinic
Kirksville College of Osteopathy & Surgery Kirksville, Mo. 63501		Adair Child Care
MONTANA		
Lewis and Clark City-County Health Dept. Helena, Mont. 59601	Shodair Children's Hospital	
NEBRASKA		
Omaha-Douglas Co. Health Dept. Omaha, Neb. 68105	St. Joseph Hospital U. of Nebraska Med. Ctr.	Dorcas Street W Street

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
NEW HAMPSHIRE		
New Hampshire Division of Public Health Concord, N. Hamp. 03301	Charlestown Medical Center Charlestown, New Hampshire	St. Jean DeBaptiste Gym Suncook, N.H. Exeter Clinic Bldg. Exeter Vaughan CHS N Conway
NEW YORK		
New York University Med. Ctr. 550 First Ave. New York, N.Y. 10016	NYU Med. Center/ Bellevue Hospital	
NYC Dept. of Health New York, N.Y.	Queens General	Rockaway HC 67-10 Rockaway Beach Blvd. Arverne, N.Y. 11692
Albert Einstein College of Medicine 1175 Morris Park Ave. Bronx, N.Y. 10461	Jacobi	
Montefiore Hospital Bronx, N.Y. 10467	Morrisania	Comprehensive Health Care Center 230 E. 162nd St. Bronx, N.Y. 10451
Jewish Hospital of Brooklyn Med. Ctr. 555 Prospect Place Brooklyn, N.Y. 11238		
Beth Israel Hospital 10 Nathan D. Perlman Place New York, N.Y. 10003	Beth Israel Medical Center	

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
NEW YORK (*cont.*)		
The Roosevelt Hospital New York, N.Y. 10019	Roosevelt Hospital Ped. Amb. Care	
The Brookdale Hospital Center 533 Rockaway Parkway Brooklyn, N.Y.		Brookdale Hosp. Ctr. Clinic 9620 Church Ave. Brooklyn, N.Y. 11212
NYC Dept. of Health New York, N.Y.	St. Mary's Hospital	Charles Drew Neighborhood HC 1531–39 St. Mark's Ave. Brooklyn, N.Y. 11233
NORTH CAROLINA		
Guilford County Health Department 300 E. Northwood St. Greensboro, N.C. 27401	*Greensboro:* Moses Cone Memorial Hospital Wesley Long Hospital L. Richardson Hospital Piedmont Hospital *High Point:* High Point Memorial Hospital	*Greensboro:* Hampton Homes HC Clairmont Homes HP Smith Homes HP Morningside HP Ray Warren HP *High Point:* Health Dept. Clara Cox HP Colfax HC, N.C.
OHIO		
Ohio Dept. of Health Columbus, Ohio		
C&Y Project Site: Children's Hospital 561 S. 17th Street Columbus, Ohio 43205		Hospital Out-patient Clinic 561 S. 17th St. Garfield Hlth. Ctr. Milow-Gogan Hlth. Ctr. Southside Hlth. Ctr. Windsor Hlth. Ctr. Neighborhood Clinic for Adolescents
Ohio Dept. of Health Columbus, Ohio		

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
OHIO *(cont.)*		
C&Y Project Site: 1735 Chapel St. Dayton, Ohio 45404	Ba ney Children's Medical Center	Lewisburg Church Mont. Co. Children's Services Bd. Clinic W. Dayton Self Help Ctr.
PENNSYLVANIA		
Children's Hosp. of Philadelphia Philadelphia, Pa.		
C&Y Project Site: Rebound Program 1427 Catherine St. Philadelphia, Pa. 19107	Children's Hosp.	
Jefferson Medical College & Medical Center Philadelphia, Pa. 19107		1332 Fitzwater St.
Hahnemann Medical College & Hospital Philadelphia, Pa. 19102		116 Bobst Bldg. 230 N. Broad St.
Medical College of Pennsylvania Philadelphia, Pa. 19129		
St. Christopher's Hospital for Children Philadelphia, Pa. 19133		
Children's Hospital of Pittsburgh, Pa.		
C&Y Project Site: Terrace Village Comp. Health Care Project 373 Burrows St. Pittsburgh, Pa. 15213		

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
PUERTO RICO		
U. of Puerto Rico School of Medicine San Juan, P.R. 00905	San Juan City Hosp.	1004 Roberto H. Todd Ave. Santurce, P.R.
TENNESSEE		
U. of Tennessee Medical Units Memphis, Tenn. 38103	St. Joseph Hospital Le Bonheur Children's Hosp.	Lauderdale Cts. HP
Meharry Medical College Nashville, Tenn. 37208		
TEXAS		
U. of Texas SW Med. Schl. at Dallas Dallas, Texas 75235	Parkland Memorial Hospital	Eagle Ford Clinic Edgar Ward Clinic Adolescent Clinic
U. of Texas Medical Branch Galveston, Texas 77550		Bay View HP
Driscoll Foundation Children's Hospital Corpus Christi, Texas 78411		Robstown, Texas
VIRGIN ISLANDS		
Virgin Islands Dept. of Health Charlotte Amalie St. Thomas, Virgin Islands 00801		*Charlotte Amalie:* Sub Base Oswald Harris Ctr. Smiths Bay Brookhaven M.K. Terrace *St. Croix:* Estate Slob *St. John:* Estate Profit *Cruz Base:* De Castro Clinic

Project Grantee Project Site	*Participating Hospital*	*Satellite Clinics*
VIRGINIA		
U. of Virginia Medical School Dept. of Pediatrics 1224 W. Main St. Charlottesville, Va. 22903		Earlysville Crozet Esmont Keswick
State Department of Health Richmond, Va. C&Y Project Site: 425 W. 35th St. Norfolk, Va. 23508		
WASHINGTON		
Washington State Dept. of Health Seattle-King County, Wash. 98104	University of Washington Medical Center	County HD Clinic 3722 S. Hudson St.

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