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Foreword

The National Food and Nutrition Institute was held in the Jefferson Auditorium of the U. S. Department of Agriculture, Washington, D. C., December 8 to 10, 1952, for the purpose of reviewing nutrition progress and determining ways of strengthening existing nutrition programs. More than 400 representatives of governmental and nongovernmental agencies carrying responsibilities for various phases of current food and nutrition programs attended.

Joint sponsors of the Institute were the U. S. Department of Agriculture, the National Institutes of Health of the U. S. Public Health Service, the Food and Nutrition Board of the National Research Council, and the Interagency Committee on Nutrition Education and School Lunch. This Interagency Committee is made up of representatives of the following Federal agencies: Children's Bureau, Office of Education, and Bureau of State Services of the Public Health Service, Federal Security Agency (now Department of Health, Education, and Welfare); Fish and Wildlife Service and Bureau of Indian Affairs of the Department of the Interior; Bureau of Human Nutrition and Home Economics, Extension Service, Farmers Home Administration, Office of Foreign Agricultural Relations (now Foreign Agricultural Service), Production and Marketing Administration, Rural Electrification Administration, and Office of Experiment Stations, Department of Agriculture; the American National Red Cross; the Federal Civil Defense Administration; and the North American Office of the Food and Agricultural Organization of the United Nations.

This broad base of sponsorship resulted in a conference that gave perspective to a wide range of problems, each related to one of common interest--nutritional betterment of our people.

The proceedings of the Institute were prepared under the leadership of the staff of the Bureau of Human Nutrition and Home Economics in consultation with staff of other sponsoring agencies.

Hazel K. Stiebeling, Chief,
Bureau of Human Nutrition
and Home Economics

Washington, D. C., July 1953

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National Food and Nutrition Institute

Introduction

The National Food and Nutrition Institute, planned jointly by representatives of the U. S. Department of Agriculture, the U. S. Public Health Service, the Food and Nutrition Board of the National Research Council, and the Interagency Committee on Nutrition Education and School Lunch, provided first for helping participants acquire a common background about the country's food and nutrition situation--stock-taking, so to speak. Secondly, it provided for discussion of mutual problems and of ways to strengthen existing programs.

The general sessions included an appraisal of our present knowledge of nutrition in relation to health, a review of current and prospective food supplies, information on how the national food supply tends to be divided among families and among individuals, and some estimate of the adequacy of diets and the state of the nutritional health of different population groups. They also included presentations of some pressing food problems, such as food protection and planning for emergencies.

Attending the Institute and actively joining in the discussions of the situation and of what to do to improve programs were some 400 leaders of a variety of food and nutrition programs, both public and private:

> Nutritionists, home economists, leaders in education or research...from schools or universities...from public health or Extension services...from Red Cross organizations...from trade associations...from Federal and National agencies.
>
> Representatives of State and city nutrition committees...of the National Research Council's Food and Nutrition Board... of professional societies such as the American Institute of Nutrition, the American Dietetic Association, the American Home Economics Association, the American Public Health Association, and the American Medical Association.

The proceedings which follow include the addresses given at the general sessions, in whole or in abstract, insofar as they were made available by the participants. They also include summaries of group discussions for each topic, based on reports from each discussion section. In briefing the discussion notes, effort was made to omit factual statements repeated from lectures and emphasize the important points brought out.

Welcome by the Secretary of Agriculture

The Secretary of Agriculture, the Honorable Charles F. Brannan, welcomed the members of the Institute to Washington and to the Department's Jefferson Auditorium. He noted that the conference was bringing together representatives from many different groups--research, education, agriculture, medicine, industry, and trade--which was important, he said, because the complexity of problems in nutrition require for their solution the sustained collaboration by all who have concern for them. This meeting on nutrition, he believed, had great potentialities for the future.

Speaking for Agriculture, he pointed out the important responsibilities farmers have in producing the amounts of the many kinds of food needed for a well-fed people. Nutrition begins with food, he said, and the production and marketing of food is a major part of the business of agriculture.

He referred to some of the improvements that have taken place over the years in the quality of our national diet, remarking that he took pride in this dietary improvement because it rests in part on the performance of agriculture. It is a tribute to the increasing efficiency of production, processing, and marketing, and to research that has pointed the way. The challenge will be even greater in the years ahead as our population increases faster than our tillable acres. He noted that in 1975 the country will have five plates to fill for every four filled at present. And as research shows ever more clearly the part that nutrition can play in providing abundant health, he said, agriculture will adjust its programs accordingly.

He recalled the Nutrition Conference for Defense which the President of the United States had called in 1941, and the fact that its influence on nutrition programs is still being felt.

He was sure, he said, that the deliberations of this Institute would likewise be fruitful, and expressed the hope that each participant would find the conference a stimulus to strengthen his part in the Nation's nutrition programs. He felt the conference would lead to increased cooperative effort among agencies and looked forward to accelerated progress in nutrition in the years ahead.

Papers Presented at General Sessions

Nutrition and Health

Presiding: Hazel K. Stiebeling, Ph. D., Chief, Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, and Chairman, USDA Nutrition Committee

Nutrition--Past and Future

W. H. Sebrell, Jr., M. D.*

Eleven and a half years have now passed since the National Nutrition Conference for Defense was called by the President of the United States. This meeting today brings that very successful occasion vividly to mind. By that time, May of 1941, our defense efforts were well under way, and the great importance of nutrition in the program was clearly recognized. Enough was known about nutrition to do something about it. Accordingly, more than 900 delegates met here in Washington to discuss the problem and to recommend a national course of action.

I have just reviewed with a great deal of interest the recommendations made by that conference to the President. They extended from intensified nutrition education and the adoption of the NRC's Recommended Dietary Allowances to actual distribution of foods and improvement of the nutritive value of low-cost staples. And not only were those recommendations formulated; the delegates went directly to work to carry them out, with the result that a national nutrition program was evolved which has continued ever since to improve the nutritional status of the people of this country.

I know that the conference beginning here today will similarly furnish a much-needed impetus to nutrition, and can be equally successful. I am confident that you share my appreciation of its deep significance.

Over the years, the application of nutrition science has become ever broader. Available knowledge prior to World War I was used mainly for the prevention or alleviation of dietary deficiency diseases in the individual. Scurvy, rickets, and goiter were countered at that level. The next step, an organized public health approach, was the planned distribution of preventive foods, such as butter, iodized salt, and cod liver oil. Meanwhile, the isolation of vitamins progressed; and just prior to World War II, it became practical to improve common foods with synthetic nutrients as a means of preventing deficiency diseases in large populations.

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*Director, National Institutes of Health, Public Health Service, Federal Security Agency.

Nation-wide control of specific dietary diseases was then feasible, and a program to that end was soon launched. It provided iodized salt, vitamin D milk, vitamin A fortified margarine, and enriched flour, bread, and corn meal.

Two related fields of endeavor have progressed concurrently with nutrition science. One is nutrition education; the other, food technology. Long-range educational efforts have shaped the national diet; and improved methods of purifying, preserving, and transporting foods have enabled producers to meet the altered demand. Today as never before, the general public is aware of the significance of good nutrition and receptive to information concerning diet and health. Food science, education, and technology, working hand in hand, have gone far toward eliminating frank deficiency diseases in the United States.

Agricultural practices in this country have undergone a remarkable transition. Nutrition science has improved animal feeds, new pesticides have been introduced, dried skimmed milk is becoming a familiar article of diet, and "frozen food" is now a national household term. These innovations, as well as favorable economic conditions, have brought a wider variety of foods, in larger quantity, to a great many people. In meeting the fundamental problems of availability, nutritional quality, and food education, we have made excellent progress.

And that brings us to the purpose of meeting here today: to consider what remains to be done, in this country and in the world as a whole, and how best to modify, if indicated, our nutrition programs to meet the need.

We may well question, for example, a general continuation of programs against specific deficiency diseases. In other words, should we continue to emphasize the specific disease approach? In the United States overt clinical signs of nutritional deficiency in population groups have become increasingly rare. Do those diseases still constitute our major nutrition problems?

There are some indications that subclinical deficiencies remain prevalent--that is, conditions presenting an indefinite clinical picture, but nevertheless an indication of suboptimal health. Such deficiencies are suspected to result in loss of vigor, retarded growth, low resistance to infection, tooth decay, abnormal births, early signs of old age, and other forms of illness and debility. The magnitude of this problem is a subject of few facts and much debate. Those facts compel supplementation and scrutiny and may call for intensive action. Another problem--by all indications, a major health problem today in America--is that of obesity. Moreover, obesity and subclinical dietary deficiencies, probably occurring together in many individuals, may play an important role in the origin of various chronic diseases.

Obesity has replaced the vitamin deficiency diseases as the Number 1 nutrition problem in the United States. An estimated one-fourth of

the adults in this country are obese--that is, sufficiently overweight to result in appreciable damage to health; and the incidence may reach 60 percent in older women. The significance of this is apparent from the fact that mortality rates for the obese are well above average at every age and rise steadily with increasing weight. Obesity is associated with a high incidence of diabetes, cirrhosis of the liver, cardiovascular disease, hernia, gall bladder disease, and certain forms of cancer and arthritis. It may not cause these conditions, but it is a dangerous and undesirable concomitant.

At this conference, you may wish to consider a reorientation of programs in light of the following objectives: First, control of obesity; second, assessment of nutritional status as an approach to the correction of subclinical deficiencies; and third, elucidation of the role of nutrition in aging and the chronic diseases, such as arteriosclerosis and cancer. The relative emphasis to be placed on these and other needs is largely for you to assign.

Nutritionists and allied workers, however, cannot confine their vision to these objectives. Today, serious world problems critically involve our own people--problems that often reflect the ratio of food supply to population. As the leading nation in food science and technology, we must develop our nutrition programs in full recognition of the food problems of other countries.

An abundance of protein has contributed greatly to America's superior nutritional status. In other regions--Asia, Central America, Africa--inadequate protein is a serious dietary defect. Established techniques intensively applied can often remedy the local insufficiency of a vitamin: a forceful example is the rice-enrichment project in the Philippines, where deaths from beriberi in the experimental zone have been reduced 90 percent. But the approach to a general protein deficiency is more complex, for the economic and social obstacles are formidable.

The most economical dietary sources of energy readily available are the cereal grains, but optimal nutrition requires supplementation with food of animal origin. Some regions cannot afford to raise animals, the most expensive sources of nourishment in terms of resources utilized. When the total protein intake is inadequate, protein edema, liver cirrhosis, kwashiorkor, and possibly some anemias are common effects.

In many areas, however, the problem could be alleviated by substitution of high-protein crops; and where this would not suffice, cereal-potato diets might be made adequate by fortification with manufactured nutrients. Modern production methods are progressively reducing the cost of nutrients that are low in a cereal diet, such as lysine and the sulfur amino acids. By these means, the capacity of the world's land to support its populations could be greatly augmented. We may hope that the unsalutary customs and food habits--the cultural barriers--would eventually be surmounted.

These are not merely considerations for the distant future. They are critical world nutrition problems that confront us now.

A reorientation of our approach to such problems in this country and abroad should be based on intensive, long-range application of the physical and social sciences. In its broadest aspects, this research program should seek additional data on the world food situation. Among the effects of a decade of conflict have been far-reaching changes in population distribution, markets, food production and potential, and other social and economic conditions. A comprehensive national program will recognize international food and nutrition problems and participate in their solution. And this program should be flexible enough to shift not only with new knowledge and national needs, but with the ever-changing world picture.

Our knowledge of the world food situation should include, for example, an accurate conception of food supply relative to population in various countries, encompassing trends and potentialities. Studies to this end should seek facts useful in considerations of crop substitution, farm mechanization, irrigation, and modification of trade agreements affecting distribution. Much valuable information along these lines has been compiled by the Department of Agriculture and the 67 member governments of the Food and Agriculture Organization, but further facts are needed.

Such data can be fully meaningful only in terms of the nutritional status of the population. Clinical as well as dietary surveys are requisite to the development of a well-rounded program. In very few regions have adequate appraisals of nutritional status been made. The starting point toward minimizing malnutrition must be a knowledge of what the people eat, what nutrients they need, and why dietary inadequacies prevail.

In public health programs of nutrition, there are two primary responsibilities: First, the prevention and correction of malnutrition, and secondly, rehabilitation of individuals and populations. The importance of the latter responsibility is frequently underestimated. So dramatic sometimes are the results of treatment, as in certain vitamin deficiencies, that the establishment of improved dietary habits may be neglected. It is now known that dietary patterns, though often firmly rooted in culture, undergo continual change and may be gradually modified through education, especially of children.

Enough is known of the total problem of nutrition to indicate the proper direction of agricultural science and food technology. The primary guide must be economy of resources in relation to nutritive value produced. Agricultural scientists should continue to develop superior strains and improve the productivity of soil, and technologists should strive to increase the availability of desired nutritive products, as they have done notably of late in the frozen-food industry. In making a balanced diet more readily obtainable, these workers, guided often by the findings of nutritionists, have contributed importantly to America's health.

Cooperatively, and with a view to economy of production, these groups have made considerable progress in developing new foods for livestock. A familiar example is the addition of antibiotics to feed. This practice, which now offers strong economic potentialities, was a byproduct of medical research, deriving from the use of fermentation residues as a source of vitamins for laboratory animals. It was soon discovered that the beneficial effects on growth and health were due to antibiotics as well as vitamins. Penicillin, aureomycin, and other antibiotics have now been tested, with good results in poultry, pigs, and calves.

At the National Institutes of Health this year, Drs. Pecora and Hundley obtained some results of possible economic significance with regard to food enrichment with antibiotics and amino acids. As in other laboratories, means of raising the nutritive value of rice are being explored, for shortages of nutrients, particularly protein, in countries subsisting primarily upon rice affect millions of people today. Common polished rice was ground and made into animal diets containing adequate fats, minerals, and vitamins; and since the protein in rice is limited, certain amino acids were also provided. A combination of lysine and threonine produced a good growth response in albino rats. Then antibiotics were added in hopes of promoting growth even more, and the response was several times that obtained with rice alone. Whether these supplements would have any significance for man can only be determined by well-controlled clinical trials.

With regard to national economy, one contribution of nutrition programs is outstanding. That is the reduction in the cost of nutritional diseases to society. In this country, marked declines in dietary deficiency diseases, such as pellagra and rickets, not only have saved the immediate costs of illness but are now contributing to healthful, productive adulthood and old age. Nutrition research and allied sciences--to speak in purely economic terms--have led to a more productive population, and thus to higher purchasing power and consumption. Put in another way, nutrition has a continuing role in raising the standard of living in America.

Nutrition research at the laboratory level has been largely concerned with establishing the dietary origin of diseases and isolating the deficient nutrients. Great strides have also been made in working out specific chemical reactions involving vitamins, enzymes, and hormones. The latter approach, however, has been confined mainly to studies *in vitro*--in model environments and isolated biologic systems. More emphasis should now be placed on the translation of these test tube findings into knowledge of actual body processes. In other words, how do the essential nutrients, of which 50-odd are now known, produce their effects in the intact organism, under normal and pathologic conditions? What are the mechanisms of nutrition?

Concurrently with the acquisition of this knowledge must be the development of means for assessing how well these systems are functioning in the individual. Dietary inadequacy and defective utiliza-

tion of nutrients are closely related problems. Many end results of metabolic dysfunction are recognizable clinically--for example, atherosclerosis involving faulty cholesterol metabolism, diabetes in pancreatic inadequacy, and obesity as a result of the failure of appetite to regulate caloric intake. We know very little, however, about the actual cause of these conditions. Nor can we detect, at present, an approaching metabolic deficiency, and thus perhaps avert a metabolic disease. This is a large order, but further progress along these lines could lead nutrition science, victor over the common deficiency diseases, to a similar success over metabolic disorders.

An understanding of the mechanisms of nutrition implies an accurate conception of the complex interrelation of nutrients within the body. The significance of these relations and the importance of their study have only recently become apparent. A few examples will illustrate the nature of results in this field.

The amount of protein required by the adult human for maintenance of nitrogen balance is now adequately established in terms of amino acid content. Of approximately 22 dietary amino acids known, 8 cannot be synthesized by the human body and so are termed "essential." In experimental animals, all the essential amino acids, to be effective for tissue growth and maintenance, must be consumed at about the same time and in proper relation to one another. Moreover, if the protein part of an adequate diet is fed separately from the remainder, the animals may starve. Similar effects would presumably occur in man, which emphasizes the need for a well-balanced intake of nutrients.

Various laboratories have reported progress in describing the interrelation of trace elements in nutrition. It has been shown, for example, that excessive traces of molybdenum in soil may create in foraging livestock a high demand for copper, which is needed for the utilization of iron in blood and enzyme formation. Efforts to work out such interrelations at the fundamental biochemical level should be intensified.

Research in these areas should seek a clearer formulation of the concept of the balanced diet. Time factors may be more important than is now realized: How often should the body obtain the various nutrients, and in what relation to one another? In selecting foods, when and to what extent is appetite reliable? Enough is known at present to guide health educators in stressing the importance of dietary balance. For the American population, we must place special emphasis on the hazards of excessive caloric consumption, which tends not only to produce obesity, but if the diet is high in carbohydrate, to preclude the ingestion of other essentials.

One of the deep mysteries concerning nutrition is the potentiality of the science and its application. We may assume that new health-affecting components of food will yet be discovered and that much will be learned about their function. There may also be health gains impossible to predict. In recent years, better nutrition in America, largely

a result of efforts to control specific deficiency diseases, produced health benefits beyond the most optimistic expectations. Maternal and infant deaths, for example, have declined to unprecedented levels, a fact for which nutrition can take much credit. It is interesting to note the downward trends in mortality from infections, particularly tuberculosis, that have accompanied the elevation of nutrition status.

There have also been appreciable increases in the growth of children. Today children are usually taller and heavier than their parents were at that age, and thus get a better start toward healthy adulthood and long life. Records kept at Yale University show that college freshmen have not only gained in weight and stature, but have also become younger than their predecessors. In 1893 the average Yale freshman was slightly older than 19, weighed 138 pounds, and was 68 inches tall. Last year the average freshman was nearly a year younger, weighed 18 pounds more, and was $2\frac{1}{2}$ inches taller. Many of you are familiar with the data indicating a greater stature of World War II draftees as compared with those of World War I..

There is ample evidence that improved nutrition in countries with a high standard of living has favorably influenced growth. Conversely, people in countries where diets are poor tend to be short and small-framed. The average Norwegian is about 5 inches taller than the average Japanese; and the fact that children of oriental immigrants to the United States are usually found to be taller than their parents suggests that such differences may not be entirely genetic. Furthermore, we can no longer be sure that nutrition and genetics are not closely interrelated.

Growth and health, of course, are affected by various influences, such as heredity and the quality of medical care as well as nutrition. Moreover, the improved American diet is undoubtedly a result of several factors, including social and economic changes. Nevertheless, the gains in national health, vigor, stature, and longevity must be attributed, in part at least, to food science, technology, and education; and they recommend a much broader application of nutrition knowledge in the future.

To indicate the potentialities of nutrition research, I should like to describe briefly some recent findings relating to the major chronic diseases. Vitamin B_{12}, isolated in 1948, has been studied intensively in connection with the macrocytic anemias, and in some cases, proves highly effective in treatment. In addition, B_{12} markedly promotes the growth of animals on vegetable protein diets and has been reported to correct growth failure in children.

Another interesting development that may lead to improved treatment of the anemias has been the discovery and isolation of a B-vitamin known as the "citrovorum factor." The substance was first described in 1948 as required for the growth of the microorganism Leuconostoc citrovorum. Last year, at the National Institutes of Health, Drs. Keresztesy and Silverman isolated the factor in the pure state from horse liver, and Lederle Laboratories have determined its chemical structure. The factor is related to the vitamin folic acid, but is more active in some laboratory tests.

Other studies at the Institutes have shown that folic acid is needed in the diet for normal tissue response to estrogen. By means of dietary manipulation, Dr. Hertz produced a fortyfold differential in the growth of estrogen-stimulated tissues. This suggests that vitamin antagonists might retard the growth of cancer in tissues controlled by hormones, and efforts to develop such procedures are under way.

Continued attempts have been made at the Institutes to clarify the biologic mechanism through which choline deficiency may damage the kidneys and liver. The absence of this common food constituent from the diet of rats may result in death within 5 days. Dr. Baxter has shown that the specific effect, apparently vascular, can be minimized by several procedures, including administration of vitamin B_{12}, ACTH, or nonspecific stimuli inducing an "alarm reaction."

I have mentioned the role of cholesterol in atherosclerosis, the most prevalent form of hardening of the arteries. For those of you who have not followed the literature on the subject, a brief review will illustrate the significance of this common food component in chronic disease. Aided by grants from the Institutes, Dr. Gofman and others at the University of California discovered large cholesterol-bearing molecules in the blood of sclerotic patients; and Dr. Bevans at Columbia University, by means of a high-cholesterol diet and thyroid interference, produced lesions in the coronary arteries of dogs. Last year, at the Institutes' laboratories in Bethesda, Dr. Bragdon injected rabbits and rats with cholesterol-bearing molecules, producing arterial lesions within a few hours. Several days are required when cholesterol is fed. Work is now in progress to determine which of various fatlike substances from the blood are most destructive.

These findings all tend to relate cholesterol formation and deposition to a major degenerative disease. They might suggest that increased longevity is simply a matter of limiting our cholesterol intake; but large quantities of the substance are normally formed within the body, and other nutrients regulate its metabolism. This is a field in which nutrition research might yield results of momentous significance to public health.

The study of arthritis has been hampered by lack of a method for producing the disease in experimental animals. There remains no satisfactory way to induce rheumatoid arthritis--generally speaking, the most serious form. But osteoarthritis, a more prevalent condition, has been induced in mice by dietary manipulation. Dr. Silberberg, an NIH grantee at the Snodgras Laboratory and Washington University in St. Louis, fed special diets to growing mice of a highly inbred strain. A high-fat diet was fed to one group, a high-protein diet to another. The mice that received the fat-enriched diet showed an acceleration of skeletal aging and an increased incidence of osteoarthritis, whereas protein enrichment retarded aging of the joints and delayed the onset of joint disease.

At the Harvard School of Public Health, another grantee, Dr. Mayer, is studying mice of a strain in which hereditary obesity is prevalent. Average young adults are twice as heavy as ordinary mice. These investigations have yielded important information on the voluntary selection of nutrients and the inheritance of diabetes.

Obese and nonobese mice showed marked differences in dietary preference. First, obese animals ate more, and secondly, they preferred a diet containing more fat, less protein, and less carbohydrate than the controls. With respect to carbohydrate content, the diets selected by the mice was analagous to that used in the management of diabetes in humans. The obese animals were found to have a high blood-sugar level and to tolerate massive doses of insulin--in short, to be genetically diabetic. For the first time, the existence of hereditary diabetes, clearly independent of environmental factors, has been established.

These are some recent high lights of nutrition research as related to chronic diseases, which increasingly compel our attention. The growing importance of these diseases in an aging population should be thoroughly considered in a reorientation of nutrition programs.

It has been my hope that these observations and views would be of some help in focusing attention upon the broader aspects of the problem before us. In general, our purpose at this conference will be to review the present situation with regard to the Nation's food supply and nutrition programs, in light of today's nutrition needs. It is my pleasure to welcome the various groups participating here and to wish you every success in this responsible task.

One aspect of our work will be to discuss the need for assessing the nutrition status of various population groups--a difficult undertaking, for which present techniques must be evaluated and their further development planned. Another objective will be to explore in some detail the relation of nutrition to the chronic diseases, with emphasis on the progress and direction of research. We will appraise legislation regarding food--its protection, improvement, and supply--and will consider the important matter of food planning for a national emergency. Closely related to all these problems is that of nutrition education--an essential link between professional knowledge and betterment of a nation's food practices.

In the task ahead, the cooperative efforts of many groups, governmental and private, will be required. And this poses a further responsibility for our attention: the coordination of nutrition activities. The organizations represented here today--concerned as they are with all aspects of the nutrition movement--will wish to clarify their areas of activity and working relations and to orient their programs toward common goals.

Much as these programs have accomplished, a great need still confronts us. There will always be dissension in a world of grossly underfed and starving people. All organizations combating nutrition problems must intensify their efforts, consecrated to the eradication of dietary diseases and the provision of a healthful food supply for everyone. Remote as that may seem--however idealistic--the goal is plain and one to be pursued relentlessly. For investment in nutrition offers a substantial hope for world prosperity and peace.

Significance of Recent Advances in Nutrition Research

Charles Glen King, Ph. D.*

This audience is familiar with the fact that among our population in the United States, the number of people over 60 years of age has grown twice as fast as the number under that age during the past half century. However, in comparing our country with Western European countries, I wonder how much agreement there would be among you, if asked to explain why our population has a more favorable health record for those below 40 years of age, but the reverse for those over 40. (You see, the age bracket for discussion is now moved down to mere maturity where it will reach a large portion of the present audience.)

I submit that the answer is related to the difference between contemporary Englishmen and Americans--the Englishman gets too few dollars for his pounds, while the American gets too many pounds for his dollars. Fortunately both of these trends can be corrected.

In broad terms the kind of research that pays best dividends in the national interest and for the world at large, is the basic research in our graduate schools (including agriculture and medicine). There, the greatest emphasis is on new principles and on training selected young scientists who have in high degree, the attributes of character and capacity to learn. I think both industry and government agencies should place much greater emphasis on this aspect of using their research funds to greatest advantage.

If asked to narrow still further the subject matter of recent research of greatest value, I would select the area that discloses how the individual nutrients function in living cells. It would be difficult or impossible to omit reference to structural and analytical research, such as the brilliant accomplishment of Dr. Frank Sanger in his attacks on protein structure, but I think we should keep in mind that the primary value of structural and analytical work is to help in our advancing knowledge of biologic functions. (You will no doubt guess that I disagree emphatically with the recent abortive attempt to classify biochemistry as molecular biology. Such a definition distorts the viewpoint and techniques of both chemists and biologists.)

If one were to attempt a still more specific citation of research of greatest value, it would be at least tempting to select the work dealing with the origin and function of fats. There are three major grounds for accepting this thesis. First is the fact that chemical evidence to

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***Scientific Director, The Nutrition Foundation, Inc., and Professor of Chemistry, Columbia University.** **(Paper presented at dinner meeting.)**

explain fat metabolism was relatively slow to develop, compared with proteins and carbohydrates, but it has advanced dramatically within the past decade. Second is the fact that evidence has accumulated very rapidly pointing toward disturbances in lipid metabolism as forerunners of breaks in human health that are becoming dominant over most of the world. And thirdly, discovery of the key reactions by which lipids are built up and utilized physiologically is having the effect of shocking the medical profession and nearly all others interested in health or biology into recognizing the intricate and endless interplay between all the nutrients.

It is difficult to attach more importance to one basic discovery than another, because the intensity of interest rises and subsides like the tide, but three directions of advance have been especially notable. The discovery of labile "acetate" or 2-carbon fragments as dominant units linking fatty acids reversibly with nearly all the other lipids, including the sterols and hormones, and further, in extending this key grouping to the sugars and amino acids, opened an area of research that beggars appraisal. Then, the discovery that the acetate fragments are controlled in large degree by the vitamin, pantothenic acid, made the advance doubly significant. (I started to say the discovery would yield better returns than any preferred stock on the market, but the thought reminded me that endowment funds kept food in the mouths of many chemists while they were making the discoveries.) Still more recently, the identification of lipoic acid has linked the acetate group more closely with thiamine, sulphydryl groups, and pyruvate, in addition to pantothenic acid.

On the health side, derangements in lipid metabolism are especially prominent in the background of excessive body weight, and this in turn with such diseases as diabetes, hardening of the arteries, high blood pressure, fatty and cirrhotic livers, nephrosis, cancer, and arthritis.

Unfortunately, research has not yet advanced far enough to give satisfactory pictures of <u>why</u> the lipid disturbances are associated with so many breaks in health. Nevertheless we can see a background of logic from which research can be organized and pressed. The fats constitute one of the dominant types of material in all cells and many types are unquestionably very labile and very complex. The cholesterol-protein complexes, the inositol phospholipids and the steroid hormones are good examples of lipids that can easily be deranged. The liver, with its very labile and generous supply of lipids, carbohydrates, proteins, vitamins, and essential mineral elements is chief guardian and traffic officer for each day's food intake.

Could you picture a more certain way for anyone to lose the characteristics of youth than by abusing the liver from one to five times a day, year after year?

Imagine your guardian angel, like Brunhilde in the opera, standing at the doorway where the blood supply brings each meal for reconstruction into what is left of you or me. I wonder what a maraschino cherry and two cocktails would look like at that stage? With valiant support by several

billion well-organized liver cells, the situation might be kept under control for a time, but sooner or later an excess of calories superimposed on a deficiency of vitamins, proteins, and mineral elements will disorganize any such delicate balance on the home front--or within the home front. When the distortion of food intake is an insult to the liver, no other part of the body can function without meeting some share of the added stress.

After making due allowance for the fact that the liver is only one of many organs in the body that is subject to injury by nutritional indiscretion, and some further allowance for a limited capacity for repair, one is still in a strong position to press the thesis that we are only on the threshold of reaching levels of health that are available to us, on the basis of a more intelligently selected and enjoyable food supply.

We may be close to having discovered all the essential nutrients, but there is good reason to continue research, even in that direction, for the present.

On the score of knowing how the nutrients function in the body, we have scarcely more than a glimpse of what happens to most of the food consumed. If Dr. Beaumont could pay us a visit and see the enormous amount of gastric and duodenal forms of disease that afflict our population, I'm afraid he would feel that we have not followed very diligently on his early discoveries.

More important still, we have only a faint outline of the evidence we should have in relating the intake levels of all the nutrients, whether essential or not, to optimum health, on a life-span basis. This lack of information is equally severe in regard to normal living conditions and to living under conditions of stress.

Not everyone can hope to achieve the intellectual and physical stature of an Oliver Wendell Holmes, an Albert Schweitzer, or a Bernard Baruch, but we are entitled to take note of such individuals. They illustrate practical goals toward which we are entitled to strive, both culturally and physically. It is high time that we stopped letting either the public or the professions related to education and public health think of nutrition as a simple or superficial science. It is almost as bad to think of nutrition only as a practical means of keeping out of the deep pit of deficiency diseases.

We live in a strange world, when we are over-proud of our food supply, without knowing or caring very much about how to use it. When the topmost four causes of death in the United States are cogently related to the abuse of our food supply, the situation is not trivial. And there is much additional loss in health, economy, and enjoyment of living beyond the uppermost four causes of death. This, we have while a large part of the world is repeatedly exposed to partial or complete starvation as their first threat to health and to any reasonable standards of living. The whirlpool of

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hunger-begetting-sickness, and sickness-begetting-hunger is not poetry in India or Puerto Rico. It is sobering, to say the least, to see competent, earnest men, with broad medical experience, discuss in all seriousness the question of whether it is fair and honorable to suppress disease in a large community, when there is no evident way to prevent starvation of those permitted to live.

There is still fun to be had--and much work to do--in cajoling or educating our indulgent friends who can add 10 years, statistically, to their respective lives by using a modest degree of judgment in eating good food. But perhaps it is more stimulating and more significant to envision the time when each child is a ruddy-cheeked youngster who certainly will never have rickets or anemia or decayed teeth or a fatty liver, and beyond that, has an excellent prospect of being in good health and mental vigor as he works toward a real, instead of an imaginary, goal of three-score-and-ten.

If our sense of humor is normal, we can relax once in a while, and enjoy a ripe honeydew melon, followed by a tasty piece of sirloin steak with green peas and hot biscuits, followed by a modest-sized bowl of strawberries and cream. For economy and variety, these foods can be rotated with others such as vegetable soup, baked potatoes, fillet of sole, broccoli, enriched bread, margarine, and a baked apple. Other than in dealing with fraud or misguided romance, there seems to be no reason to anticipate a future trend toward yogurt, brewer's yeast, blackstrap molasses, and cucumber juice.

Beyond the broad problem of discovering what the human body needs in the form of essential nutrients and discovering how all foods function inside the body, two additional kinds of research offer great promise in the years ahead. The first pertains to getting much more adequate records of the relation between quantities of all the nutrients and their combined effects on health, on a life-span basis. The second is in the field of developing methods of appraising nutritional status, so that one can have an objective appraisal of the metabolic state, with reference <u>not to the risk of disease</u>, but rather as an index of the prospect that the individual will <u>continue in optimum health</u>.

Professor Sherman's work at Columbia University stands as a great landmark in establishing the long-term value of diets that are low in cost and simple to prepare, but high in nutritive quality. We seriously need more such studies. They should be accompanied, also, by more intensive chemical and histochemical studies to provide information concerning the specific causes of breaks in health, as a guide for human experience. I think it is especially gratifying to see several well-organized human studies getting underway, where the long-term observations reach from early gestation to maturity, accompanied by as complete records as circumstances permit, relating to food intake, blood analyses, physical development, and specific records of health and accomplishments. The work

underway by Dr. Alfred Washburn and his group at the University of Colorado and Dr. Harold Stuart's group at Harvard University are examples of this trend.

The remarkable progress made in preventing tooth decay by means of good diets and fluoride control is gratifying in itself, but there is no reason to think that we are at the end of such discoveries with respect to other nutrients and other diseases.

The problem of nutritional or functional assessment is still very poorly solved. Micromethods of blood analysis such as developed especially by Drs. Bessey, Lowry, and Burch are already very valuable, but further explorations should increase their use and significance very greatly. Measurements of vitamin A, carotene, thiamine, riboflavin, ascorbic acid, niacin, hemoglobin, serum albumin, and a series of enzymes in mere drops of finger tip blood, have already proved of great service. However, as more is learned of the functions of all the nutrients, and their relationship to future rather than immediate breaks in health, the micromethods should take on greatly enhanced value. The next immediate steps are likely to include greater emphasis upon the coenzymes, hormones, and labile intermediates that are dependent upon a sustained and balanced intake of individual nutrients. Then we will be moving into areas of nutrition and preventive medicine that would approximate an ideal in practice.

Although kwashiorkor is not regarded as endemic in the United States or Western Europe, identification of the syndrome is becoming increasingly common in tropical areas. The etiology apparently differs in significant degree from pellagra and the older forms of gross malnutrition that have been studied in detail from a nutritional and biochemical point of view. Nevertheless, the fact that kwashiorkor develops so quickly in the newborn, following their transition from mother's milk has lead to special attention to the condition of infants previous to birth. From recent reports by competent medical investigators it is evident that fatty livers and related systemic disturbances are of common occurrence prenatally as a result of poor maternal diets in the areas where kwashiorkor is endemic. This situation illustrates again the increased attention that must be given to diseases associated with fatty livers and to the importance of systemic disturbances that have long been unrecognized on the basis of external conditions.

The observations of Dr. Best and his associates at the University of Toronto are also brought to mind with reference to the importance of early changes in fat metabolism that can result from short periods of malnutrition. The fact that abnormal globules of fat are evident in the delicate structures of the kidneys and liver within 24 hours, resulting from a choline deficiency, and the further observation that tissue injuries become irreversible after a deficiency of only 3 to 5 days, constitute another sharp warning of the importance of disturbances that can be induced by faulty nutrition without the patient or the physician having any basis for recognizing the injury that has occurred.

The further fact that experimental animals (rats) studied by the Toronto group showed the tragic results of an early choline deficiency, only when they had reached an adult stage of development furnishes another instance of the delayed effects of malnutrition--a warning at least in regard to human practices. You may recall that, although rats have been regarded as relatively resistant to hardening of the arteries and related disturbances in cholesterol metabolism, under the conditions of the Toronto experiments, the early injury was followed by a typical development of atherosclerosis, enlargement of the heart and high blood pressure shortly after they reached the period when they should have been vigorous adults. The observations were confirmed, also in similar studies by Dr. P. Handler and his associates at Duke University.

From an educational point of view, the conclusions of the Harvard University group associated with Dr. Stare impressed me as being of major importance. In the long run, our food and nutrition problems cannot be solved unless people learn to use their food supplies intelligently. I believe we are going to find it necessary in the public interest to begin to educate children to adopt sound principles of nutrition very early in life. Preferably, of course, we would like to begin with the parents so that the offspring would have the benefit of good nutrition during gestation and infancy, but in a practical sense we can begin with kindergarten children and systematically build a sound program of nutrition education as essential to health, vigor, and general accomplishment of our ideals in living. The program should not only begin at an early age but it should be continually developed within the normal framework of teaching, without attempting to develop specialized courses or to introduce material that does not hold the interest and respect of teacher and pupil--and beyond that--of parents and medical personnel without whose support measures of this kind will not succeed in any community.

The National Food Situation

Presiding: Hazel K. Stiebeling

Food Supply and Prospects

Frederick V. Waugh, Ph.D.*

My talk today is built around a series of charts summarizing the food situation and comparing our present food supplies with those of the prewar period 1935-39. (A few of the charts referred to are reproduced on pages 21 to 24 .**)

A widely-used BAE index indicates that per capita food consumption in 1952 is 12 percent higher than in 1935-39. What does this mean? Any index number is a sort of average. Like any average, it is likely to cover up many diverse trends.

Today the average person in the United States is eating a slightly larger number of pounds of food, but about the same number of calories as prewar. In terms of nutrients the average person is getting less carbohydrate than before the war, about the same amount of vitamin A, a little more ascorbic acid, and significantly more riboflavin, thiamine, niacin, iron, protein, and calcium. The average American is eating fewer potatoes and grain products, but more livestock products, citrus fruits and tomatoes, leafy green and yellow vegetables.

In order to add up all these diverse trends and make some sort of average, it is necessary to weight each food in some way. The BAE index of food consumption weights each food by its average retail price in 1935-39. The 12-percent increase in the index reflects mainly a shift from less expensive to more expensive foods. Thus, consumers are getting more of the foods they want the most. The index does not directly measure the change in the nutritive value of American diets. No nutritive index has yet been devised. Nevertheless, it is clear that as Americans have been able to buy more of the foods they want, they have also increased their intake of some of the most important nutritive elements.

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*Assistant Chief, Bureau of Agricultural Economics, U. S. Department of Agriculture.

**The complete set of charts is available as a filmstrip, 80 frames in color, entitled "Food Facts and Figures." Order from Photo Lab, Inc., 3825 Georgia Avenue, Washington 11, D. C. Price $5.25.

The increase in per capita food consumption since 1935-39 has occurred in spite of our increased population and in spite of a very large increase in exports and in military requirements. It was made possible by two factors. First, farmers produced 44 percent more food in 1952 than before the war. They did this with fewer farm workers, but with larger expenditures for fertilizer, electrification, machinery, and other supplies. Even though cash costs of farming increased sharply, farmers were induced to produce more because of higher prices. Second, consumers could afford to buy more food in spite of higher prices because their incomes were substantially larger than before the war, and because the distribution of incomes has become less unequal.

Food consumption and food expenditures increase as incomes rise. The demand for food is significantly higher than before the war. Also, such programs as school lunches, distribution of surplus foods to institutions, industrial feeding, and the enrichment of foods have contributed materially to the improvement of our diets.

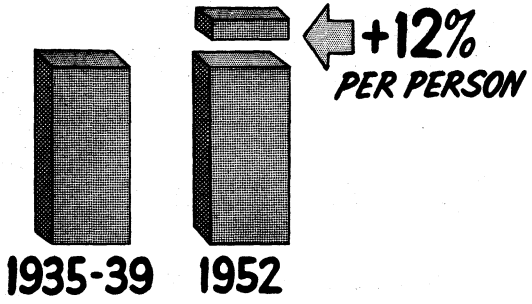
Now, let us look to the future. Will the demand for food continue to increase, and can our food supplies keep up with the demand? Our population is continuing to grow rapidly--at the rate of about $2\frac{1}{2}$ million persons a year. Farm costs are rising and doubtless will continue to rise in the next few years. If per capita food consumption is going to be maintained and perhaps be increased, it is clear that farmers will have to receive fairly favorable prices in order to induce them to produce even more food.

Consumers cannot afford to pay high food prices unless their incomes are high. Our food bills have increased not just because of higher prices, but also because we buy more food, food of better quality and relatively higher cost, and more marketing services with our food. To get the food we want and need at prices we can afford to pay, we must have still more efficient and productive farming, still more efficient marketing, plus policies that maintain general prosperity for farmers and consumers alike.

With adequate research and education, and with programs to help farmers and to maintain prosperity, we can continue to increase agricultural output and to improve diets.

AMERICANS ARE FED

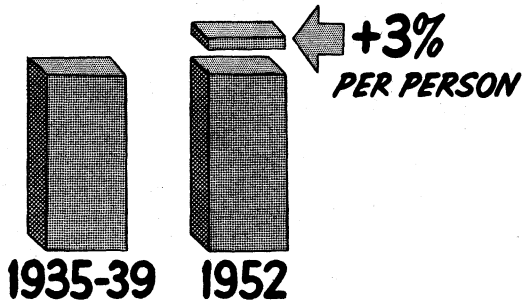
12 percent better



What does 12% more food per person mean?

Chiefly, we shifted to foods richer in vitamins...

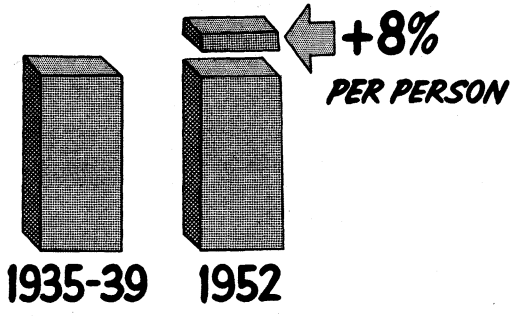
ASCORBIC ACID



What does 12% more food per person mean?

Chiefly, we shifted to foods richer in

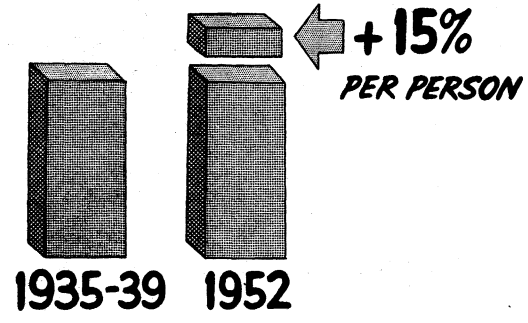
PROTEINS



What does 12% more food per person mean?

Chiefly, we shifted to foods richer in

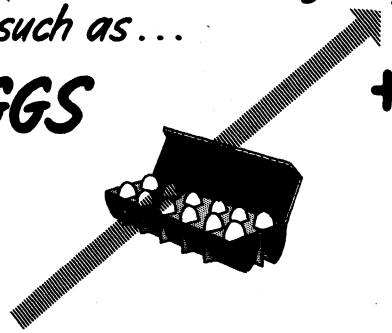
CALCIUM



What does 12% more food per person mean?

Chiefly, we shifted to higher priced foods such as...

EGGS



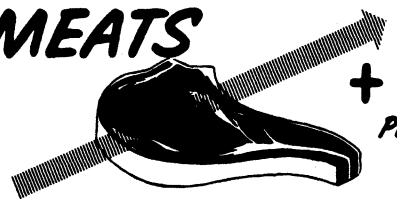
+36%
PER PERSON

1935-39 1952

What does 12% more food per person mean?

Chiefly, we shifted to higher priced foods such as...

MEATS



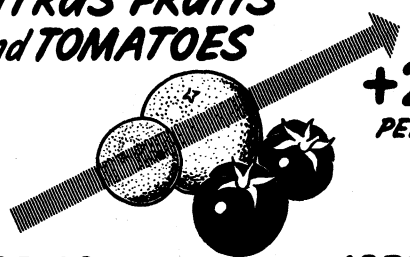
+18%
PER PERSON

1935-39 1952

What does 12% more food per person mean?

Chiefly, we shifted to higher priced foods such as...

CITRUS FRUITS and TOMATOES



+23%
PER PERSON

1935-39 1952

What does 12% more food per person mean?

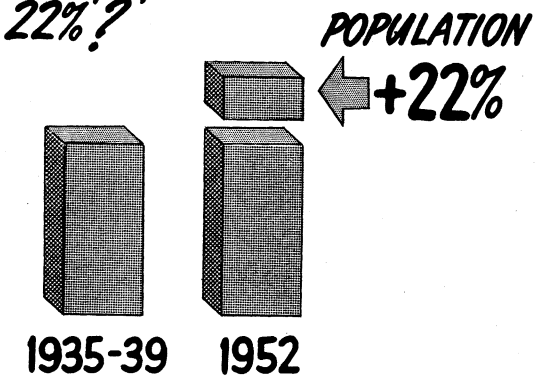
Chiefly, we shifted to higher priced foods such as...

LEAFY GREEN and YELLOW VEGETABLES

+11%
PER PERSON

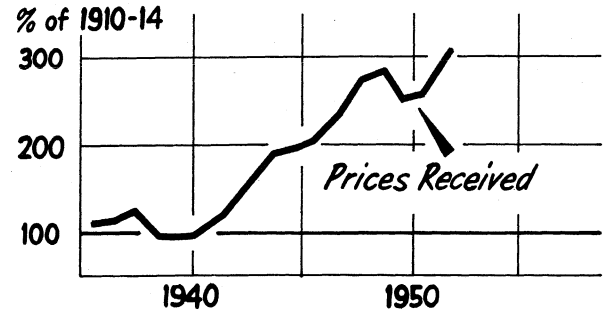
1935-39 1952

How did we get better diets while our population rose 22%?



IN SPITE OF HIGHER COSTS

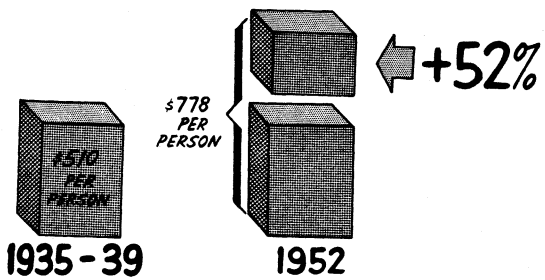
Farmers could produce more because they got better prices...



AND IN SPITE OF HIGHER FOOD PRICES

Consumers could buy more because they got better incomes

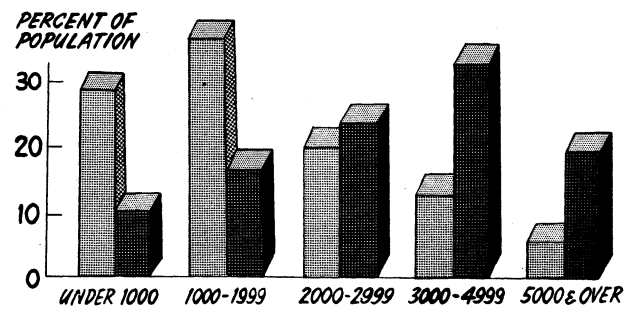
DISPOSABLE INCOME PER PERSON
IN 1935-39 DOLLARS



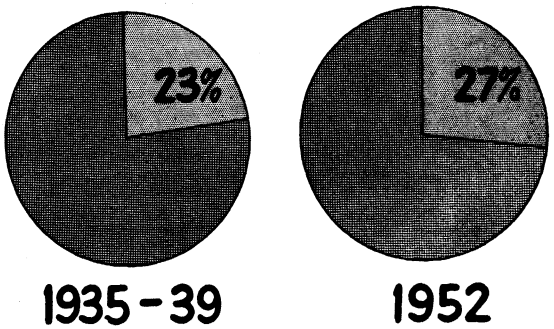
AND THERE WAS MORE EVEN

Distribution of Income

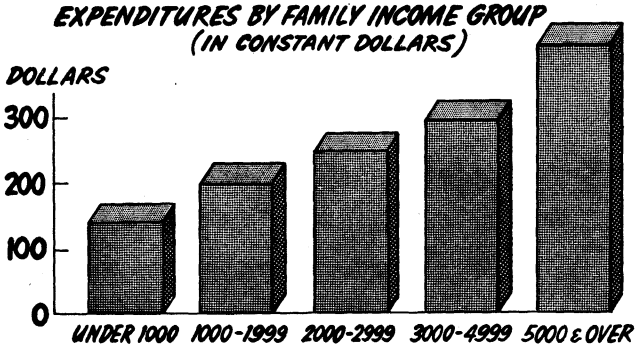
Consumers by Family Income Groups
(IN JUNE 1946 DOLLARS) 1935-1936 & 1950



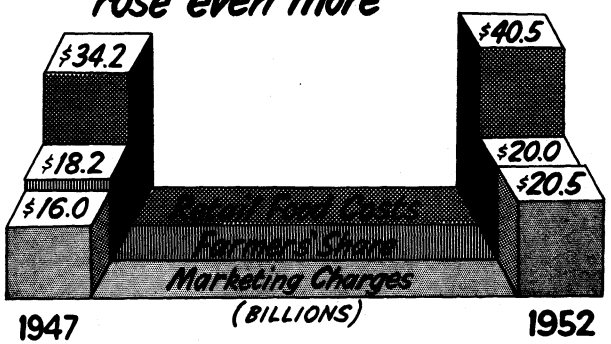
The consumer spends a larger share of his income for food



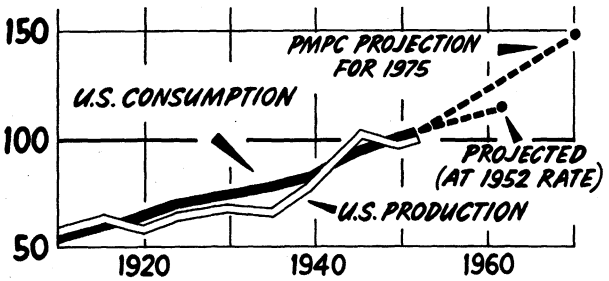
And here's how Food expenditures per person go up with incomes



Farmers' returns are higher ... but food marketing charges rose even more



Can food supplies keep up? ... Here are two projections of food demand



Food Supply and Prospects

John D. Black, Ph.D.*

There need be little doubt about the ability of the agriculture of the United States to produce all the food that its people are going to be able to buy even with a continuously high level of employment. The combined judgment of the several hundred scientists in the USDA and the 48 States who were consulted in the preparation of the report of the President's Materials Policy Commission was that if our farmers would adopt the technology of production that is already developed, or in process of being developed, an output at least three-fourths larger than that of the years around 1950 would result by 1975, and this with no increase in the acreage of land in farms and little or no conversion of unimproved land to cropland and pastureland in rotation.

This does not mean that no such conversion will take place. There is always a balancing under way of getting more output from acres now in use by more intensive cultivation and converting marginal acres to a higher order of use. Another 100 million acres now mostly in unimproved pasture and woodland is readily available for conversion whenever it is needed. Drainage and irrigation can add at least another 40 million acres. If the pressure in food supply were as strong in the United States as in Europe, 200 million more acres still could be farmed in crop rotations, although mostly in hay or improved pasture.

What determines how much of increased output comes on the intensive margin and how much on the extensive margin, is the relative cost of getting it in these two ways, and this depends on the relative progress of the technology of increasing yields per acre and per animal unit and of the technology of land improvement. In most of our agriculture, progress would appear to be easier and cheaper along the first line than along the second in the next decade or two.

Such a statement, however, confuses the issue in one important particular. It does not make clear in which of these two categories one places converting poor unimproved pastures to highly productive pastures by liming and fertilizing it and seeding it to good grasses and legumes. Or if, in addition, some of the pasture has to be cleared of brush and the like. It is land use of this sort that will be most nearly critical in the coming decades.

Although the agricultural land resources of this country have all this potential, we are by no means assured of having all the food that we shall want our people to have. If we were to slacken in our research, we would be

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*Professor of Economics, Harvard University.

in real danger. One reason for this is that merely maintaining yields is a constant battle against plant and animal diseases and pests. The rate at which new forms and types of these evolve, or present species develop resistance, has been startlingly revealed in the past 10 years. Another strong need for action is that erosion is still carrying away humus and plant nutrients at a menacing rate on a large acreage of cropland in this country. Even though the topsoil may be kept fairly productive by use of fertilizers and plowing under green manure crops, the B horizon layer is being drawn upon faster at the top than it is being replenished at the bottom.

Much more serious than these threats to our food supply, however, are the effects on the cost of it, on what consumers will have to pay for their food, if agricultural productivity is not maintained at a high level, and even raised in addition. Output per worker in the nation as a whole rose at the rate of 3 percent per year from 1900 to 1950. It rose faster than this in manufacturing. If output per worker does not increase as fast in agriculture as in industry, trade, and transportation, these will outbid agriculture for labor and this will raise farm wages and prices of food. The PMPC report projects a doubling of national output by 1975, an increase of output per worker of 2.6 percent per year, and a rise in disposable income per worker from $1,300 in 1950 to $2,000 in 1975.

We must be careful to see to it that no agricultural statesman gets the idea from the foregoing that it is only the consumers of food that stand to gain from such advances in technology. In general, the gains are pretty well shared between producers and final consumers. The producer gets a lower gross price per unit of his product, but his unit costs are lower too. His net per unit of product may be higher or lower depending upon the stage of adoption of the new technology. In the early stages of such adoption, when only a small fraction of the producers have made the change, his net price is almost certain to be higher, unless there is general agricultural depression at the same time. After a majority of the producers have made the adoptions, his net unit price may be lower. But still his total profits may be higher--that is, his profit per unit multiplied by the number of units produced may give a larger total net income. Altogether too many of those who reason on the subject seem to have forgotten how to use their multiplication tables. They seem to think that the producer should have the same net returns per unit as before, in spite of his larger output.

This situation is simply illustrated in poultry production. Twenty years ago, a flock of 800-1,000 layers was about all that a poultry farm family seemed to be able to care for in New England. Nowadays, such a family probably has 2,500 layers. Not only is there more effective use of the labor, but of the feed and other inputs. Index numbers constructed for four representative poultry farms for the period from 1920 to 1947 indicate an increase in efficiency of use of feed, hired labor, and other cash inputs of 20 percent.* The ratio of prices received for eggs and

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* J. D. Black, The Rural Economy of New England, Chapter 30.

poultry sold to prices paid for feed and other inputs fell off 15 percent in the same period. This is equivalent to a decline in the parity ratio from 100 to 85. This was gain to the consumers. It would look as if the consumers got all but 5 of the 20 percent gain in efficiency. But the output of these farms, measured in volume of eggs and poultry sold, increased 115 percent. The multiplication product of this output times the smaller profit per unit gave these poultrymen an increase in real net income of more than a half.

The foregoing does not mean, however, that prices may not fall so low that total net incomes are reduced. This can happen for individual products even when there is no general depression. It can come about as the final stage in a period of adoption of a new set of technologies with no important new technologies coming along. It can also result in the downswing of the hog-corn and other production cycles.

This points to the other major food supply problem facing us in the next decade or two, that of keeping production and consumption of the different foods in balance. This is a problem that we always have with us, but that is likely to be somewhat more acute than usual in the near future as an aftermath of war and postwar of a big world war and a still bifurcated world. Those who hold to the theory of a beef-cattle cycle now tell us that we are definitely on the down grade of such a cycle. One of them has recently stated that beef cattle prices have fallen scarcely half way to the bottom of their trough. Hog production reached its peak a year earlier. Poultry production and consumption continue at an all-time high. Does this represent a new equilibrium? Or will consumption expand still more? Potato production has not yet reached anything like an equilibrium with prices since struck with a new burst of technology during the war.

So-called "orderly production" was introduced into the program of the U. S. Department of Agriculture in a speech that Calvin Coolidge made at the first International Livestock Show after his induction to office. It was planted there by the Bureau of Agricultural Economics, as a counterpart of the "orderly marketing" that had become the central object of the Sapiro Cooperative Movement then being widely promoted as the cure for agricultural depression, even by the Coolidge administration. In spite of all the undertakings since, it is doubtful if production and consumption of farm products are being kept in better balance with each other now than in 1920-1925, except as subsidized foreign buying may have assisted in recent years. The whole trend of the legislative programs from 1938 on has been to the opposite effect. Surely the maintaining of prices above the equilibrium level by production and marketing quotas, even in cases where it can be made to work after a fashion, does not achieve the true objectives of orderly production and consumption. Yet it should be possible to devise and generally adopt a set of procedures that will go far toward keeping production and consumption of different foods and fibres in good balance with each other. It has been pretty well achieved for milk, for example, in the Boston milkshed in the past 5 years. Conceivably the legislative and market situations in the next 4 years will be such that working toward such a goal will again be feasible.

Even with a reasonably rational program of production adjustment in operation, the supplies of some foods will be too large or too small in individual years or seasons. Yet any surplus thus arising should be utilized efficiently and not dumped or even diverted to low-order uses except in extreme cases. This calls for making the school lunch program more flexible and expansible and likewise the development of a standby stamp plan that is also flexible and expansible. Both of these need to be geared into the longer run objective of raising the level of per capita food consumption of the lower income fraction of the population, and of increasing the consumption of protective foods and especially foods of animal origin and shifting more of agriculture over to a grassland and forage basis.

It may be noted that nothing has been said about producing food enough for an adequate diet for all. It should be obvious after a little thinking that such a goal has no practical meaning in public food planning. A diet entirely adequate from a purely nutritional standpoint could be produced with much less land and effort than we are now putting into food production. A practical program begins by accepting the amounts of the different foods that the population of the United States will buy with the income it has, and adds to and subtracts from these amounts to allow for the effects during the year, if the planning is for 1 year, of any school lunch or other supplementary food distribution programs, and of any educational or promotional program that is carried on that affects consumption, food losses, and the like. If the planning is for a larger period, the parallel effects for the larger period must be estimated. Allowance, of course, must be made for food exports and imports.

It is equally obvious that the food supply of a nation cannot be safely planned by multiplying the Recommended Dietary Allowances of the National Research Council by the numbers in the population. The margin of safety in these is so large that if amounts of food thus calculated were actually produced, it would be in excess of current demand and would call for a larger supplementary food distribution program than any nation has ever had except as a result of war.

This statement assumes, of course, that in such a calculation, due allowance is made for food losses between the receiving market and the final ingestion of the food, and also the wastes of overeating. This may well exceed the margin of safety in the RDA. But they need to be known before food supplies can be publicly planned with safety when using the RDA as a basis. Basing food supply on demand in the market place accepts whatever losses and wastes there are without attempting to isolate them.

Another factor of importance in any long-time planning of food supply is the stage of preparation of the food when it reaches the home or restaurant and the amount of services sold with the food. Consumer expenditures on food have remained a nearly constant percentage of disposable income in recent decades. They were 24 percent of it in 1929 and 26 percent in 1950. The percentage stayed within these limits all the way from 1929 to 1945, and rose to 28 in 1947. There thus appears no good reason for projecting

a percentage greatly lower than 25 for 1975. But a percentage no higher than 20 would call for a 47 percent increase in total food expenditures by 1975 if the Gross National Product doubles in this period as projected by the PMPC. If the actual food consumption of the United States increases by no more than 30 percent by 1975, the difference between the 30 percent and the 47 percent will have to be made up entirely of more marketing services sold with the food, more preparation of food for use, more meals eaten out, and related items. This will call for a large increase in the marketing spread between farm and consumer. But in 1913 this spread stood at 54 percent of the consumer dollar as compared with 52 percent in 1952.

Also pertinent is the fact that while the percentage of actual expenditures in food rose from 24 to 26 between 1929 and 1952, the percentage would have been only 7 percent less if the same food had been bought in 1952 as in 1929. These 7 points are a far call from the 17 called for in the assumption of only 20 percent of disposable income being spent on food in 1975.

If the rise in food consumption is 40 percent by 1975 instead of 30 percent, only 7 percent will be left to be explained by increased services and the like. This is surely more in keeping with past experience.

But a 40 percent rise is going to call for a considerable increase in per capita consumption of the protective foods--17 percent for meats other than poultry, 3 percent for eggs, 13 percent for fluid milk, 16 percent for fresh vegetables, and 28 percent for processed vegetables. This will call for a vigorous program of converting low-yielding pasture land into improved pastures and hayland.

Dietary Adequacy of Family Food Supplies

Esther F. Phipard, Ph. D.*

The abundance and variety of our national diet and some of the changes that have occurred in the last 10-15 years have been pointed out by previous speakers. We now consume more meats, poultry and eggs, dairy products, vegetables and fruits than we did in the late thirties, but fewer potatoes and less grain products. This change has been possible because of the productivity of our farms, and the effectiveness of the food industries and marketing system in making improved food products widely available across the country and throughout the year. We have also enjoyed economic conditions under which an increasing proportion of people have been able to have the kinds of foods they want. Our national diet today can be described as the kind our people choose under relatively favorable circumstances of food supply and ability to buy food.

Some of the shifts in food consumption discussed in relation to the last 10 or 15 years are really long-term trends that go back as far as we have records--at least 40 years. One way of appraising these changes is in terms of the nutrients they provide. First of all there has been a slight but probably significant trend toward fewer calories. In other words, the increased consumption of some foods has been more than compensated, calorie-wise, by smaller consumption of others--grains and potatoes chiefly.

In this slide the top line shows (in 5-year moving averages) total calories per person per day from 1909 to 1952 (chart 1). Calories per person per day in the national food supply have declined from an average of 3,450 to 3,250. It is well to remember that these figures apply to food at the retail stage of distribution. They include some food that is consumed in the economic sense but that is not actually eaten. There is no reason to believe, however, that the differences between what is available and what is actually eaten have differed greatly over the years. Although it may be that in times of economic crisis there is less household waste. On the other hand, over this 40-year period we have had a shift in the kind of work people do, a movement of population from farms to cities, and widespread use of the automobile and many labor-saving devices in factories, on farms, and in the home. So perhaps this trend reflects a slightly lower average calorie requirement.

The steady increase in the share of the total calories derived from fat is probably of more importance. There has been a slight increase in grams of fat consumed per capita, and because total calories are down the

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percentage from fat has increased rather markedly--from about 32 to 40 percent. At the same time the percentage of calories from protein has remained remarkably constant--around 11 percent. Whether or not this shift in the source of our calories--more from fat, less from carbohydrate--is nutritionally desirable is questionable, and may be discussed by later speakers. It is clear that this shift towards getting a larger share of our calories from fat is an important characteristic of our present day diet.

The most spectacular changes in the nutritive value of the national food supply are those resulting from the enrichment of flour and bread with thiamine, riboflavin, niacin, and iron. You will recall Dr. Waugh's charts which showed the increases that have taken place since 1935-39 in per capita supplies of certain nutrients. The largest increases were for these four nutrients that are added under the enrichment program.

The next chart shows the effect of enrichment on the diets of city families studied in 1948 (chart 2). Two nutrients, thiamine and riboflavin, are shown for two income levels. The total length of the bar indicates the amount of each nutrient in these urban family diets (per adult male equivalent). The red portion of each bar is the addition made by the enrichment program, 20 and 13 percent for thiamine at the two income levels, and 5 and 2 percent for riboflavin. Figures for iron and niacin would fall between the two nutrients shown. These are important "plusses" in our national diet.

The second and even more significant point made by this chart, is that the enrichment program has had more effect on diets of low-income families than on diets of those higher in the income scale. This is because, as was known when the enrichment program was first proposed, bread and flour are a larger share of the diets at lower income levels. Looking now at the top bar for thiamine, we find that the diets of low-income families contained actually slightly more thiamine than the families with higher incomes, although if it were not for the enrichment program they would have had slightly less. In other words, in assessing the nutritional importance of the enrichment program, we must be aware of the important addition to supplies of thiamine, niacin, and iron that has resulted and of the fact that benefit is greatest to the lower income groups.

As illustrated by this chart, family surveys show how the food supply is divided up among population groups. An ample food supply does not mean a well-fed population unless food supplies are distributed in such a way as to meet nutritional needs of various population groups. Family dietary surveys, therefore, are important for nutrition programs because they make it possible to identify in the population those groups that have the poorest diets, or the best. Such surveys also show the factors associated with different dietary levels.

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Among city families, the level of income is very important. The next chart shows the proportion of families at different income levels whose diets provided the quantities of protein, ascorbic acid, and calcium recommended by the National Research Council (chart 3). You can see that the proportion of families with recommended amounts of these three nutrients is larger at the upper than at the lower end of the income scale. For example, the proportion with diets providing recommended amounts of protein increased from about two-thirds, at low-income levels, to almost all families in the upper income groups. The proportion with recommended amounts of ascorbic acid increased from somewhat over half to nearly 90 percent.

This chart also shows that lack of money is not the only reason why family diets fall short of recommendations. No matter what the income, calcium is the nutrient most often short as compared with recommended allowances. And even at the higher income levels, 4 out of 10 families could well have more calcium in their diets.

We have chosen calcium and ascorbic acid to show in this and subsequent charts because, repeatedly in our dietary surveys, we find those nutrients most often below recommended amounts. Protein is shown because of the wide interest of nutritionists in this nutrient. In terms of family food supplies, however, it is more generously provided as compared to recommended allowances than either calcium or ascorbic acid.

Family size also makes a great deal of difference in dietary levels (chart 4). This chart shows the same nutrients as the previous one, plus several others. The longer the bar, in each instance, the higher the proportion of families with specified amounts of these nutrients available to them. The bars for households of five or more are all shorter, and much shorter for the two nutrients, calcium and ascorbic acid, that were emphasized on the previous chart. This chart is for families at a middle-income level. So, in identifying the less favorably situated families with respect to nutrient supplies, we add the point that the larger families are especially in need of assistance in planning good diets within the limits of the money they spend for food.

The kinds and amount of knowledge people have can also make a great deal of difference in the nutritive quality of the diet they select. We know that people get nutrition knowledge from many different sources--much of it after they leave school. But the amount of formal education they have appears to be an element in their ability to select a good diet. In this chart the data are for a middle-income group, so the ability to buy food is to some extent the same for the three groups with different amounts of formal schooling (chart 5). The three horizontal bars in each section represent the classification of families by whether the homemaker had some college, high school, or no more than an elementary education. Each of the six groups of bars represents the proportion of family diets that provided NRC recommended allowances for each of six nutrients. The

nutrients most likely to be short by this method of measuring the quality of diet are calcium, the middle of the top three groups, and ascorbic acid, on the lower right of the chart. The chart shows that the more formal education the homemaker had, the greater the chance that the family diet measured up to recommendations.

Family dietary surveys suggest that differences in food consumption among different segments of our population are not now as great as they were formerly. We seem to be approaching a more uniform dietary pattern. It is still true that we have regional food patterns. Differences between the food habits of the South and other parts of the country are the best known example. We could point also to the tendency of people on the West Coast to eat more fruits and vegetables, but, I believe these differences are becoming less important in their nutritional implications. We find not much difference among urban families in the four widely scattered cities for which we have data, as to whether diets measure up, with respect to calcium, for example. Regardless of the region, this is the nutrient in which family diets are most likely to be short as compared to NRC recommended allowances. In rural areas, the kinds and amounts of home food production seem especially influential--more so than regional food habits--in determining the dietary level.

One reason for lessened differences in food consumption among population groups is the more equal distribution of income that has in recent years come to characterize life in this country. Thus it has been possible for a larger proportion of the population to have more of the foods characteristic of the high-income diet--meat, milk, eggs, fresh fruits and vegetables. Moreover, dietary surveys in the South, where regional patterns are most pronounced, suggest that regional foods appear in lesser quantities in the diets of upper income families there. In other words, with increased purchasing power people have broadened their diet pattern and now use more freely foods formerly unavailable or unknown to them.

This chart shows how some of the gaps in food consumption between low- and high-income groups have been closed up during a period in which the change in income distribution occurred, 1942-48 (chart 6). We are comparing the percentage increase in consumption of three broad groups of food--each popularly considered expensive--from 1942 to 1948 by city families in the lower and upper thirds of the income distribution. You will note that the increases in consumption of families in the lower income third for meats, milk, and fruits and vegetables were 37, 25, and 25 percent respectively. This compares with little or no increase for families in the upper income groups in meat, fruit and vegetables, and an increase of 21 percent for milk. This, then, illustrates a change in the distribution of food, or, in other words, lessened differences in the character of the diet among income groups. Actual consumption of these foods is still higher for the high- than for the low-income groups, but the increases have been greater among families in the lower income groups.

This chart gives the result in terms of nutrients of the changes in food consumption shown in the last chart (chart 7). Lower income dietaries now include substantially more protein, calcium, and ascorbic acid than they did previously. With more milk consumed by all groups the increases for calcium and protein show up also in the upper income groups, but they are less, percentage wise, than in the lower groups.

Much of the discussion thus far has dealt with factors affecting dietary levels and with changes that have occurred. Now just where do we stand?

This chart summarizes the situation with respect to three nutrients in diets of urban families in 1948, our last Nation-wide sample (chart 8). Each bar represents 100 percent of the families. The dark portion at the left shows the proportion with relatively low levels of each nutrient. The right hand portion of each bar shows those with generous amounts. Looking at the top bar for calcium, you see that while only 3 percent had less than 0.5 a gram per nutrition unit per day, only 58 percent had as much as 1.0 gram. Of ascorbic acid, 4 percent had less than 50 mg., and a large proportion, almost 80 percent, had as much as 100 mg. But remember this is an elusive vitamin, easily destroyed under unfavorable conditions and dietary estimates from food composition tables may be optimistic. The striking thing about the protein bar is that 89 percent of city diets provided at least 70 gm. per nutrition unit. This nutrient does not appear to present a problem for most families in these groups.

Comparable data for rural families are not available on a country-wide basis. We do have data, however, from a recent study in the South in which three areas were sampled--mountain country, and places where tobacco and cotton farming predominated.

This chart shows for each of these areas the proportion of families with diets providing the recommended allowances of each of five nutrients (chart 9). Two points are brought out by this chart. First are the differences among the three areas, which reflect differences in the amount and variety of foods produced on the home farm for the family's own use. Secondly, fewer of these farm diets contained recommended amounts of ascorbic acid than was found for the Nation-wide sample of city families. Two of these farm areas also scored low on calcium. In this season, late winter-early spring, vitamin A was relatively low in many of these farm diets.

As indicated earlier, family dietary studies help to locate the population groups whose diets are most in need of improvement. In terms of the nutrients provided by foods reaching the kitchens, low-income families, large families, and those in which the homemaker has least formal education are least well supplied among urban groups. Differences in quality of diet due to economic limitations are not so great as formerly, but there

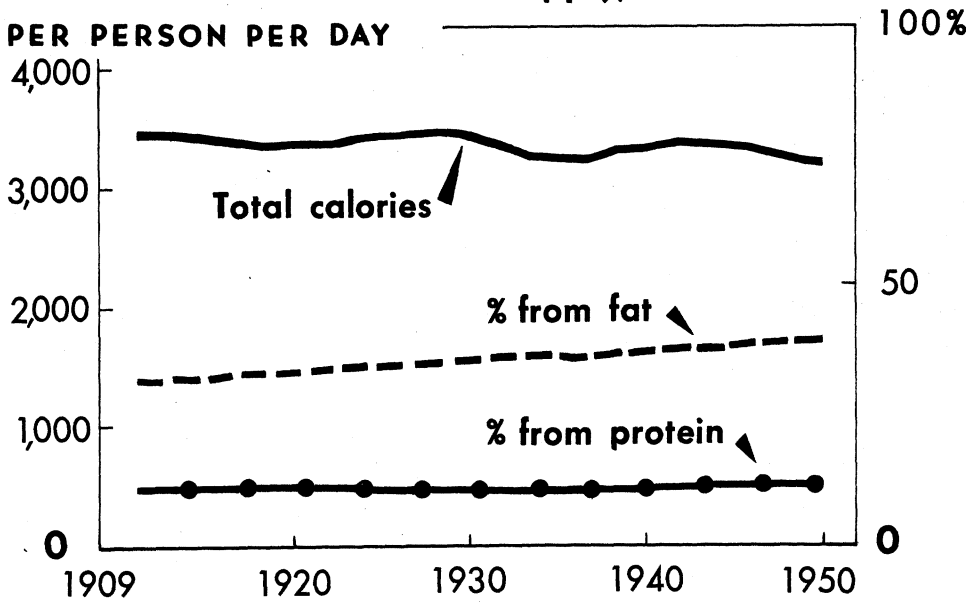
are still problems of getting good diets on low incomes that merit the attention of nutritionists. On farms, the kind and quantity of food produced at home for family use determines the nutritive quality of diets, at least in the South. In both urban and rural diets, calcium and ascorbic acid are the nutrients most often short as compared to recommended nutrient allowances, and on farms, at least in the spring of the year, vitamin A. Urban diets, especially in the North, are likely to fall below recommended amounts in thiamine, also. We need, therefore, to emphasize the sources of these nutrients in our educational programs.

This is, in many ways, a favorable report that I have given you on the nutrients available in the food supplies families have. But we must remember that these family surveys describe the food supply at the kitchen level--what is available to the household for consumption. They do not tell us how the food is used in the home, how much is wasted, how well it is prepared, nor how it is shared by family members. In other words, the family diet cannot be any better than the food supply that comes into the kitchen, but it may be considerably worse. This gives us a cue for educational programs--continued emphasis on choosing foods wisely, followed up with more attention to the best use of foods and to the diets of each family member.

CHART 1

CALORIES

In National Food Supply, 1909-52



AVAILABLE FOR CIVILIAN CONSUMPTION AT RETAIL LEVEL 5 - YEAR MOVING AVERAGE

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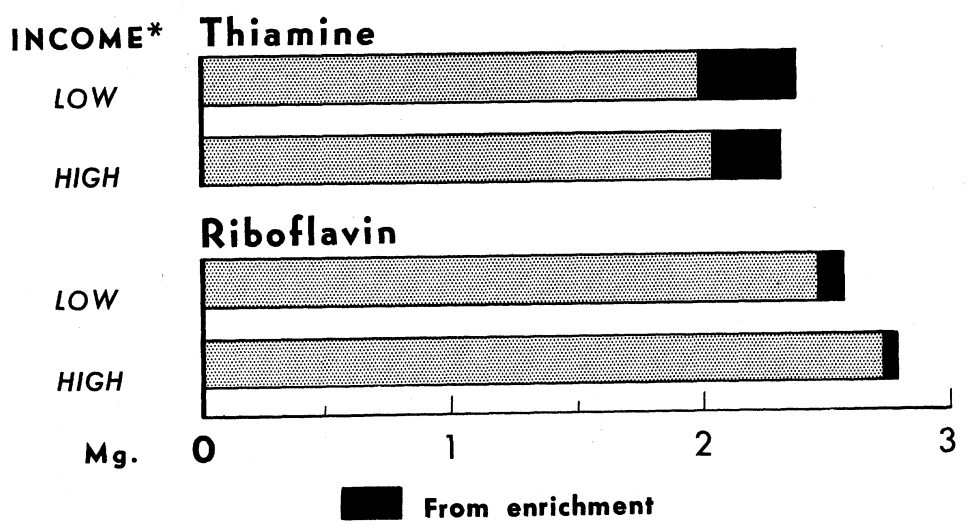
CHART 2

FLOUR AND BREAD ENRICHMENT

Contribution to Diet, Two Family Income Groups



NUTRITIVE CONTENT OF DIET PER ADULT-MALE EQUIVALENT PER DAY, CITY FAMILIES, SPRING 1948

* LOW INCOME = $1,000 - $2,000; HIGH INCOME = $5,000 - $7,500

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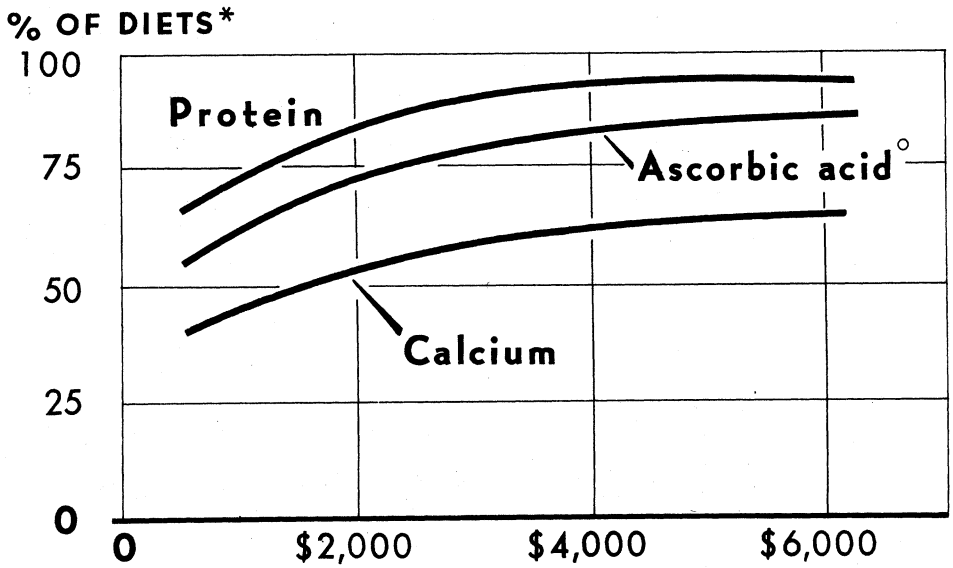
CHART 3

INCOME AND ADEQUACY OF FAMILY DIET



*PROVIDING NRC ALLOWANCES

°AFTER COOKING

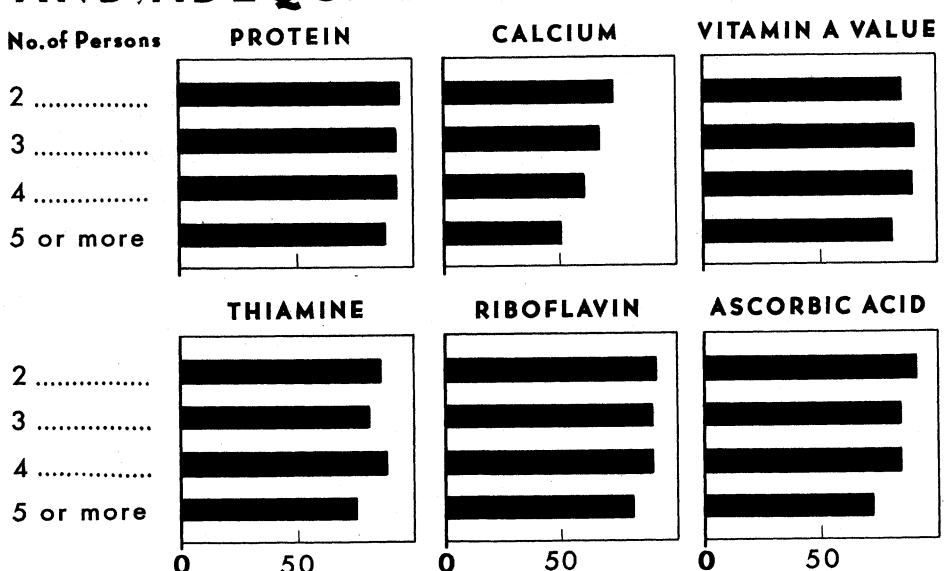
CITY FAMILIES, SPRING 1948

U. S. D. A.

BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS

CHART 4

FAMILY SIZE AND ADEQUACY OF FAMILY DIET*



* CITY FAMILIES, $3,000-$4,000 INCOME, SPRING 1948

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NEG. S 9223-D

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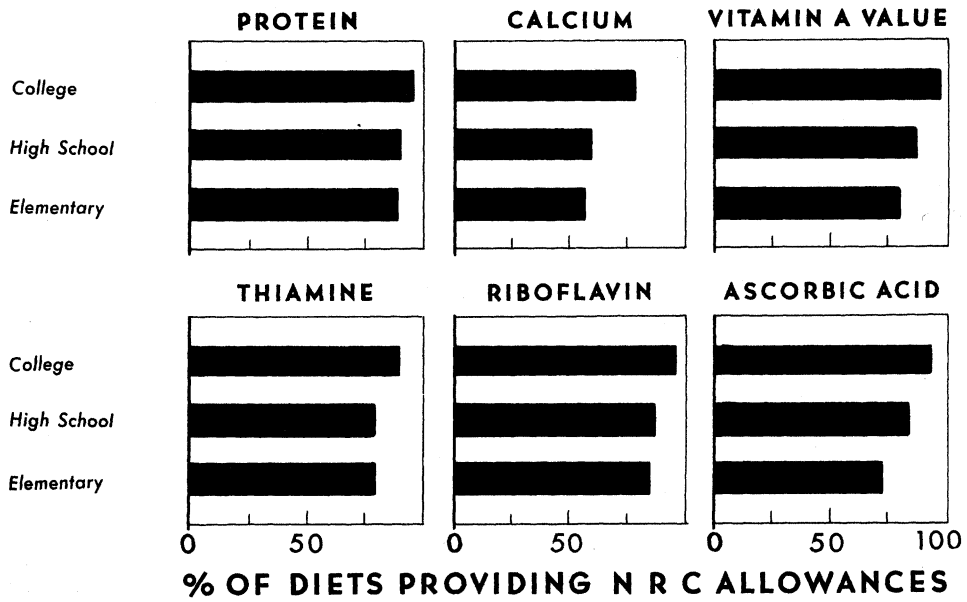
CHART 5

EDUCATION OF HOMEMAKER* AND ADEQUACY OF FAMILY DIET



* CITY FAMILIES, $3,000-$4,000 INCOME, SPRING 1948

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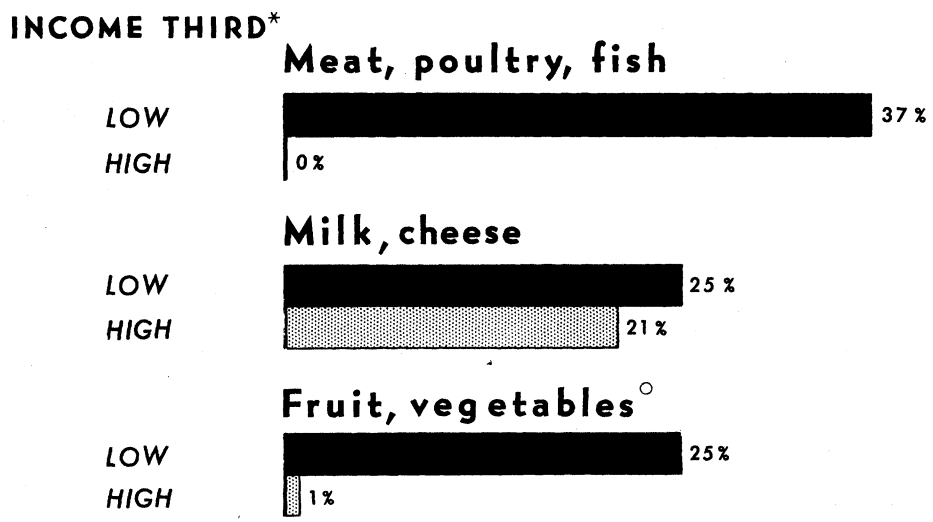
CHART 6

FOOD CONSUMPTION INCREASES

By Income Thirds, City Families, 1942 to 1948



* IN EACH YEAR, CITY FAMILIES RANKED BY DISPOSABLE INCOME IN CONSUMPTION PER HOUSEHOLD OF 3.5 PERSONS

° EXCLUDING POTATOES

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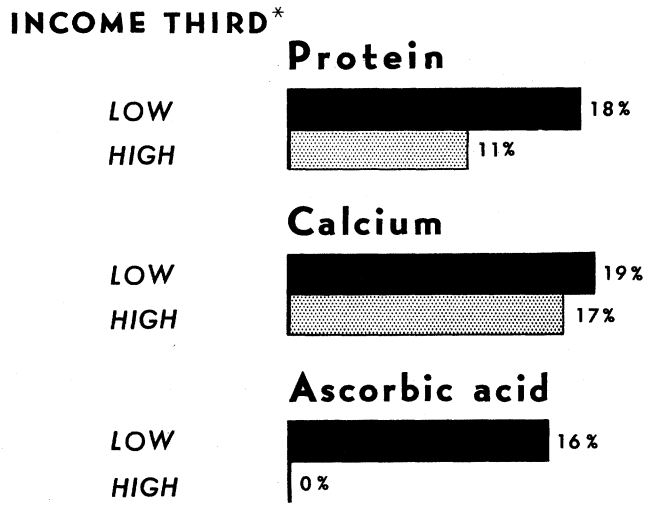
CHART 7

NUTRIENT INCREASES

By Income Thirds, City Families, 1942 to 1948



IN CONSUMPTION PER ADULT - MALE EQUIVALENT

* IN EACH YEAR, CITY FAMILIES RANKED BY DISPOSABLE INCOME

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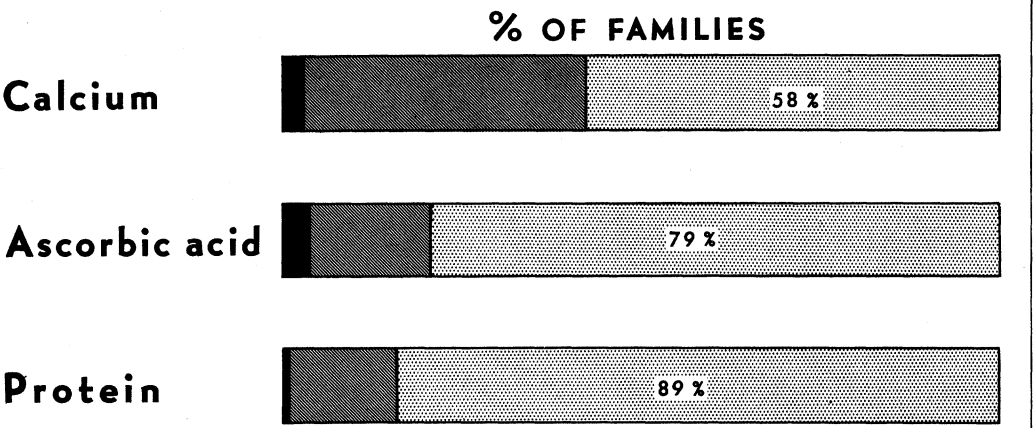
CHART 8

DIETARY LEVELS

City Families, Spring 1948



		CALCIUM	ASCORBIC ACID	PROTEIN
LOW	Under	0.5 gm.	50 mg. *	45 gm.
HIGH	Over	1.0 gm.	100 mg. *	70 gm.

* BEFORE COOKING

PER ADULT - MALE EQUIVALENT

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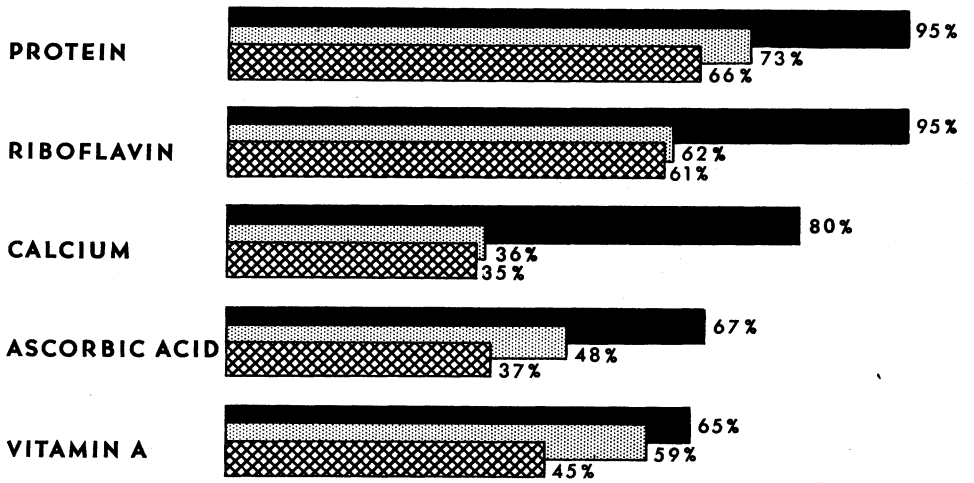
CHART 9

DIETS MEETING NRC ALLOWANCES

SOUTHERN FARM FAMILIES, WEEK IN FEB.-APR. 1948



Type of farming areas: Mountain ■ Tobacco ▒ Cotton ▩

SOURCE: SOUTHERN EXPERIMENT STATIONS AND BHNHE

U. S. D. A. NEG. 9517-D BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS

Nutritional Health in the United States

Presiding: W. H. Sebrell, Jr., M. D., Director, National Institutes of Health, Federal Security Agency

Food Intake of Individuals

Pearl Swanson, Ph. D.*

Some find it difficult to accept the premise that undernutrition still exists in this country. Specific and acute nutritional disease virtually has disappeared, and ours is a nation with a food supply apparently sufficient in kind and amount to meet the needs of our military and civilian populations. It is very easy, indeed, to assume a complacent attitude, and to forget that many people may have poor diets even in a land of plenty and that these diets are leaving imprints which in light of new nutrition knowledge cannot be ignored. More often than not, nutritional injury, like others acquired in the course of living, leaves a residue of scarring behind. While the harm done may not be detectable immediately there are considerable insidious cumulative effects (1). As Stieglitz says, we are largely what we are because of our yesterdays, and the older we become the more yesterdays have occurred to affect us.

So we need to know what people and what special groups of people are eating. We need to know how diets of people change as they pass from childhood and youth into adulthood and old age. We need to know whether or not the food they eat represents the best food for them in respect to their age, activity, and station in life. And surely, for certain age-decades at least, we need to know much more than we do now about what constitutes "best".

We have a pretty good picture of what people are eating in these United States. Many studies have been reported that relate to their good practices. But they tell the story of groups; give us mean pictures. And on the whole the outlook is encouraging (12). While these figures are important we must not let them contribute to the false sense of security I mentioned earlier for, packed away and hidden from sight in the mean values, is information sorely needed in the evaluation of the food practices of individuals or of subgroups represented in the mean. I have come to think of the mean as an iron curtain, and to believe that what we will learn when we pierce it will lead us to the people we need to reach with our nutrition programs.

I would like to present a few examples. The first relates to a study conducted in the state of Iowa on the food intakes of school children by Eppright and her coworkers (2). Some 700 elementary, junior,

*Assistant Director, Iowa Agricultural Experiment Station, and Professor in Charge of Home Economics Research, Iowa State College.

and senior high school children living in towns of less than 50,000 population recorded their food intakes every day for a period of 1 week. The records showed that the girls consumed the equivalent of 2.4 glasses of milk per day, the boys, 2.95. On the assumption that this represented the average day by day performance, one might feel encouraged in thinking that nutrition teaching regarding the dietary importance of milk really was reaching home. But these investigators were not content to stop here: they began to dig into an analysis of these mean records. And as they unraveled the mean, they found that the picture was not as bright as it was before (fig. 1). These children apparently did not consume milk regularly. Only 14 percent of the boys and 7 percent of the girls had the equivalent of 3 cups of milk every day of the week. Further scrutiny of the boys' record shows that only 50 percent of them had this much as often as four times a week; 84 percent had 3 cups at least one day. In other words, 16 percent of the boys never received 3 cups of milk or its equivalent in their daily diet.

The pattern for the use of ascorbic acid-rich foods is shown in the middle curve of the same figure. The mean intake for both boys and girls is about 0.6 of one serving, but only 50 percent of the children have a full serving as often as four times a week; 93 percent get it at least once each week.

It is significant that the pattern of the intake of ascorbic acid-rich foods is reflected in the concentration of the nutrient in the blood serum of these children (right-hand curve, fig. 1). About 25 percent of the children showed serum values of less than 0.4 mg. percent. In the eyes of many investigators, this would be considered as a "poor" rating. In terms of the same yardstick, another 50 percent had only a "fair" concentration of serum ascorbic acid. Data like these surely lead to speculation as to how many of these children are being scarred by the diets they customarily eat.

Another treatment of the data (2) gives further insight into food practices of these boys and of girls, and how they change as children grow older. Figure 2 shows the number of servings of the important food groups eaten per day by boys and girls representing four age groups. It is clear from this figure that the diets of boys are better than those of girls. They are eating more generously of all food groups with the possible exception of the vitamin-rich fruits and vegetables. Boys tend to increase their consumption of all food groups as they grow older except for the green leafy, yellow, and vitamin C-carrying fruits and vegetables. On the other hand, girls 15 years of age and over, distressed perhaps at rapid changes in growth and size, try to achieve the fashionably slim figure by cutting down the quantity of milk, fats, and cereals in their diet. Here indeed is a vulnerable group needing help and council in selecting meals that will provide the right foods, let them live happily within the social dictums of their very special group--even to inclusion of snacks!--but still keep their weight within bounds. The story shown by this chart confirms and amplifies the studies so admirably summarized in the July 1952 issue of Nutrition Committee News (3).

A survey of the dietary practices (1-day dietary recall) of a group of 1,072 women representing a probability sample for the state of Iowa of individuals ranging in age from 30 to 95 years has disclosed a wealth of information about what women eat (4). In the instance of the number of calories provided by the daily diets reported, the mean value is of special interest on account of its extraordinarily low value--1,735 calories. That low caloric intakes are representative of the food practices of women in this age group in Iowa is illustrated in figure 3. Here the energy values of the diets are grouped in 200-calorie intervals and the percentage of women reporting diets in each energy range plotted. Apparently 86 percent of the women reported diets providing less than 2,400 calories, the recommended allowance of the National Research Council for the moderately active woman. The data would indicate that the busy homemaker in today's society needs only three-fourths as many calories as she did a quarter-century ago--a situation clearly understandable in light of the many time- and labor-saving devices of the present era. But these data also indicate that new information is needed on the energy cost of the tasks and activities of the modern woman if her caloric needs are to be estimated. What these requirements actually are poses another pressing question when we note that despite the low caloric intakes, 40 percent of the women may be considered obese in terms of their ideal weight at age 30.

The picture presented is not characteristic of Iowa women only. Trends are amazingly similar in like studies conducted in other states in the North Central Region (4). Also, studies based on dietary calculations of 7-day weighed dietaries of a large group of women and on determinations of the heats of combustion of diets consumed offer confirmatory evidence (5). The need for a revitalized attack on the nutritional problems of adult women is indicated clearly.

But now to get away from the consideration of the mean. As in the case of children, no mean figure will describe the food habits of adults. For one thing, their food practices change as they grow older. Again, caloric intake may serve as an instrument of appraisal. In the sample of Iowa women just discussed, the mean energy value of the day's diets reported by individuals in the 30-year decade was 1,865 calories; that in the group 70 years of age and over, 1,435 calories.

Other factors also leave their imprint on mean values of the order described and need to be recognized and taken into account in trying to understand dietary needs of people. Income, education, place of abode, etc., alter food practices of families and family members. For example, the study just referred to shows that in each successive age-decade from 30 to 70, women in rural areas consume diets of higher energy value than their contemporaries living in villages and cities.

Physiological disability also may bear a close relation to amount and kind of food eaten. Even among older women choosing diets of low energy content, a wide range in caloric value of the diets is observed.

For example, of 174 women 70 years of age and over, the diets of those who had lost all of their teeth provided 1,080 calories per day; of those who had no teeth but who were wearing dentures, 1,430 calories; and of those who had some of their own teeth, 1,538 calories. Only the spotlight of nutritional evaluation will clarify the extent to which diets like these meet the needs of the individuals or groups represented. Problems are clearly indicated.

One common device for the evaluation of dietaries of families is the expression of foods or nutrients consumed in terms of "man units." The procedure may only give a partial picture, however, and unraveling mean values of family consumption figures becomes an interesting occupation indeed, as Leverton has recently demonstrated (6). She has obtained weighed records of foods eaten by Nebraska families. In a preliminary report based on 33 families, she writes that in every instance father ate the best diet. Not every father had an adequate diet, but his diet ranked the highest in his family. Mother ate the poorest diet except in families where there were teen-age girls. Then the girls ate the poorest diets and mother the next poorest. Father always ate more food and a greater variety of food than other family members. The way milk was used each day by different members in these 33 families is very interesting:

Fathers.....	1-1/4 cups
Mothers.....	1/2 cup
Boys, 13 to 15 years.....	1-1/4 cups
Girls, 13 to 15 years.....	3/4 cup
Boys, over 16 years.....	2-1/2 cups
Girls, over 16 years.....	1-1/4 cups
Boys and girls	
1 to 6 years.....	1-1/2 cups
7 to 12 years.....	1-1/2 cups

Additional information about food intakes of individuals can also be gained if a study of the mean is attacked from another angle. By definition, it represents a set of items. In size, it is intermediate among the various items. But as one looks at the individual items represented, one is struck by their variability. Statisticians have evolved a tool for measuring average variability that is called the standard deviation. They tell us we can expect to find that about two-thirds of the items will fall within a range represented by the mean value plus or minus one standard deviation. These values clustering around the mean are more or less representative of the group, whereas those in the fringe falling outside the range of the mean plus or minus the standard deviation

probably are not. Data falling in the extreme ranges may be of special importance in the interpretation of nutrition studies. Let me illustrate again with data pertaining to the energy value of the diets reported by the women in the Iowa probability sample. The picture is summarized below:

No. of women reporting.....	1,072
Mean energy value of diets reported.....	1,735 calories
Range from highest to lowest value..... (4,025 calories - 177 calories = 3,848 calories)	3,848 calories
Standard deviation.....	±599 calories

It would appear therefore, that the daily energy value of the diets of--

2/3 of the women (417) ranges from 1,136 to 2,334 calories;

1/6 of the women (179) is less than 1,136 calories;

1/6 of the women (179) is more than 2,334 calories.

The variation in the items represented in the mean value, 1,735 calories, is apparent. This variation measured in terms of the standard deviation tells us that about 714 women in the sample are eating diets whose energy value ranges from 1,136 to 2,334 calories. This, then, seems to be the general pattern. But 179 of the women in the group had diets that supplied less than 1,136 calories per day--a supply of energy in many instances inadequate for meeting even basal requirements. What about the health of the individuals in this group? Is there any relation between quality of diets consumed and nutritional well-being? To what extent are the women able to engage in the normal activities and tasks of their living patterns? Do they regard each day they live as an endurance race?

A partial answer to these questions is found in the case records of the women. Actual count showed that there were 184 people eating diets furnishing less than 1,200 calories per day--a figure agreeing very well with the estimate just made. It must be kept in mind that in a probability sample of the kind used, all women over 30 years of age in Iowa are represented; that one would expect to find a number of cases for which some reasonable explanation for the ingestion of minimal diets could be made. This proved to be true. Temporary ill health, invalidism, diseases involving the curtailment of food, doctor's orders, "unusual" diets on the day of contact, extreme old age, and inability to buy more food explained the low-caloric diets of 114 of the 184 women. Another 20 apparently were trying to reduce on self-directed regimes.

There remained, then, 53 women for whom the exigencies of life provided no answer as to why they used poor diets. But further probing of the schedules revealed some very interesting information (table 1). Thirty women, or 60 percent of the group, were more than 10 percent overweight in respect to their ideal weight at age 30. Obesity ranks today in the minds of many experts as a nutrition disease; indeed, there are those who consider it the major nutritional problem of our day and age. Obesity also carries with it the possibility of the uncontrolled reduction program and its attendant dangers. It has been noted already that some women in the original group of 184 were trying to reduce on "their own." In addition, many women apparently not engaged in active reduction were curtailing food in an unregulated haphazard fashion, that is, deliberate omission of one of the meals of the day and avoidance of pork, potatoes, starchy foods, etc. Erratic food habits were characteristic also of certain of the women in the group who were not overweight. But, overweight or not, overt signs of undernutrition appeared among approximately 20 percent of the women. There were complaints of listlessness, irritability, nervousness, fatigability, and constant weariness. Planes of activity were low and some neurotic tendencies exhibited. Youmans (7) has called attention to the emotional changes that accompany reduction of nutritional state, notably in calories.

The harm of indiscriminately used low-calorie diets does not lie in their reduced energy value alone. It has been shown (5) that within comparable dietary patterns, the protein content of diet follows its caloric value. In turn, adequate ingestion of protein seems to insure adequate intakes of thiamine, riboflavin, niacin, and iron. The diets of women about whom we have been talking here, therefore, undoubtedly are inadequate in many nutrients (table 1) and probably are leaving nutritional scars that may be reflected in health in later life as indicated in table 2. The data point to the possibility that the higher the energy and protein values of the diets, the higher is the health rating. Figure 4 may be suggestive in this connection also.

This discussion has implied that the use of low energy-producing diets represents a problem of specific importance, and that many individuals in specific population groups could be benefited by nutrition-education programs. The size of the problem is indicated by the Iowa data which make possible the estimation that, on any one day, more than 50,000 women are eating meals that provide less than 1,200 calories per day.

Diets of adequate energy value are important nutritionally from another angle also. A sufficient intake of energy-producing foods is needed to insure efficient utilization of the protein present in the dietary. A series of short-term balance studies from the North Central Region (8) have shown that at approximately the same nitrogen intake, nitrogen retention varies with the caloric value of the diets consumed (fig. 5). Around 1,500-1,800 calories seem to be needed per day in order to secure approximate equilibrium in women 40 to 60 years old eating self-selected diets. The incidence of negative nitrogen retention by individuals in this age group calls for intensive investigation.

The importance of calories in nutrition has been emphasized by others. Implications of the work of Leverton and coworkers (9, 10) are that the lower the dietary intake of proteins and calories, the greater is the need for including high-quality protein in each meal if the nitrogen is to be well utilized. Oldham and Sheft (11), too, have noted that the amount of nitrogen retained by pregnant women is more dependent on caloric than on nitrogen intakes. For example, more than two times as much nitrogen was retained by women ingesting diets providing 50 grams of protein and over 2,100 calories per day than by individuals consuming 70 grams of protein and less than 2,100 calories.

In summary, it may be said that although dietary studies in general indicate that the national diet is good (12), there still remain in the picture certain vulnerable groups of individuals that should serve as targets of nutrition education programs. They are: Children, ages 6 to 15 years and in particular adolescent girls, mothers of families, aged people, adult women in the age bracket 30 to 70 years, and pregnant women.

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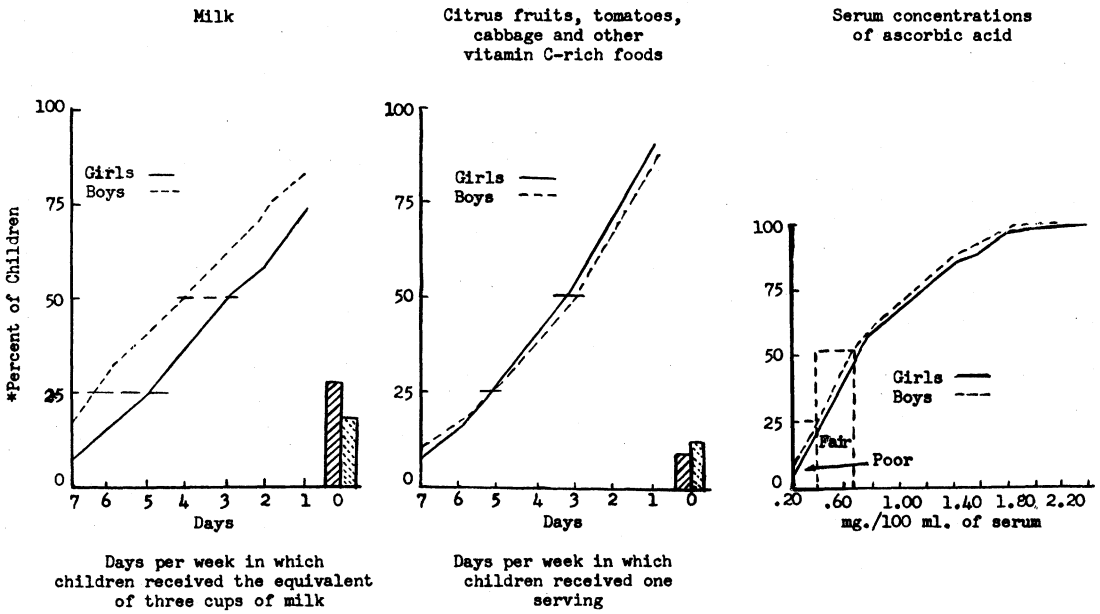

* Cumulative

FIGURE 1.--DISTRIBUTION OF IOWA SCHOOL CHILDREN WITH REFERENCE TO THEIR USE OF MILK, VITAMIN C-RICH FOODS, AND THE DISTRIBUTION OF ASCORBIC ACID IN THE BLOOD.

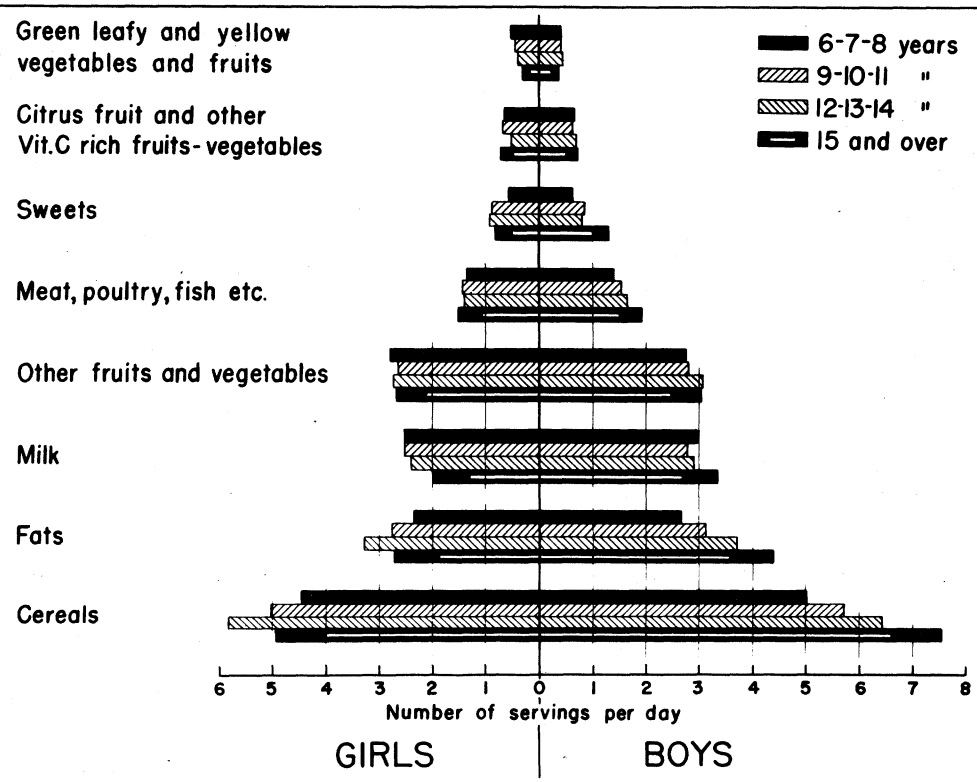

FIGURE 2.--USE OF FOOD GROUPS BY IOWA SCHOOL CHILDREN

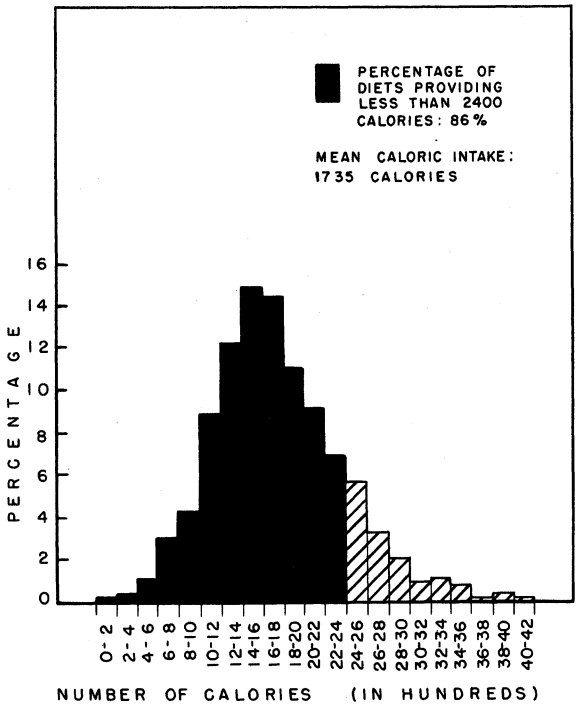

FIGURE 3.--PERCENTAGE OF DIETS PROVIDING SPECIFIED NUMBER OF CALORIES BASED ON FOOD RECORDS REPORTED BY 1072 IOWA WOMEN, 30 - 95 YEARS OLD.

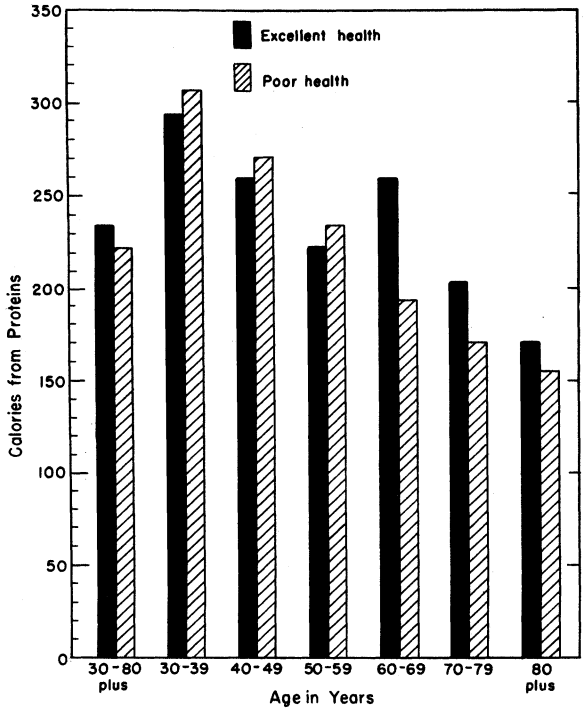

FIGURE 4.--CALORIES ORIGINATING FROM DIETARY PROTEIN AND STATE OF HEALTH IN DECADES OF LIFE AFTER 30 (5).

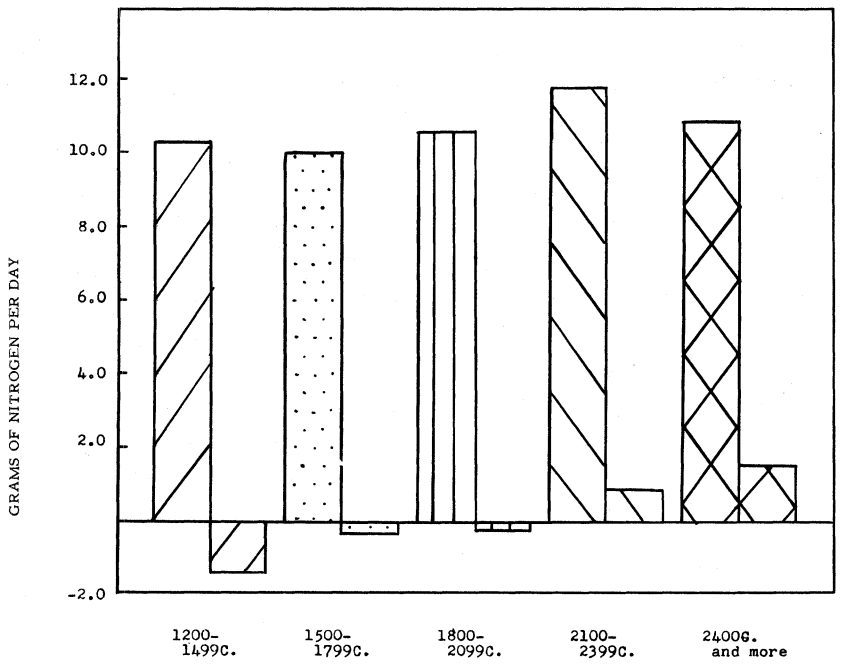

FIGURE 5.--INTAKES AND RETENTIONS OF NITROGEN OF 68 WOMEN, 40 TO 60 YEARS OLD

Table 1.--Some characteristics of 51 women ingesting less than 1,200 calories per day

Classification in respect to body weight	Number of women	Mean energy value of daily diets	Mean protein intake per day
		Calories	Grams
Overweight (11 percent and more above ideal weight age 30)*	30	...	...
Women with erratic food habits	9	1,036	41
Women with symptoms of undernutrition	9	872	27
Others	12	1,107	36
Normal weight (ideal weight age 30 ± 10 percent)	21	...	...
Women with erratic food habits	8	824	27
Women with symptoms of undernutrition	3	937	34
Others	10	1,017	34

* It is a paradox that three-fifths of the women are overweight on caloric intakes of the order indicated. The low protein intakes suggest that overweight may represent water retention in some instances at least. Also the tendency of obese women to under-report their diets (13) should be considered.

Table 2.--Nutritive value of diets and health of women 70 to 90 years of age

Health classification*	Number of women reporting	Mean energy value of daily diets	Mean protein intake per day
		Calories	Grams
0 to 3	30	1,529	47
4 to 8	62	1,409	44
9 to 10	32	1,437	43
11 to 19	22	1,309	37

* The higher the score (5), the greater the incidence of symptoms that may be of nutritional significance.

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Nutritional Health of Adults

Russell M. Wilder, M.D.*

From preceding speakers you have heard about the nutrition of our people as judged by national food supplies and the adequacy of food available to individuals and families. The task assigned to me is to focus your attention on the question: How well are the American people being fed, judged by their health? That is, how commonly are the people of the United States suffering from ill health because of deficient diets? How common and how severe are nutritional deficiencies today? The ultimate aim of food production and nutrition programs is, after all, to produce an optimum of health and satisfaction.

A critical look at our present situation reveals substantial evidence that the nutritional health of the population has improved in recent years. In the 1930's, particularly in the latter part of that decade, as Dr. Sebrell said, contributions to the science of nutrition accumulated rapidly. This permitted intensive attack, during the 1940's, on the specific nutritional deficiencies which we knew existed then. We ought to be in a position now to evaluate the extent to which we have improved that situation and to assess correctly the problems which remain.

In the time available today, I must limit my remarks to the adult population. Other speakers will discuss special population groups.

Most of you already are familiar with the difficulties which attend assessment of nutritional health. Suffice it to say, there is no single criterion or measurement which reflects nutritional status with complete reliability. When one deals with adults, who are considerably less sensitive indicators of dietary failure than are growing children and women during pregnancy, the criteria of nutritional ill health become even less reliable. However, by collecting data of many types from many sources, certain trends become apparent, as I shall indicate.

Vital statistics

Vital statistics serve as useful indices of public health, but have limitations when we turn to them for information about nutritional status. Reported deaths from pellagra have steadily decreased in number from the late 1930's to a low of 606 in 1948. It is regrettable that any deaths from this nutritional disease should have occurred after the discovery in 1938 that nicotinic acid was a specific treatment for pellagra. Possibly some of the deaths in recent years were attributed to pellagra incorrectly.

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At any rate, the morbidity figures are more encouraging. Up through 1941, approximately 9,000 cases had been reported every year. From then until 1948, with the exception of 1946, the figure ranged from 900 to 1,500 (in 1946, the number was about 4,000). From 1949 up to the present, the rate dropped rapidly to a low of 141 in 1951. Even this last figure may be high, since the recent reports from most of the medical schools in the South indicate that they can find no cases of pellagra to show their students. It is not unlikely that many of the reported cases of pellagra have been diagnosed improperly. The differential diagnosis is not easy for physicians who are inexperienced in the differentiation of pellagra from diseases which resemble it.

Deaths attributed to other avitaminoses, such as beriberi, never have been recorded in sufficient numbers, in our country, to permit a judgment as to trend of incidence for them. However, the statistics for less specific indices of nutritional health present a consistently improving picture. Infant mortality, fetal deaths, and maternal mortality rates have been constantly improving. Mortality from tuberculosis is continuing its slow decline. The average span of life continues to lengthen. While a multitude of factors have contributed to the continuing improvement in these indices, improved nutrition also must have played a role. Indeed, it is fair to say that the degree of improvement noted depended largely on improvement of the diets of the people.

Other evidence of improved nutritional status

For many years, in various sections of the country, certain large medical centers have maintained continued interest in detecting and recording instances of vitamin deficiency in patients admitted to their hospitals. One of these institutions is the Cincinnati General Hospital where the declining frequency of pellagra has been notable. From 1935 to 1939, frank pellagra could be diagnosed in one in every hundred admissions (around 35 cases per year). However, from 1946 to the middle of 1948, only one such diagnosis could be made.

Milder, atypical nicotinic acid deficiency was observed, but the prevalence of these milder cases likewise has declined. The experience of numerous medical centers throughout the country has been the same, and in the Southern States, where pellagra and other specific nutritional deficiencies once were common, it is now, as I have said, almost impossible to find cases of pellagra for teaching purposes.

In a large general hospital in Chicago, where beriberi formerly was not uncommonly observed, a systematic search failed to detect a single case over a 3-year period. In some hospitals, for instance the Boston City Hospital, a few cases of scurvy, beriberi, and similar deficiencies appear each year, but they now are so rare that they are pounced upon with extraordinary glee when they are found.

Chronic alcoholics consume a notoriously poor diet. In the 1930's,

specific vitamin deficiencies appeared in appreciable numbers among those patients in almost every hospital. However, in 1948 and 1949, some 16,000 alcoholic inmates of Chicago's House of Correction were surveyed, with the discovery of only 2 with pellagra, 1 with possible beriberi, 3 with ariboflavinosis, 1 with Wernicke's encephalopathy, and 7 with possible nutritional polyneuropathy. No scurvy, no xerophthalmia, and no gross phrynoderma was disclosed. Furthermore, in a smaller group subjected to more detailed study, hemoglobin, plasma protein, and urinary thiamine and riboflavin were found to be within the range of normal. All this was true despite the fact that many of these patients were obviously ill fed. Of 451 newly admitted inmates, 23 percent were grossly underweight.

There are two points of major interest in this Chicago study. One is that the rapid decline in the incidence of vitamin deficiencies began shortly after enrichment of white bread was started. The second is that the infrequency of vitamin deficiency in this extraordinarily vulnerable group implies that the incidence of vitamin deficiency diseases in the general population, subsisting as it does on a far superior diet, is very low indeed.

Between 1946 and 1950, the Public Health Service maintained several nutritional survey units in various sections of the United States. Much of their work was with children, pregnant women, and other groups not considered in this paper. However, they also made numerous surveys of families, factory workers, and other adult groups. Several thousand adults were examined, and among them not a single case of frank vitamin deficiency was detected. However, a certain low incidence of physical signs was detected which are associated with nutritional deficiencies--signs such as cheilosis, glossitis, dyssebacia, and similar abnormalities. This gives some reason to believe that the nutrition of these adults may not have been as good as is desirable.

I should make it clear at this point that I am omitting from discussion a prevalent, indeed, the most common type of malnutrition seen in this country today. One can walk into almost any hospital and pick out numerous malnourished people. These individuals, however, are suffering from a secondary type of malnutrition. They have some acute or chronic disease which, through its own effects and through a depression of appetite, has produced what is often very advanced nutritional deficiency. Such deficiencies, however, are rarely of specific vitamin or mineral nature. Such patients usually present a general insufficiency of calories or protein with, perhaps, proportional insufficiency of other nutrients. Numerous biochemical studies have shown them to be less than saturated with vitamins, although apparently rarely to the degree that signs of specific vitamin deficiencies appear. Such patients often can be greatly benefited by attention to their proper nourishment, as well as to specific treatment of the primary disease. These, however, are essentially individual medical problems. One certainly cannot blame our national food supplies for them, or even our national eating habits.

Institutionalized adults also present nutritional problems. It is well known, for instance, that many of our mental hospitals are overcrowded and

that their budgets are limited so that the diets provided often are unsatisfactory. Furthermore, many of these patients give little if any thought to what they eat. In a mental institution in the South, a member of our research staff had occasion to examine a number of the inmates. Forty-six percent of the white males and colored females, and 34 percent of the colored males were 10 percent or more underweight. More than 50 percent had a mild anemia with a small but definite macrocytosis. From 2 to about 50 percent of various groups showed one or more of the physical signs which have been associated with vitamin or mineral deficiencies. Yet some of these subjects were treated for as long as a year with large doses of vitamins, yeast, B_{12}, folic acid, and some with liver extract, with no improvement in body weight or anemia. As a matter of fact, the physical signs of nutritional deficiency were more prevalent after therapy than before. This certainly indicates that the poor physical state of these subjects could not be due to vitamin deficiency alone and that, if dietary failure was involved, it was a deficit of calories or of protein rather than the lack of a specific vitamin. This certainly is a far different situation from that in similar institutions in years gone by, when pellagra was "epidemic" in some of them.

Overweight

Dr. Jolliffe will discuss overweight and its unpleasant implications. We hear much about this now and are ready to believe that obesity constitutes our chief nutritional problem. The problem, however, is not new; indeed, it is unlikely that the incidence of overweight exceeds that prevailing always where food supplies have been abundant.

The Division of Chronic Disease and Tuberculosis of the Public Health Service has very kindly provided a summary of some heretofore unpublished tabulations. The data are from surveys made in Atlanta in cooperation with the Fulton County Health Department. These data are compared to the figures in the Height-Weight Tables of the Medical-Actuarial Mortality Investigation of 1912 (figures 1 and 2). The agreement in these curves holds true for males in all age groups, although I have time to show you only the data for the age group 35 to 44 (figure 1). To the extent that these studies represent a true cross section of the adult male population, it can be said that the actuarial tables of heights and weights published in 1912 reflect the average situation today. These data further show that there is no essential difference in the average weights of Negro and White adult males. The men in the Atlanta study follow the actuarial curves as closely as one could expect. In addition, studies in Richmond, Va., and the height-weight data from World War II draftees show essentially the same findings, indicating that there are no significant regional differences in height and weight.

For the women, the situation is a little different. In the first place, there is nothing available that is comparable to the measurements of the draftees. Perhaps that may be partially changed when the results of the examinations of the women's corps in the military services become available. The surveys in Atlanta and Richmond indicate that white women

weigh about 4 to 5 pounds on an average less than the weight given in the actuarial tables. It has been stated that recent studies of the Equitable Life Insurance Company provide a similar picture for the women in the United States as a whole. In part, this can be attributed to the light weight of the clothes and shoes which women wear today. However, the Negro women in both Atlanta and Richmond were approximately 15 pounds heavier than white women were before 1912. Perhaps that in part is owing to the improvement in their economic status.

Summary

Our present situation with respect to the nutritional health of the adult population may be summarized as follows:

1. Frank vitamin and mineral nutritional deficiencies are rare in the United States today. This is strikingly in contrast to the situation which existed prior to the National Nutrition Conference of 1941. Most of the specific nutritional deficiencies which do occur today are secondary to other diseases and are individual medical problems rather than problems to be approached by mass nutrition programs.

2. Nevertheless, specific nutritional deficiencies still persist, even though their incidence is very low. The inevitable corollary to this, if data from nutrition experiments in animals and in man have any meaning, is that a larger though indeterminable number of our adult population still suffers from so-called "subclinical" or borderline deficiencies. Unfortunately, the diagnostic methods as yet available are simply not equal to the task of determining the frequency of occurrence of such borderline deficiencies. How much ill health actually results therefrom is anybody's guess. Even that time-honored court of last resort, the therapeutic trial, has not been of much assistance in answering this question.

3. The time has been too short to say much about anemia. It constitutes a problem by itself. Using standards as generally accepted, anemia undoubtedly is a prevalent defect, especially among women, but again we find ourselves in an embarrassment. It appears to be impossible to decide what proportion of this defect--if it is a defect--is clearly nutritional in origin. Unquestionably, some anemias can be corrected by nutritional therapy. However, the very common mild hypochromic, so-called iron-deficiency, anemia, which represents the major part of the problem, has responded poorly, if at all, to the increased iron intake resulting from enrichment with iron of white bread. We must entertain the thought, in my opinion, that much of this anemia is in part an artifact, attributable to the use of unrealistic hemoglobin standards, and that many of these so-called anemic individuals actually suffer no ill health from their hemoglobin levels.

4. Evidence has been presented which suggests that the problem of overweight is no more serious today than it has been in the past. It is a serious problem, perhaps the most significant nutritional problem facing us at present, but the average weights of adults for their heights remain about the same as they were in 1912.

5. Considering all aspects of the nutrition situation, it is fair to state, I think, that the problem of vitamin deficiency in our adult population has been largely overcome, so that deficiencies of specific nutrients no longer represent major causes of demonstrable ill health.

6. However, I must hasten to emphasize that this ought not to lure us into complacency. There is every reason to continue the programs and activities which, since the Food Conference of 1941, have been pursued with evident success. The fact that smallpox has largely disappeared does not mean that we can safely discontinue vaccination. It would be the height of folly to stop the very activity responsible for almost eradicating smallpox. Furthermore, the evidence is substantial that a large segment of our people are skating on thin ice nutritionally. While their intake of nutrients now is sufficient to prevent overt evidence of vitamin or mineral deficiency, they have little margin of safety in their tissue stores to resist nutritional stresses incident to disease or to periods of temporary imbalance or shortages in their diets. I should point out that the actual change in nutrient intake from 1940 to the present, which apparently has produced a major improvement in our nutrition picture, has been small indeed on a per capita basis. It follows that only a small deterioration in the average American diet would put us back to where we were before. We, therefore, should continue to exert ourselves to improve both foods and our food habits.

7. However, a problem of ways and means presents itself today, which I regard as serious. Any organization, any movement, indeed, a science itself, will stagnate and die if it finds itself unchallenged. The manifest diseases of nutritional origin encouraged action in the past. That challenge now is lessened. The diminished prevalance of conspicuous nutritional diseases will make it increasingly difficult to maintain an active interest in nutrition programs. The national nutrition problems which face us now are nebulous, and benefits obtainable, if any, are too difficult to demonstrate. Thus, proper financial backing for our programs may be denied.

8. The science of applied nutrition is at a crossroad in this country now. It can wither and die, or it can grow, develop, and strike out mightily with a continuous flow of contributions to the public health. Above all, we must maintain a constant watchfulness, lest we lose the ground already won. The price of good nutritional health, no less than that of freedom, is eternal vigilance.

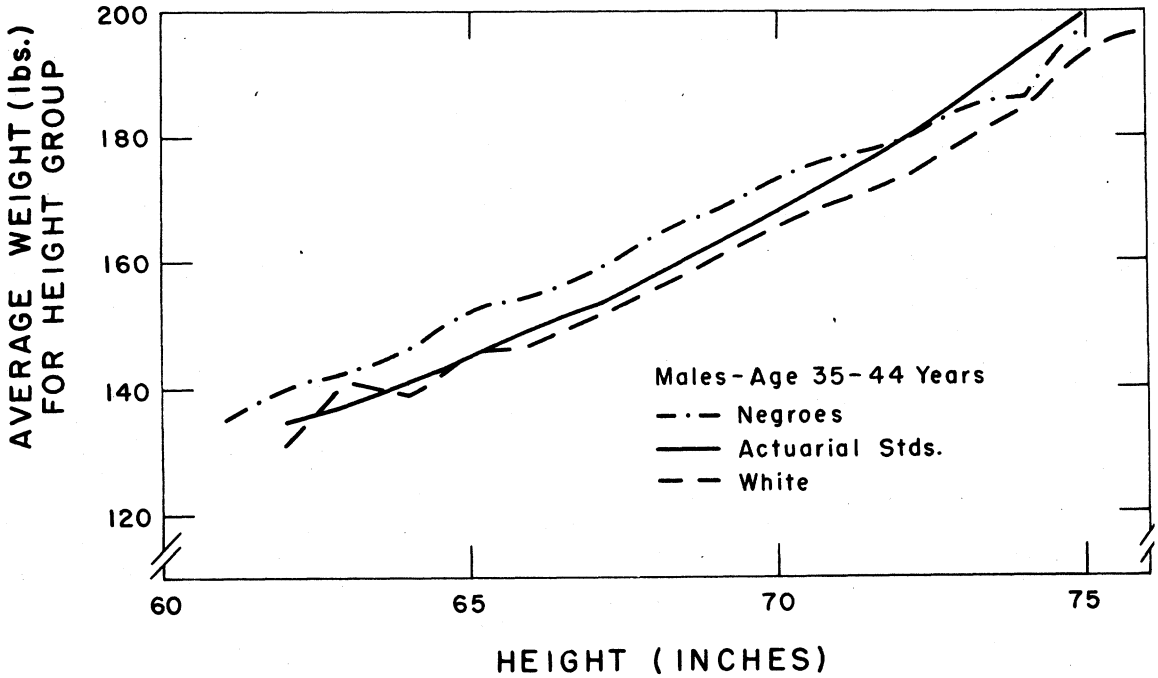

Figure 1.--Height and weight of men 35-44 years of age (Atlanta, Ga., survey) compared with actuarial standards.

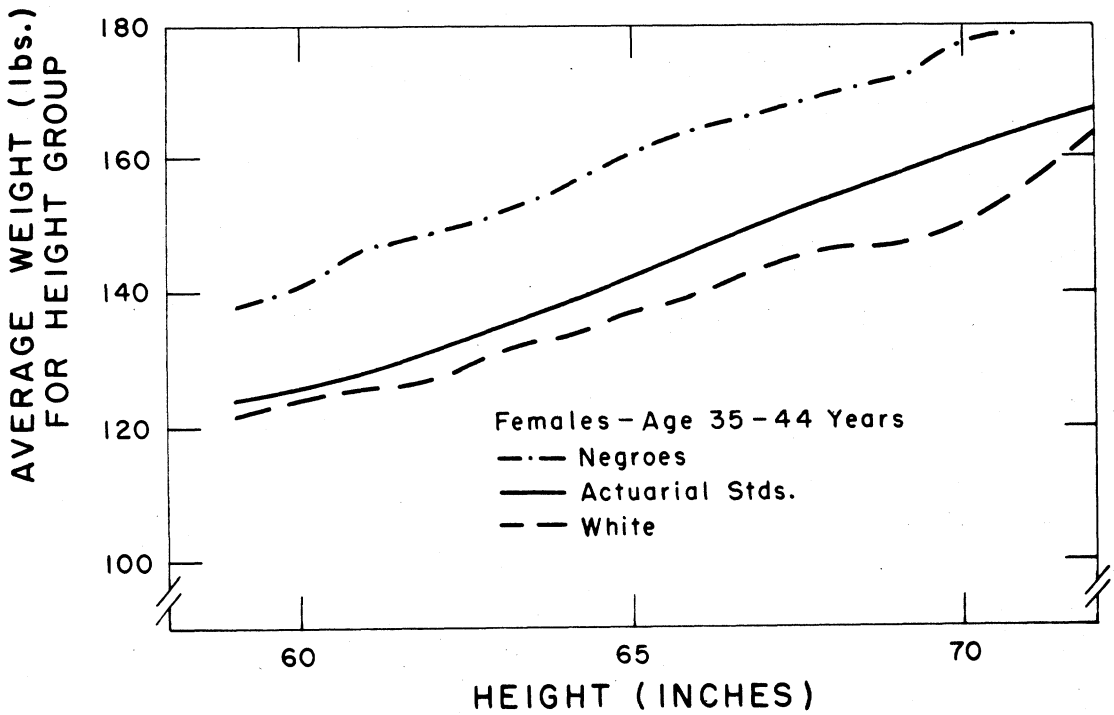

Figure 2.--Height and weight of women 35-44 years of age (Atlanta, Ga., survey) compared with actuarial standards.

Nutritional Health of Infants, Children, and Adolescents

Genevieve Stearns, Ph.D.*

It is generally conceded that, during the period of growth, children should be in excellent nutrition, to permit best growth and development.

The infant occupies a favored position in the family--education of the mother has impressed her with the necessity of providing a good diet for her baby. In addition, the fortification of milk with vitamin D, especially the cheaper forms of milk, as evaporated milk, has made the administration of this essential vitamin automatic and cheap. Clinical rickets in infancy is becoming rare; similarly scurvy is disappearing, for mothers know an antiscorbutic is necessary. The overfat babies of the condensed milk era have given way to the alert, wiry youngster fed more protein and less carbohydrate. One of the chief concerns at present is overdosage of infants with vitamins, particularly those, as A and D, which cannot be excreted and are broken down in the body slowly. The advent of highly concentrated water-miscible vitamin mixtures and the American belief that "if a little is good, more is better" are resulting in wholesale overdosage of infants with vitamins. Acute toxicity with vitamin D has been reported occasionally; acute toxicity with vitamin A is becoming more common.

The baby after birth is well-fed, but the baby is, or should be, 9 months old at birth. If his nutrition in utero is poor, his stay is apt to be less than 9 months, and the incidence of birth injury and of congenital abnormality increased. Medical science has learned how to save many of these tiny, poorly nourished infants, but their too-early birth should be prevented. Good nutrition of pregnant mothers will cut the mortality among newborn infants far more than the best care of the prematurely born can ever accomplish.

As soon as the child becomes able to feed himself, he seems to lose his favored position in the family and must often fend for himself at the family table. He is a slow and untidy eater; he chews poorly. His meal, therefore, is apt to consist of such foods as he can manage with a spoon or eat from his hand. Potatoes and gravy, bread and butter, form the mainstay of his diet--poor in protein and too rich in carbohydrate. Yet in these years his need for protein is as great as during infancy, for these years of slow body growth from 1 to 3 years of age, are a period of changing body composition. The musculature grows far more rapidly than the rest of the body, if the protein intake permits. The child changes from an infant dependent on others for his locomotion, to a child maintaining an upright posture and moving about by himself. Such a change

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means the skeletal muscles should increase by about one-third--all too often there is little or no increase, and the result is a child with habitual fatigue posture and little energy.

The period from 4 to 11 years of age is one of steady growth. This is a period wherein dietary deficiencies can be remedied more easily than in later years. Deficiencies of protein can be overcome in 6 weeks to 2 months, for protein foods seem to be well absorbed at all ages during growth, by sick and by well children alike. The school-age child is exposed to many infections; it appears probable that good protein nutrition increases the resistance of the child to infection. Conversely, it has been shown that the child recovering from rheumatic fever who is well fed and well cared for has as low a recurrence rate of this disease as does the child given continuous preventive therapy with antibiotics, which is more evidence that good nutrition provides increased resistance to disease.

Studies of calcium retention, as an example of the more difficultly absorbed nutrients, show that retention of this element depends both on the age of the child, or rather the rate of growth normal for that age, and on the intake of calcium. Given an ample intake, children tend to store calcium most heavily during the year or so which precedes the period of rapid growth in height.

Studies of thiamine, riboflavin, and vitamin C nutrition show that the urinary excretion of these substances varies with the intake. If the protein and calcium intakes are adequate the first two vitamins will be supplied adequately. Vitamin C can come from many sources, or from few. In the north, potatoes and canned tomatoes are the chief sources of vitamin C in winter. The amounts supplied seem never to drop to a true scurvy level, but recorded blood values are often lower than considered desirable.

The period of adolescence is a period of strain. Body hormones seem to vary widely in amount from day to day; emotions are unstable. Rapidity of growth produces its own emotional problems. In a study of the nitrogen and calcium retention of children 11 to 14 years of age, whose diets had previously been adequate in calories only, we were surprised to find that the retention of calcium averaged only half the expected amount. The retention of nitrogen (protein) was excellent. Both boys and girls showed poor utilization of calcium, yet they needed it badly. The intake of milk and of vitamin D was increased stepwise over a period of 6 months, and only at the end of this time, when the intake had increased to 2 quarts of milk and 800 I. U. of vitamin D daily, did the retention of calcium equal the value estimated as desirable. In striking contrast, a second group of girls of the same age range, whose diets were known to have been nutritionally adequate for several years, were able to retain the quantity of calcium estimated as desirable, when given a little less than one quart of milk daily. Why were well-fed children, presumably in less need of calcium than ill-fed children, able to retain ample amounts of this element, whereas the children who needed it could not retain calcium when it was ingested in

ample amount? To answer this question, a third group, again a group poorly nourished except for calories, but within normal range for height and weight, were given a constant and nutritionally adequate diet containing a quart of 400-unit vitamin D milk daily. Retentions were determined the last 15 days of each month. The calcium retention, which approximated 200 mg. daily during the first month, rose steadily each month and from the 5th to the 8th month of the study remained consistently above 400 mg. daily, the retention estimated as desirable. It appears, therefore, that inadequate nutrition during any considerable part of childhood results in decreased efficiency of the gastro-intestinal tract. Absorption of substances difficult to absorb normally, as calcium, is affected to much greater extent than is absorption of nitrogenous substances. Six months or more may elapse before utilization of a good diet becomes efficient. The implication of this poor utilization of calcium on studies of nutrition and diet in relation to dental caries in adolescence is obvious.

During the above studies, it appeared that emotional disturbance of unusual nature, whether the emotion provoked was happiness or unhappiness, tended to decrease the absorption of calcium. An emotional crisis was fomented deliberately in the last period of study of the third group. Calcium retention dropped nearly 50 percent. It appears that emotional crises, like febrile illnesses, decrease the efficiency of the gastro-intestinal tract.

Good nutrition during childhood and adolescence is particularly important for girls, for the childbearing age begins in adolescence. A girl or young woman entering pregnancy after years of malnutrition, and maintaining her customary diet adequate in calories but low in many nutritional essentials, cannot possibly nourish her fetus well in the critical first 2 months of development in utero. Evidence is accumulating that excessive nausea is more common among the poorly nourished pregnant women. It is not strange that the incidence of abortion, stillbirth, and premature births tend to be high in this group. In order to assure the birth of healthy infants, carried to term, the mother's diet should be nutritionally adequate from early childhood so that she enters pregnancy with a full store of nutritional essentials. Thus we come full circle. The diet habits of the child are continued into adult life. If poor, her children will be poorly nourished in utero, frail in infancy. Such a baby can be saved and built up to be a normal healthy infant. Unless the diet habits of the family are improved, however, soon after infancy the child again becomes less well-nourished and the cycle repeats itself. Education of the child and re-education of pregnant women in good habits of nutrition seem necessary if we are to decrease infant mortality in the newborn period, and prevent premature aging.

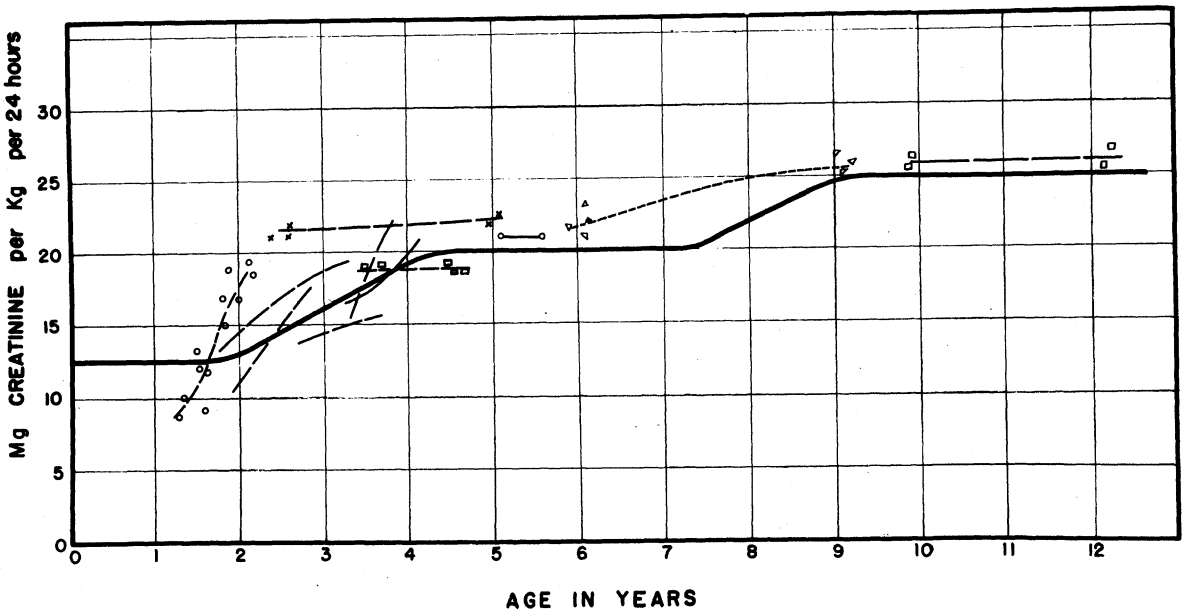

Figure 1.--The rate of increase in creatinine excretion per kg. body weight between the ages of 1.5 and 4 years is indicative of the rapid growth of skeletal muscle compared to the body weight as a whole. The heavy line indicates mean creatinine per kg. daily; the lighter lines indicate the rate of increase for individual children.

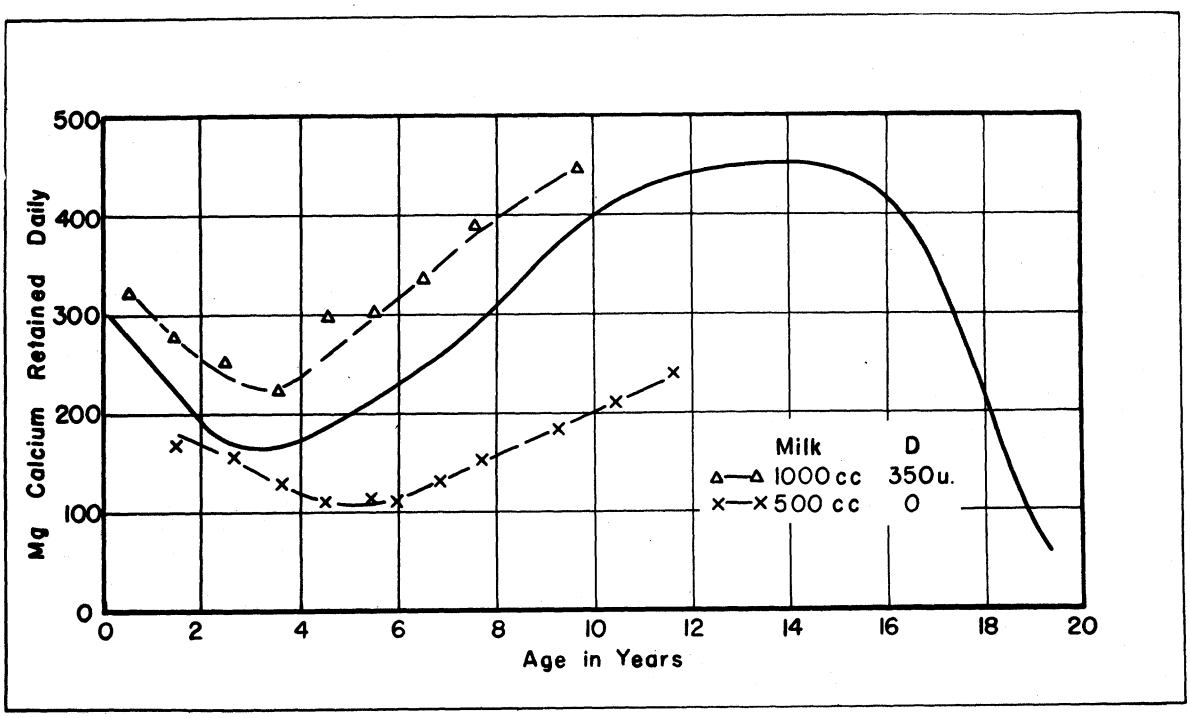

Figure 2.--The solid line shows the estimated mean daily calcium retention considered desirable during each year of growth. The lower broken line indicates mean retention of calcium by children given a pint of milk daily together with a good diet; the upper line is the mean daily calcium retention when the milk intake was raised to 1 quart and 300-400 IU of vitamin D were given daily. The estimated requirement is more than met by this group.

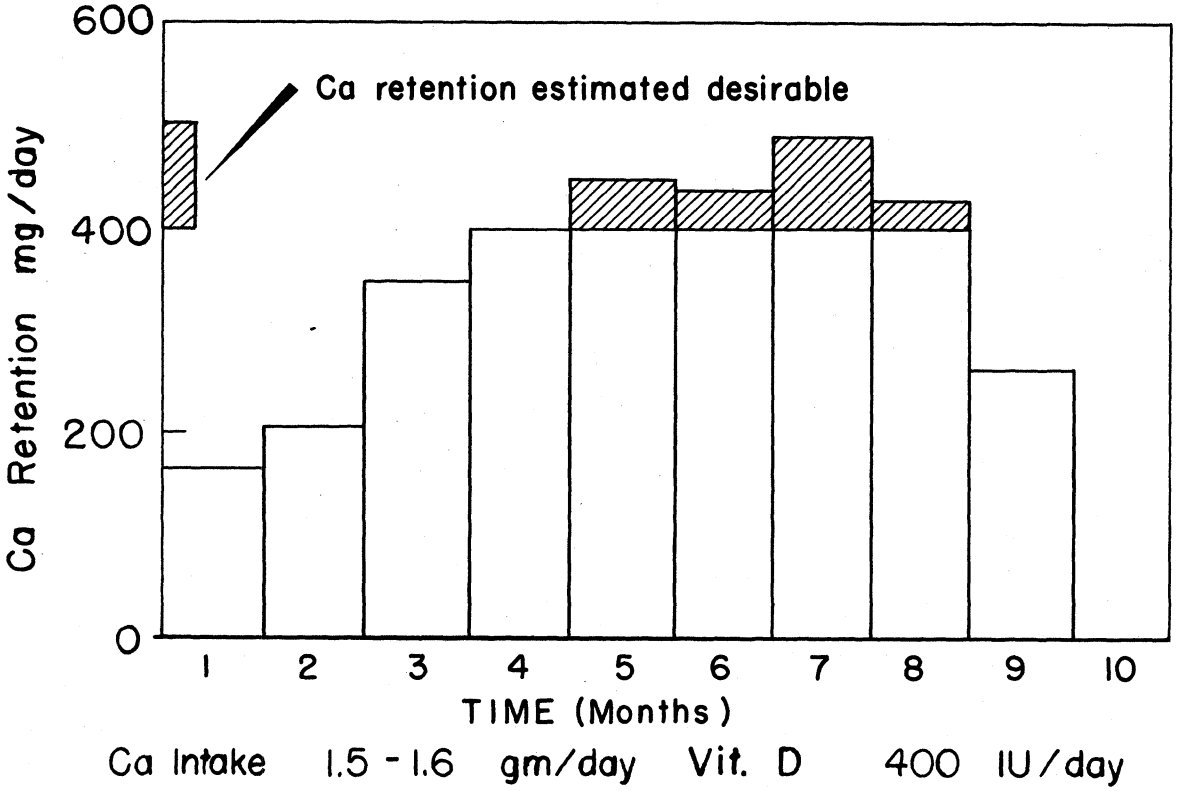

Figure 3.--The mean daily retention of calcium by young adolescent girls who had been poorly nourished except for calories. These girls received an excellent diet containing 1 quart of milk and 400 IU vitamin D daily. Five months of the good dietary regimen were needed before the calcium was used efficiently. The last study period shows the deleterious effect of emotional disturbances.

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Nutritional Problems in Later Maturity

Edward J. Stieglitz, M. D.*

Thank you, Dr. Sebrell, not only for your generous introduction, but also for the opportunity of joining such a distinguished company of scientists as here collected for the National Food and Nutrition Institute. The subjects on the program are of immense importance, not only to those present, but to the Nation and the world. I am acutely aware of the limitations of my own ability to define the Nutritional Problems of Later Maturity in 20 minutes. This is so huge an assignment that 20 times 20 minutes would hardly suffice for a comprehensive consideration of the subject. The magnitude of the subject matter of the conference insures that the Institute as a whole, and this presentation in particular, will commit many sins of omission. So long as we avoid sins of commission we must remain content, for comprehensive consideration is frankly impossible.

It would have been easier to start by quoting the opening sentence of a letter written by that gigantic figure of American history, Abraham Lincoln. President Lincoln once commenced a letter as follows: "My dear Sir: I am sorry that I do not have the time to write you a short letter..." Today, however, we must be short, even at the expense of comprehensiveness.

Before proceeding further I should like to clarify the meaning of nutrition from the viewpoint of a clinician. This may differ somewhat from the working definitions employed by other disciplines represented at this Institute. To the clinician nutrition means much more than supplying an adequate ration or dietary (1). Malnutrition means bad nutrition. Malnutrition implies more than mere deficiency in diets or food supply despite the concentrated spotlighting given vitamin deficiencies in the last two decades. Malnutrition must include excesses as well as deficiencies, and also imbalance in ingested foods. There may be enough of everything but unless wisely selected and utilized, malnutrition results. For example, the simultaneous ingestion of spinach, with its high oxalate content, with milk is an example of poor dietetics and results in malnutrition, for the precipitated calcium oxalate is not absorbed. Both spinach and milk are excellent, valuable foods, but not together.

The primary purpose of nutrition and/or of eating is to insure optimal cellular nutrition, particularly of parenchymal cells essential to health and life. Secondary are the pleasurable sensations. Cellular

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nutrition involves many factors other than mere food ingestion. Putting something into the stomach is not the same as putting the same nutrients into the body. The alimentary canal is a hollow tube, intermittently open at both ends, its lumen actually outside the organism. Before nutrients are of the slightest use to the cells of the organism, they must be digested, absorbed, transported, and utilized either for growth or energy. Furthermore, the catabolic debris left after their utilization must be promptly and thoroughly removed. Let me remind you that we live in at least two environments simultaneously: the external environment of noise, smoke, poor ventilation, competition, irksome controls, cold, ice, wind and rain, ambition and conflict, and also an internal environment, wherein the physical and chemical balance of temperature, chemical concentrations, enzymatic activity are maintained within narrow limits. Though this be an apparently peaceful balance in health, equilibrium is maintained only by vigorous, continuous activity. Relative constancy of the internal milieu is essential not only to health, but to survival.

Nutritional problems, and particularly those arising in the later maturity of men and women, are immensely complex and involved. Disorders arise from any one or several of five major factors (2):

1. Inadequate nutritional supply from without. This factor is illustrated by the consequences of dietary deficiencies or inadequate oxygen tension in the atmosphere. We must not forget that oxygen is a foodstuff just as much as glucose, protein, soybean oil, or any of the vitamins. Oxygen, like water, is usually ignored by nutritionists. But the body does not ignore it. What good is glucose, even in the presence of adequate insulin, if the oxygen necessary for the combustion of glucose is in inadequate supply? Those here who have suffered muscle cramps due to vasoconstriction or the pain of angina will appreciate even more fully how essential a nutrient oxygen is.

2. Incompetent absorption of necessary nutrients. This source of difficulty is illustrated by the serious nutrition problems arising in achlorhydria, pancreatic deficiency, protracted diarrhea, and/or vomiting.

3. Inefficient distribution. Heart disease, hypertensive arterial disease, arteriosclerosis, and anemia, alone or in combination, impair distribution. Despite a liberal exogenous supply, oxygen cannot be adequately distributed to the vital parenchymal cells if the engine is in failure or if there are not enough little red freight cars (erythroplastids) to carry the oxygen.

4. Ineffective utilization. Insulin deficiency in diabetes mellitus is the obvious example of ineffective cellular utilization of nutrients. Others include parathyroid distortion of calcium metabolism, the impairment of urate decomposition in gout, and the incompetent

utilization of fats in hepatic disease.

5. Incomplete removal of metabolic debris with cellular intoxication occurs in renal and vascular disease.

These various factors are closely interrelated in the significant chronic progressive impairments so frequent in later maturity. The diseases to which mature patients are particularly subject differ distinctly from the disorders frequent in youth. Though an older person may acquire any disease, he is typically vulnerable to the so-called degenerative diseases (3). These include four major groups: Circulatory disorders, metabolic disorders, malignant new growths, and the arthrites. A much simplified classification shows some of the more pertinent relationships of these disorders:

A. Circulatory disorders
   1. Chronic infective myocardial disease
      (a) Rheumatic
      (b) Luetic
   2. Hypertensive arterial disease
   3. Arteriosclerosis
      (a) Cerebral: Apoplexy; dementia; encephalopathy
      (b) Coronary: Cardiac disease
      (c) Renal: Chronic nephritis
      (d) Pancreatic: Diabetes mellitus
      (e) Extremities: Gangrene; Buerger's disease
   4. Combination forms

B. Metabolic disorders
   1. Diabetes mellitus
   2. Osteoporosis
   3. Anemia
   4. Climacteric
   5. Gout

C. Malignant tumors, all forms

D. Arthrites

Of these the first two groups, the circulatory and metabolic disorders are preeminently important. They are so intimately related that attempts to separate the consequences into distinct and isolated disease entities are futile (4) (5).

The essential differences between the disorders common to youth and those typical of later life are perhaps best contrasted in tabular form:

	Disease in--	
	Youth	Senescence
Etiology:	Exogenous Obvious Specific (single) Recent	Endogenous Occult Cumulative Distant in time Multiple (superimposed)
Onset:	Florid (obvious)	Insidious; asymptomatic
Course:	Acute Self-limited	Chronic Progressive (long disability prior to death)
Immunizing:		Not protective (increased vulnerability to other diseases)
	Little individual variation	Great individual variation

These chronic, insidious, and progressive disorders today represent the major source of disability and death in the American population (6). In 1901, 53.5 percent of all deaths were due to chronic disease, whereas in 1945 the chances of ultimately dying of chronic disease (instead of acute infective disease, violence, and all other causes) had increased 82 percent. The National Heart Institute (7) reports that in 1951, cardiovascular diseases accounted for 51.8 percent of deaths from all causes, and that arteriosclerosis and hypertensive arterial disease caused over 90 percent of deaths due to cardiovascular disorders. At present one estimate (8) states that for about 40 percent of persons admitted to mental hospitals the diagnosis is arteriosclerotic and/or senile psychosis. According to the National Institute of Mental Health (9) 32 percent of all persons admitted for the first time to state mental hospitals in 1949 were aged 60 or over. Senility and arteriosclerosis, as the other chronic diseases so superficially discussed here, reveal a single and significant common denominator in that all are essentially consequent to or contribute to impaired cellular nutrition. Therefore in the broad sense, and appreciating that the internal milieu is the medium of life, we may say that degenerative diseases are nutritional problems (10)

It would be worth while to elaborate upon the interrelations and interdependence of nutritional impairments in geriatric medicine (5), but our hard taskmaster, Time, limits us to one illustration, superficially analyzed. Expressed in the simplest possible terms, anemia arises from:

(1) Inadequacy of supply of one or several nutrient materials, (2) impairment of the functional capacity of the "factory," (3) excessive or continuous loss of blood, or (4) any combination of these etiologic factors. Specifically, these may include such factors as deficient intake of iron, the B group of vitamins (especially folic acid and B_{12}), continuous loss of blood from hemorrhoids or chronic nephritis, depression of the metabolic rate slowing the "factory's" capacity to produce (11), etc. Anemia, on the other hand, contributes to its own genesis by producing relative histanoxia of the hematopoetic tissues as well as other tissues less directly involved, such as the kidneys, thyroid, and myocardium. Anemia results in chronic fatigue and in this highly competitive external environment the habitual application of spurs or whips such as alcohol, coffee, dexedrine, ambition, patriotism, love, and barbiturates. Not only are some of these whips toxic in themselves, but chronic fatigue, whose subjective manifestations are thus covered up, is an intoxication per se, which may contribute further to the genesis of anemia. Increased vulnerability to infection and the consequent intoxications further depress hematopoesis. The achlorhydria of pernicious anemia is a factor in demineralization of bone and the pathogenesis of osteoporosis. Many other "vicious circle" correlations could be enumerated, but I think we have demonstrated how nutritional impairments can initiate complex "chain reactions," often significant in the self-perpetuation and progression of disease, and also how absurd it is to consider the chronic metabolic disorders as specific and sharply demarcated entities.

The nutritional problems of later maturity are significantly affected by aging changes within the organism (12). To age is to change. Aging begins at conception and terminates only with death. It cannot be arrested in life, though there are hopes that its consequences may be modified or retarded (13). Here we can mention but a few attributes of maturity particularly significant to nutrition.

Individual variation. An increasing divergence among persons occurs with advancing age. We are today what we are largely because of our yesterdays. The older we become the more yesterdays have affected us. No two persons experience the same injuries, intoxications, infections, nutritional insults, fatigues, or emotional traumas. As these inevitable vicissitudes of existence are never identical in character, in severity, or in sequence, older persons become increasingly divergent. Thus, it is essential that there be individualization in analysis of the nutritional status and any diet therapy. Generalizations are dangerous. Oversimplification is hazardous.

Factors affecting absorption and transportation of foods. Certain changes in the alimentary canal and its ancillary structures are significant in the problems of nutrition in later years. Loss of teeth interferes with proper mastication. Because of painful or missing teeth, older persons frequently choose only the softer foods. This generalization was significantly pointed up by studies of Professor Clive McCay.

In a survey of the nutritional situation in all the New York State Mental Hospitals, McCay found that the per capita consumption of bread exceeded even that of the Navy personnel. Knowing that changing dietary habits is an almost unsurmountable task, McCay set out to improve the nutritional quality of bread and developed what is now known as the Cornell formula, wherein the protein content is greatly enhanced by soy flour, wheat germ, and skim milk solids (14). This bread is vastly superior to the usual soggy, tasteless, and nutritionally relatively poor bread of some large commercial manufacturers, despite all the advertising ballyhoo of "enrichment," which is really only partial "replacement."

The secretion of digestive enzymes and hydrochloric acid by the stomach and the intestinal canal diminishes with advancing age. In the eighth and ninth decades an almost complete achylia is usual. The secretion of trypsin and pepsin is likewise diminished. Therefore, considerable interference with the digestion of foods is to be anticipated. Chronic cholecystitis or impairment of function without active inflammation interferes with the utilization of fats; their ingestion may account for considerable flatulence and discomfort. In such circumstances, unless the diet be fortified with the fat-soluble vitamins from sources other than the natural fats, a deficiency due to spontaneous avoidance of fatty foods is not at all unusual. Atrophy of the alimentary mucosa with diminished vascularity makes the senile bowel more vulnerable to trauma and may impede absorption. Diminished secretion of mucus, which normally serves as a lubricant in the lower intestinal canal, contributes to the tendency to impaction and constipation.

Metabolic factors. With normal aging, there is a gradual diminution in the homeostatic efficiency of the organism. This impairment may be accelerated by accumulated injuries of previous disease. It is well-known that the internal milieu of the organism remains nearly constant throughout the life span and the ranges of almost all the so-called physiologic constants, such as temperature, pulse rate, concentrations in the blood of glucose, protein, calcium, and the like, are about the same at age 80 as at 8. Nevertheless, the ability to maintain such constancy depreciates with advancing age. Tolerance for stresses of all sorts is diminished; older persons do not adjust as well as younger adults to extremes of temperature and dehydration, to starvation, to excesses in carbohydrate intake, and the like.

In man, the basal metabolic rate appears to diminish with age. In some respects, the diminution in metabolic rate with advancing age in man is unique, for it is the only physiologic constant for which we make correction for age in the calculation of normal levels. It still remains to be demonstrated whether this decline in caloric utilization and oxygen consumption with advancing age is necessarily desirable. Just because it occurs in the majority certainly does not prove its desirability. We know that most persons tend to gain weight after their full maturity, but recent studies prove that this gain is undesirable

and affects longevity adversely. However, from the clinical point of view, the fact that the basal rate does decline with age and that this diminution is of considerable magnitude is important. It is possible that the change in basal metabolic rate affects cholesterol metabolism and thereby may play a role in the development of arteriosclerosis (15). Further study in the interrelationship of thyroid activity, arteriosclerosis, and cholesterol metabolism is needed. At the present the data are too confusing to warrant final interpretation (16).

Aging fixes habits. Eating habits are most significant in the etiology of nutritional disorders as well as other problems (17). Not only are present habits pertinent, but past habits also. As previously stated, we are what we are today largely because of how we lived our yesterdays. Habits may last longer than life itself, for they may be transmitted from one generation to the next. It is extremely doubtful, for example, whether obesity is primarily an inherited characteristic in the purely genetic sense. The child who grows up in a family where parents are obese by reason of overeating acquires the habit of eating excessively. The longer habits have been indulged in, the more rigidly they become fixed (12).

Dietary habits are affected by many elements (18). Cost of food is often the most significant factor. Secondly, the ease of preparation is significant for older persons, particularly when they have to prepare their own foods. The elderly are prone to rely largely on packaged foods, and particularly on bakery goods, and consequently often develop an asymmetric dietary. For consideration of these more specific aspects of our problem I refer you to the A. M. A. Handbook of Nutrition (1951) and Dr. Sebrell's chapter on Nutrition in Principles and Practice of Geriatric Medicine now in the course of revision.

In conclusion permit me to reemphasize the complicated nature of the etiologic, pathogenic, symptomatic, and functional interrelationships existing between nutrition and the immensely significant chronic progressive disorders of later maturity (19). It is essential to individualize. Generalizations and routinization are unwise and hazardous (5). The individual is indivisible. Rational research and pragmatic clinical application alike must consider the mature person as a whole and treat the patient not just his disease or diseases.

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Nutrition as a Factor in Disease

Presiding: W. H. Sebrell, Jr., M. D.

Obesity--Its Prevalence, Etiology, Effects on Health, Management

Norman Jolliffe, M. D.*

The recognition of obesity as a public health problem has been one of slow development. A decade or two ago hardly any one recognized obesity as anything more than a personal problem created by vanity and the dictates of fashion. An outstanding exception to this general opinion was that of a small group of actuarial experts and diabetes specialists who knew that the obese carried very serious health hazards. One may add to this small group many surgeons who often refused to do elective surgery on very obese persons because of the technical difficulties and operative risks involved.

There is no need to detail to this audience how and why the "crude death rate" has declined from 17.2 deaths per 1,000 population in 1900 to 9.7 in 1949; and how and why "life expectancy at birth" has increased from 47.3 years in 1900 to 67.6 in 1949, a spectacular increase of 20 years (1); how and why the proportion of the entire population dying before age 45 has fallen from 38 percent in 1900 to 10 percent in 1951 (2). This means that 90 percent of the present population will live to and beyond age 45. This record of health achievement justifies the characterization of this period as "man's greatest half century" (1).

However, these advances, by producing an older population, have of themselves created new health problems. Dr. Dublin will tell you that life expectancy at age 40 is less in this country than in 16 other countries. It is the belief of many that the hard core of these newer health problems is the degenerative diseases, chief of which is arteriosclerosis. In this connection mortality figures show that the obese die earlier of the degenerative diseases than do the nonobese. If our present mortality rates continue, it has been calculated, for example, that 60 million Americans now living will die of arteriosclerosis (3). A new plague, although an old disease, has arisen to smite us (4).

During this same half century obesity has in all probability increased in frequency; how much no one knows, for there are no good data on the prevalence of obesity in 1900 or thereabouts. That it has increased in prevalence is probable by deduction. For example the per caput consumption of calories in food has, for practical purposes, remained constant at

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around 3,100 calories a day since 1900 (5). During this period the population age 45 and over has increased from 17.8 percent of the whole to 28.4 percent. This fact alone should have reduced our per caput food consumption, because our need for calories decreases about 7.5 percent for each 10 years after age 25 (7, 8). Furthermore, there has been a significant decrease in average energy expenditure since 1900 because of easier transportation and labor saving devices on our farms and in our factories and homes during this period. This latter saving in energy expenditure may be estimated as a minimum of 5 percent, while the decrease in energy expenditure because of the increasing age of the population would approximate about 2.5 percent. So if 3,100 calories was the correct energy requirement in 1900, then 230 calories less, or 2,870 calories per caput population, would be a comparable maximum now for an older and less hard working population. At 3,100 calories we are either now wasting more food than in 1900 or obesity is more prevalent--or both. At any rate, it has been estimated that 25 to 30 percent of our population is over the desirable weight (3).

Although the cause of arteriosclerosis is unknown, one fact stands out with clarity: it is that deaths from arteriosclerosis and the degenerative diseases occur earlier in the overweight than in the nonobese population (3). An excess mortality of 50 percent for the significantly obese would be a reasonable estimate.

It is equally clear at the present time that about the only advice the medical profession can offer with confidence to the public in regard to the prevention of arteriosclerosis and its diseases is "never become overweight, and if overweight, reduce and stay reduced." Should the American public do this it would by this means alone increase life expectancy by perhaps 1 to 4 years.** This compares to about 2 years increase that would result if beginning today no one would die of cancer. All of these figures are, of course, oversimplifications of complicated predictions but they do point up the comparative magnitude of our newer public health problems.

**Based on an over all death rate of 9.7 in 1949, the death rates of the nonobese were calculated under the following assumptions: (1) that the obese death rate is 150 percent of the nonobese, and (2) that the proportion of obese in the total population is 25 percent, of whom only (a) one-half and (b) one-quarter are sufficiently overweight to influence the death rate. On this basis the nonobese death rates were determined to be, respectively, (a) 9.13 and (b) 9.41 per 1,000.

Increases in life expectancy based on these lower death rates were computed by relating them to the known increase in life expectancy of 1949 over 1900 as a result of the decrease in the death rate from 1900 to 1949.

This basic information concerning the etiology and treatment of obesity may be briefly summarized as follows:

1. Obesity is invariably caused by a greater intake of calories in food than expenditure of calories as energy. This fact is important, not only in understanding the cause of obesity, but in its treatment. All too often, as a concession to conservatism, we see such statements as "Obesity is nearly always caused by overeating" or "In 9 out of 10 subjects obesity is caused by overeating." Such statements give the obese person a reason for not blaming his obesity upon his own gluttony. They are often, in their own minds at least, the exception to the rule.

2. The essential component of every reducing regimen is a "calorie deficit" (9). By metabolic studies, the loss of adipose tissue over a period of time in an obese person maintained on a sub-calorie diet, otherwise adequate, has been shown to be directly proportional to the calorie deficit. This loss of adipose tissue can be predicted with remarkable accuracy. These metabolic calculations are based on the fact that 1 gm. of adipose tissue yields an average of 7.7 calories, 1 pound of adipose tissue yields 3,500 calories, and 1 kg. yields 7,700 calories. Therefore, a deficit of about 3,500 calories leads to the metabolism of a pound of adipose tissue, and a deficit of about 7,700 calories leads to the metabolism of 1 kg. of adipose tissue. This is true whether the calorie deficit is acquired over 1 day, 1 week, 1 month or, for that matter, 1 year. It is therefore possible, when the calorie deficit is known, to predict with remarkable accuracy the loss of adipose tissue over a period of time (3).

All methods of reducing the obese of excess fat are effective only insofar as they aid in producing and maintaining a calorie deficit. A calorie deficit can be obtained either by increasing the calorie expenditure or by decreasing the calorie intake, or by both methods. There is an exaggerated idea of the value of exercise in producing a calorie deficit. For the average person a walk of 1 mile at the rate of 2 miles per hour leads to the expenditure of 100 extra calories. Therefore, to lose 2 pounds of adipose tissue by this type of exercise alone, the average person would have to walk 10 extra miles each day for 1 week without increasing the food intake. This is difficult because exercise usually increases the appetite. Therefore, a considerable and sustained increase in calorie expenditure by exercise for most obese persons is impractical. On the other hand to lose 2 pounds of adipose tissue by diet while maintaining the same calorie expenditure--that is, without additional exercise--the obese person needs to eat daily for 1 week 1,000 calories less than the calorie expenditure. For most obese persons this is easier than the equivalent amount of exercise and does not require daily 5 extra hours of walking. Therefore, most effective reducing plans are based on the production of a calorie deficit by a reduction of calorie intake below calorie expenditure without, as a rule, simultaneously increasing the calorie expenditure.

Adjuvants to the low calorie diet, whether medicinal, physical, psychologic, or educational, are valuable only insofar as they increase the calorie expenditure or aid the patient in control of appetite or in adherence to the prescribed diet. These adjuvants that do aid in one of these ways probably lead to more harm than good.

3. The reducing diet should form the basis of dietary reeducation so that the proper eating habits will continue after the desired loss of weight has been attained. For this reason skipping meals, uncommon or trick diets, and high-fat diets that do not furnish a sound basis for permanent dietary habits are not recommended. Only under special and unusual circumstances and then but temporarily are such expedients used. To reeducate the reducer in proper dietary habits is one of the reasons bread, milk, and a large variety of protein foods, fruit, and vegetables should be included in reducing diets. Although no one single food is essential, these foods are all normal ingredients of a well-balanced American diet and should form the basis of low-calorie diets aimed at both weight reduction and dietary reeducation.

In this respect I wish to emphasize the education of the patient in elementary dietetics, that is, into calorie counting, if you please. A number of people reduce without ever learning food values. This they do by following a rigid menu and never deviating from the prescribed plan. While reducing they are barred from eating many foods which they might eat simply because they know nothing about food values or how to substitute one food for another. They are psychologically barred from eating away from home because the food served may differ from that prescribed at a particular meal. Still more important is the fact that when the desired amount of weight has been lost, it is promptly regained because the reducer has learned nothing of the energy value of foods.

So to gain freedom from rigid, monotonous menus, in order to reduce and then stay reduced it is necessary to learn food values in terms of standard portions. With a little practice this can become almost second nature.

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DISCUSSION

A. L. Chapman, M. D.

I believe that Dr. Jolliffe has convinced us that the prevalence of obesity constitutes a very real public health problem and that it finally will be solved when overweight people are reeducated to adopt lower caloried but well-balanced diets.

Having spent all of my professional years in public health practice, concentration on the dietary management of the obese person does not entirely satisfy me. Constantly ringing in my ears is the trite, if homely, expression, "You can lead a mule to water but you can't make him drink."

How accurately that applies to many obese people! Once they want to be thin it is possible to apply sound dietary principles to the process of weight reduction. But--how to make them want to be thin? To me, that is the primary problem in weight control. In other words, is it enough to know how to bring about weight reduction safely? Or, is it just as necessary to know how to motivate obese people to want to utilize weight reduction resources that may be available in their community?

Perhaps you are like me in one respect. I have to see very clearly the exact nature of a problem with which I am dealing or I become confused and ineffective. To me, obesity and good nutrition are two separate, although related, problems. I sense that that fact is not always recognized--admitted is the better way of putting it. One problem is obesity itself, plus the pathologic sequelae of obesity. The other problem is good nutrition, or a balanced diet, and the pathologic sequelae that may follow poor nutrition.

I am compelled to ask the question, then, "Is the remedying of obesity of no value of itself? To have any value, must weight reduction be accompanied by the development of conventional nutritional habits in those who lose weight?"

If by relatively crude mass methods we can make immediate inroads into the tremendous backlog of obese cases--some 15 million of them--and if the consequences of obesity thereby can be avoided, even partially, is this not worthwhile?

Believe me, my point of view is not predicated on any lack of interest in the reeducation of the diet habits of the American people. It is predicated, rather on the desire to do whatever job we are tooled to do today and to get to the bigger job when more resources are available to us.

I look upon obesity as a separate and distinct disease. Someone once aptly described it as a "benign fatty tumor." It is as separate and distinct a disease entity as chronic cholecystitis or peptic ulcer. Although diet therapy is part of the treatment regimen of any patient with either of these latter diseases, the disease itself is attacked aside and apart from the nutritional disturbances that accompany the disease.

My point may be made clearer when I suggest that through the development of group conferences for overweight people, we may have a method whereby many thousands of overweight people may be motivated to lose weight before nutritionists and dietitians are available to nutritionally reeducate all of these people on an individual basis.

This then poses still another question: "Would these fat people--many of them nutritionally illiterate, be better off obese and poorly nourished, than thin and poorly nourished?" Perhaps the answer to this puzzling but practical question will be answered during the deliberations of the next few days.

This series of questions quite naturally introduces the psychologic approach to the problem of obesity. If the drive to eat more than the body needs has an emotional basis (as many authorities believe it has), it becomes evident that obese people, through some mechanism, must be helped to a better understanding of the workings of their own minds, of their own emotional make-up, and the way their minds and their emotions trick them into overeating.

How can this be done when we can't find enough psychiatrists to staff existing mental institutions, let alone engage in preventive work? Can we make any progress by group methods? Shall we wait an endless number of years until thousands of additional psychiatrists are trained, with no assurance that if and when they are trained there will be any money available to pay their salaries? Or, shall we do the best we can with whatever resources we have available?

The experiences of the past few years in the development and conduct of group methods of weight control, if they have not been conclusive, have at least been encouraging. Their initial success recommends their continuance and expansion if on no other basis than a fact-finding one.

Through group conference methods, then, motivation may be developed that may impel overweight people to want to be thin. This motivation may be translated into a successful and let's say, hopefully, a permanent experience in weight reduction.

The history of public health and medicine during the past 50 years has been one of trial and error. Nephritis once called for a starvation diet--now high-protein diets are prescribed. Clean teeth once never decayed--now dentists are happier to talk about the benefits of fluoridation. Papers describing the benefits of antipneumococcal sera were hardly printed before such sera were outmoded by the introduction of the sulfa drugs and shortly after that by the antibiotics.

I mention these evolutionary steps in public health and medical practice as examples of the aggressiveness with which public health workers, doctors, and scientists in the past moved against their problems. They did the best they could with the knowledge, experience, and resources currently at their command. They sought and eventually they found their answers. They knocked, and doors opened to them.

Should we wait for the final fact to be collected and the final experiment to be conducted before we move aggressively and inquisitively ahead in the field of weight control?

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Nutritional Aspects of Chronic Disease

R. J. Anderson, M. D.*

Before I discuss the nutritional aspects of chronic disease, I shall talk a little about chronic disease itself, what we mean by the term, and what its effect is upon the health of the Nation. By strict definition, "chronic" means "lasting a long time," and any illness or disability which requires medical observation, supervision, and care over a long period of time is considered a chronic disease. The category is a large one. It includes diseases with a wide range of causes, effects, and treatment. Tuberculosis, which is caused by a bacillus; cancer, which is due to changes in the development of cells of the body; and cerebral palsy, which is a misfunction of the neurological system, are all chronic diseases. There are some 22 kinds of heart disease, all of which may be chronic. Diabetes, arthritis, blindness, deafness, allergy--there are many others. The common factor is simply that the illness or disability lasts a long time.

Our concern with these diseases is not new, of course, although they have been receiving more emphasis in recent years. I need not review for you the efforts which have brought under control many of the acute communicable diseases which used to threaten us. Our children no longer live in great danger of diphtheria or scarlet fever, and smallpox is a rare disease. Because mortality from these and many other former threats to life has been reduced greatly, our people are living longer, and there are more people who live past middle age. Although the chronic diseases are not unique to older people, they are more common in the years over forty. And so we have an increasing problem of chronic disease.

In 1935 the National Health Survey indicated that about 23 million people had one or more chronic diseases. If we increase this figure in terms of our larger and older 1952 population and of the improved data now available about some diseases, the estimate places the number of people who have one or more chronic diseases today at 35 million. It is a figure that is profoundly significant to our national well-being and our economic productivity. It poses to health workers the double problem of preventing the occurrence of chronic illness, where that can be done, and of preventing disability or premature death if disease cannot itself be prevented.

Campaigns against the chronic diseases are under way to meet the growing problem. The Public Health Service is engaged in both research and the practical application of useful scientific information. In the National Institutes of Health, scientists are at work on a wide variety

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of projects in the cardiovascular diseases, in arthritis and metabolic illnesses, in cancer, and in the neurological diseases and blindness. The Clinical Center which is to be opened in Bethesda in a few months, will provide a unique facility for this research. The Division of Chronic Disease and Tuberculosis, with which I am associated, assists States to develop public health programs for the control of tuberculosis, heart disease, and diabetes and also carries on demonstration programs in the home care of the chronically ill and in physical medicine and rehabilitation. Many health departments on State and local levels have initiated chronic disease programs and the private practitioners of medicine are constantly engaged in the campaign. There are many national voluntary agencies concerned with specific chronic diseases which give support to official activities.

This widespread participation forecasts success, since any effective program in public health, at whatever level, requires the whole-hearted cooperation of official and voluntary agencies and of public and professional groups. The Commission on Chronic Illness, which was founded 3 years ago, is an example of this cooperation. It was organized by the American Medical Association, the American Hospital Association, the American Public Health Association, and the American Public Welfare Association. The Commission is sponsored by 43 other health and welfare organizations, among which, incidentally, are the American Dietetic Association and the Public Health Service.

Two years ago the Commission on Chronic Illness sponsored a conference on the preventive aspects of chronic disease, at which the two phases of prevention I mentioned a few minutes ago were defined and designated as primary and secondary prevention. Primary prevention, according to this definition, is the prevention of actual occurrence of disease. For example, a diet that contains sufficient niacin is primary prevention of pellagra. Wearing protective goggles to prevent injury to the eyes is primary prevention of blindness. Immunization of children against various infectious diseases, and spraying stagnant water with DDT, are widely practiced primary preventive measures.

Unfortunately, for many of the chronic diseases we still do not know how to practice primary prevention. But, as the Chronic Illness Conference pointed up, there are many secondary preventive measures which we <u>can</u> take; that is, steps to inhibit the progression of disease, to avoid complications, to minimize disability, and to prolong life. Case-finding for diabetes is such a step, since if early, unsuspected diabetes is found and brought under treatment, disabling complications can often be avoided. Another example is the use of antibiotics to prevent or treat streptococcal infections in patients with rheumatic heart disease, so that they will not have recurrences of rheumatic fever which will increase their cardiac disability.

Now I have talked much about the chronic diseases, and I have said little about nutrition. As a matter of fact, good nutrition has for a long time achieved primary prevention of chronic diseases like pellagra and beriberi and rickets. Those are diseases of which we know the causes and which are directly related to the food we eat. The possibility that food may be a causative factor in diseases which continue to baffle us is the subject of some very interesting research now in progress. Within relatively recent years we have seen many of the conditions which we now know as allergies traced to abnormal individual reactions to specific foods. When we know more about why some people develop diabetes or heart disease or arthritis, we will have, perhaps, tools to prevent their occurrence. It is reasonable to anticipate that in some instances nutrition will be such a tool.

The varied, well-balanced diet which has been emphasized for a long time has contributed to improved growth and development, to better health. To what extent it has prevented chronic illness or helped people to recover is not known; however, I think it reasonable to believe that good nutrition has been a positive force. In the past the great task of nutrition has been to build up eating patterns to meet the recommended dietary allowances of the National Research Council. I think we may be coming to a time when this emphasis must be broadened. Perhaps not only lack of food or of certain food constituents is undesirable. It may well be that too much food or too much of certain food elements may be causative or predisposing to disease. The association of overweight with chronic illness is well accepted, and Dr. Jolliffe has so ably covered its importance that I will not attempt to discuss it further. I would like to add, though, the thought that individuals may have varying tolerances to certain foods or food components, just as we know that individuals do have varying responses to various pollens and drugs. One man's meat may indeed turn out to be another man's slow poison. At any rate, some of the animal experimentation points in this direction.

In secondary prevention of chronic disease, nutrition has a more clearly understood place. Knowledge of nutrition is part of the physician's armamentarium in treating diabetes, certain forms of heart disease, and tuberculosis, as well as many other chronic diseases. In some instances, specific diet adjustments are required to help the patient accommodate to the disability caused by his disease. Even where this is not the case, keeping the patient in a good nutritional state helps him to live more comfortably within his limitations.

In diabetes, the diet prescribed is as important a part of therapy as insulin. As a matter of fact, the management of some cases of diabetes is possible on the basis of diet without the use of insulin. The physician evaluates the patient's condition, and prescribes a diet appropriate to the individual's needs in terms of carbohydrate, protein, and fat content. Then it becomes necessary for the patient to adjust his eating habits to the prescribed regimen. This is not as easy as taking a pill and usually it must be continued for a lifetime. In order to help patients make this

lifelong adjustment, the services of public health nutritionists and nurses are being made available in many communities for patient education in diabetes.

The Division of Chronic Disease and Tuberculosis provides consultation to the States for this type of program. A few years ago, realizing that diabetic diets which had to be calculated by the patient in terms of grams were exceedingly difficult for patients to accept and follow, the PHS joined with the American Diabetes Association and the American Dietetic Association in developing the plan that resulted in the booklet, "Meal Planning with Exchange Lists." As you probably know, the six lists of food make it possible to translate the physician's orders into household measurements. They enable the patient to select his own food and combine foods any way he likes. However, he must stay within the amounts or number of exchanges from each list for each meal as planned for him by his physician. The patient using the booklet finds, for example, that when his doctor allows him four bread exchanges for the day, he may substitute a half cup of spaghetti or a half cup of cooked cereal for one of the slices of bread allowed. Similar substitutions are possible on lists of milk, vegetables, fruit, meat and fat exchanges. The booklet and the lists do not give diets. These must be prescribed by the physician.

The nutritional aspects of heart disease are more complex than those of diabetes. They are still at the research stage, and there is considerable difference of expert opinion about them. Most widely discussed, perhaps, is the low-sodium diet which is used for hypertension and congestive heart failure. The cause of hypertension is not known, but research has shown that in some 30 percent of cases, reduction in sodium intake is beneficial. There is general agreement that a low-sodium diet is indicated for patients with congestive heart failure, to reduce the edema which accompanies this condition.

There is considerable research being done on the relationship of dietary cholesterol and other fats to arteriosclerosis. Conclusive evidence on nutritional factors has not yet been found, and the subject is not yet ready for public health application.

Since it is obvious that excess weight places an added burden on the heart and circulatory system, maintaining weight at a desirable level is very important for patients with heart disease. It has been demonstrated that overweight hypertensive patients can reduce their blood pressure through loss of weight alone.

Nutritionists in our Heart Disease Control Section have an important part in its operations. In the Newton, Mass., heart demonstration program they collaborated in the planning of a nutritionally adequate low-sodium diet, upon which the booklet, "Planning Low Sodium Meals," was based. They give consultation to States and local communities on practical nutrition in heart disease. As in diabetes, the function of nutritionists in heart disease is to help the patient follow his physician's orders.

There is general agreement, as you know, that the tuberculosis patient has a better chance in his struggle against the disease if he is well nourished. A diet high in protein, vitamins, and minerals is indicated, and high in calories if the patient is underweight. Many tuberculosis patients have poor appetites, and need much encouragement to eat. Sometimes physicians prescribe supplementary vitamins which help to overcome anorexia. Incidentally, you may know that isoniazid, the new drug now being used against tuberculosis, is related to niacin. One of its effects is to stimulate appetite.

Part of the process of restoring a patient who has a disability such as paralysis or amputation due to injury or disease is good nutrition. His weight should be at a high enough level so that he will be able to overcome as far as possible his handicaps, but it should never get to the point where it is an increased physical burden. Strength to make use of his residual capacities may depend to a large extent on the adequacy of his diet. It's hard work to walk with a brace or to manage a prosthesis, and this should be taken into consideration in planning these patients' meals.

I have been talking about diabetes, heart disease, tuberculosis, and physical handicaps as though they were always considered separately. As a matter of fact, they occur in combination in many patients, so that a diet may have to be planned for diabetes as well as tuberculosis, or for hypertension and diabetes, and so on. These require individualization of a high order. Perhaps they serve to point up that knowing as much about the patient as possible is essential to giving good nutrition advice.

It is here that I should like to bring up one of the difficulties in diet therapy which must be all too familiar to you who work continuously with people's diet patterns. That is the problem of helping people to follow a dietary regimen. The physician may have carefully prescribed a diet--and the patient may have the best intention in the world to follow his physician's instructions. But all too often, upon checking up, the physician finds that the diet has not been followed.

One obstacle to following diet instructions is expense. People who live on meager incomes are, we know, particularly subject to illness, and special diets--or even good normal diets--are hard for them to manage. They need the kind of help that you as nutritionists are especially able to give them.

I would not want to leave the impression, however, that I believe education is an answer in itself to this problem of keeping to a diet. I am sure we all can think of many people who know all about food values but who eat poorly balanced meals. Many diabetic patients understand not only the foods they should eat, but also the effect of eating otherwise--and yet do not follow their diets. Why is this? Perhaps you who work directly with people in planning proper nutrition know the answer better

than I. Probably there is no single answer, since the reasons for individual behavior are so varied. Eating habits are ingrained in culture patterns--people in Boston still eat beans every Saturday night. I think we can agree that eating habits, once established, are hard to change. And probably the solution lies in not attempting drastic changes but modifications to fit the diet into the lifetime eating habits of individuals.

Nutrition has a big place in the campaign against the chronic diseases. The science of nutrition has been effective in improving maternal and child health and in controlling the diseases that are known to be due to malnutrition. Now our national health problems require emphasis on periods of life and diseases, the nutritional aspects of which are not so clear. Research in nutrition is continually turning up answers to the perplexing questions of the etiology of disease. As we know more about the nutritional aspects of chronic disease, we have greater responsibility in the effective practice of nutrition. Just as the penicillin that stays unused on the druggist's shelf is ineffective against disease, knowledge of diet therapy is ineffective unless patients are helped to use it. The nutritionist, who combines a knowledge of food and its effect in health and disease with an ability to teach and to persuade and to motivate people to use this knowledge, is an important member of the chronic disease team.

Food Laws and Food Protection

Presiding: James R. Wilson, M. D., Secretary, Council on Foods and Nutrition, American Medical Association

Processing Trends and the Nutritive Value of Foods

G. E. Hilbert, Ph. D.*

The short talk I am to give you today grows out of one very simple question which concerns all of us--"Are the foods available to the American public becoming more nutritious year by year, or less so?" In our search for the answer to this extremely important query we are led at once to a scrutiny of food processing. We all know that a large and growing fraction of the Nation's food supply is now industrially processed before it reaches the consumer. This growth of processing is in itself a major trend. Is it a change for the worse, or for the better? If subsidiary trends are discernible within this broad movement, do they presage good or ill to the well-being of the Nation?

As you can see, I am raising questions of the most serious import. Unfortunately, even if I had unlimited time at my disposal I would not be able to answer them conclusively. In what I have to say I shall lay heavy stress upon the tremendous job of research remaining to be done. But, if I may anticipate my conclusions, we have good reason to regard the major trends as beneficial. We are better fed than our forefathers were, and the next generation will be even better nourished than we are.

I need not describe at length the revolutionary changes in our system of handling food products during the past 50 years. In that earlier day, the butcher shop cut up the carcasses of locally slaughtered animals and trimmed the moldy rind from home-cured ham and bacon. The grocery store was characterized by the open cracker barrel and pickle barrel and the huge round yellow cheese; its staple supplies were bulk coffee and tea, flour, lard, dry beans and peas, smoked herring, sauerkraut, and dried fruits. City families bought fruit and vegetables from farmers' wagons during the few weeks or months of the local season. Farm families might have available large supplies of fresh fruits and vegetables during the summer and fall, but by early spring had fallen back on the smoked meat, dry beans, flour or cornmeal, and the remains of the stored root vegetables and apples. There was a food canning industry, to be sure. Canned tomatoes were perhaps the most important product. However, the science which is really basic to that industry, bacteriology, was first seriously applied to canning problems in the period 1895-1900.

The great change which has taken place is, of course, woven into the whole changing pattern of life in America. Changes in our practices of

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food distribution, including the rise of large-scale food processing, are intimately related to the shift from rural to urban living, the disappearance of household servants, the rise of careers for women outside the home, the invention of mass-production techniques, the trend toward highly mechanized cash-crop farming, and the appearance of a whole host of scientific discoveries and mechanical developments. Each of these factors has helped to make the others possible or necessary.

Even within the past 20 to 25 years, major changes have become apparent. Bulk groceries have been almost entirely supplanted by nationally advertised prepackaged goods. The entire retail frozen-food industry has come into being within that period. Since 1929, while our per capita consumption of meats, fluid milk, eggs, and fresh vegetables was rising by about 10 to 20 percent, consumption of canned vegetables per capita was rising by about 40 percent, and of canned fruits and fruit juices more than 100 percent.

Now let us look more closely at some of the trends within the food processing industry itself. The force behind them is practical, down-to-earth, competitive economics. It goes almost without saying that the urge to capture a Nation-wide market, 12 months out of the year, has put an abundant variety of foods in every city and hamlet of the land, and has had a profound effect on the customary diet of most of our people. A nutritionally adequate diet can now be had anywhere, at any time. While this is an outstandingly important trend and has unquestionably led to improved nutrition, I intend in this talk to emphasize a somewhat narrower matter, namely, the effects of trends in food processing on the nutritive value of particular food products.

Mechanization, streamlined design, and automatic controls of many kinds are being employed more and more in our food plants to bring about that steady production at high capacity which is the key to profitable operation. Delays, pile-ups, hit-or-miss controls are intolerable. A salutary result from the standpoint of the nutritive value of the product is that perishable foods are processed and stabilized within at most a few hours after they are harvested. The costs of a shut-down are so great that highly effective systems have been devised by many plant managers to keep the raw material flowing steadily into the plant, through the processing line, and into finished-product storage. These streamlining procedures are made necessary by competition. They are never finished--better procedures, improved controls are constantly being devised. The trend will continue.

Competition is also constantly forcing food plants into the best possible locations--and in the case of perishable crops that usually means the best area from the standpoint of producing the raw commodity. Such a location gives the food processor an opportunity not only to assure speedy truck movement of the commodity to his plant, but also to make firm arrangements with the growers to grow the desired varieties, follow approved fertilizer and cultural practices, and harvest the crop at optimum maturity. These too are desirable ends from the standpoint of palatability and nutritive value.

Brand names that have become well-known to the housewife, because of costly advertising, have acquired fabulous money values. This simple fact has far-reaching consequences in the processing plant, and in the character of the food which reaches the family table. The article sold under that brand name must be uniform, always good, any time, any place. In the plant exacting standards have to be maintained. Both the raw material and the finished product are kept under constant surveillance by Federal-State inspectors. Important authority is given to technically trained quality-control men in the plants. Since the product must be good not only when it is freshly packed, but also when it comes into the housewife's hands after all the vicissitudes of transportation, handling, and storage, a high premium is automatically placed on making such improvements in processing and packaging as will assure quality stability. And finally, as public knowledge of nutritional facts becomes broader, vitamins, essential amino acids, and minerals become a part of the advertising story, and processing technology must follow with improvements as far and as fast as it can. We have certainly not seen the culmination of this trend. In my opinion it holds great promise for the nutritional well-being of our people.

The changing pattern of our urban life during the past 15 years has created an enormous demand for food products of all kinds that can be very quickly and easily prepared for the table. The list of new products aimed to satisfy this need is growing rapidly. It includes frozen precooked foods, frozen french-fried potatoes, dry biscuit mix, quick-cooking rice, instant-mashed potatoes, partly-baked rolls, liquid or powdered coffee concentrate, and frozen orange juice concentrate, to name only a few. The orange juice concentrate illustrates very well a point I wish to make.

This remarkable product reached the market only a few years ago. Already it consumes more of the Florida orange crop than is shipped as fresh fruit, and per capita consumption is rising steadily. Many an American family which rarely purchased fresh oranges has become a steady user of the frozen concentrate. The vitamin C and carotene of the original orange juice are retained very well through the low-temperature concentration process and subsequent frozen storage. Aside from the delightful flavor appeal of orange juice, we should perhaps be mainly concerned about these two vitamins, and be thankful that the new product helps to assure their adequate presence in the American diet. But at this point we encounter a large area of ignorance, and until we know a great deal more than we do now we cannot say exactly what is the difference in nutritive value between orange juice concentrate and a fresh sliced orange. After all, orange juice is more than a solution of sugar, citric acid, flavoring oils, vitamin C, and carotene; and a whole peeled orange is still more than that. Whereas 15 years ago we had but a meager idea of the many constituents of oranges, current research is bringing many of the details to light. We now recognize 11 amino acids, 17 carotenoid pigments, of which 4 have vitamin A activity, and 11 flavonoids of which 8 have not as yet been identified. The flavoring con-

stituents of the oil are no less than 28 in number. Of course there are many others yet to be found. Some of these substances are known to be physiologically active, but if you should ask, "Are they good--or bad?" we should either have to confess complete ignorance or answer with another question, "Good for what?" The fact is that we very quickly come to the limits of present precise knowledge. I can only say that so far as we know, the nutritive value of oranges seems to be very well preserved in the processed frozen juice concentrate--but that the answer is greatly over-simplified.

The same product illustrates two other trends--the rapid growth of preservation of perishable foods by freezing, and the growing importance of food concentrates.

Frozen foods made their initial appeal to the public only a little more than 20 years ago. Fresh frozen fish, a few fruits, and a few vegetables appeared, at first tentatively in a few big-city markets. As the products caught on, distribution spread across the nation and a veritable tide of new frozen products started to rise. That tide certainly has not yet reached its flood. Technological developments are still happening fast, especially in the direction of formulated and precooked foods, and even complete, well-balanced meals.

The great selling point of the new frozen foods was that they brought to the home kitchen essentially fresh fish, or berries or peas out of season and a thousand miles from producing areas. The claim was, of course, substantially justified. The point I want to make is that when the producers bound themselves to this standard they also automatically set themselves to preserve the nutritive values of the fresh produce. To a very large degree, the methods of handling and processing which will make the food look good and taste good will also minimize loss of nutritive factors. The one kind of nutritive loss which is most likely to occur is that same leaching out and discarding of sugars and other soluble nutrients which also happens in too many homes between the saucepan on the kitchen stove and the dish on the dining table.

The other trend I spoke of is the expanding use of food concentrates of many kinds. The general public may not be fully aware of the importance of concentrates because many of them are later used for remanufacture into a very wide variety of food products, such as baby foods, catsup, soups, and canned pork and beans. For example, hundreds of thousands of pounds of dehydrated potato dice are used in the preparation of canned meat products such as stews and hashes. As another example, thousands of cases of tomato paste are shipped from California to Eastern canneries for remanufacture into canned soups. It is important to remember that modern low-temperature concentrating operations require extraordinary care to avoid damage resulting from growth of microorganisms. Whether the concentrate be preserved by heat processing, by dehydration, or by freezing, the real reason for its importance is that the reduction in weight and volume makes possible great savings in packaging cost, transportation,

and storage. Here again the major threats to retention of nutritive value are the same factors that threaten acceptable color and flavor, namely oxidation and the complex reactions associated with exposure to high temperature. A whole series of technological developments has come into use in answer to this challenge. I shall have time only to name a few especially noteworthy developments--vacuum deaeration, efficient low-temperature concentration, and highly effective heat exchangers which make it possible to heat, concentrate, and cool delicate food products in the space of a few seconds. There is no sign that the flow of new developments is slackening; on the contrary, I believe that modern engineering and food technology are only at the beginning of their great era in the food industries.

In the offing there are, as you know, even more radical developments which are engaging the attention of many research organizations. Especially intriguing are the unorthodox methods of preserving perishable foods, for example, by incorporating in them minute quantities of antibiotics or by exposing them to the action of penetrating electronic radiations. Investigation of these possibilities will have to be as much concerned with effects on the wholesomeness of the food, the possibility of toxicity development, and the retention of nutritive values as it is with the initial objective of killing the microorganisms which produce spoilage.

I am omitting mention of numerous other developments in the food industries, even though many of them are germane to our subject, only because I must not fail to point out the serious problems which confront workers in this field, and the vast amount of work remaining to be done.

In the first place, the science of nutrition is very young. When we speak of the "nutritive value" of a food, our judgment is only as good as the current status of the science. I need not tell you that study of the effects of food in the animal organism, discovery of the essential nutrients, determination of the minimal requirements for each, and identification of deleterious constituents such as the growth inhibitor in certain beans, oxalic acid, and thiaminase, is a complex business indeed. Our ideas about the effect of a particular processing method upon the nutritive value of a specific food product are therefore necessarily tentative. As of the present day, our approach to questions of nutritive value seems to take the calorie value and carbohydrate and fatty constituents pretty much for granted, make careful note of total protein content and especially the amounts of the ten essential amino acids, and lay great stress on calcium, phosphorus, iron, and the known vitamins.

Now there is no doubt whatever that food processing methods, whether carried out in an industrial plant or in the home, do have effects--sometimes profound effects--on various nutritive factors. The losses of vitamins in the milling of wheat to white flour were so disturbing that vitamin

fortification of white flour has become a well-established practice. An example of a more complex effect appears in some dried or dehydrated fruits and vegetables where the deliberate addition of sulfur dioxide to the product, in order to inhibit the development of unpalatable brown substances, serves to protect the vitamin C content of the food, but simultaneously destroys the vitamin B-1. Research concerned with studies on improved stabilizers is in progress. In dealing with fruits and vegetables we find that ascorbic acid and carotene are among the most sensitive constituents, the ones most likely to be lost in the processing or subsequent storage of the product. Indeed, measurements of ascorbic acid retention are commonly used by food technologists as an important criterion of changes in processing, packaging, and storage methods.

On the other hand, the changes brought about by processing also may be profoundly beneficial to nutritive value. I need only remark that one of the basic processing operations is cooking. We know well enough that the digestibility and palatability of many raw products is enhanced by cooking. Beyond that, however, we know that the heat treatment of cooking destroys some naturally occurring deleterious constituents, for example the growth inhibitor in raw beans. Then again, an important development in processing is the growing use of vacuum packing, inert gas packing, or the addition of an edible antioxidant, in order to delay or prevent the onset of rancidity in the fatty constituents of foods--and rancid fat in the diet is known to be deleterious.

Assessment of the effects of some other processing methods is not at all simple. For example, what about the refining processes used to produce granulated white sugar and vegetable cooking and salad oils? Refining removes scores of complex organic compounds from raw sugar and crude vegetable oil. Some of the things removed are doubtless nutrients, others are at least suspected to be harmful, and most are simply unknown, both as to chemical identity and as to physiological effect. I think we shall nearly always find there is no simple answer to the question, "Is the nutritive value of this food better or worse because of the processing treatment it has received?" We shall usually have to strike a balance and make a judgment of relative values.

It seems clear that a great and complex field of basic investigation remains to be explored. The fact is that our knowledge of the constituents of our commonest foods is extremely sketchy. Even less is known about the physiological effects of many of the known constituents, to say nothing of the unidentified ones. Perhaps we have been too ready to assume that the foods found acceptable by the human race for ten thousand years are necessarily ideal. After all, people still suffer and die from chronic organic ailments whose basic cause is unknown, but which may be due to unknown food factors. Foods which are adequate or even superior for children and young adults are not necessarily the best for elderly people--and we cannot forget that the proportion of oldsters in our population is steadily increasing. It may not be too optimistic to predict that an

important trend in the food processing industry of the future may be set in motion by discovery of ways to enhance true nutritive values and inhibit or destroy deleterious factors.

The kind of research that is needed is, of course, already being pursued vigorously, not alone in the Department, but also in distinguished public and private laboratories throughout the civilized world. The amount of effort being devoted to it is still not enough because the job to be done is enormous. Chemists must identify the scores and hundreds of constituents, not only in the raw materials but also the new compounds that are formed during processing and subsequent storage; they must isolate and purify these substances in large enough quantity so that physiologists and nutritionists can make conclusive tests on animals and men. Plant and animal breeders must see what can be done about building up the desirable constituents and breeding out the bad ones. Food technologists must devise practical ways of putting that broader basic knowledge into food factory practice.

In conclusion, I must repeat what I said at the beginning. In spite of our scanty and inexact knowledge, powerful forces are assuring our people of a better food supply than the world has ever known. I am confident that the main trends are in the right direction, and that the joint efforts of scientists, farmers, technologists, and industrialists will surely bring the improved foods of the future to the American people.

Nutritional Consequences of Food Laws

Robert R. Williams, Ph.D.*

It may be fitting to begin this discussion of the consequences of food laws with an incident relating to the consequences of no food laws. I once had a metallurgist friend whose early life included many technological adventures such as reworking ancient Mexican mine dumps on week days and running bull fights on Sundays. Finding this inadequately remunerative he moved to San Francisco before the great fire and got a job with a firm making pure honey out of glucose. In proof of authenticity it was the practice to drop one dead bee in every jar.

My own connection with control of food supply came at a later, less adventurous time when our first national Food and Drug Act had already been operating for some 8 years. The zealous spirit of Harvey W. Wiley still was in evidence in the Bureau of Chemistry which then had the task of its enforcement. In this atmosphere I was schooled for several months for a job in food and drug enforcement, a training which was destined to fail of its effect because I was enamored with research on the newfangled vitamins.

I did, however, get a picture of some of the problems. It was a very wet summer on the eastern seaboard and numerous canners of tomatoes were suspected of watering their products. Among the many who came for informal hearings in response to warnings was an old lady who tearfully assured us that the water all came from the tomatoes and I for one believed her. The role of policeman was not appealing under these circumstances.

By contrast, it was a lot of fun to assist in manipulating veterinarians' syringes in surreptitous injections of quinine solution into gunny sacks of cacao shells on New York wharfs and subsequently using the quinine as a tracer to prove that the shells were being used as an adulterant of ground coffee.

Fortunately now the era of widespread, willful violation of food laws has now long since passed. To a truly remarkable degree the present cooperation between reputable food manufacturers and the food and drug officials of our Federal government is cordial and mutually helpful. Many present-day scientists and technologists are inclined to accept this situation as a matter of course. It is not a matter of course but the result of very intelligent cultivation by the Food and Drug Administration of the good will of industry and of the support of public opinion.

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The result could very easily have been quite otherwise. Just a breath of the scandalous corruption which has recently invaded our Internal Revenue Bureau could have rendered impossible the wholesome government-industry relationship which now exists. The record of personal integrity in the Federal Food and Drug Administration is unsurpassed if not unequaled in our governmental history.

Lacking a more definitive accusation against our food officials, it has become the fashion of late among certain self-styled reformers and publicity seekers to bring the charge of "bureaucracy" against them. This is easier to support because the nature of the crime of "bureaucracy" is vague. Our officials would have to be more than human to escape utterly the temptation to wield authority arbitrarily at times because the authority exists. Yet a fair acquaintance with the Administration, its personnel, and methods leads one to the conviction that what may seem to be "bureaucracy" issuing a thousand needless rules and regulations is really something else. It is, we submit, a direct outgrowth of the extensive and diverse growth of our food technology. Time was when our food supply came directly to the farm house from the field, the garden, poultry yard, or barn a hundred or a thousand yards away. Now we mostly live in cities and our foods come from increasing distances through ever growing complexities of processing in specialized factories for each purpose. These processes are not sophistications for the purposes of concealment. For the most part it is true that the abandonment of any one of them would mean delivering the food too little, too late, or at too great a cost.

With respect to foods, one of the outstanding innovations of the Food, Drug, and Cosmetic Act of 1938 was its provision that the Administrator may promulgate a reasonable definition and standard of identity for a food product when in his judgment "such action will promote honesty and fair dealing in the interest of consumers." From the Administrator's standpoint the existence of such a definition and standard has great value. In the case of any suspected food of the classification so defined, he no longer has to prove that the article is adulterated, unwholesome or injurious. The fact of nonconformance to the definition and standard of the article whose name it bears constitutes misbranding and renders sale of the article under that name illegal.

I have asked myself the question whether the convenience of the Administrator in prosecuting doubtful food products provides adequate justification for the fixity of food patterns which these definitions and standards tend to introduce. This is a sober question and one which is not readily answered except by integration of a wide and profound experience in food manufacture and sale. Suffice it to say that I have yet to encounter a representative of an established food industry who does not feel that such definitions and standards are essential for a significant enforcement of the law. It is obvious that the manufacturer of a widely used article of food, such as milk or bread, wants those terms

"milk" or "bread" to have a definite meaning when they appear on labels. He does not want to be put in competition with someone else who chooses to sell something else as "milk" or "bread." It is equally obvious that the consumer also wants the common names of the foods she orders to bring her what she asked for--not somebody's newly invented substitute or modification.

If this need for standards is conceded, still a way must be left open for the development and sale of wholesome substitutes and modifications under proper labels. Otherwise we shall be freezing grandma's recipes into permanent and exclusive patterns. The way to do this, we are told, is to devise new and properly descriptive names for the new things our food industries invent. Then they can be sold without conflict with the standards, provided that by appearance or mode of sale they do not "purport to be" the previously standardized article. New names for the new things if recognized by new definitions and standards clear up all difficulties ultimately. However, often this can be a long and expensive process. Hence the present endeavor to find ways to shorten hearings or to omit them altogether in case no controversial issues are involved.

There is an oft-expressed desire to write into our food law more of the element of protection of public health while safeguarding the present protection to the consumer's pocketbook. Our Food and Drug Administration has clearly evinced a willingness to do this and to weigh heavily the public health implications of our present statute. The Administration has greatly facilitated the introduction of fortified oleomargarine and enriched white flour and bread and other cereals by providing definitions for these products. I shudder to think how the introduction of cereal fortification would have lagged had there been no authorized term by which to call them. Equally, I shudder to think what "enriched" might mean by now if its use had not been restricted by legal definition to products meeting specified standards.

So in spite of all the legal tangles in which we may become involved by the use of law to promote the wholesomeness of foods, I am certain that we are succeeding slowly not only in eliminating fraud and in eradicating toxic or injurious substances but even in the more difficult phase of building balance into our prevailing dietary patterns. It can not all be done by law; much must be left to education. But at least the law can preserve an open road to betterments both in the choice of foods we eat and to new modes of their technological preparation.

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Limitations of Consumer Food Protection Under Existing Laws

C. W. Crawford *

Both the subjects and attendance at this National Food and Nutrition Institute indicate its importance and value. As a representative of an agency which is deeply concerned with nutrition, and which has an important role to play in maintaining this part of the American standard of living, I am grateful for the opportunity to participate in these discussions.

To get a proper perspective on the topic assigned to me, I considered the subjects of the previous sessions and speakers. We have been hearing about the adequacy of the Nation's food supply and the adequacy of the American diet in terms of nutritional health, about nutrition as a factor in disease, and the significance of recent advances in nutrition.

These subjects place an accent on the positive. I wonder if we should not look also at some of the negative aspects. It is these that create some of our most difficult problems. It is these that tend to negate the values to the public of the great scientific advances in nutrition.

The advances have been spectacular. The organizations represented here who have contributed to these discoveries, and who have guided the dissemination of useful information about them, can justly feel proud. The food and pharmaceutical industries can likewise take pride in their contributions to nutrition research and the translation of its fruits into products that have improved our nutritional standard of living. The enrichment of flour, bread, and corn meal with vitamin specifics for pellagra and beriberi is an outstanding public health achievement. Where about 3,000 deaths from pellagra were reported annually in this country during the thirties, I am told it is now very difficult to find a single case for clinical study.

The diet of the American people has undergone great changes--I am sure for the better. American agriculture has produced ever-increasing quantities of the so-called protective foods, and found wider markets for them. The food processing industries and the pharmaceutical industry have developed processes and products of great value. New canning and freezing techniques preserve the nutritional values of food crops. Chemical synthesis has made vitamins plentiful and inexpensive. Millions of our citizens have been educated on the importance and content of a balanced diet.

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One consequence of all this is a great change in the work of the Food and Drug Administration over the past 25 years. Looking at it casually, our laws, which have also changed during that period, might seem to be very adequate indeed. One need only consider the amazing quality, variety, and abundance of the American food supply, especially in comparison with that of less favored nations, to conclude that the United States is the best fed country in the world. Undoubtedly, some of our people are even overfed.

Unfortunately, the American public does not fully realize the excellence of its food supply. It is not sufficiently informed to gain full advantage of the achievements of science and technology in the fields of nutrition and of agriculture, food processing and marketing. Because public education in these fields has lagged in some areas there has been a penalty for our progress in nutrition. This lack of public knowledge has made a fertile field for new forms of quackery which exploit the consumer's pocketbook and too frequently impair his health by inducing him to rely on bizarre diets or nutritional nostrums for treatment of serious diseases.

Perhaps by reviewing the environment out of which the problem arises, we can arrive at some conclusions as to the weapons we must use in future battles with deceit and fraud. Myths and folklore in regard to foods and diet are as old as mankind, but a vast new folklore of nutrition is being built by distorting the facts of the real advances of nutrition science. Speculative theories reported to scientific groups are stated to the purchasing public as facts; facts are half stated and become half truths in this campaign of misinformation which constantly seeks to persuade uninformed consumers to become faddists of one sort or another. Based upon experience, it will not surprise me at all if quotations from the proceedings of this very meeting later turn up out of context in food and drug labeling that is grossly misleading. May I interject here a suggestion that in all our scientific writings we should try to choose expressions of such accuracy and clarity that they will not lend themselves to easy distortion for the promotion of nostrums.

The food quack has something to sell. Usually it is a commodity which bears labeling. If it is shipped across State lines and if the labeling includes false or misleading statements, we can institute legal action. But if the quackery is confined to false teachings in the form of books, pamphlets, or so-called health magazines or radio and TV broadcasts that are not part of a commercial scheme of distribution and do not come under the legal definition of labeling, then the Food and Drug Administration can take no legal action.

Where the false or misleading matter does not fall into the category of commodity advertising, the Federal Trade Commission can do nothing. To put it bluntly, false or misleading information about nutrition may be disseminated freely to the public without fear of any legal measures such as apply to false labeling or advertising or the

dissemination of obscene matter. The guarantees of free speech and press provide immunity.

We have observed the growth of certain publications and the wide sale of certain books containing statements which, if used as labeling for products, would violate the law. Within recent years we have in fact had several important cases in which the courts have ruled that such matter does constitute labeling where it is used for the purposes of labeling. You may recall our successful seizure last year of a lot of blackstrap molasses, with accompanying copies of a book on diet which was a national best seller. This book prescribed blackstrap for a half million or so readers, to prolong life, treat menopausal difficulties, grow hair and correct baldness, restore gray hair to its natural color, prevent nervousness, tiredness, and poor digestion, promote normal functioning of the glands, and prevent changes due to old age. Fortunately, the Reader's Digest condensation of this misleading book did not contain the blackstrap references. I think today the blackstrap fad is dead, but there are others.

In the field of nutrition the layman is all too frequently at a loss to know where to go for sound information. Dr. E. V. McCollum has expressed the problem in these words: "There is no field of knowledge in which there are so many self-appointed advisors, who have judged their fitness for instruction on the basis of personal experiences or credulous belief in attractively presented fallacy....The distinction of fact from fallacy is difficult for those who have sought to become well informed through reading of many authors, some of whom are faddists."

In trying our cases before lay courts and juries we are brought face to face with this situation. It is frequently difficult to convince a lay jury of the misleading nature of representations that are made. These false teachings are intriguing to the uninformed, particularly those who want to believe that something is good for them. The sweet reasonableness of the argument wins the purchaser's mind despite the lack of factual proof to support the essential parts of the argument. The development of nutritional nostrums is always based on some fact or at least something that is difficult to disprove. What are some of these current myths of nutrition?

There is the widespread belief that the nutritive value of a plant is dependent upon the kind of soil on which it is grown, and even that the nutritive value of meat products is dependent upon whether or not the feed the animal consumed was grown on the proper soil. There is an element of truth in this thesis, but the only disease in man that has been associated with deficiencies of the soil is simple goiter. However, we see claims that foods gain almost magic properties through the practice of so-called organic farming. More frequently we see the assertion that we cannot depend upon ordinary foods as a source of essential nutrients because the food was grown on impoverished soil, and that

we must turn to the pitchman's vitamin and mineral preparations as a supplement to avoid malnutrition and all its dire consequences.

The American housewife is frequently told that certain water-soluble vitamins leach out in cooking and that others are destroyed by heat and, therefore, our ordinary foods cannot be depended upon to supply them. It is true that there may be some loss of certain vitamins in improper cooking. But it is also true that it is not difficult to obtain all of the essential vitamins by properly cooking foods obtainable at the average grocery store and that this does not require any expensive special equipment.

Anyone who has a headache, that tired feeling, or an ache or pain in almost any part of the body is urged to believe that he is suffering from a "subclinical deficiency" and needs to supplement his diet with some concoction. A "subclinical vitamin deficiency" is described as a condition in which it is not possible to obtain clinical evidence of a vitamin deficiency but a deficiency is suspected. Of course no normal individual, no matter how well fed, can go through life or even a small part of his life without experiencing some of these symptoms. There is no basis for believing that such symptoms are frequently or even commonly due to subclinical deficiencies. The implication of the sales programs, however, is that subclinical deficiencies are the first thing to suspect when we experience such a symptom as a headache. This just is not so.

The quack tells us that these subclinical deficiencies are almost universal and that unless promptly remedied they may cause serious or fatal diseases. The fact is that he is diagnosing or encouraging self-diagnosis of conditions that even the experts cannot recognize if they are of nutritional origin, but may be the first signs of an undetected serious illness--something which requires prompt and competent medical attention.

There is always something about the quack's product that makes it superior to anything else. To soften the market he seeks to undermine confidence in our abundant common foods. Sometimes he pretends to be allied with the medical profession, but often he attacks the advice of physicians as orthodox and out-of-date. He artfully inspires in the prospect a fear that his diet is nutritionally inferior and that he is suffering or will suffer from about every disease in the dictionary if he does not avail himself of this wonderful supplement. Older people, or the chronically ailing, are particularly apt to be taken in by this type of pitch.

The outstanding current examples of this kind of salesmanship are the promotions of those food-supplement products containing a multiplicity of vitamins and minerals, all combined with a base of plant extractives, alleged to be derived from plants grown on organically fertilized soils and harvested to prevent loss of highly acclaimed but unidentified nutritional factors. Two producers of these nutritional shotgun prescrip-

tions are each claiming to have the largest compost pile in the United States, but the other current "myths of nutrition" are also exploited. If the benefits promised for these and other nutritional cure-alls could be fulfilled, we would indeed be a nation of stronger, wiser people, with inexhaustible supplies of physical and mental energy, free from disease and worry--and free from objectionable odors.

Quackery in the field of nutrition cannot be dealt with adequately by law, since it is so largely an educational problem. The members of this conference are well acquainted with the need for public education in nutrition. Indeed, much of your time is taken up in efforts to disseminate sound and truthful advice on the relationship of diet and health. All too often, however, your teachings are counteracted by quacks who pose as eminent authorities in your field.

The answer to this is plain. We must seek to expose quackery in the nutrition field as well as in the strictly medical field. We must warn the public against it. In our educational programs we must encourage the habit of looking into the validity of new theories and concepts of nutrition, the habit of asking what research has been done, the habit of evaluating the adequacy of such research. Nutrition education should always emphasize the distinction between known facts and speculations.

Another limitation to consumer protection--and one which can be dealt with through legislative enactment--is the absence in existing law of authority to properly regulate the use of food additives, some of which may be harmful or otherwise contrary to consumer interest.

There is an interesting and significant connection between this problem and that of quackery. The growing use of food ingredients with strange chemical names has provided the promoters of food faddism with some rather effective ammunition. Frequently we see this reflected in our correspondence with consumers who are interested in problems of diet. Many are seriously concerned about the "chemicalizing" of their food supply. Whatever the source of their information, or misinformation, on this subject their concern is real.

I am glad that Dr. Longenecker, who follows me on this panel, is speaking on some of the nutritional implications of food additives. With no desire to encroach on his subject, I would like to discuss its relation to existing law.

The growing use of food additives has emphasized a serious gap in consumer protection under the Federal Food, Drug, and Cosmetic Act. The law as passed in 1938 requires pre-marketing tests of new drugs to insure their safety when used as directed, but it does not require testing of new food additives before they are used. While the authority to prescribe food standards may be exercised to exclude additives whose safety is suspect, the prescribing of standards for each food is a slow process

and is not an effective solution of the problem. Under the law as it now stands an ingredient of questionable safety may continue to be used in food until such time as standards can be formulated and become effective or until we have sufficient evidence to prove that it is poisonous or deleterious. This may take years, during which the public may be used as guinea pigs. I am glad to say that most food manufacturers do establish the safety of new ingredients before using them. But there are some who do not.

The Food and Drug Administration has advised the Congress in hearings before the Delaney Committee that legislation is needed to require adequate testing of these new ingredients of foods. The Committee, after hearings covering a period of 2 years, has recommended that such legislation be drafted and enacted. It is our expectation that a bill for this purpose will be introduced in the new Congress.

But if this law could be enacted tomorrow I would still tell this conference that we should continue to give attention to these new ingredients of food, even though every test reasonably applicable at the time their use is permitted shows them to be harmless.

I wish you could see the reports which come to me week after week from our Division of Pharmacology. There is a ferment of competitive development in the food and chemical industries aimed at the improvement of food products and processes to make foods cheaper or more attractive. Not a week goes by that does not bring some proposal for the use of some new substance, hitherto foreign to food, as an ingredient of food or as a component of food wrappers or as a treatment for food plants or animals.

New emulsifiers, stabilizers, humectants, mycotics, preservatives, fumigants, antioxidants, and the like are coming along all the time. Livestock raisers are employing drugs in ever-increasing quantities to promote growth and fattening, stimulate milk production, protect against disease, and bring about other changes in domestic animals. The use of antibiotics and other drugs in poultry and hog feed is now common practice. In addition to being treated with insecticides, fungicides, and herbicides, many of which are new, food crops are being subjected to applications of new products to stimulate growth, or thin out immature fruit, or stop dropping of mature fruit, or defoliate the plant before harvest.

We have laboratory and clinical methods developed by our best scientists for acquiring information about the toxicity and effects on nutrition that these substances may impart to foods. Such methods guide us in determining the safety of additives that may be used by man over an entire life span. In a practical world we must accept them and base our actions on them.

It is a disturbing fact, however, that some of the additives new in use have not been adequately studied by our newer methods. Other substances now in use in significant amounts have been tested and shown

safe by all available methods that are reasonably applicable. They would be considered harmless under any standards likely to be written into law. But are these widely accepted methods entirely adequate? Are they delicate enough, are they precise enough, to insure that the safety and nutritional values of these foods are not impaired? Can we sharpen the accuracy of our translation of the results of animal experiments into potential effects on humans? Can we derive more information from human tests, which have necessarily been of limited scope and duration, about the effects of these treated foods when consumed over the span of normal human life?

I do not mean that we should cease efforts to improve the quantity and quality of our foods through the use of new substances. Hazards in some degree are inherent in all progress. I do mean to suggest that you who are so vitally interested in the integrity of our food supply will serve our Nation well if you keep close watch on these newly admitted additives as they are tested in the laboratory of human experience during the years ahead. Our present abundant food supply is the safest and most nutritious in history. Let us remain vigilant to avoid any decline.

A paper on some nutritional implications of food additives was presented by H. E. Longenecker, Ph. D., Dean, Graduate School, University of Pittsburgh, but no copy was received for publication.

Emergency Food Planning

Presiding: James M. Hundley, M. D., Chief, Laboratory of Biochemistry and Nutrition, National Institute of Arthritis and Metabolic Diseases, Federal Security Agency

Emergency Food Supplies

Roy W. Lennartson*

It is a pleasure to meet with you today and discuss the problems and progress of emergency food planning. We in this Nation have dealt successfully with many and varied emergencies in the past. Today, however, with the current tensions and uncertainties in the international situation, the word "emergency" has taken on a new and sobering meaning. It now includes the possibility that this country may be subject to direct attack; and it includes the necessity of planning for the civil defense of the Nation.

I do not feel that I need to take time to explain to this group the importance of food--the need to plan for its abundant production and effective utilization--whether under conditions of peace or of emergency. Nor do I feel the need to explain--especially to those of you who have worked with farm families--that in agriculture the possibility of an emergency is ever present. Farmers have always faced the possibility of emergencies arising out of circumstances beyond their control. Crops may fail because of drought; floods or insects may destroy the harvest. Or--nature may work with us to such an extent that our harvests are way beyond our expectations. Then the emergency is economic--the markets cannot absorb the extra supply good weather provides and prices fall sharply and disastrously. Now, we must add another possible emergency situation--that of producing and distributing food during an all out war which may include direct enemy attacks upon this country.

I have not pointed out these various other types of emergencies faced by agriculture to, in any way, minimize the seriousness of the emergency we would face in the event this country is attacked. Rather, it is to stress some common characteristics of all emergency situations that must be kept in mind in planning to meet and overcome them. By their very nature, emergencies are unpredictable--we do not know <u>when</u> or <u>where</u> they will happen--and we do not know <u>how</u> <u>serious</u> they will be.

Thus, there is never any easy answer in emergency planning. There can never be a hard and fast plan of action--worked out to the very last detail. To prepare for emergencies, you must consider all possible situations; strengthen the basic resources available to combat them; and keep

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your plans and programs flexible enough to meet the particular emergency at the particular time it faces you.

This is the framework within which the Department of Agriculture is carrying out its responsibilities in connection with the national mobilization program and the basis upon which it has worked with the Federal Civil Defense Administration on emergency food planning programs.

It is impossible to separate the Department of Agriculture's current responsibilities and activities in the defense mobilization program from those we share with the Federal Civil Defense Administration for "emergency" food planning. Planning for the food emergencies of an all out war grows out of our basic mobilization program--just as it, in turn, is based upon the regular research, action, and educational programs of the Department.

Therefore, I should like to block in the background of the current mobilization program for agriculture before outlining the scope of our responsibilities for emergency food supplies and the plans that have been developed to meet those responsibilities. My remarks will be based primarily upon the work of the Production and Marketing Administration because it has been assigned major responsibility for the food programs that have the most direct relationship to civil defense food supplies.

The key to the current planning for the defense food program--and it is true also for our industrial program--is the strengthening of our food production. As a major food producing nation in the free world, the first step in mobilizing our food resources for defense must be the mobilization of our productive resources. Our food plant must be in sound condition so that food production can be further expanded if we should find ourselves at war. This job would be more difficult than the one we faced in World War II.

Then we had unused food production capacity. Now, acres under cultivation in the United States are almost at a practical maximum. Our future increases in food supplies must come largely from more efficient production. This means the best possible farm management practices; greater use of improved plant strains and of fertilizers; and further mechanization to counterbalance the smaller farm labor force.

At the same time we are gearing up our food production resources, we must continue to conserve and improve our soil and water resources. We cannot let our current high-level food production endanger our future productivity, which will be needed for the longer pull that is ahead. Even if we did not face the possibility of an emergency, the current development and conservation of our productive resources is our essential insurance for meeting the food requirements of a growing population in the years ahead.

By 1975, there will be a fifth plate at the Nation's table for every four plates today. And we want each fifth plate--as well as the other four plates--to have all the nutritious foods people need for healthful and vigorous living.

Mobilization of the Nation's agriculture for defense in the post-Korea period has, outwardly, been less dramatic--and, thus, less newsworthy--than in other segments of the economy. First, agricultural production had remained high following World War II and--through the operation of the price support program--much-needed reserves of basic agricultural commodities (primarily grains and cotton) were available. Thus, restrictions on civilian use of food have not been necessary--unlike the situation for critical industrial materials. Moreover, our reserve supplies plus continued high-level production have proven to be effective weapons against inflationary pressures.

Second, it was not necessary for the Department of Agriculture to institute radical changes in its organizational structure. The present-day PMA incorporates the hard core of our World War II Food Administration--both from the standpoint of organization and personnel. Moreover, the aims and objectives of our regular research, educational, and action programs are consistent with the needs of the mobilization program--a highly productive, efficient, and stable farm economy.

This is not to say that the mobilization program has not brought about changes in the programs of the Department of Agriculture. Our regular work has been reoriented to the needs of mobilization and possible defense emergencies and several new staff groups have been added. Among others, an Office of Requirements and Allocations has been established to compile and evaluate the food requirements of all groups depending in whole or in part upon U. S. food supplies. An Office of Materials and Facilities is responsible for insuring that our food production, processing, and distribution plant gets the allocations of critical industrial materials it needs to keep it at peak operating efficiency.

First responsibility for the distribution phases of the civilian food program also has been centralized within the Department. These responsibilities include: Acting as the official representative of U. S. civilians in the development and presentation of their food requirements; planning for and maintaining effective distribution of food through wholesale and retail outlets; and planning and carrying out programs designed to insure that adequate supplies of food are available for special and emergency civilian feeding programs.

It is in respect to this latter phase of the civilian food program that the Department of Agriculture works in close cooperation with the Federal Civil Defense Administration. It is the responsibility of Civil Defense to sponsor the development of an effective emergency civilian food supply program as one of the highly essential emergency measures in any community suffering an attack. It is the Department of Agriculture's responsibility to help insure that supplies of food are available to back up those emergency plans.

Working cooperatively, the Department of Agriculture and the Federal Civil Defense Administration have developed basic plans for emergency food supply, with special emphasis upon the needs in the period immediately following attack--both for mass feeding of the homeless and for meeting the needs of those able to remain in their homes.

The basic policies on which this joint Civil Defense-Department of Agriculture emergency food plan is based are:

First, that stock piling of special food reserves is undesirable and unnecessary. The normal stocks of undamaged food that would be available in homes, stores, warehouses--and en route to the area--would be sufficient to meet immediate emergency needs.

Second, that the job of emergency food supply is essentially a local one of organizing normal food distribution so that it can continue to function on at least a minimum basis under extreme emergency conditions.

Third, that full use of the experience, resources, and "know-how" of commercial food distributors is essential in the planning, organization, and administration of emergency civil defense food supply plans.

This is the basic policy being jointly followed by the Department of Agriculture and the Federal Civil Defense Administration in their respective areas of responsibility for emergency feeding. Within these policies it is the job of Civil Defense to assist State and local civil defense units to plan for and handle State and local emergency food supply programs--using the food supplies available in the State. The Department of Agriculture's basic responsibility is to plan for and, when necessary, to channel additional food supplies into the stricken areas as needed.

The Federal Civil Defense Administration has, for many months, been helping State and local civil defense authorities to organize food supply committees of commercial food handlers for work on this problem. The Department's State and county agricultural mobilization committees--composed of the field staffs of our various agencies--have been instructed to assist in this work in every possible way.

The Department also is participating in meetings held by the Civil Defense Administration to discuss emergency food supply with State civil defense authorities. These meetings are providing an excellent opportunity to help State civil defense people develop their emergency feeding plans with the framework of the total emergency food plan.

Civil defense food planning is a vital part of the total plans for food emergencies. Much has already been accomplished in a field where our own previous experience offers no guidelines. But there is much left to be done.

The Department of Agriculture's responsibilities for food in an emergency are, of course, broader than those I have related in connection with civil defense. Our first responsibility would be to keep the national food production and distribution system functioning. We would be responsible for maintaining the flow of food into, out of, and through attacked areas and preventing the commandeering of stocks needed in other areas by the States in which attacks occurred. At the same time, we must stand ready, where necessary, to redirect additional supplies of some foods into damaged areas.

Another of our emergency responsibilities is to plan for the restoration of essential food processing and distribution facilities damaged in an attack.

Emergency food supply plans must be fully integrated into emergency planning in other fields--transportation, for example. More work needs to be done on the kind and type of food distribution controls that would be required to keep the food supply system functioning under emergency conditions. I believe the Civil Defense representatives here will agree that more work is needed before State and local food supply committees are fully organized.

Lastly, more work needs to be done in developing emergency food requirements--based upon various hypothetical attacks on possible target areas. Such requirements need to be matched against estimates of probable undamaged supplies that would be available to meet these needs. This work would give us clues to the essential foods that might be quickly depleted in an emergency and preliminary plans could be developed for ways to provide additional supplies at once to the attacked areas.

I don't want to minimize for a moment the necessity for continuing this important planning for civil defense emergency food supplies. The Department of Agriculture will continue to assist in it. We hope also to help close some of the planning gaps I have just mentioned. After all it's only common sense that in the face of the billions we are spending for specific military preparedness we at the same time must develop adequate plans for the maintenance of our civilian morale and productivity in event of an attack. However, I can't leave you without pointing out again, and emphasizing, that our basic safeguard for our whole defensive strength, as well as food for emergencies, is the maintenance of maximum food availability through sound, dynamic, farm economy, and an efficient, well integrated distribution system.

DISCUSSION

Paul B. Murphy, Food Specialist, Federal Civil Defense Administration, discussed the way this national plan, outlined by Mr. Lennartson, would work to supply food for local Civil Defense emergency feeding. He emphasized three points chiefly: (1) The necessity for a Food Supply Committee

composed principally of local commercial food distributors as part of each local Civil Defense organization, (2) the vital importance of the cooperation of the Food Trades, and (3) the urgent necessity for action at the local level, now. All advice which the Federal Civil Defense Administration has been able to obtain indicates that the national plan developed jointly by FCDA and the Department of Agriculture* is sound and well adapted to our current strategic situation. However, any national plan is doomed to failure unless it is put into operation at the local level. It was emphasized that functional local Civil Defense units are the heart and core of effective Civil Defense.

The discussion was continued by Miss Edith Walker, Assistant Secretary and Director of the Emergency Meals Division, Ministry of Food, London, England. She reviewed some of the lessons about emergency feeding learned in Great Britain during World War II and outlined the plans now being developed for any future conflict. Their plan to provide food for Civil Defense emergency feeding is identical in principle with that adopted in this country, that is, reliance on food stocks normally found in commercial distribution channels as the principal source of food. Miss Walker emphasized the danger of underestimating the importance of adequate emergency feeding during and after enemy attack. "It is more important to feed the living than to bury the dead." Mobility, flexibility, and improvisation are keystones in any successful emergency feeding plan.**

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*Details of this plan may be found in FCDA Advisory Bulletin #78 which is now in the hands of all State and major local Civil Defense organizations.

**The principles of successful emergency feeding were summarized in the final report of the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense (Pub. Health Reports 67: 608. July 1952). Additional details of Miss Walker's views may be found in her article "How We Are Doing It in England," Amer. Dietet. Assoc. Jour. 29: 17-19. Jan. 1953.

Atomic Warfare and Food

Vincent B. Lamoureux*

Modern warfare plans for attacks on war industry, and therefore on cities which physically house these industries and on their surrounding populations. Atomic warfare presents all the problems of modern, conventional warfare, with the addition of injury and death from nuclear radiation and residual hazards due to radiological contamination. Such warfare may be overt or covert--it is with the overt attack that we are primarily concerned.

Blast and fire effects from an atomic explosion are greater in degree than from the conventional high-explosive or incendiary attacks. The overall effect of an atomic attack depends, in turn, upon the number of weapons used and upon the explosive force of each. We are accustomed, in our planning, to talk about and use the term "nominal" bomb--the one equivalent to approximately 20 kilotons of TNT used during World War II. These bombs, which were air bursts, destroyed structures within a half-mile radius from the center of the burst and severely damaged structures within a mile of the center. Severe fires destroyed or damaged other structures within $1\frac{1}{2}$ miles.

These results, familiar to many of you, are repeated to emphasize that the major damage to the food stores of any community may come from destruction of food warehouses, cold-storage plants, stockyards, and other food-storage or food preparation plants located within the 7-square-mile area of damage and destruction created by a nominal atomic bomb. The destruction of food stores may be magnified by the tendency in American cities to concentrate warehouses and processing plants, in that they may well be within a severely damaged area. Damage may be multiplied by the number of weapons employed or by the use of weapons with greater explosive force. The radius of damage from weapons of greater explosive force is increased in proportion to the cube root of the ratio of the magnitude of the larger weapon to the nominal bomb. Thus, a weapon eight times as powerful as the nominal bomb would double the radius and quadruple the area of destruction. Your major problem after an atomic attack is to recover the foods in partially destroyed warehouses, canneries, and the like, that can be used.

The question of reclamation points up the other unfamiliar result of atomic attack--that of radioactive contamination. The radiations from an atomic burst are neutrons, gamma rays, beta particles, and alpha particles. The neutrons induce radioactivity within the materials or the substances which they penetrate. As their effective range is largely con-

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*Radiological Defense Consultant, Federal Civil Defense Administration.

fined to the area of heavy damage, it is probable that much of the foodstuffs with which they react will be destroyed by blast or fire, or so scattered that recovery and reclamation is not possible. The salvable foods will probably not be dangerously radioactive. The degree of induced radioactivity will roughly parallel the salt content of the food. Cured meats, pickles, salt crackers, and the like, would be among the most likely affected. Sodium is the specific element involved in these instances. However, its half-life is only 15 hours, so the radioactivity would die down rapidly. In no instance are neutrons significant except immediately following an atomic burst.

Gamma rays not only are significant during and for about 90 seconds immediately following an atomic burst, but also are emitted from residual contamination resulting from fall-out, which is the deposition of radioactive materials, including fission products, following an atomic explosion. Gamma ray penetration in air, tissue, foodstuffs, solids, and other materials depends upon the initial energy. Along the path of the rays, their principal effect is the ionization of the atoms or molecules of the penetrated substance. This ionization does not render food unfit for consumption. Food animals, however, that have received a heavy dose of radiation should be slaughtered immediately and used for food. There are two reasons for early slaughter, the primary one being esthetic in that we can and should kill the animal (for food) before he gets sick. The other is that the meat will not be of good quality during the period of fluid loss, hemorrhage, and anorexia.

Beta particles have less penetrating power than gamma rays, and shielding against them is provided by relatively thin materials, such as clothing, and by short distances in air. Since the specific ionization, that is, the number of ionizing events per unit distance traveled, is greater for beta particles than for gamma rays, the damage is localized. Thus, the internal hazard from beta radiation is greater than that from an equivalent amount of gamma radiation, where the damage is more dispersed.

Alpha particles of concern to atomic warfare come from unfissioned plutonium and uranium. Plutonium (like radium) has an affinity for bone tissue. The slow rate of elimination once incorporated in the bone structure, the high specific ionization of alpha particles, and the long half-life of the emitter explains why they constitute an internal hazard. Due to their very poor penetrating power, they are not an external hazard.

Effective radiotoxicity will depend upon: (1) Half-life (this will be the composite half-life of the mixture of fission products), (2) energy of the beta particles, (3) degree of selective localization in the body (that is, iodine concentrates in the thyroid gland, whereas phosphorus and sodium are widely distributed), and (4) rates of elimination. Most radioactive isotopes emit both gamma and beta radiations.

The probability of radioactive contamination of foods depends upon the type and the explosive force of the atomic burst, and upon the number of bursts. It is not significant following an air burst, except with regard to those foods that may be salvaged within the area of extreme damage. Surface bursts will damage a lesser area, but the intensity of radioactive contamination will be increased. The greatest danger comes from subsurface bursts, where induced and fission-product radioactivity can present serious hazards. As the force of atomic weapons increases, there is relatively little increase in the area affected by the initial nuclear radiation. Meteorological conditions can have a material influence over both the concentration and spread of fall-out and resultant residual radiation.

There are some precautionary measures to be observed to permit a freer use of foods from a devastated area. Perishable foods within the damaged area may be so scattered and otherwise contaminated as to require destruction. Bulk foods may be salvaged if original packages are unbroken. If surveys indicate that there is significant radioactive contamination, such foods may be set aside until radioactive decay will permit their use. Levels of permissible contamination and methods of making measurements are given in FCDA Technical Bulletins 11-8 and 11-9. Foods within stores, markets, and homes in original containers such as cans, bottles, and waxed paper cartons, or in closed cupboards and refrigerators may be freely used, provided that the surfaces are cleaned by washing before opening. Contaminated meats, particularly cured meats, may be salvaged by removing the outer one-fourth to one-half inch, provided they are otherwise safe. Foods will be in short supply following an attack. Foods should <u>not</u> be destroyed because of radiological contamination, unless perishable. They should be set aside until the levels of radioactivity become safe.

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Biological Warfare and Food

F. K. Erickson*

Biological warfare is the deliberate use against man, animals, or crops of antagonistic or disease-producing organisms or their products. BW agents may include bacteria, bacterial toxins, fungi, richettsiae, viruses, and protozoa. They may be disseminated either covertly or overtly, alone or concurrently with other attacks such as bombing. The method of dissemination may be by use of massive aerosols to reach large areas and large populations, by localized aerosols to affect key segment of population, by massive or localized contamination of water supplies, by sabotage of certain food products or by contamination of products shipped in international or interstate trade. The agents used may be foreign to the experience of the target area, or new strains of familiar organisms, or familiar organisms introduced in a manner to by-pass normal safeguards.

Biological warfare can affect the emergency food problem both as to quantity of food supply and as to the safety of foods to be consumed.

BW when applied against crops or animals can deplete our food reserves and even alter our national diet. It is unlikely that our total food production resources could thus be so depleted as to create an actual scarcity and privation. Yet the need to substitute for several of our commonly accepted staples could adversely affect the national morale.

In the area of food preparation and service, the effectiveness of biological warfare agents is such as to place this as a secondary effect in a more direct assault on large populations. The primary exception to this would be a deliberate sabotage attempt against a key group in an industrial plant, business house, or government agency. Two examples of the first premise should be sufficient to illustrate.

(a) It is obvious to anyone familiar with the operation and hydraulics of a public water supply that such supplies in most American cities are suspectible to sabotage by biological warfare agents. Particularly is this true of the distribution systems. It is feasible to introduce sufficient numbers of some organisms or of certain bacterial toxins to produce grossly incapacitating or even fatal illness in most who consumed a normal tumblerful of the water. That the water was served at a meal at home or in a

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*Acting Chief, Emergency Sanitation Branch, Health and Special Weapons Defense Division, Federal Civil Defense Administration.

restaurant or was taken between meals would be quite incidental. Also incidental would be the organisms or toxins in the water used for preparation of uncooked foods. The process of cooking would render innocuous the contaminants in water required in the cooking.

(b) In the event of an aerosol type of attack, a certain proportion of the organisms could be expected to deposit and survive on exposed foods and utensils. However, unless the foods were eaten raw and without subsequent washing, the numbers of viable organisms thus introduced would indeed be insignificant. If good food sanitation practices have been followed, the organisms introduced by either prepared foods or utensils would be a negligible percentage of those introduced by the respiratory route.

At least in the area of food service, our best defense against biological warfare is a strengthening and improvement of basic food sanitation practices. In the area of food salvage, the basic features of evaluating access by biological contaminants are essentially the same as those imposed by salvage of food stocks subjected to natural disasters of flood, fire, and blast.

In civil defense disasters the controlling factor is the magnitude of casualties and destruction which we believe will be involved. Because of this great magnitude, it will be possible to concern ourselves only with essential or basic sanitation. Where flood, earthquake, or hurricane may render hundreds or thousands homeless and in need of feeding, the civil defense emergency may see tens of thousands to hundreds of thousands homeless and hungry in any one city. Natural disasters have rarely struck more than one or two major centers of supply and transportation at one time. Enemy attack is likely to strike at many major cities simultaneously.

The feeding of these tens or hundreds of thousands of homeless will have to be done initially under very primitive conditions due to unprecedented physical damage. Our basic utilities of electricity, gas, and water supply services may be disrupted. Without electric and gas service, commercial and institutional kitchens will be of little utility and refrigeration units will be inoperative. Damage, fire demands, and interrupted power services will deplete the water supply and such as may be available must be suspected of contamination. Even in the outer suburban fringe where private water supplies would otherwise be available, power shortages may render most supplies inoperative.

Emergency supplies of potable water would have to be provided. However, the many other demands on transportation services and the utilities groups in engineering services will limit such emergency supplies to an austere minimum. Hospitals and casualty services would logically have first priority on such supplies.

As just indicated, for a short but critical time cooking units operated by electricity or gas will probably be unusable. Very few areas will have army-style field ranges available to substitute. Outdoor improvised cooking facilities will have to be established. Such conditions will aggravate the need for proper sanitation precautions. Equally enlarged will be the problems of effecting and maintaining such precautions.

The sanitation problem is not over once the food is prepared. Attention must be given to measures that will guard the food if it must be transported and while it is served. What will the people eat from and how will they clean such utensils? What will be done with the garbage and refuse of the food-preparation area and of the eating area? They must be so disposed as to avoid the establishment of insect-breeding areas adjacent to or within the mass-feeding area.

All these items have a familiar sound because they mark the sanitation functions that have concerned us throughout the history of public health development. Their importance in civil defense emergencies is even greater. Medical services already overwhelmed with the casualty load of bombing and possible attendant special weapons, such as biological, chemical, and radiological warfare agents, will be unable to cope with additional illness. Furthermore, the tremendous tasks of fire-fighting, rescue, restoration of essential services, and care of the homeless will demand an able-bodied force undiminished by epidemic or debilitating illness. Too often the civil defense planning groups neglect the obvious fact that the numbers of casualties from communicable disease could easily exceed the numbers of bombing casualties.

1. In planning for emergency food service, the welfare mass-care services should bring in right from the beginning the health services, the food wholesalers and retailers, the restaurant industry, and the established volunteer relief agencies such as the Red Cross.

2. In selection of potential sites for emergency feeding, the adaptability of the location to safe food preparation and serving under conditions of interrupted water, gas, and electric service must be a primary consideration.

3. In staffing of feeding services, the maximum utilization of trained restaurant management personnel and their staffs is highly desirable. In cities having an active and effective public health program, these personnel will require less additional training on sanitation practices. They are accustomed to the preparation and serving of meals for large groups. Dependence upon this group must not be so great, however, as to interfere with the most rapid practicable reestablishment of retail food service.

4. Provisions should be included in the planning period for such arrangements as will insure the rapid release to emergency feeding services of the extensive stocks of paper service on hand with the distributors in the area. The paper container industry is anxious to cooperate in civil defense preparation and already has provided a Nation-wide network of 20 paper-service stock piles designated for disaster use only. Their representatives should be included in the advance planning councils.

5. Sanitation training for all staff and volunteers for food services is important. Existing programs such as the food-handler's training courses can frequently be adapted to this need. It must be remembered, however, that when improvising must be anticipated, such training must stress the basic techniques of sanitation and their reasons and must be shorn of the high lights on how to use modern feeding service gadgetry.

6. Planning must not neglect the feeding needs of the great numbers of civil defense workers in rescue, fire, first aid, police, engineering, etc. Here again stress must be placed on simple methods and simple menus that will produce the least sanitation hazard to safe food service.

The measures that will be required to provide adequate sanitation protection of emergency food supply and feeding services will be a matter of intelligent local adaptation to such factors as climate, time of year, the normal structure of food sanitation supervision, the topography of the city, the local organization of civil defense services, and the type of attack suffered. Several suggestions as guide lines merit inclusion at this point:

1. Under primitive conditions of emergency, safe food service can be accomplished if simplicity and basic sanitation principles are the keynotes. Such basic principles must not be confused with the many present-day methods that are dependent upon a maze of labor-saving and space-saving gadgetry.

2. Menus will of necessity be simple with basic staple foods predominating. Even these staples can be improperly used. Outstanding, of course, are the hazards of cold meats, with especial reference to ham. Any of these can serve as culture media when refrigeration is absent and the opportunities for contamination unlimited. Hot soups and stews should be emphasized.

3. Cooked foods must always be served hot and never just warm. This represents a distinct problem when meal periods may stretch over periods of hours and heating facilities are crude and difficult to adjust.

4. Cold foods should be served direct from the can and cans should be opened only as needed.

5. Milk and fresh milk products must be well protected and should be obtained only as needed if refrigeration is not available. Where dried milk is reconstituted, the water used must be potable and the reconstituting must be phased to avoid holding periods in excess of 2 hours.

This listing could readily be continued with suggestions on such details as the provisions for dishes, dishwashing, garbage and refuse disposal, hand-washing facilities, sanitary facilities, insect control, etc. However, these will all be properly approached and dealt with if health services and welfare services work in close cooperation on the food and feeding problem. They must be guided by two overriding requirements, namely: Keep it simple and adhere to basic sanitation principles.

Chemical Warfare and Food

Thomas H. Alphin, M. D.*

Chemical contamination of food under civil defense disaster conditions can arise from two sources: (1) From the primary use of chemicals as warfare agents by an enemy; (2) secondary, from chemicals normally stored in the bombed area and released by the bombing attack. The effect of such chemicals upon food could be either toxic, resulting in sickness or death, or simply make the food unpalatable by changing its odor, taste, color, etc. Certain of the newer chemical warfare agents which are extremely toxic in very low concentrations cannot be detected by the ordinary human senses. This is also true of a number of industrial chemicals commonly found in metropolitan areas. A simple testing kit for chemical warfare agents in food is therefore being prepared. Civil defense officials responsible for food supplies should be familiar with possible sources of contaminating chemicals and identification methods for these chemicals for his own locality in addition to being familiar with methods of identifying known chemical warfare agents.

Fortunately in this country a large amount of food is not stored in bulk, and packaged food is much less subject to chemical contamination. Modern food package methods are in fact often developed around a requirement for preventing exposure of food to the atmosphere and such a requirement frequently would protect against most chemicals. Food known to have been exposed to chemical agents should not be summarily destroyed until the possibility of salvage has been thoroughly investigated. Quite frequently large packages and bulk storage will be contaminated only at the periphery, and by the use of proper precautions it is possible to salvage a large part of the uncontaminated food.

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Discussion-Group Reports

Group I. Food Supplies for Good Nutrition

Group I reviewed the facts that had been presented by speakers on the subject of food supplies for good nutrition at the first general session of the conference. The dietary improvement that has taken place since the late 1930's and the factors contributing to this improvement were discussed briefly. It was noted that there are still many segments of the population, as indicated by dietary surveys, that have diets considered inadequate by present nutritional standards. The nutrients most often in short supply are calcium, ascorbic acid, and in some groups thiamine and vitamin A.

There was some discussion of factors related to these nutrient shortages, such as income, local food supply and its use (for consumption or sale), transportation, and food habits, and the fact that these factors may differ from area to area as well as from group to group.

Meeting the calcium needs of the nation

Data on national per capita consumption and dietary surveys of various population groups indicate that, of all nutrients usually considered, calcium is in shortest supply relative to present-day recommended allowances. In 1948 four out of ten city families in the United States did not have food furnishing the dietary allowances recommended by the Food and Nutrition Board of the National Research Council. Some members of the group asked whether the present (1948) calcium allowances are not too high, especially in view of the lack of concrete evidence of calcium deficiency. The Food and Nutrition Board is currently reviewing the experimental basis for the dietary allowances recommended for various age, sex, and special need groups, and will make whatever modifications seem justified in the light of present knowledge.

How to meet calcium needs was the subject of vigorous discussion. The usually recommended way to increase the calcium level of diets is through increased consumption of milk. There are many problems in bringing this about and several approaches are needed.

Maintaining production and consumption of milk. It was pointed out that the total production of milk in the United States is not keeping up with the increase in the population. Many milk producers are turning to the production of other agricultural products that give better financial returns. The cost of fluid milk appears to be so high in many areas as virtually to prohibit its use by many low-income families. It was further pointed out that there are some milk deficit areas, such as the South, where greater milk production is feasible and desirable. For the country as a whole, however, consumption levels of milk products except butter have been maintained thus far because of more effective utilization of the milk solids produced.

Nonfat milk solids. The increasing use of nonfat milk solids as an item of diet is making an important contribution to the nutrition of many groups. In view of the nutritive value of nonfat milk solids, and particularly of the contribution that this food can make to diets of low-income groups, it was considered important that effective use be made of this valuable food and that greater quantities be channeled into human consumption. There was considerable discussion of the possibilities for greater use of nonfat milk in bread.

Nonmilk sources of calcium. The group recommended that efforts be made to further the consumption of foods that are natural sources and good carriers of calcium. Mention was made of the rich supply of calcium found in small unprocessed fish which are eaten, bones and all. Some kinds of greens, as kale, collards, and mustard and turnip greens, are also good sources of calcium. The group further recommended that since some segments of the population, particularly the low-income groups, do not buy adequate amounts of foods rich in calcium, consideration be given to promoting enrichment of bread with calcium, now an optional ingredient under the bread standards.

Educational efforts

The need for good educational methods in bringing about dietary improvement was emphasized. Consumption of milk, for example, is often low from choice rather than from necessity.

Discussion of the Basic 7 as a teaching guide indicated its general usefulness. However, some modification of this teaching aid should be made to make it more realistic quantitatively. Some members felt that more emphasis on the amounts needed or recommended would help families to understand their food needs, and to take more positive action in improving their individual and family diets.

The importance of consumer demand in maintaining adequate market supplies of milk and other needed foods was pointed out. A gradual increase in consumption of milk by those now using only small amounts would help to stimulate increased production and more effective utilization of that which is available.

Leader: Bushrod W. Allin
Resource persons: Isabelle M. Kelley, Faith Clark
Recorder: Andromache Sismanidis
Hostess: Esther Scott

Group II. Food Distribution as It Affects Nutrition

From the broad field of food distribution as it affects nutrition the group selected three subjects for consideration:

1. The need for more information on foods in plentiful supply, their availability in the market place, and the nutritive quality of these foods. The group was in agreement that such information would materially help consumers to use their food dollars to the maximum in obtaining an adequate diet. Discussion centered largely on the Department of Agriculture's activities to promote the use of plentiful foods. This program seeks to encourage greater use of plentiful foods through the cooperation of the food trades' industry, those responsible for large-scale public eating establishments, and the public information services: press, radio, and television. In general, the group considered this program worthwhile in assisting producers to market heavy supplies. Also, there was general agreement that the program was helpful in providing information on the availability of plentiful foods and that this information was effectively used by many groups, especially those concerned with the school lunch programs.

On the other hand, certain reservations were expressed concerning the plentiful foods program. First, the foods designated monthly as in plentiful supply do not necessarily represent best buys. In a particular food group an item may be in greater supply and cheaper in price than last year but, at the same time, another item in the same food group may represent a more economical buy from the standpoint of the nutrients it provides. Secondly, the information on food supplies provided under this program is available only one month in advance. This time schedule does not meet the needs of large-scale food buyers who must plan their purchases 3 months in advance of actual delivery.

The group felt that the program was only indirectly related to improving the nutrition of the Nation's population, but that its value could be greatly increased if information on nutritional characteristics could be included with information on supplies. There was specific mention of the contribution that retail food stores could make by including nutrition information in their food advertising. At the same time recognition was given to the work of many branches of the food industry in nutrition education and interest was expressed in having this work extended and improved.

Throughout this discussion, it was recognized that the list of plentiful foods distributed monthly to school lunch programs is pointed up with due consideration to nutritive factors and suitability for use in school lunch programs.

2. Improving the nutritional status of low-income groups. Time was too short to discuss this problem fully. However, the group suggested that people both in and out of Government concerned with the nutrition of the Nation's population should consider how nutritional improvement of low-income groups could be brought about by educational techniques and possibly by some device to improve their food purchasing power.

3. The contribution that nutrition research can make in guiding the development of programs aimed at improving the distribution of available food supplies. Members of the group agreed that there is a need for more studies and appraisals of local diet patterns to serve as a practical basis for developing programs to meet nutritional deficiencies. These studies are particularly useful as an educational device if local groups recognize the need for them and participate in them.

Leader: George Travis
Resource persons: Margaret Prentice, Janet Cameron
Recorder: Sam Vanneman
Hostess: Janet McFadden

Group III. Emergency Food Planning

Both the questions raised and the comments of this group discussing emergency planning revealed in general: (1) a lag in planning by many cities and communities with respect to food problems that are likely to arise in the event that the city or community is subjected to disaster, and (2) lack of coordination and integration at National and State levels of such emergency food plans as are being developed in some of the cities and communities throughout the Nation.

The group recognized the need for stimulating local civil defense authorities to develop, in cooperation with local welfare organizations and food distribution trades, emergency food plans for their community. The various plans of Federal, State, and local agencies need to be coordinated and integrated in order to:

Avoid duplication of effort,
Have a medium for exchange of ideas on emergency food planning,
Provide assistance to local civil defense organizations in developing plans and programs,
Give a proper perspective to the problem as it relates to the Nation as a whole.

It was recognized that emergency food planning, which is only part of a more comprehensive local welfare program for an individual city or community, is a problem relating to food for everyone--both for those who are able to remain at home and those whose homes have been destroyed and who must obtain food at a central feeding canteen (mass feeding). Before going into these aspects of the problem, the group gave consideration to two preliminary questions:

1. <u>What is an emergency and, according to civil defense plans, how will it be met?</u> For discussion purposes, the group defined an emergency in terms of the period during which a particular community suffers a disaster (or a community cares for large numbers of evacuees and for the adjacent communities) and as lasting from 3 to 6 days afterward. During this period volunteer organizations, under the guidance of the local civil defense authorities, would assist in operating the various welfare programs. By the end of the 3 to 6 days the local government would have resumed its normal functions and along with that the following would have taken place: (a) the reestablishment of communication, transportation, and other public utility services; (b) return of food stores and restaurants to more normal operation; (c) the evacuation, if necessary, of children, the aged and sick persons from the particular community; and (d) the resumption by all able-bodied persons of their normal pattern of activity. Volunteer organizations, including the American Red Cross and other groups which have experience in mass feeding would function as "assisting agencies."

The local civil defense organization would have the responsibility for administering the various relief programs during the emergency period.

2. Will the food and water already in the target area be fit for consumption after the attack? A review of the facts brought out by the speakers on A.B.C. warfare indicated that the damage to the food supply in a city or community which had been subjected to attack with atomic weapons may not be quite as serious as is commonly supposed. The problems associated with the contamination or disruption of the water supply are more critical. In order to anticipate some of the immediate problems that are bound to arise when the water supply of the community is contaminated or disrupted, it was suggested that local government and civil defense authorities should survey alternative sources of potable water--as, for example, wells on farms or in rural areas adjacent to the target area--and the availability of tanks and facilities for its transportation.

Food for people to eat at home

It was pointed out by one of the resource advisers that the problem of how to keep retail food stores and restaurants in the community open and supplied with food during an emergency period is one that calls for considerable planning by both the local government and the civil defense authorities. The current program assigns to the Federal Government the responsibility for assuring an uninterrupted flow of food into all areas of the Nation. The responsibility for food distribution within a community falls largely on the local authorities.

It was agreed that in developing plans to assist food stores and restaurants to function during an emergency, local government and civil defense authorities should enlist the cooperation and work closely with wholesalers, retailers, and restaurateurs, with employees of the Federal, State and local governments, and with various local welfare groups. Plans should include measures for assuring the uninterrupted flow of food to retail stores and restaurants.

The building up and maintenance of food stockpiles by each city or community is definitely not encouraged by the Federal Government because this might interfere with the flow of food between and among communities and lead to food spoilage. However, individual families are encouraged by the Federal Civil Defense Administration to keep a rotating 3-day normal supply of food in their pantries. Although no recommendations are made as to the foods that universally should comprise the family food reserve, authorities in some of the States have recommended that this include canned foods, in tin rather than glass containers, and foods covered by heavily waxed wrappers. Canned juices and foods that have a high liquid content are strongly recommended.

It was apparent that both Federal and local plans relating to the family emergency food supply are sketchy. Additional consideration should be given to this problem, with special attention to the family supply of potable water.

Mass feeding

It was agreed that a second major problem of emergency food planning--emergency mass feeding--requires a comprehensive program which should include the preparation and serving of food at strategically located canteens and at provisional hospitals, and the transportation of food to rescue teams and other local civil defense workers. The success of a mass-feeding program under emergency conditions depends on many factors, including the extent to which personnel have been recruited, trained, and oriented to cope with possible problems. In addition to the welfare objective, another important aspect of the mass-feeding program is to retain able-bodied persons in the community so that rehabilitation work can be resumed as soon as possible.

The tremendous program of recruiting and training personnel for work at the community emergency canteens for mass feeding is to be carried out under the authority of the local civil defense with the cooperation of welfare organizations and other groups. Civil defense authorities in some cities and communities have already begun to enlist such help, but recruitment programs of the various organizations will need coordination to minimize duplication of effort. The American Red Cross, through local chapters, has agreed to train volunteers for work at emergency canteens.

In addition to trained personnel for the strategically located canteens, the need for mobile units to transport food to rescue teams, hospital employees, and workers on other civil defense activities during an emergency was recognized as an important part in the over-all local planning for a mass-feeding program. The need for such units will depend largely upon the location of the city or community, the density of the population, and other factors. In general, the group did not consider it advisable or practical to purchase such equipment for this single purpose until the local resources have been carefully surveyed by the local civil defense authorities. Suitable equipment in the city or community should be specifically designated for this particular use during an emergency.

The recommendation was made that, in addition to the material already published, a simple and comprehensive manual covering all phases of mass feeding (including suggestions for feeding in an improvised hospital, the feeding of infants and of aged persons, and the technique of cooking outdoors), written by competent specialists in nutrition, should be prepared and distributed by the Federal Civil Defense Administration for use as a planning guide. Attention was called to the fact that parts of such an undertaking have already been started, and some information on the subject has been published and disseminated in a number of bulletins by the Federal

Civil Defense Administration; however, it was agreed that the distribution of this information has not been adequate.

It was pointed out that the problem of financing the food and the food-preparation facilities for use in an emergency mass-feeding program is complex and no solution has been arrived at yet. Some States are attempting to set aside funds for this purpose; however, most indications point to dependence upon the Federal Government for assistance in this particular problem.

Leader: Gladys Spear
Resource persons: Howard Davis, Paul Pearson
Recorder: Harry Sherr
Hostess: Mariana Sewell

Group IV. Achievement of Good Nutritional Status

Two sections discussed the topic of achievement of good nutritional status. The leaders met in advance and drew up agenda which were accepted by both groups. The report which follows is a composite of the discussion of the two sections.

Nutritional status

The question first considered was that of seeking a common understanding of the meaning of nutritional status. Then, what is good nutritional status, and how can poor nutritional status be detected. A definition proposed was: "Nutritional Status (or nutriture) is the sum total of the conditions of body tissues and functions which have been (or are being) produced or influenced by the food consumed and metabolized."

Good (or the best) nutritional status was described as: "That degree of nutriture which permits the development of maturity according to the individual's biological and social time schedule for effective living and postpones senescence, thus providing the longest span of active adult life."

There is great need for clear conception of the meaning of these terms by both professional and lay people. The haze that surrounds the meaning of the word "nutritional status" may undermine the effectiveness of many of our programs aimed at improving it. The clarification of terms and better interpretation to the public are thus of practical importance in the achievement of good nutrition.

Focal points of this conference relating to nutritional status

1. Subclinical or borderline nutritional deficiency: How much ill health is derived from poor nutrition?

2. Metabolic disorders--obesity, diabetes, arteriosclerosis, and arthritis.

3. Professional people as well as others should guard against nutritional hysteria which focuses attention on some disorders to the exclusion of others of equal importance.

4. Analyses of dietary trends have revealed the general upgrading of the diets in the past decade or so, but some weaknesses exist.

5. Nutrients apparently most likely to be short in comparison with National Research Council allowances (1948) are calcium, ascorbic acid, and possible vitamin A, all of which are readily obtainable from common foods.

6. The increased proportion of calories from fats is a trend in food habits that may be noteworthy in view of present emphasis on disturbances of fat metabolism in a variety of metabolic disorders.

7. Averages may mask the wide variations in intake which occur in families of varying income, size, educational levels, and among the different members of the families.

8. Although the margin of dietary safety has been improved, it is still small and could easily vanish in time of emergency.

9. The evaluation of good nutrition must consider the individual as a whole--not just his present diet. Previous nutritional planes, emotional climate, and general health have an important bearing on the use of food in the achievement of good nutritional status.

Suggested steps or measures for improvement

1. Adequate purchasing power. While factors other than income are related to the adequacy of the diet, income is an important one. Its importance is increased in view of the fact that a large proportion of the children are found in families at lower income levels.

2. Production, processing and marketing of high quality food in amounts sufficient to meet our needs and those for world trade.

3. Improvement in nutritive quality of food. Technological advances in the processing of food should be applied to the end that nutritive values of foods are maintained or enchanced rather than diminished. The contribution of enrichment of grain products to the improvement of diet is an example of the benefits that may be derived by improving the nutritive value of food. The expansion of this program to States not yet adopting it and the inclusion of other nutrients known to be low in the American diet merit consideration by authoritative advisory groups.

4. A good health program is basic to the achievement of good nutrition, and nutrition should be an integral part of the health program. Many factors influence nutritional status--freedom from infections, for example, is important to the utilization of the nutrients for proper growth and development.

5. Adequate therapeutic services for the increasing number of people with metabolic disorders requiring dietary adjustment.

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6. Continuation and expansion of the school lunch program as a preventive measure, a sound educational tool, and a demonstration of what nutrition can accomplish.

7. Research. Progress in accomplishment of good nutrition is handicapped by lack of information. Research is needed:

To establish additional and more adequate techniques for detecting the complex subclinical conditions of malnutrition.

To establish criteria and standards for evaluating nutritional status. Much background information is needed to interpret results obtained by existing methods about nutriture. New norms derived from well chosen samples of all population groups are needed, for example, new tables of height-weight and other anthropometric measurements, that would provide a practical reference against which to check observations of nutritional status.

To define more accurately the nutrient needs of many types of people and to understand more clearly the individual differences. This is an important measure in the conservation of our food supply. The present allowances are often described as extravagant.

To determine the interaction of nutrients as influencing factors in the normal development of individuals throughout their life span.

To explore the relation of nutrition to the genesis of numerous diseases, for example, dental caries.

To determine more extensively the nutrient value of foods as consumed.

To understand the mechanisms operating in the formation and change of food habits.

8. Continuous surveys of nutritional status and food habits of all population groups as a sound basis for educational, preventive, and therapeutic programs. A large number of such studies have been conducted. There is need for a compilation and interpretation of the results. More emphasis might well be made on continuous and systematic height-weight measurement of children in the schools as a practical index of nutritional status.

9. Increase in number of trained workers in all areas of nutrition such as--teaching, research, dietetics, public health, and school lunch, and improvement in professional opportunities and recruitment of trainees.

10. Establishment of more adequate financial support for all phases of nutritional work.

11. Education. Essential to the achievement of good nutritional status, vital to the application of test-tube findings to the benefit of persons.

Leaders:
Ercel Eppright
Maurice Shils

Resource persons:
Mary Spiers, Florence MacLeod
Olaf Mickelsen, Georgian Adams

Recorders:
Patsy Graves
Elizabeth Handy

Hostesses:
Helendeen Dodderidge
A. Christine Justin

Group V. Food and Nutrition Education

The great interest that conference members had in problems of food and nutrition education was evidenced by the fact that 131 persons indicated this topic as their first choice for discussion. Five sections were organized.

The report which follows is a brief composite of the notes submitted by the recorders of these sections.

The sections listed a dozen or so questions and problems, each concerned with some aspect of nutrition education. Three groups listed the problem of evaluating nutrition education programs. Two groups considered the problem of motivating people to develop good food habits. One group was concerned with teacher education and the importance of developing an appreciation of, and training in, nutrition by teachers so that they can effectively integrate nutrition education into the general education program. One group discussed the role of the school in promoting good food habits, and four groups considered different problems having to do with methods or techniques in nutrition education.

Evaluation problems

1. Major points of agreement

There was agreement that evaluation of progress is important in a nutrition education program and that more careful planning needs to be done for effective evaluation than appears to have been done to date.

2. What is being done?

(a) Current evaluation seems to be confined to checking on food consumption as a measure of effectiveness of nutrition education efforts.

(b) Extent of purchase of milk or fruit juice from dispensers as compared to use of "coke" machines has been observed in some places as one indication of the effectiveness of nutrition education.

3. What needs to be done? By whom?

(a) Develop basically sound and objective procedures and use them in more situations.

(b) Provide a broad nutrition and education background in the training of nutritionists so that they can have sound preparation for evaluating nutrition education programs.

Motivation problems

1. Major points of agreement.

The majority of the groups that discussed "How to motivate people to develop good food habits" felt that people should be encouraged to eat food because it tastes good, rather than because it is good for them. It was pointed out that too much may be told to children in some cases and they become tired of hearing about nutrition. Another point of view was that explanations should be given as to why certain foods should be eaten.

2. What is being done?

(a) One community stimulated interest in overweight and provided a series of lessons for 20 women.

(b) In one school parents came and ate the regular school lunch with their children. After the meal, the school's lunch program was explained to the parents with emphasis on nutritional aspects.

(c) In some schools children in the different grades take turns planning the week's menus for the school lunch and making decorations for the lunchroom. Their participation in the program has increased interest in improving food habits.

(d) Other activities reported include preschool clinics, baby clinics, radio programs featuring women who have attended extension meetings concerned with nutrition education, and the distribution of nutrition leaflets containing recipes.

3. What needs to be done? By whom?

(a) There is need for good educational materials which qualified people help plan and which are written with such appeals as will influence the different age groups.

(b) Critical studies should be made of motivation procedures to make sure that appeals do not go over the heads of the people toward whom they are directed.

(c) Nutrition workers need to learn the food habits of people concerned, then start with the good points and supplement for adequacy.

Teacher education problems

1. Major points of agreement.

(a) School administrators need to have more appreciation of the value of nutrition education throughout the school program.

(b) All teachers need preservice preparation for teaching nutrition as an integrated part of the total education program. This is particularly true for teachers in elementary schools.

(c) Some teachers are not keeping up with new findings, nor are they developing constructive attitudes toward nutrition education.

2. What is being done?

(a) A few colleges and universities require a course in nutrition for all graduates who qualify for teaching certificates.

(b) A few colleges and universities are offering a course in nutrition education combined with one on school lunch.

(c) Nutrition education workshops are offered in several States.

(d) Some States are urging the attendance of school administrators at nutrition education workshops.

3. What needs to be done? By whom?

(a) Goals in nutrition education should be related to overall goals in education.

(b) Courses in nutrition education should be included in the preservice curriculums of all elementary teachers.

(c) More nutrition education workshops are needed for teachers and other workers in nutrition.

(d) More nutritionists who can work with teachers are needed for work in many communities.

(e) The job of finding out needs and getting across nutrition information to improve food habits should be shared by many persons in the school--home room teacher; core teacher; teachers of homemaking, science, social science, and physical education; the superintendent and principal; and others.

(f) Better use should be made by teachers of all the teaching media that are available: television, visual aids, radio, newspapers, etc.

Problems concerned with methods or techniques

1. Major points of agreement

(a) Effective learning experiences in nutrition education, as in other kinds of learning, involve the participation of the learner.

(b) Nutrition education begins as soon as a child begins to eat and continues throughout life.

(c) Effective nutrition education is related to experiences at home, at school, and in leisure-time activities; effective programs are built upon cultural and regional eating patterns.

(d) Many people should assume responsibility in providing a nutrition education program: nutritionists, teachers, parents, nurses, doctors, and others.

(e) The school lunch has many potentialities as an avenue for nutrition education which have not generally been well-developed.

2. What is being done?

(a) Animal feeding demonstrations show the effects of good and poor diets.

(b) Tasting parties to sample new foods help to interest children in unfamiliar foods.

(c) Nutrition information, including terms commonly used in discussing nutrition, is made a part of stories in books for elementary children.

(d) Civic clubs in one city using leaders skilled in democratic group processes sponsored discussions for adults on the topic of "Nutrition after 50."

(e) How to use new foods, such as dried milk, is demonstrated to pupils and to parents.

(f) Simple leaflets containing nutrition information are distributed at grocery stores.

(g) One elementary teacher and her class set up charts listing foods and food-producing trees, plants, and animals. Each child checked what his family used in preparing meals. As the year progressed, teacher and pupils worked to increase the variety of food available to each family through exchange of garden plants and sharing surplus food. In the spring, pupils planted vegetable seeds in large boxes, and the young plants were made available for pupils to transplant to home gardens.

3. What needs to be done? By whom?

(a) Persons with nutrition education training should help school administrators see the needs and opportunities for furthering nutrition education through the programs of the school. Nutrition education workshops for school administrators were emphasized as a good way to do this.

(b) Nutrition education should be integrated with all phases of education rather than taught only in special units or classes.

(c) The school lunch might be made a more effective medium for nutrition education through the services of a teacher or a staff member of equal rank who would serve as nutrition education leader for the entire school.

(d) Activities of all groups and organizations should be coordinated to further nutrition programs.

(e) Studies of nutritional needs must be made with the assistance of the people concerned if changes in food habits are to take place.

(f) There is need for evaluating teaching methods. There is little information on what constitutes effective techniques, especially for indirect approaches such as through written material.

Leaders:
- Willa V. Tinsley
- G. Dorothy Williams
- Ethel A. Martin
- Ata Lee
- Helen Mackintosh

Resource persons:
- Mary Lee Hurt, Flemmie Kittrell, Bertlyn Bosley
- Paul Amidon, F. Eugenia Whitehead, S. Virginia Wilson
- Esther Seijo de Zayas, Evangeline Smith
- Miriam Lowenberg, Elizabeth Whipple

Recorders:
- Irene Wolgamot
- Kathryne Sheehan
- Rua Van Horn
- Rose G. Kerr
- Gale A. Ueland

Hostesses:
- Margaret Alexander
- Elsa Schneider
- Dorothy Bovee
- Mary Louise Collings
- Sue Taylor

Group VI. Nutrition as a Factor in Disease

The two sections considering nutrition as a factor in disease discussed 4 topics: obesity, heart disease, diabetes, and additional needs or problems.

Obesity

The discussion centered around experiences in the control of obesity and the need for more work in its prevention. Since the incidence of obesity is so high, and its control now such a major problem, the group felt that too little recognition has been given to preventive aspects.

It was suggested that to develop more effective materials and methods to use in the prevention and control of obesity, there must be more basic research to determine what factors motivate individuals to attain and maintain desired weight.

It was also agreed that further research is needed on adolescent obesity, including study of the physiological aspects of adolescence, to determine the advisability of encouraging the teen-ager to restrict his caloric intake.

One group expressed the opinion that the approach used in teaching nutrition may have contributed to the present obesity problem. For example, in the past, emphasis has been placed upon eating foods that give the essential nutrients for good health, without regard to limiting one's appetite. With this philosophy, the individual's caloric needs were little stressed. Today we recognize that we must equally emphasize caloric needs of individuals and other nutritional needs. This is true for all age groups.

In education, it was felt that the major area of work was with professional groups who, in turn, work with the total health problems of the Nation. Specifically, these groups are teachers of all education levels, the medical professions in schools, clinics, and private practice, nurses, social workers, nutritionists, dietitians, and home economists.

From the experiences related, it was evident that leaders are more actively engaged at the present time in the control phase of the obesity problem than in the preventive phase. Programs now in operation throughout the Nation were explored and it was evident that there are two approaches to obesity control--the individual and the group approach.

In relation to weight control groups, several questions were presented for discussion:

1. How to locate the individuals who can profit by joining such groups.

Methods that have been used to find individuals are:

(a) Referrals from community multiphasic screening programs.
(b) Direct referrals from physicians.
(c) Physicians' referrals where a person was motivated by other professional health workers.
(d) Advertising through newspaper, radio, and television.

2. What are the mechanics for enrolling of individuals?

It was generally agreed that each individual should be examined by his physician and obtain his written permission before participation in group discussion for weight control.

3. What are the basic essentials for forming a weight control group?

(a) Approval and clearance of the medical profession in the community should be secured.
(b) All participants in the group should be under medical direction.
(c) The group leader should be someone who likes working with people and is experienced in group discussions.
(d) The group would benefit from the services of a dietitian or nutritionist.

4. What procedures make for success in group work?

From the discussion, it was evident that various methods are being used. In some groups, emphasis is placed on teaching food values. In others, the major emphasis is motivation to lose weight by the following methods: Giving gimmicks or prizes; exchange of personal experiences; and frightening the individual with the association of bad health with obesity. It appeared that none of these methods seem to be final answers to the problem of attaining and maintaining desired weight.

Follow-up of any group is of the utmost importance, since experience shows that many individuals do not maintain desired weight. Agreement was reached that the group approach is a technique that needs special professional guidance.

Heart disease

Shortness of time limited the discussion to the need for reference materials pertinent to low-sodium diets useful to professional and lay persons. The references should cover educational information as well as specific diets and food values. It was recognized that there is need for careful evaluation of all such information for the use of lay persons.

A member of the group reported that an evaluation of low-sodium diets would soon be released in a bulletin by the Food and Nutrition Board of the National Research Council. A definite need was expressed by all present for an inexpensive cookbook of low-sodium recipes that are practical and tasty.

Diabetes

Information available on the control of diabetes was mentioned, and it was reported that State health departments have audio-visual kits of educational materials available for loan for group teaching of patients.

Additional needs or problems

1. Some of the participants felt that further research should be done to determine the relationship of trace elements to chronic disease.

2. It was agreed that there should be a reemphasis in an educational program for the use of iodized salt.

3. The group agreed that greater emphasis should be given to the role of nutrition in dealing with chronic disease.

Leaders:
Helen Walsh
Marjorie Cantoni

Recorders:
Geraldine Piper
Lois Burman, Edith Jones

Resource persons:
John Browe, Charlotte Young
Dena Cederquist, George Cowgill

Hostesses:
Oneta Liter
Rosemary Lodde

Group VII. Food Laws and Food Protection

Importance of food laws and food protection

This group recognized that the enforcement of good legislation and the widespread acceptance of voluntary measures for food protection are areas in which progress can be made to improve the nutritional qualities of food, to add to the attributes of foods that make them acceptable and enjoyable, and to keep foods safe for consumers.

A basic objective of food laws is to protect the health of consumers. For this purpose minimum standards may be established by law that will protect consumers against physical harm from foods as they are used. In this limited sense the laws may be regarded as contributing to the wholesomeness of food.

Efforts to define wholesome food brought out the fact that some nutritious foods contain ingredients that are potentially harmful if large amounts are ingested. Moreover, many enjoyable foods that are widely used do not make significant contributions to the nutritional welfare of consumers. Food protection laws are not intended to eliminate or restrict the use of such foods. Greater reliance must be placed upon education, rather than legislation, to guide consumers in wise food choice.

Food laws and protection programs may have economic as well as health protection objectives. For example, some are influenced by concern about providing an adequate total supply of food. Some also endeavor to aid consumers in identifying and evaluating foods by requiring that they be given adequate information for this purpose.

New legislation and increase of regulatory power of Federal Government

The group considered the need for new legislation relating to food control and the matter of giving the Federal Government more regulatory power. There was general agreement that industry and Government cooperate well to make food laws effective. Industry in general makes a great effort to meet the requirements of governmental regulations. As an example, it was pointed out that industry brought the problem of the use of agene in flour to the Food and Drug Administration.

Concern was expressed over the recent Supreme Court ruling that a manufacturer can bar a Food and Drug inspector from his plant. It was felt that the purpose of inspections would be defeated if manufacturers were forewarned of inspection visits. Up to this time, it had been assumed that such inspections were fully authorized but the Supreme Court decision raises a question that should be answered in future legislation.

It was suggested that the methods of conducting hearings on food standards under the Food, Drug, and Cosmetic Act should be reconsidered for purposes of new legislation. Some of these hearings have been prolonged and complex in nature. The group strongly favored shortening them insofar as possible. One suggestion to achieve this end was to eliminate formal hearings entirely in cases where there were no protests to standards being proposed.

Another suggestion was that discussion groups be brought together to consider proposed food standards apart from formal hearings. These groups should include scientists, industry representatives, and other interested parties. Administrators and lawyers would be excluded so that discussions could be informal and not under oath, and scientific and technical problems could be thoroughly discussed.

Additives in food products

The problem of additives in food products was considered briefly. It was pointed out that three important questions should be raised in considering the use of additives: (1) Are they harmless? (2) If they make no useful contribution to the value of a food, should they be permitted? (3) Does their inclusion make it possible for the unscrupulous to practice deception?

There was general agreement that additives to foods should serve a useful purpose and that adequate methods must be used to keep them within prescribed limits. The group felt strongly that before additives are used in foods, they should be shown to be safe insofar as this can be determined in a period of time that is not unduly prolonged. The degree of safety required should be determined by a qualified and unbiased group of scientists acting in an advisory capacity. Such a group might be formed from scientific societies, universities, and other organizations. It was assumed that the Food Protection Committee of National Research Council's Food and Nutrition Board will continue to issue statements as to nontoxicity of additives in use or proposed for use, but it was recognized that the problem is growing beyond the ability of this group to cope with.

It was pointed out that a suggestion has been advanced that another Government organization be given the responsibility for deciding on the suitability of new additives. This group would spend full time working on such problems and the Food and Drug Administration would carry out enforcement of the laws.

Consumer education concerning food and drug regulations, informative labeling, and information

Educating the public in the meaning of food and drug regulations and informative labeling of foods next engaged the attention of this group. Informative labeling is an important means of educating the public on quality and contents of packaged foods. It is difficult, however, to present descriptive information that is clear and meaningful to the average consumer. There is the problem also of devising labels that are acceptable both to the consumer and to the producer. Requests for more adequate informative labeling are frequently received from consumers.

Combating the exorbitant claims of quacks, faddists, and advertisers that deluge the public over radio, television, and other media was mentioned as an increasingly serious problem. It was recommended that combined action should be taken by such interested groups as the American Medical Association, the American Dietetic Association, the American Home Economics Association, and others. Only through organized effort can this type of misinformation be counteracted and an effective consumer program on informative labeling function.

Leader: D. B. Hand
Resource persons: Frank Gunderson, E. M. Nelson
Recorder: Rebecca K. Pecot
Hostess: Rowena S. Carpenter

Summary of Panel Discussion on Coordination of Nutrition Activities

Moderator: Lydia J. Roberts, Ph. D., Visiting Professor, Department of Home Economics, University of Puerto Rico, Rio Piedras, P. R.

Panel Members:

Bushrod Allin, Chairman, Outlook and Situation Board, U. S. Department of Agriculture, Washington, D. C.

Helen Ward, State School Lunch Supervisor, State Department of Education, Richmond, Va.

Gladys Spear, Director of Nutrition, Red Cross Chapter, Toledo, Ohio.

Maurice Shils, Assistant Professor of Nutrition, School of Public Health, Columbia University, New York, N. Y.

Willa Vaughn Tinsley, Head, Home Economics Department, Southwest Texas State Teachers College, San Marcos, Tex.

Helen Walsh, Chief, Nutrition Service, State Department of Public Health, San Francisco, Calif.

David Hand, Head, Division of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, N. Y.

Purpose of the session

The achievement of good nutritional status for the American people was agreed to be the ultimate goal toward which each of the groups had been directing its attention from its own particular angle during the discussion periods. The panel discussion was focused on combined effort toward the achievement of that goal, whether in the local community, the State, or the Nation.

Why coordination?

Nutrition work involves a large number of specialties and different talents that need to be brought together for maximum effectiveness. Coordination provides a means for discovering gaps in the activities of existing agencies. Coordination helps also to utilize personnel more effectively. It is only through coordinated effort that there is any hope of achieving the goals of the conference with the resources that are presently available.

Nutrition committees as coordinating bodies

A strong nutrition committee can be effective in coordinating activities of official agencies and in bringing agencies into productive working relationships with citizens' groups. Some of the attributes that make for strength in a nutrition committee are: (1) True representation of the groups in a position to accomplish something in the area; (2) a reputation for authority and lack of bias; and (3) a job to be done. Affiliation with a larger body, such as a welfare or health council, was reported by two panel members as providing financial and moral support, increased prestige, and the opportunity for wider service.

Among significant recent activities of nutrition committees were mentioned:

1. Cooperation with Civil Defense.--Formulation of standards for emergency feeding, preparing training manuals, and setting up rosters of personnel qualified to man feeding stations.

2. Personnel classification under Civil Service.--Review of classification and compensation plans for nutritionists and allied workers and making recommendations for revision.

3. School lunches.--Representation on a municipal committee to work with Board of Education on improvement of facilities and food.

4. Food in State institutions.--Formulation of specifications for food purchases.

5. Popular education.--Preparation of radio transcripts and observance of Nutrition Week.

6. Review of studies and surveys.--Consideration with allied groups in health and welfare fields of implications for programs of findings from recently completed studies.

Other forms of coordinated effort

At the national level, the combined effort of the Public Health Service, the American Dietetic Association, and the American Diabetic Association in preparing educational materials on food for the diabetic patient was cited as an example of successful collaboration.

A most important opportunity for coordination exists in the elementary schools, where more than 26,000,000 boys and girls at the age when food habits are being established are susceptible to the concerted influences of those adults with whom they are associated day after day. Sympathetic administrators, adequately prepared teachers, interested school lunch personnel, and cooperative parents working together can do much to encourage

desirable eating practices and to give children the knowledge and the attitudes toward food and nutrition that will help them to attain the best nutritional status of which they are capable. Considering the key position held by the elementary teacher, the importance of giving her adequate preparation and stimulating her interest in the possibilities of nutrition education can hardly be overstressed.

A sense of proportion

A sound nutrition program must be based on facts arrived at through research. The research worker may justifiably emphasize the seriousness of the problem on which he is working, such as the widespread incidence of degenerative diseases and the possible part that nutrition plays in their onset. Those who apply research for nutritional betterment must be equally aware of the importance of maintaining a healthy attitude toward food and of retaining some of the fun of eating. Without minimizing the importance of adequate protection against the introduction of toxic substances during food processing, nutrition leaders who inform the public must remember the less spectacular but probably more prevalent menace to health from lack of refrigeration or adequate heating of foods in the home or commercial eating place.

Conclusion

Coordination, agreed upon as essential to the achievement of good nutritional status for our people, may take many forms, according to the needs and resources of the area at a given time and also to the background and special interests of the leaders of the movement.

Summary by Marjorie Heseltine,
Chief, Nutrition Section, Division of Health Services,
Children's Bureau, Federal Security Agency

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Plan of the Conference

The plans and program for the Food and Nutrition Institute were developed by a working group of representatives from the several sponsoring agencies. From the committee's varied interests and knowledge of current problems in food and nutrition, topics were selected for the program and speakers and group leaders were chosen for their competence in relation to the topics.

The invitation list was carefully planned in order to include, among the 400 persons who could be accomodated in the available meeting rooms, a cross-section of the Nation's many groups who are concerned with various aspects of nutrition programs. It was desired to have persons engaged in research, higher education, industry, and administration bring the food and nutrition subject matter needed as conference background through addresses at general sessions and by serving as resource persons in discussion groups. It also was desired to include workers actually engaged in educational programs related to nutrition, as well as others who influence nutrition and health education by virtue of their positions.

The letter of invitation was accompanied by tentative agenda and an outline of discussion topics, with the request that each person indicate the topics of special interest.

The three days scheduled for the meeting were about equally divided between information-giving sessions (Monday through Tuesday morning) and discussion periods (Tuesday noon through Wednesday afternoon). The latter included a general session at which highlights of group discussions were reported, and a panel session to evaluate progress in the coordination of nutrition activities.

Considerable effort went into planning for the discussion groups. For each discussion group of 20-30 persons a leadership team was named, consisting of a leader, two resource persons, a recorder, and a hostess. The leaders were selected for their qualifications both in subject matter and ability to conduct group discussions. The resource persons were selected for their knowledge of subject matter. Hostesses were chosen from the Washington area for familiarity with the city as well as resources of the Government. Recorders were selected primarily from the agencies represented in the Interagency Committee on Nutrition Education and School Lunch in order that they might continue to work with report writers after adjournment of the Institute.

In lieu of requesting leaders of discussion groups to come to Washington in advance of the Institute, two orientation sessions were arranged for early in the conference. The first session was held during the registration period on the first day and included the conference staff and the entire leadership group--some 80 individuals. This provided an opportunity to review the over-all setting, to discuss expectancies of staff and team members, and to agree upon the responsibilities of the respective team members in serving their discussion groups.

Membership in each discussion group represented a wide variety of interest in or responsibility for nutrition work, and the topics assigned were suggestive of a multitude of problems.

Each discussion group first listed the aspects of the topic in which there was special interest. The time available for discussion-- half a day to a day--proved to be all too short for deliberate consideration of the topics. It was not expected that groups would arrive at final solutions to the problems they listed, but it was hoped that participants would receive suggestions which they and other leaders could apply to their own work. Groups were requested not to make suggestions for legislative action.

Plans for reporting discussion highlights to the general session and plans for the panel discussion on the third day were made by small groups after participants arrived, in line with procedures developed by and with the responsible chairmen. The Institute provided time for the groups to bring only the main points of their discussions before the membership as a whole and did not permit approval of the recommendations by the general session.

The reports of group discussion made to the general assembly on the final day of the Institute, were given in preliminary form by the recorders. The highlights were then summarized by the chairman of the session, Edna P. Amidon, of the Office of Education. Final reports for each group were prepared later by the recorders with the help of the chairmen.

The combination of general sessions on background information followed by small informal group discussions seemed to meet with the approval of participants, judging by their response to a question on this point at the final session.

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/The Roman numerals in parentheses indicate the discussion group in which the person participated./

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