PROCEEDINGS

OF

THE SECOND NATIONAL

NUTRIENT DATA BANK

CONFERENCE

April 28 and 29, 1977

Department of Nutrition and Food Sciences
Utah State University
Logan, Utah

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This report contains the proceedings of the Second National Nutrient Data Bank Conference held April 28-29, 1977 at Utah State University, Logan Utah. The American Academy of Pediatrics and the American Dietetic Association co-sponsored the conference with Utah State University. The conference brought together nutrition database users and database compilers to discuss ways of sharing, expanding and better utilizing the existing computer and nutrient data files.

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PREFACE

The Second National Nutrient Data Bank Conference was held at Utah State University, Logan, Utah on April 28 and 29, 1977. The American Academy of Pediatrics and the American Dietetic Association co-sponsored the conference with Utah State University. The conference brought together nutrition data base users and data base compilers to discuss ways of sharing, expanding and better utilizing the existing computer and nutrient data files. The program was divided into sessions for formal addresses with question periods and sessions for group discussions. Time was also provided to present summaries of the group meetings and open discussion among the participants.

The speakers provided information on progress made in data bases, new computer programs and new problems which concern users of computerized nutrition systems. The task force groups focused on areas of special interest and concern to the majority of participants. Each participant attended one of the task force meetings where he/she contributed his/her particular expertise.

In addition to the information exchange, one of the principal outcome of the conference was a subcommittee assignment to design a questionnaire to identify nutrient data bases and to facilitate sharing procedures. The results of this questionnaire will serve as a bases for the 1978 conference tentatively planned to be hosted by CFEI-ARS and Computer Sciences Corporation.

The conference organizers wish to express their appreciation to the U.S.U. Conference and Institute Division for their professional handling of the arrangements; to Linda Robinson for transcribing tapes and editing presentations and to Kathy Daugherty for transcribing tapes and typing the manuscript.

Bonita W. Wyse, Ph.D., R.D.
Proceedings Editor and Conference Co-Chairperson

Ann W. Sorenson, Ph.D.
Conference Chairperson

R. G. Hansen, Ph.D.
Conference Co-Chairperson

Department of Nutrition and Food Sciences
Utah State University
Logan, Utah
September 29, 1977

Second National

April 28 & 29, 1977 **Logan, Utah**

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NUTRIENT NEEDS AND THEIR EXPRESSION

by

R.G. Hansen

Consumers are confronted with 10,000 choices in the supermarket and we think, as a consequence, there is a real possibility that, in electrical terms, the discriminatory circuits are jammed. On what basis are judgements made? We think it is difficult for the professionals to make judgements about nutritional quality of food and, therefore, even more difficult for the consumer to discriminate. We have to know how to categorize foods better and know how to describe them in consumer usable terms. For this reason we have become very much interested in nutrient density as a means of describing nutritional quality of foods. In order to do this practically, the computer and nutrient data bases are invaluable tools.

The two principle terms to consider in describing the nutritional quality of foods are obviously the nutrient composition of foods and the human needs for those nutrients. How are these two parameters related in terms the consumer can understand? With data processing techniques we have a capacity to manage and reduce these to usable concepts.

One can find in the literature more information about the composition of milk than of most foods. Such literature data has been accumulated and can be expressed as amounts of nutrients per 1,000 calories of milk in column 1 (Table 1). On the other hand, the American Academy of Pediatrics has explicitly stated the nutrient requirements of infants and children. When these nutrient requirements are converted to allowances and expressed per 1,000 calories for the infant, we have column 2. With a common basis of expression (per 1,000 calories) the two parameters may be directly compared--one as a ratio of the other. To quantitate nutritional quality, this becomes an important ratio.

The ratio can be simply conceived and understood in graphic form (Figure 1). It should now be reemphasized that we use energy or Kilocalories as the common denominator. Using protein as an example, the allowance per 1,000 calories for an infant is 18 grams. Most children of one year need 1,000 kilocalories of energy. On the other hand, milk contains 54 grams of protein per 1,000 Kilocalories. Hence, 54 divided by 18 is 3. If a child were to derive all of its energy from milk, three times the protein requirement would be consumed. The Index of Nutritional Quality of milk for protein for the child is 3. It now appears that most children and adults generally consume an abundance of protein. It becomes obvious from the graph that, in proportion to calories, ascorbic acid, vitamin E, and iron show deficits in milk. The nutritional strengths and weaknesses of milk as a human food immediately become evident by this analysis. The more extensive and more readily accessible descriptive information about food becomes, the more usable it is for consumers in underpinning quality judgements in food selection.

The applications for a nutritional quality index based on nutrient density are many: i.e., visually presenting nutritional quality of foods for consumer education and nutrition education in schools; underpinning nutritional tools that have traditionally been used by nutrition educators, i.e. food group classifications; evolving quantitative and qualitative basis for adjectives that have been used to describe nutritional quality, i.e. "poor", "fair", "good", and "excellent"; visually illustrating concepts such as nutrient dilution; a basis for determining limiting nutrient in a food supply (both nationally and internationally); means of identifying food items which are supplementary sources of nutrients, etc.

The National Academy of Sciences Recommended Dietary Allowances are undergoing revision for the 9th edition. For many uses of the RDA, such as consumer education, an ability to simply state the nutrient allowances of humans is urgently needed. A rationale can be developed for stating the allowances on a 1,000 Kilocalorie basis. The development of the USRDA by the Food and Drug Administration was a step forward, but the concept needs extension. A nutrient allowance per 1,000 Kilocalories as a base instead of per 2,800 used for the USRDA suggests several applications. With the general table from the 8th edition of the RDA, nutrient allowances are given for both men and women separately at various ages. The regular allowance table has its uses for the professional nutritionist, but what can be done to simplify it for alternate uses? Nutrients per 1,000 kilocalories would be a step in this direction.

The concept of a provisional recommended dietary allowance to supplement the RDA is a matter of some current interest and under consideration by a subcommittee of the Food and Nutrition Board. There is a growing interest and need for consumer education to extend the RDA to a more inclusive list of nutrients known to be required by humans. For example, the desirable limits for sodium and potassium intake should be developed. With considerable reason, excessive sodium intake is thought to be a major factor in the development of hypertension. Potassium intake, on the other hand, is highly variable in the United States, and is often especially variable for those who attempt to control hypertension therapeutically with drugs which stimulate sodium excretion, but inadvertently deplete the potassium as well. Other nutrients which should be considered are fluoride, copper, chromium, manganese, molybdenum, selenium, biotin and pantothenic acid.

Provisional could mean something a status less than for those nutrients currently in the master table. As an evolutionary process, perhaps the expectation would be that provisional nutrient allowances will be included in the master table with more definitive research.

The need for more food analysis and systematizing that data for the nutrition professionals should complement the further elaboration of the RDA. To maximize the impact of the RDA on the nutritional welfare of the community is an appropriate goal for nutrition educators.

Table 1. Composition of milk in relation to nutrient needs to the infant.

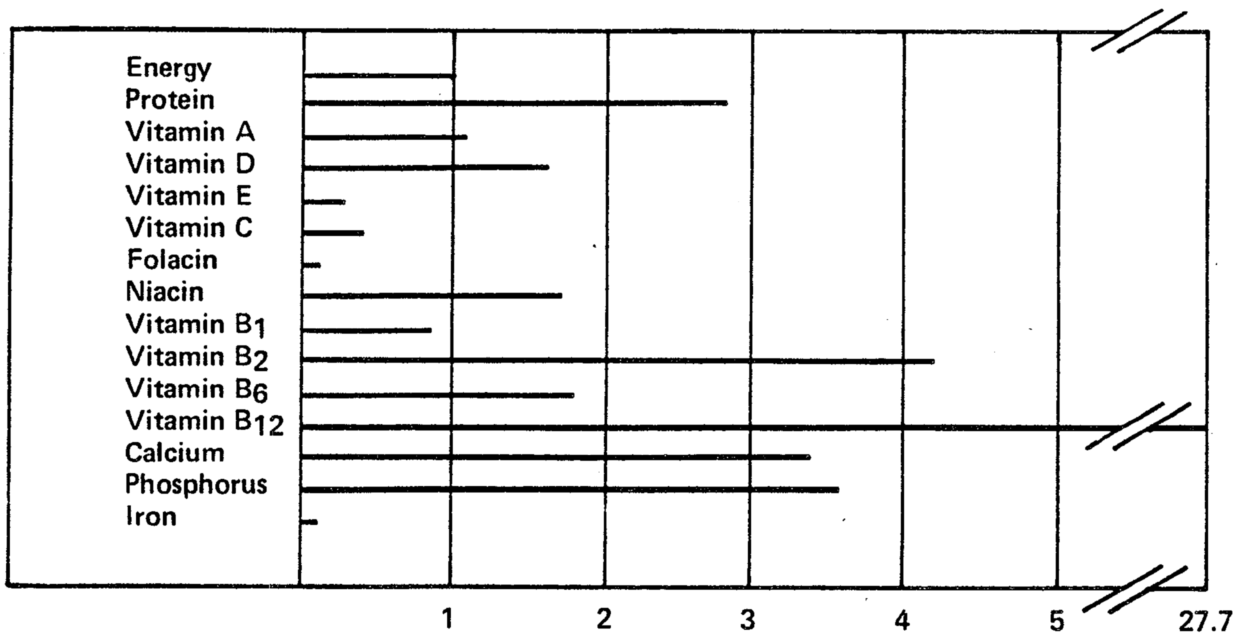
		A Composition of Milk*	B RDA/ 1,000 kcal**	Ratio A/B
Energy	kcal	1,000	1,000	1.0
Protein	g	54	19	2.8
Vitamin A	i.u.	2,154	2,000	1.1
Vitamin D	i.u.	630	400	1.6
Vitamin E	i.u.	1.4	5	0.3
Ascorbic Acid	mg	15.4	35	0.4
Folacin	ug	3.4	50	0.07
Niacin Eq.	mg	14	8.0	1.8
Vitamin B_1	mg	0.46	0.5	0.9
Vitamin B_2	mg	2.6	0.6	4.3
Vitamin B_6	mg	0.73	0.4	1.8
Vitamin B_{12}	ug	8.3	0.3	27.7
Calcium	g	1.815	0.54	3.4
Phosphorus	g	1.431	0.4	3.6
Iron	mg	1.4	15	0.1

*Cows' milk fortified with vitamin D

**Six to 12 months (Recommended Dietary Allowances, Seventh Revised Edition, 1974.)

Figure 1.

NUTRIENT DENSITY OF WHOLE MILK



UPDATE

by

Robert L. Rizek, Ph.D.

As a result of discussions at the White House Conference at the Food Economics Institute and the interest in nutritional labeling by the Food and Drug Administration and industry, a group of interested partys began developing the concept of a nutrient data bank. The group was made up of representatives of USDA, FDA, The Canadian Department of Agriculture and food industries. The concept of the data bank was to make food composition information accessible to users in a number of ways. The end product is a revision of USDA Handbook #8.

The USDA nutrient data bank includes three data bases. The first is the individual food analysis values as they are received from industry, government laboratories and universities. Data base 2 is an average of values of exact like items. Data base 3 is in essence a revision of Handbook 8. The values are a weighted average used to give a representative value for variety, storage period, harvest time and region of production, etc.

Not all data is entered into the computer data bank as it is received. The files are updated by food groups. The first two sections revised and released last year and early this year were dairy made products and spices and herbs. Baby foods, fats and oils and soups and sauces are being revised how and should become available early next year (1978). Hopefully shell fish, pork, sausage and lunch meat, nuts and seeds and juice sections can be completed in 1978. There is a possibility that canned vegetables and fruits will be reevaluated next. Summarized data for data bases 2 and 3 are not compiled until sufficient data have been received and stored in data base 1.

So that the data bank will be more usable, Handbook 8 data will be coded and qualifiers inserted marking computer values for some missing nutrients. As each food section is completed in a continual review process, old data will be purged and new will be put in the data bank. The year of the update will be identified with a qualifier so that users will have access to the latest data available on all foods.

Computer Sciences Corporation has been contracted to store the food composition data and deliver it to users. At present only data base 3 is in line for instant retrival, but data base 2 will be made available if there is sufficient demand. Data base 1 has not been finalized and due to its great magnitude will probably never be on line. However, researchers could have access to the information with a 24 hour to 1 week turn around.

The Computer Sciences Corporation is also working on programs designed to evaluate the nutrient content of diets or recipes and for determining if the RDA's are met for certain nutrients.

USDA Food Consumption Survey

The USDA is one of the largest users of the nutrient data bank. Field work for the survey began April 1, 1977. The study consists of two surveys. The basic survey which covers 15,000 households over a year's time will assess both a household and an individual intake. An inventory will be made of retail weights on all food as purchased and brought into the household during a week's time. Also a 24 hour recall of yesterday's intake and a 2 day diary of today and tomorrow's intake will be collected from persons in the household. The first quarter of the study will include all persons while the last 3 quarters will include all persons under age 18 and 1/2 of those 19 or over.

A second bridging survey will collect data from a sample population using the same procedures used in the 1965 USDA household consumption study. Substudies will include data from 5000 households where elderly persons (65 years +) reside, 3000 households in Puerto Rico and 1200 households in Alaska and Hawaii. There is also a good chance that a low-income survey of about 5000 households will be made. The total survey will include over 25,000 households and individual data on 45 to 50 thousand persons.

EVALUATION OF PROGRAMS FOR ESTIMATING DIETARY INTAKE

by

Loretta Hoover, Ph.D.

Numerous tables of food composition have been compiled since the 1890's to meet the needs for nutrient data by nutritionists, researchers and consumers. A trend toward increased specificity for most nutrient classifications has resulted in consideration of many nutritional components in the development of nutrient data bases. Computer-stored nutrient data bases have tended to vary in much the same manner as printed tables of food composition with respect to number of food items, number of nutrients and classification schemes.

Nutrient data bases have been utilized in a variety of ways, such as: cost optimized menu planning, evaluating menus for meeting nutrient standards, research, analyzing client intake data, etc. and new ways of using the computer in clinical work are being developed. Epidemiologic studies, nutrition surveys, metabolic diets, food consumption surveys, evaluating nutritional adequacy in patient care and complex exchange list construction have been completed using computerized nutrient data banks. Areas of exploration for clinical application include diet patterning, patient education, and analytical reports which will facilitate clinical decision making.

At the conclusion of the 1976 National Nutrient Data Bases Conference in Seattle, several participants agreed to analyze the same dietary record so that nutrient values, various types of analyses and output formats could be compared. The values were based on analyses from eight computerized systems. Considerable variation was present for calories, protein, fat, and CHO.

The difference between the extreme values for calories was 571 calories or 29% of the low value of 1947 calories; for protein, 34.6 grams or 66%; for fat, 46.9 grams or 60%; and for carbohydrate 56.8 grams or 25%. AFter seeing these differences, several of us were interested in eliminating the judgement required when interpreting the weights of the household units. Thus, several individuals agreed to participate in a subsequent round of analysis using the menu with gram weights.

On the second round, the difference for calories was 456 calories or 23% of 1942 calories; for protein, 14.8 grams or 20%; for fat, 51.9 grams or 66%; and for carbohydrate, 9.6 grams or 4%. These values are based on values from seven computerized systems (Not identical to the first eight).

Since several contributors indicated a willingness to continue to assist in this comparison, a third round of analysis was initiated where the dietary record was described more specifically.

Eleven analyses were included in the third round. The number of nutrients analyzed in these systems ranged from 14-88 nutrients. From the second round, approximately 150 nutritional components were analyzed. Not all of these components were analyzed in all of the systems.

In the third round the 1972 USDA tapes were used as a source of data for ten of the systems. The 1963 tapes were used in one system. Most contributors had incorporated additional data from manufacturers and other sources.

These are the ranges which resulted from the third analysis. The difference for calories was 357 calories or 18% of 1942 calories; for protein, 6 grams or 7%; for fat, 30.7 gms or 39% and for carbohydrate, 52.8 gms or 22%. When the differences for these nutrients were compared for the second and third analyses, the results were the following: for calories, the difference was reduced by 99 calories: 456 vs 357. For protein, the difference was reduced by 8.8 gms: 14.8 vs 6 gms. For fat, the difference was reduced by 21.2 gms: 51.9 vs 30.7 gms. For carbohydrate, the difference increased by 43.2 gms: 9.6 gms vs 52.8. Calorie values: low value = 1942; median value = 2042; high value = 2299. Protein values: low value = 78.77 gm; median value = 85.6 gm; high value = 87.3 gm. Fat values: low value = 74.9 gm; median value = 85.3 gm; high value = 108.9 gm.

If any others would like to participate in this project at this stage please inform me of your willingness. I will treat your data in a confidential manner.

Accuracy of Data. With respect to the coverage of nutrients included in data bases, more data are being sought for: essential amino acids; CHO fractions; fiber; zinc and other trace elements; B_6 pantothenic acid, B_{12}. Some additional information is desirable to identify: allergy codes; food-drug interactions; pH of foods; plant or animal sources; caffeine; gluten; nitrates and nitrites. Some specific foods for which analyses are needed are: commerical candy-fatty acids; cheese varieties-lactose availability; vegetables and fruits-amino acids data; ethnic food groups; convenience foods; crackers; cooked fish.

Food group codes. Several code schemes could be incorporated into a multipurpose data base to permit flexibility for various types of analyses. A consensus should be reached so that a data base is not filled with rarely used codes.

Updating of data bases. Guidelines should be established for when updates are permitted if comparative analyses are being made in various stages of a research project. An identification scheme will be necessary to document the status of a nutrient file each time new data are merged with an existing file to create a new file.

Numbering Schemes. Several numbering schemes have been utilized to designate nutrient codes.

1. The 4-digit numeric code used in Handbook No. 8.

2. A code which has been expanded to five digits where one digit may be designated as a check digit which is utilized for data editing.

3. An expanded numbering scheme which is used to designate food group classifications and provide greater flexibility for grouping similar foods.

4. The first four characters are alphabetic and will be used to designate food within classifications. The remaining series of an alphabetic character and three numeric characters are used to specify qualifying terms which uniquely identify the food designated by the first four alphabetic characters. This is the coding scheme adopted for the USDA Nutrient Data Bank.

Computational efficiency is an important consideration from both the data base and software points of view. Some users are finding that systems are easier to use when smaller versions of a larger data base are accessed for frequently used foods. One advantage is the reduction in the amount of time required to "look-up" code numbers in indices or catalogs. Also, abbreviated files could be customized for a special use by selecting only the nutrients of concern for a particular application or project.

If techniques can be developed for selecting smaller files from a large comprehensive data base, then both flexibility and computational efficiency can be achieved. Maintaining the up-to-date status of smaller coordinated files must be considered if this approach is followed.

INDUSTRY'S NEEDS AND CONTRIBUTIONS TO NUTRIENT DATA BANKS

by

George Purvis, Ph.D.

Though not entirely representative of all food companies, the Gerber Baby Food Corporation can be illustrative of how one small company in industry handles analytical information on their products. There are three basic reasons why we maintain a nutrient data file.

1. To comply with FDA labeling regulations.

2. To collect information for nutrition studies and to provide information services for professionals and consumers.

3. For internal control which is necessary for competitive comparisons and ingredient control. Every ingredient has a specification which includes at least one nutrient index.

Amassing this information requires a great deal of time and work. Data collection is divided into four areas. The first is nutritional analysis. Company laboratories have the capability to run all the nutrient assays except those that involve animals. Laboratory results are computerized using a calcom data handler. The capability of this data processer include graphical printouts and regression analysis. Data is also subjected to other statistical analysis followed by automated formating and printing of the information on labels.

Gerber collects data from its five processing plants three times each year. Ten observations per product from each plant make up a 50 sample composite. Most of the analysis of the samples are done at the home plant of the Gerber company in Fremont, Michigan. Gerber developed a nutrition policy based on statistical theory and then wrote the computer program which translated the policy into practice. For example according to labeling regulations nutrients must be present in significant amounts to be declared. The computer program calculates the amounts of each nutrient from the raw analysis data and determines if the values derived from the composite sample will be further analyzed or rejected as not significant.

Though composite analysis are much easier to handle statistically one must know about the variation which may occur between plants and among individual samples. When a disagreement occurs in a product analysis, additional analysis run to determine whether the differences are statistically significant.

When samples of products do not comply with statistical limits they are handled separately. This situation does occur occasionally as it did recently with some vegetable products processed at the Ft. Smith Arkansas plant. The problem is due to a unique geographic location with its own peculiar soil type and growing season. Ft. Smith will probably have to have a separate label for products distributed from there. When the reports from this plant was removed from the composite product data the values from the other four plants fit nicely within the constraints of the computer program.

There are two classes of nutrients which must be delt with in government regulations. Class one nutrients are those that are added to the products as supplements or fortifications of naturally occuring nutrients. An example is iron which is added to cereal. Class two nutrients refer to nutrients that are naturally occuring over which the processor has no control. It is Gerber's policy concerning class one nutrients that the consumer can be 95% confident that the stated amount in the label declaration will be present in the product taking into consideration that the product will be held a reasonable amount of time be for sale. Gerber also states that one can be 95% confident that any sample will contain class 2 nutrient quantities greater than or equal to 80% of the declaration. As further consumer protection on declarated values, rounding never occurs in excess of 1/2 of an increment. By definition, considering the way the statistics are derived, the probability for going below the 80% confidence level which is written into the regulations is considerably greater for class two nutrients than for those in class one.

One must consider producer as well as consumer risk. Producer risk is the possibility of rejecting a sample which in fact is equal to or greater than the declaration. Using the same parameters as consumer risk there is a 5% probability of error for the producer.

Labels must be printed in advance of product processing. Therefore labels declarations must be made from predictions of past experience. Based on data collected at random from last years products the declared values on this years labels are within regulations in every respect.

Calorie declarations are resolved on the basis of assayed amounts of protein, carbohydrate and fats and do not represent assays of individual samples. The values for nutrients which serve as the base for calorie calculation are derived from an average of 6 actual observation. If the coefficient of variation

($\frac{\sigma}{\bar{x}}$ or standard deviation divided by the mean)

exceeds 20% further analysis and manual evaluation is necessary. It is difficult enough to meet a single set of regulations but mixed food products which contain meat and vegetable foods must comply with FDA as well as USDA specifications. The statistical analysis becomes much more involved for these products. Because of the additional variations that must be anticipated, the label values must be treated as good estimations but not absolute numbers. Labels should be viewed as representative of minimum and/or maximum values but not necessarily actual amounts of ingredients in any particular product sample.

Besides the nutrients required in labeling regulations Gerber performs extensive B_6 analysis and a significant amount of neutral detergent fiber assays.

The fiber data has not been made public nor has the data been interpreted in house. Gerber believes this information is important and would be willing to share it with researchers working on projects concerning human dietary fiber.

THE USES OF NUTRIENT DATA BASES IN EPIDEMIOLOGICAL HEALTH RESEARCH

by

Joseph L. Lyon, M.D.

Epidemiology tends to look at disease patterns in human populations. It is primarily a non-experimental discipline, in otherwords we don't have the advantages of putting the rats in the cages, or putting the humans in the cages, if you will and feeding them on different diets or exposing them to different chemicals. What epidemiology attempts to do is to try to refine better the observations one makes through a variety of tactics.

I would like to talk briefly about the kinds of cancer that we are dealing with in gastrointestinal, the problems and where we stand in terms of epidemiologic observations.

Esophageal cancer is very common in African natives. In the United States it is noted to be significantly higher in Blacks than Whites, particularly in males versus females. The major findings from several studies at least within the United States and European countries is that alcohol is the single most persuasive factor. In Iran, where it is the highest in the world, these people are all non-drinking Moslems and it occurs most frequently in the females.

Stomach cancer has been declining in the United States at a rather remarkable rate over the last 30 years. The reasons for this decline are completely unknown. On the other hand, stomach cancer is the number one cancer in Japan.

As you move down the gastrointestinal tract and you look at the tract itself, the small bowel is one of the most perplexing things because it is almost immune to the effects of any cancer. The rates there are extremely low, in the order of about 60 times lower than what colon and stomach cancer are. No one has any explanation as why the small intestine should be protected.

When you get into the large intestine, there has been a tremendous amount of activity on the question of cancer. Most of this rose out of the observations of Denis Burkitt. He began publishing in about 1970, primarily relating this to fiber. He has stimulated a tremendous amount of research on this topic, particularly in the areas of dietary fiber, however badly defined that may be.

The other major hypotheses revolves around two ideas. One is that dietary fat in and of itself can be degraded into a carcinogenic like substance by bowel bacteria. The other relates to some findings in some studies on Hawaiian-Japanese that beef is strongly related to risk in colon cancer. The ideas are that perhaps the amount of fat eaten in the beef is in some way degraded in this process.

Rectal cancer presents some perplexing problems because people have assumed it was the same entity as colon cancer and yet it does not seem to have all of the associations that colon cancer does. Colon cancer seems to be strongly correlated in women with risk of breast and uterine cancer and so there is some feeling that it may be related to some endocrine and/or dietary fat going into endocrine process. Rectal does not have nearly this strength of association.

There are several other things that could be related to the gastrointestinal tract and possibly related to diet. One is cancer of the liver. This is a very uncommon malignancy in the United States. It is quite common in African natives which possibly could be related to the type of alcohol they ingest. It could be contaminated, but that is not entirely clear. The other is biliary tract cancers. These are cancers of the gallbladder and/or the gall ducts. This is the commonest malignancy in the American Indian.

The other malignancy that I raise just as a possibility that may be related as part of the gastrointestinal tract is pancreas. Pancreas cancer has been steadily increasing in the United States at a very slow but steady rate over the last 30 years. We know that it is related to dietary patterns and the only clear group that has increased are diabetics. In diabetics who have been followed through time, the one pattern they seem to produce is a risk of pancreatic cancer anywhere from two to six times greater than the normal population.

The following are types of studies that have been done on colon cancer and diet.

Denis Burkitt: His research has been observational in nature. He started theory that lack of dietary fiber is related to colon cancer.

A.R.P. Walker: Studied Bantu diets. He confirmed some of Dr. Burkitt's observations; high fiber intake, high intake of complex polysaccharides and lower beef consumption was correlated with lower risk of colon cancer.

Ernst Wynder: In 1967 he published a study which concluded fat implications in colon cancer. This study was done on a matched group of approximately 260 cases of colon cancer and controls all hospitalized. He did not give his diet methodology. All he said is they collected a good deal of dietary information. An interesting thing was there was absolutely no difference between the persons admitted with the diagnosis of colon cancer and the control group which were people admitted with other forms of cancer to the hospital.

John Higginson: Did food frequencies and essentially found little difference between his hospitalized patients with colon cancer and his control group again who were hospitalized with other non-cancer diseases in this case. He looked at both gastric and colon and came to the same negative conclusion.

William Haenzel: He did a very large study in Hawaii. He attempted to study Japanese immigrants to Hawaii (those who were born in Japan and immigrated) and those who were Hawaiian born and were being culturized into the American culture in terms of dietary patterns. The study was carried out using hospitalized cases and a group of matched controls with other forms of disease. He did a food frequency analysis. He looked at what happened to the Japanese immigrants after they abandoned their native diet and started eating an American diet (especially beef). He came up with two associations with colon cancer in the Japanese after abondoning their native diet. 1. Higher beef intake. 2. Higher string bean and macaroni intake. Fiber was not studied.

Baruch Modan: In 1975 compared hospitalized colon cancer patients, a hospital control group without cancer and a neighborhood control. He found the colon cancer cases consumed less fiber than the neighborhood controls. There was no difference when he compared his hospital control group to his cases.

In conclusion, there are some interesting epidemiological problems we are finding in diet and cancer research: 1.. You are forced into case-control methodology. This is identifying the case after the disease has developed, trying to obtain from people recall information on some exposure (in this case diet) and then getting control information about the same variables (again diet). 2. What happens to the individual in the hospital or if you interview them shortly after discharge, which by the very intervention of either surgery and/or radiation that they may have received for the malignancy? 3. Most studies have been food frequencies and have not provided enough depth on food composition.

We really need to put a good deal more emphasis on trying to refine method and methodology in answer to some of these questions before we get down to the question of making stronger recommendations.

DAY-TO-DAY APPLICATIONS OF HEALTH PROFESSIONALS - PART I

by

Joan Karkeck, R.D.

One of our early objectives of having a data bank conference was to expand the use of the computer, not only data base related but the computer altogether in dietetic services. We have had some successes and some failures in doing that in the Seattle area.

We started out with the Ohio State program and a fairly extensive data base which rested in archives and was not used. Nobody within our area had had any experience working with a computer and therefore nobody was. We had the material and we didn't have any expertise, we had some interest but not a whole lot of interest, and nobody had any funding to support the idea.

We pushed the idea of getting a group of organizations together who might be interested in trying it out. We asked them that as a group, would they support putting the data base on a computer paying the space by dividing it between the group of five. We had a lot of people who committed themselves to supporting this joint effort. As part of committing themselves we asked them if they would in addition support the idea of helping us collect data, having a committee that would accept or reject the data that was submitted based on quality, validity, judgement and we also expected them to support their part of the system. We asked that each one of them work on one other person in the state or in the three state area that we were in to get them to be a suer with the thought that each additional user makes our basic costs divided by one more. In this way we have extended the use of the computer to eight individual groups who could not have possibly afforded to use it themselves.

Because of computers being what they are, everybody had their natural inborn resistance and I want to share a little bit of our experience with breaking down the resistance. One of the things we had to do is guarantee success at the very beginning because if you have two bad things that happen on the first two days you have to cancel out the use of the computer in that institution. We do have a teaching program that teaches you how to use the computer as well as our manual and we make sure people plod their way through that whole thing before they get too far into this thing.

We had our computer people write a manual on how to use the computer in the dietary department. Then we gave it to a group of dietitians who came back and said "cancel this." So we had a dietitian write it and that way it worked. We need to talk to each other on levels we can understand. You must guarantee success. We really won't extend the use of nutrient data bases throughout a lot of institutions unless we do this.

Through this central organization kind of thing I think the computer could be offered in lots of different ways from the way that we did it. We can see where in our area given a few more users, we will have people (nursing homes and really small groups) that would be able to use the facility we have to offer.

We have learned a lot about things we can do in the coding area and we do have some precoded forms for 24-hour recalls. We wanted one that was truly all precoded which doesn't sound very possible unless you use a food grouping system like food frequency. So food frequencies we've used combines food into 52 possible groups designed to elicit information on your food pattern. It asks you to give thought to what things you've been doing for the last month and how you could perhaps catagorize that within these 52 patterns. Interestingly enough, most people can do that. Some people need guidance so I have a dietitian there to interview the patient using that form and she makes some decisions about where to put food within the form. We also have it arranged so that people can sit down at a terminal and do it directly.

There hasn't been any good research done on food intake forms in the last 30 years. I understand that the people at Mayo Clinic are working in great depth on one and I am very anxious to see it although it is not being talked about a great deal. Food frequency can be as good or as bad as the person making it out but so is the 24-hour recall. Where we are now is at the point where as we are developing techniques to do the computing, but we have not done very much to develop techniques to get the information out of people and into the computer. If you are already developing it I would plead with you to print it up or publish in somewhere or share it with this group and lots of other groups because I do think it is a valuable thing to do.

DAY-TO-DAY APPLICATIONS OF
HEALTH PROFESSIONALS - PART II

by

Mary Farley, M.S.

When coding it is helpful and important to draw distinct column lines before entering numbers on coding sheets. This helps avoid numerical errors that often occur due to column misalignment. You have to really train people properly and you have to select the right kind of people to work with coding, somebody who is going to have a certain amount of "caring."

I feel that with the work we do here at Utah State University, we have a moral obligation to be as exact as possible. We have dietetic students going and taking dietaries on senior citizen groups and then we analyze them. The end result is that these dietetic students or some personnel who knows about nutrition are going back with these dietaries and saying "this is what your eating, you need improvement in this area." Now if they have not been accurately taken, and accurately coded we are giving them a bunch of garbage.

One thing I found is that a bowl can be very misleading as far as the volume. It is very important if you have eaten a bowl of soup and you didn't measure it beforehand, you can still fill it up with water to that level to find out, or get a pretty close amount on the volume. Besides volume, description of food can be a problem. Tomato soup can be made with milk or water. A salad can be so varied. In Utah Swiss steak is made with mushrooms and gravy. In Minnesota it might be made with tomato sauce. These types of questions are important. Everybody knows what gravy is but when you get down to coding it, it makes a big difference as to how it was made. Nowadays we have granola, but there are so many varieties, getting all the intricacies about this food is very important. Just saying you had a slice of roast beef and even describing it quite well you still need to know; did you eat the fat or didn't you?

I have two dietaries. As a coder dietary one is a fun type of diet to code, it is just a breeze and it is really bad.

Dietary 1

Peanut butter sandwich
Milk; 2 large glasses
Apple
Carrots

Expounding further on this lunch:

Dietary 2

Peanut butter sandwich:
- 2-1/2 tbsp. peanut butter
- 1 tbsp. jelly
- 3/4 ounce American cheese

2 slices of whole wheat bread; 16 slices per pound

1 apple, 3" diameter, ate peeling
Milk, two 10-ounce glasses of skim

Dietary 2 is a much better dietary. It is not as much fun to code, it takes more time, but the data from it is much more valuable, so when we go back to the person we feel a lot more confident about what we are telling them.

Sometimes we code the quality of the dietary. It is not entered into any of the calculations, but it is noted on the printout, "this was a poorly recorded dietary", "this was a well recorded dietary", "this was an inbetween". So the person who is taking this information back can use this to guard against their statements saying "you have a very well recorded dietary and we feel it is quite accurate to say you need more vitamin A" or "your dietary was not recorded very well at all. From what you said it looks like the coders had to make a fair number of decisions about what you ate, so these are some of the recommendations we would like to make based on your dietary."

We are coming up with people who are eating lots of alfalpha sprouts and wheat sprouts. Do you give them bean sprouts and hope that it is somewhere in the ballpark? We have some data for taco shells but we don't have it for fried taco shells that you get at the taco stand. We don't have baking soda. Also I'm sure that the canned refried beans are not the same as a home-made recipe. Some of these things are problems, others such as beef, have various numbers of listings to choose from.

Another thing I encountered was the use of refuse. When I first started, I was given a list of weights and I assumed this was the edible portion for a medium apple, but no, it included the core. So for at least half of a year until I read some other things, if a person gave me a medium apple they ate the core. You have to be alert in the coding process as far as this goes.

If you are going to be doing coding as a full-time professional job I would really admonish you to think of the quality of your data. My personal opinion is that eight hours a day, day after day, coding can become very boring.

These are the main problems I have noticed in working with coding for the last two years.

TASK FORCE I

Discussion Focus: Expansion of Research and Clinical Nutrient Data

Among other topics this group will discuss:

1) Ways and means of providing data for nutrient data banks
2) Re-evaluate the priorities for analysis of foods and nutrients
3) Define acceptable data and establish criteria for the quality of data which is acceptable for common use
4) Make suggestions for a food item classification system

Summary:

The group was informed by USDA representatives that the USDA Consumer Research Division will be gathering data for the National Nutrient Data bank from many sources. Though all of the sources haven't been identified a great deal of the information will be generated from the USDA composition laboratory and nutrition institute. The Food and Drug Administration will also be a major contributor of food composition data.

Task force participants also identified industry as a potential source of a great deal of food composition data but the question of how to get the data into the data bank remained unanswered. However several suggestions were made as to how the food industry may be approached. An industry representative was asked if data sharing would be more acceptable if food companies were approached by some established and respected professional organization acting as an intermediary. The American Dietetic Association, the American Medical Association or other national educational organizations were mentioned. Several participants suggested that the Food and Nutrition Board of the National Academy of Sciences be asked to act in some kind of advisory capacity to those involved in contributing and compiling nutrient data. It was also suggested that an industry oganization might gather data from its members and deliver them to the National Data Bank compilers, thus preserving the anonamity of the contributing companies. An additional advantage in such a cooperative scheme would to provide a single source of information to data users rather than have repeated requests for the same information from individual companies. Industry interests in nutrient data were identified as aids to compliance with labeling regulations, for internal control and to generate information for promotional purposes.

In addition to existing nutrient data, the group expressed interest in current food composition analysis being performed that will provide more values for the Data Bank.

Composition analysis is currently being done on carbohydrate fractions, lipids, fatty acids, cholesterol, trans-sterols, Vitamin E, fiber and trace minerals; zinc and copper in particular.

Though the task force group was not large enough to represent the interests and concerns of all data bank users, they did have suggestions as to nutrients which should be included for future nutritional analysis to further clinical and research needs. Amino acids and trace minerals, mentioned at last years data base meeting were again names as priority items for analysis. Eventually some non nutritive food components such as phytates, oxalates, nitrites etc. may need to be evaluated and added to the central data bank.

In gathering data on nutrient analysis problems of data reliability must be considered. There are many problems in methodology and reliability and even when techniques can be agreed upon the problems of nutrient variation within foods must be dealt with. The general feeling of the group was that all information should be gathered from all reliable sources, show the variability of the data and make statistical tests which would enable the data to be divided into different classes which then would make practical retrival possible for the nutrient data bank users.

The discussion then turned to the delivery of information to consumers and the course of the research needs of users. Money will be needed to perform more food analysis. Funding will probably be divided among the land-grant colleges and other institutions through grants. Of late very little money has been available for such chemical assays but Dr. Robert Rizek (Head of the Consumer Research Division of USDA) pointed out that Congress is proposing additional funds for agriculture research and perhaps nutrient research will be included within the scope of these research projects.

TASK FORCE II

Discussion Focus: Uses of Computerized Nutrition Data

Objectives of this group will be:

1. Identifying existing programs using a nutrient data base.
2. Sharing the formats of computer programs and identifying their unique features.
3. Identifying existing and potential users of computerized data base programs i.e., workers in biological and medical research, clinical settings, industry, etc.
4. Discussing ways to expand clinical and research applications.

Summary:

Objective 1 - The group went through various ways of deciding how to identify, contact and in some way involve various people in the country who are in some way using nutrient data bases and programs. Suggestions were made such as the Nutrition Consortium which involves the ADA, Nutrition Education Society and other organizations. A general questionnaire was suggested but some of the group felt that some people might not want to share their data base information and would not answer a questionnaire. Finally, everyone agreed to have a subcommittee of this group draw up a formal survey and in someway contact the people in the country with the understanding that the contents of the survey would be submitted to them before publication. All participants felt this would get around the feeling of taking something from somebody and not giving them anything in return.

Objective 2 - Those in the group who were actually using nutrient data bases or who knew a great deal about other peoples programs described them. Some of the participants had actual printouts from their data bases and these were passed around the group and compared.

Objective 3 - Besides biological and medical research, clinical settings and industry, the group expanded the list to include nutrition education and consumers. It was mentioned that restaurants could use data base programs for identifying the nutrient and caloric content of the various items on their menus. Also mentioned were supermarket surveys and analysis of shopping lists. Data bases are already being used in nutrition education in Utah elementary schools and in Seattle in graduate work and for medical students.

Objective 4 - This overlapped the other areas somewhat. The group wanted to integrate caloric nutrient input with caloric expenditure exercise programs. Joan Karkeck suggested having some kind of a program that would take into consideration the caloric intake of someone, the caloric output and incorporate some kind of exercise program.

A final suggestion was made to have a special workshop next year on the problem of computer nutrient data bases. In that way more people would be participating and all could share new ideas and new systems. This would spread the idea of the need for nutrient data bases.

TASK FORCE III

Discussion Focus: Methods of Funding and Administering Nutrient Data Bases

This group will concern itself on how to perpetuate and expand existing data banks. Discussion objectives will include:

1) Suggest organizational structures for the collection and dissemination of nutrient data on a national basis (USDA Nutrition Data Bank will serve as the national center)
2) Suggest mechanisms for funding programs which use a nutrient data base, especially those which promote clinical medicine and nutrition
3) Identify funding sources, both private and government
4) Discuss methods of including nutrient analysis in research proposals

Summary:
Task Force 3 objectives were combined with Task Force 4 and were addressed by the same group. Time did not permit a discussion of the funding problems.

Dissemination of nutrient data on a national basis was discussed from a procedural standpoint. USDA representatives suggested that the computerized Data Base 3 would be updated on a continual basis. Data bank holders who wanted periodic updates through Computer Sciences Corporation would be alerted to the need for updating when they reviewed the paper copies of the updated Handbook 8 provided through the Government Printing Office.

TASK FORCE IV

Discussion Focus: Methods of Data Sharing

Task Force 4 will be concerned with determining ways to design information sharing procedures including:

1) Propose a system for sharing nutrient information which currently exists but is not commonly accessible from private sources including information owned by conference participants
2) Tray to establish methods of standardizing values in the data base and in computer programs so resultant nutrition information will be comparable among users
3) Discuss methods of updating data files as new information becomes available and methods of tagging program results with the set of nutrient values used
4) Establish conventions which can be commonly accepted by developers of computer data files and computer programs. This includes data formats and media for sharing data such as tapes, cards, etc.
5) Determine how existing programs might be utilized by other users who do not have access to onsite data banks or programs

Summary:

Group determined that the primary goal of an information sharing effort should be to first determine what data is currently available. When we learn "who has what", then we can decide how to share the information.

Group proposed that a questionnaire be developed and sent to all holders of nutrient data banks. Questionnaire would be drafted by Dr. Whse and reviewed by interested conference participants before the final copy is distributed. All known data bank holders would be queried and notice of the questionnaire would be announced in various professional publications to solicit the participation of any other data bank holders who might have been missed. Questionnaires would be returned to USU where the results would be compiled and made available for distribution. Topics covered by the questionnaire would include:

1) Name/acronyn of data base and or ADP system
2) Availability of data; distribution restrictions; contract requirements; legal concerns; etc.
3) Size of data base
    a) Number of food items
    b) List of nutrients
4) Price
5) Media (machine readable or hard copy)
6) How are sources of data identified?
7) How is validity of data documented?
8) Is the data base readily updated and expanded?
9) Are nutritional analysis software packages available?
    a) Programming language
    b) Computer hardware
    c) Batch or on-line
10) Is any recipe nutrient information included?
11) Is your organization affiliated with a laboratory with nutrient analysis capability?

Task Force 4 was also directed to "establish commonly accepted conventions...". The overall concensus of the group was that whatever formats were developed for the USDA Nutrient Data Bank would readily be accepted by other data bank users and would thus be recognized as the "standard".

FINAL SESSION

Group Discussion

Several questions were brought up by the group regarding next year's conference:

1. Who should be invited?
2. How should we contact them?
3. How can we get these people together? Where?
4. Funding possibilities?

To resolve these questions, a committee was formed to gather names via professional journals soliciting information from people interested in joining next year's data bank conference. The information put in the journals should be worded so existing users and compilers as well as those who would like to become a part of the conference could respond. This will form the basis of the membership identification for next year's data bank conference. After this information is obtained, a questionnaire constructed by the committee will be sent to those people who have software and data bases to determine the nature of their systems. That information will be compiled into a document which will be presented at the 1978 conference.

Suggested journals for membership identification:

Journal of Nutrition Education
Food Technology
Journal of Home Economics
Journal of The American Dietetic Association
American Statistical Association
Nutrition Reviews
Journal of the American Medical Association
A.O.A.C.
American Association for the Advancement of Science
American Journal of Public Health
Nutrition Today
Hospitals
Food Service Management
C.N.I.
American School of Food Service Association
Institution Management
Association for Computing Machinery
Biometric Society

Joan Karkeck accepted responsibility for writing a short announcement and submitting it to the above journals.

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Dr. Robert Rizek indicated that CFEI-ARS-USDA and Computer Science Corporation would tentatively plan to co-host the data bank conference in 1978. The results of the questionnaire mentioned above would serve as a basis for this conference.

Included with this year's proceedings, a draft of the questionnaire will be mailed to each participant with a page for comments to be returned to the central committee.

SECOND NATIONAL NUTRIENT DATA BANK CONFERENCE
April 28-29, 1977

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NUTRIENT DATA BANK QUESTIONNAIRE (PART I)

10. What is the basis for quantities of food items in your data base?

____ Household units

____ 100 grams

____ Other (specify) ____________________

11. Is there a means of identifying or ranking the accuracy of each nutrient value according to a range (such as utilizing a range of accuracy values, where one extreme would represent highly reliable values derived from several assays by a recognized nutrient analysis laboratory and the other extreme would represent potentially unreliable data that may have been obtained from unknown sources or as the result of an educated guess)? Yes ____ No ____

If yes, briefly describe: ____________________

____

____

____

12. Do you have a technique for flagging questionable nutrient values?

Yes ____ No ____ Comment: ____________________

13. Do you have a regular method of purging and updating your data base?

Yes ____ No ____ If yes, how often are files updated? ____________

14. Are your programs and data base available to users "on-line" via computer terminals? Yes ____ No ____

15. Is your data base available for:

a. Purchase: Yes ____ No ____ Price ____________________

b. Rental (shared time): Yes ____ No ____ Cost ____________________

NUTRIENT DATA BANK QUESTIONNAIRE (PART I)

16. If data base is not available, will you perform analysis on contract?

Yes ____ No ____

17. a. Was your data base acquired from another institution or organization?

Yes ____ No ____ Source: ____________________

b. Were your analysis and update programs acquired from another institution?

Yes ____ No ____ Source: ____________________

18. Do you have a food group code indicated for individual foods?

Yes ____ No ____

19. Do you have foods flagged or marked for allergies (i.e. gluten, lactose, etc.)?

Yes ____ No ____

20. Do you have a means of indicating food-drug interactions? Yes ____ No ____

Comment: ____________________

____

21. Please indicate all applicable sources of data:

____ USDA Handbook 8 (1963 tapes)

____ USDA Handbook 8, 1972 release with imputed values

____ Periodical literature

____ Food manufacturers

____ Laboratory analyses (unpublished)

____ Other (please specify) ____________________

____

____

22. Approximately how many food items are contained in your data base? ____________

NUTRIENT DATA BANK QUESTIONNAIRE (PART II)

Please check (✓) all of the nutrients currently stored in your data base

General Data

- ____ Water or moisture
- ____ Calories
- ____ Ash
- ____ Refuse
- ____ Caffeine
- ____ Other general data (itemize on page 2)

Carbohydrate Components

- ____ Total Carbohydrate
- ____ Fiber
- ____ Refined Carbohydrate
- ____ Natural Carboyhydrate
- ____ Alcohol
- ____ Total Sugars
- ____ Starch
- ____ Unknown Carboyhydrate
- ____ Pectic Substances
- ____ Sorbitol
- ____ Organic Acid
- ____ Reducing Sugars
- ____ Sucrose
- ____ Natural Sucrose
- ____ Added Sucrose
- ____ Glucose
- ____ Fructose
- ____ Lactose
- ____ Maltose
- ____ Dextrins
- ____ Hemicellulose
- ____ Pentosans
- ____ Other carbohydrate components (itemize on page 2)

Protein Components

- ____ Total Protein
- ____ Animal Protein
- ____ Plant Protein
- ____ Mixed Protein
- ____ Unknown Protein
- ____ Alanine
- ____ Arginine
- ____ Aspartic Acid
- ____ Citrulline
- ____ Cysteine
- ____ Cystine
- ____ Glutamic Acid
- ____ Glycine
- ____ Histidine
- ____ Hydroxyproline
- ____ Isoleucine
- ____ Lencine
- ____ Lysine
- ____ Methionine
- ____ Phenyalanine
- ____ Proline
- ____ Serine
- ____ Threonine
- ____ Tryptophan
- ____ Tyrosine
- ____ Valine
- ____ Remaining Amino Acids
- ____ Total Nitrogen
- ____ Nitrates
- ____ Nitrites
- ____ Ammonia
- ____ Gluten
- ____ Niacin Equivalent
- ____ Other protein components (itemize on page 2)

Fat Components

- ____ Total Fat
- ____ Total SFA
- ____ Total USFA
- ____ Total Polyunsaturated FA
- ____ Animal Fat
- ____ Fish Fat
- ____ Plant Fat
- ____ Hydrogenated Fat
- ____ Cholesterol
- ____ Arachidic
- ____ Arachidonic
- ____ Butyric
- ____ Capric
- ____ Capronic
- ____ Caprylic
- ____ Decosahexanoic
- ____ Lauric
- ____ Linoleic
- ____ Linolenic
- ____ Myristic
- ____ Oleic
- ____ Palmitic
- ____ Stearic
- ____ Other Known SFA
- ____ Unknown SFA
- ____ Unknown & unlisted SFA
- ____ Unknown FA
- ____ Trans FA
- ____ Total Glycerides
- ____ Phospholipids
- ____ Glycolipids
- ____ Other fat components (itemize on page 2)

DRAFT

NUTRIENT DATA BANK QUESTIONNAIRE (PART II)

Vitamins

_____ A
_____ Preformed Vitamin A
_____ Vitamin A Precursors
_____ Alpha-Carotene
_____ Beta-Carotene
_____ Gamma-Carotene
_____ Thiamine
_____ Riboflavin
_____ Niacin
_____ Ascorbic Acid
_____ Reduced Ascorbic Acid
_____ Dehydro Ascorbic Acid
_____ B6
_____ Pantothenic Acid
_____ Pyridoxal
_____ Pyridoxine
_____ Pyridoxamine
_____ B12
_____ D
_____ Total-Tocopheral
_____ Alpha-Tocopherol
_____ Other Tocopherol
_____ E
_____ Folate
_____ Biotin
_____ Choline
_____ K
_____ Inositol
_____ Other vitamins (itemize)

Minerals

_____ Calcium
_____ Phosphorus
_____ Iron
_____ Sodium
_____ Potassium
_____ Magnesium
_____ Zinc
_____ Copper
_____ Chlorine
_____ Iodine
_____ Chromium
_____ Cobalt
_____ Manganese
_____ Molybdenum
_____ Selenium
_____ Sulfur
_____ Florine
_____ Other minerals (itemize)

Itemize additional nutrients

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DRAFT

DRAFT

November 1, 1977

Dear Questionnaire Respondent:

Thank you for agreeing to participate in this survey. Since April, 1976 two National Nutrient Data Bank Conferences have been held in the United States. One of the objectives of these meetings was to discuss methods of sharing nutrient data and computer programs to use that data. One result of those discussions was a suggestion that a questionnaire be developed which would be used to assess the current "state of the art". We wanted to learn what was available before we started talking about how to share it.

The attached questionnaire has been designed to facilitate the collection of this information. Part I asks several specific questions, of a general nature, which will allow us to define the types of data banks which are in existence. Part II is devoted to itemizing the specific nutrients contained in each data bank.

When the completed questionnaires are received, the results will be summarized and will serve as a basis for discussion at the Third National Nutrient Data Bank Conference. Please send us your completed questionnaire in the enclosed pre-addressed envelope by ———————— in order that the information can be compiled prior to the conference. Your cooperation in this effort is sincerely appreciated and this committee hopes that you will be one of the first to benifit from the results.

For the ad hoc committee to develop a nutrient data bank questionnaire:

TONY FISHER, R.D.
Chairman

DRAFT