APPLICATION OF COST BENEFIT ANALYSIS TO THE EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

by

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Dissertation submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Human Nutrition and Foods

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May, 1988

Blacksburg, Virginia

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(ABSTRACT)

In 1981, President Ronald Reagan issued Executive Order 12291 which requires Federal agencies to perform benefits assessments of proposed major regulations and prohibits them from taking regulatory action unless potential benefits exceed potential costs to society.

A review of welfare economics literature and applications of the CBA model to health, education, and nutrition is presented. CBA for use in the Cooperative Extension Service Expanded Food and Nutrition Education Program (EFNEP) is then systematically examined using the following criteria: 1) theoretical considerations - can the economic criterion appropriately be applied to EFNEP?; and 2) application of the CBA model - can it be made operational?

Following the critique of application of CBA to EFNEP, conclusions are drawn as to the appropriate use of CBA or alternative techniques in evaluating EFNEP and similar programs.

ACKNOWLEDGEMENTS

Sincere appreciation is extended to my committee members:

Ann A. Hertzler, committee chairman, for her guidance, sincerity, and support. Dr. Hertzler's contribution to my education has been incomparable.

W. David Conn, who expended tremendous time and effort teaching me about Cost Benefit Analysis. Dr. Conn's knowledge and clarity of explanation provided a valuable contribution to the dissertation, and to my overall education.

Janet Johnson, for her expertise in the area of Foods and Nutrition, and for her support.

Mike Lambur, for his knowledge of the Extension Service and of Evaluation, and for his guidance and support.

Betty Mifflin, for sharing her knowledge and experience which provided me valuable insight into the administration and operation of EFNEP. Betty's support, friendship, and guidance are greatly appreciated.

Jane Wentworth, for her wisdom and expertise in the area of public health and nutrition. Dr. Wentworth has been an exceptional educator and an important member of the committee.

The knowledge they shared and guidance provided played an significant role in my education.

I would like to thank the following people for their help in my educational process: Deloris Ellis who has provided valuable professional work experience; and Nancy Leidenfrost who provided input into the dissertation.

I would also like to thank my parents, Robert L. and Sylvia Korona; my sisters; grandparents; and friends for their support.

I would most like to thank my husband, George, for his love, understanding and support throughout my education at VPI & SU.

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CHAPTER 1 INTRODUCTORY SECTION

In 1981, President Ronald Reagan issued Executive Order 12291 which requires Federal agencies to perform benefits assessments of proposed major regulations and prohibits them from taking regulatory action unless potential benefits exceed potential costs to society (1). Numerous attempts at benefits assessments have been made which have been labeled Cost Benefit Analysis (CBA). However, it appears that these analyses are different applications of the CBA model which has its theoretical foundation in welfare economics literature.

The application of the CBA model to health and nutrition education program evaluation is discussed in this paper. The discussion focuses specifically on the Cooperative Extension Service Expanded Food and Nutrition Education Program (EFNEP). A description of EFNEP follows:

Expanded Food and Nutrition Education Program

Food and nutrition education has always played a major role in the total program of the Federal and Cooperative State Extension Services. In the 1960's, the Extension Service funded a series of pilot studies to test approaches for establishing and maintaining a nutrition education program with low-income families. One, a five-year project conducted by the Alabama Extension Service from 1964 to 1969, utilized paraprofessionals to teach low-income

homemakers on an individualized basis in their homes (2). Other pilot studies were conducted to test the model in urban areas and with various ethnic groups (2). Due to the success of these projects, the Extension Service in 1968 was selected to develop and implement a nationwide program that would employ paraprofessionals to teach low-income families about nutrition.

The arguments made for education rather than a subsistence program emphasizes the relationship of nutrition to health. Low-income families are at greater nutritional risk because they have fewer resources to spend on food and health care; thus, each expenditure is critical. Low income areas have a higher incidence of certain nutrition-related diseases and disorders which further strains the resources of the poor (2).

In 1968, EFNEP was federally initiated by USDA Extension Service with $10 million (from Section 32 of An Act to Amend the Agricultural Adjustment Act). In 1970, EFNEP received funding under the Smith-Lever Act; in 1977, under the Food and Agriculture Act; and in 1981, under the Agriculture and Food Act (2).

Today, EFNEP remains an integral part of the Cooperative Extension Service. EFNEP teaching is tailored to the needs, interests, financial resources, age, ethnic backgrounds, and learning capabilities of participants. EFNEP's objectives are:

1) to improve diets and nutritional welfare for the total family.

2) to increase knowledge of the essentials of human nutrition.

3) to increase the ability to select and buy food that satisfies nutritional needs.

4) to improve practices in food production, storage, preparation, safety, and sanitation.

5) to increase ability to manage food budgets and related resources such as food stamps (2).

EFNEP helps low income families, especially those with young children, acquire the knowledge, skills, attitudes, and behavior change necessary to improve their diets. Four distinguishing features of EFNEP are:

1) Targeted audience of low-income families with youth,

2) Teaching performed by paraprofessionals and/or volunteers trained and supervised by Extension professionals,

3) Intensive instruction for individuals and/or small groups.

4) Innovative program delivery methods to expand clientele participation, increase retention of nutrition knowledge, and improve program effectiveness (2).

The 1983 revised EFNEP policy supported the Cooperative Extension Service's efforts to initiate innovative program delivery methods, expand clientele contacts, and improve client retention of nutrition knowledge (3). Efforts to

expand outreach have included:

1) group instruction

2) multi-media program delivery (television, radio, telephone, and newsletter)

3) curriculum implementation (use of selected lessons taught in an intensified and shortened time frame).

4) management techniques to increase cost effectiveness

5) multi-agency cooperation

6) bilingual presentation

7) program assessment and redirection

8) electronic media (computerized reporting)

Research Objectives

President Reagan's Executive Order requires evaluations of nutrition education programs such as EFNEP to provide decision-makers with an economic rationale for the selection of investment projects. These studies also aid in the determination of: 1) the worth of a project; 2) which is the best of several possible alternative projects; or 3) when a project might be undertaken and/or its timing (4).

The purpose of CBA, theory, terminology, and methodology have been discussed in the economic literature (8, 9, 10, 11, 12, 13). Examples of applications of the CBA model also exist in this body of literature. In the past five years, nutrition-related CBA's have increased. However, it appears that evaluators in the field of health and nutrition have problems understanding and adopting the theory presented in

the economic literature (5). The analyses conducted have been of marginal value to nutrition educators who are in search of an appropriate model to utilize in conducting CBA studies (6).

Therefore, the objectives of this research are:

1) to critique the application of CBA to EFNEP

2) to draw conclusions as to the appropriate use of CBA or alternative techniques in evaluating EFNEP and similar programs.

CHAPTER 2 REVIEW OF LITERATURE

The review of literature consists of three basic parts: 1) a review of welfare economics and key findings that have come out of this literature; 2) a review of CBA in health, education, and nutrition literature, including a) how CBA is theoretically addressed, and b) how CBA has been applied in these areas; and 3) a discussion of EFNEP's benefits and costs.

WELFARE ECONOMICS

According to Sassone and Schaffer (7), economics may be partitioned into two areas: 1) positive economics, and 2) normative economics. Positive economics describes, explains, and predicts actual economic phenomena. Normative economics includes value judgments in its assessment of the relative desirability of different economic conditions. Welfare economics is normative in nature and attends to society's allocation of scarce resources for the purpose of maximizing social welfare. Welfare refers to the well-being of all members of a society (7). Cost benefit analysis (CBA), an application of welfare economics, can be used as a guide for distributing society's resources to public projects, with the explicit goal of maximizing the net social value of all goods and services produced in society (8).

Although evaluations of public projects have occurred

throughout history, the modern literature on CBA normally dates from 1844 with the publication of the essay, "On the Measurement of the Utility of Public Works," by Jules Dupuit (9). Dupuit stated that although legislators had prescribed the formalities necessary for certain works to be declared of public utility, the political economy had not yet defined any precise conditions that these works should fulfill in order to be useful. Dupuit noted that the information available on this subject was vague, incomplete, and often inaccurate (9).

Although Dupuit's work was the beginning of a stream of thought about CBA, the first application of CBA came much later. With the 1936 United States Flood Control Act, Congress declared that benefits "to whomsoever they may accrue" of federal projects should exceed costs. But, no consistent methods were developed at this time to examine these benefits and costs. The Corps of Engineers, the Soil Conservation Service, the Bureau of Reclamation, and other agencies all utilized different approaches (7). The Federal Government then attempted to standardize its project appraisal procedures.

In 1950, the Subcommittee on Benefits and Costs of the Federal InterAgency River Basin Committee issued Proposed Practices for Economic Analysis of River Basin Projects. The writers of this document attempted to merge the language of project appraisal and welfare economics (4).

In 1952, the Bureau of the Budget issued its Budget Circular A-47, formally setting forth considerations which would guide the bureau in evaluating proposed projects. In 1962, this circular was replaced by Senate Document 97, "Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources." After an extended review, this document was replaced in 1973 by "Principles and Standards for Planning Water and Related Land Resources" (4).

As Federal efforts were directed toward these revisions in policies and standards to guide practices, a firm theoretical base was being constructed in scholarly circles. Otto Eckstein's (10) "Water Resources Development" came out of Harvard University Water Program in 1958. Eckstein formulated what has been described as the traditional formulation of the cost-benefit approach. The allocation problem was clarified through the identification of: 1) objective function, 2) constraints, 3) externalities, 4) a time dimension, and 5) risk and uncertainty.

At the same time, Roland N. McKean's (11) "Efficiency in Government through Systems Analysis" appeared from RAND Corporation. In 1965, Prest and Turvey (4) wrote "Cost-benefit analysis: A survey" which outlined the development and scope of CBA in general terms. They surveyed applications of CBA in a variety of fields including water

supply projects, transport, land usage, health, education, and research.

In addition to these major works, numerous other studies have appeared in almost every field of public expenditure. Several excellent texts and booklets are available on CBA, including those by E.J. Mishan (8), Ajit K. Dusgupta and D.W. Pearce (12), and G.H. Peters (13).

The theory of welfare economics is based on the postulate that the welfare of society depends on the aggregate well-being (or "utility") of the individuals in society. Economists have attempted to define utility in a manner that permits direct measurement, but now agree that this is not possible. In the late 1930's Hicks demonstrated that welfare economic theory did not depend on an absolute measure of utility but only a ranking. It is now considered that a person's utility for items can be determined by having the person rank his preferences.

There has been a long search to find a criterion for judging a change (increase or decrease) in social welfare. There is no inherently correct criterion, but the most widely accepted economic criterion is the Pareto Criterion. A Pareto-efficient change is one which makes at least one person better off without making another worse off (8). If one person is made worse off, it cannot be asserted that an improvement in social welfare has occurred. Most public actions will benefit some individuals and harm others. Few

activities in the public sector could strictly satisfy this conservative criterion. Consequently, the Pareto Criterion is limited in application.

As a result, economists have been inclined to replace the Pareto Criterion in practical applications with one less confining -- the Hicks-Kaldor Criterion or the Potential-Pareto Criterion. Hicks and Kaldor hold that an increase in the general welfare occurs if those who are made better off by a change could potentially compensate those who are made worse off, whether the compensation is actually paid. Thus, a general improvement in welfare would occur and compensation paid is not essential. The criterion is justified on the basis that the payment of compensation affects only the distribution of the gains (i.e., who gets what) rather than how much is gained or lost in aggregate. The Pareto criterion says nothing about the relative desirability of different distributions. It may be noted that if compensation were actually paid, the change would satisfy the Pareto criterion.

Welfare economists apply the Potential-Pareto criterion by measuring willingness-to-pay and willingness-to-accept-compensation. Benefits are measured by the maximum willingness-to-pay to obtain a desired change, or by the minimum willingness-to-accept-compensation for not receiving it. There are two general types of benefits: 1) the gain in something desired, and 2) the reduction of something not

desired.

Costs are measured by the maximum willingness-to-pay to avoid an undesired change or by minimum willingness-to-accept-compensation for giving up something. There are two general types of costs: 1) the lost opportunity for a benefit, and 2) the increase in something not desired (14).

The theory of welfare economics does not provide an answer as to which method of measurement (willingness-to-pay or willingness-to-accept-compensation) is correct to use. Operationally, one may not have a choice of methods, and there also may not be much difference in the amounts suggested by the two methods. Mishan suggests that guidance can be obtained from the law (8). If one is given something to which he has a right, then the willingness-to-pay criterion should be used. If one has something to which he has a right taken away from him, the willingness-to-accept-compensation should be used. For example, if a person has a right to freedom from pollution, then the cost of pollution created by the operation of a nearby industrial center should be measured by his willingness-to-accept-compensation for it, not his willingness-to-pay. The willingness-to-accept-compensation is usually larger than the willingness-to-pay. The person in the example would have a low willingness-to-pay for preventing pollution if he had a low income. But, his willingness-to-accept-compensation for the pollution would be much higher. The lower the income, the

more constrained the willingness-to-pay. Whereas, the willingness-to-accept-compensation is not constrained by ability to pay (8).

Measurement of Willingness-to-pay

One method of measuring willingness-to-pay or willingness-to-accept-compensation for both costs and benefits is to ask people directly. Economists prefer to observe actions, however, because a person's answer to these hypothetical questions may not be valid.

Market information on the prices and quantities of goods and services can provide a measure of willingness-to-pay, as it reflects revealed preferences (14). Theoretically, the usefulness of market information depends on how closely market conditions approximate the so-called "perfect" market and on the size of the change. In markets approximating the "perfectly competitive" model, the market price is a measure of the marginal consumer's willingness-to-pay for the good or service being supplied. When changes are small, the market price is a good approximation of the willingness-to-pay of all consumers affected by the change. In other situations, the area under the demand curve (which relates to quantity demanded to price) provides a means of measuring willingness-to-pay.

All projects require the use of scarce resources which, if not utilized in the subject project, would yield benefits in alternative uses. The cost of these resources, sometimes

referred to as "opportunity cost," is their value in the highest valued alternative use. If the lost opportunities for the resource are widely diffused among many alternative uses, resulting in small changes for each use, then the cost of the resource can be closely approximated by its market price.

Summary of Measurement of Benefits and Costs

Market information used for computing costs and benefits is drawn ideally from perfect markets, where sufficient competition prevails and uncompensated spillovers do not exist. If monopolies, spillovers, or other "distortions" prevail, market prices are biased measures of benefits and costs. Because spillovers and monopolies do exist in many markets, much of the data obtained is biased. Adjustments to correct these biases are seldom made, however, because often the magnitude of the biases are not known, and market prices are still used as the best available information (14).

Treatment of Equity in CBA

The concept of equity concerns the distribution of costs and benefits among the members of society. CBA ignores equity considerations - the underlying criterion does not address the issue of who gains or who loses (14). The changes which satisfy the underlying criterion may consistently benefit one group (e.g, the rich) over another (e.g., the poor). Furthermore, it is widely felt that a

dollar means more to a poor person than to a rich person. If this is so, then an analysis will be biased in favor of the preferences of the rich, who are likely to be willing to pay more for a given benefit than would the poor. The rich are also less constrained by their ability to pay.

Several methods have been proposed for determining weights that might be applied to the costs and benefits received by people at different income levels. One method is to determine the weights from the schedule of marginal income tax rates by income level. Another method for addressing equity impacts is simply to report separately the costs and benefits that affect different groups and leave the equity weighting up to the decision maker (14).

Treatment of Time in CBA

An important element of the decision-making criterion is that of time. In general, a unit of benefit is thought to be considered less desirable at a given time the longer the period before it can be enjoyed. Differential weighting of benefits over time is performed by a process of discounting. Costs accruing over time are also weighted by use of the discount rate, and the particular benefit-cost decision criterion employed will thus incorporate the time streams of costs and benefits into the analysis of the project.

The discounting technique is equivalent to compounding in reverse. It converts future values to present values.

The following is a formula for discounting:

$$PVB/C = \sum_{i=1}^{n} \frac{Y}{(1+R)^n}$$

PVB/C= The present value of benefits/costs
Y= dollar value of the benefits and costs for each future year
n= The number of years these benefits or costs will accrue
R= The discount rate (17).

A problem with discounting arises in the selection of the discount rate, for which there exists no unique, "inherently correct" conceptual basis. Current interest rates are often suggested. A proposed method for determining the discount rate for units of effectiveness, termed social time preference rate (STPR), uses a discount rate extrapolated from past social decisions (15). The problem with this rate is that past inadequacies are perpetuated and adjustments such as social preference change are not allowed (16).

Cost Effectiveness Analysis (CEA)

CEA is a form of CBA that has been used for identifying the most efficient use of limited resources. It is important to consider CEA because of the difficulty in measuring all costs and benefits of a program. In CEA, dollar costs are compared to physical units of output rather than dollar benefits. CEA aids in the identification of the most appropriate alternative strategy that address the same goal and can be measured by a single measure of output. CEA,

however, does not allow comparison of programs having widely different objectives, because the outcome measures are likely to differ. The most cost-effective alternative usually is defined as the one that either 1) maximizes the output for a fixed cost or 2) minimizes the cost of producing a fixed level of output, depending upon the nature of the decision situation (14).

Many situations do exist in which the accept decision has already been made, so the evaluation problem is narrowed to that of selecting the best action for meeting the objective. One situation is the case in which a level of output is fixed, and the evaluation problem is to select the least-cost method of achieving it. Another situation is the case in which a fixed budget is set aside for a specific purpose, and the evaluation problem is to choose the highest output method that does not exceed the budget (14).

CEA aids the decision-maker in the progression from a desired objective to the final choice of one of the alternative means of obtaining it. The first stage of this sequence is identification of the objective desired - the end result of following a particular policy or course of action. The second phase is a proposal of alternatives by which the objective might be obtained. In preparation for the logical choice of an alternative, comparisons between them must be made. The next phase in CEA, therefore, is an evaluation of each alternative for both effectiveness and

cost. Several alternatives with the same physical output are ranked in order of least cost. This ranking provides a means for weighing costs against effectiveness. The final decision is the selection of one of the alternatives as the policy for meeting the objective (19).

Where the physical output differs, the choice may be less clear cut. In such cases, demand curves may be developed in which costs are shown as abscissas and the effectiveness as ordinates (See Figure 1). Demand curves may help in making a judgement, but they do not provide an answer as to the best alternative. As the costs are increased, the level of effectiveness increases. If the level of costs is predetermined, one can estimate the level of effectiveness. Assuming one desires the highest level of effectiveness, Figure 1 can help determine the point at which an increase in the cost will produce no appreciable increase in effectiveness (20).

A simplified comparison of alternatives is illustrated in Figure 2. If one knows the cost that can be spent, Figure 2 helps decide if Alternative A or B is the more effective. The cost effectiveness curves for Alternatives A and B intersect at a point where, for the same cost, the effectiveness is identical. At a cost less than that at the point of intersection, Alternative B gives greater effectiveness. If costs are higher than that at that point of intersection, Alternative A has greater effectiveness

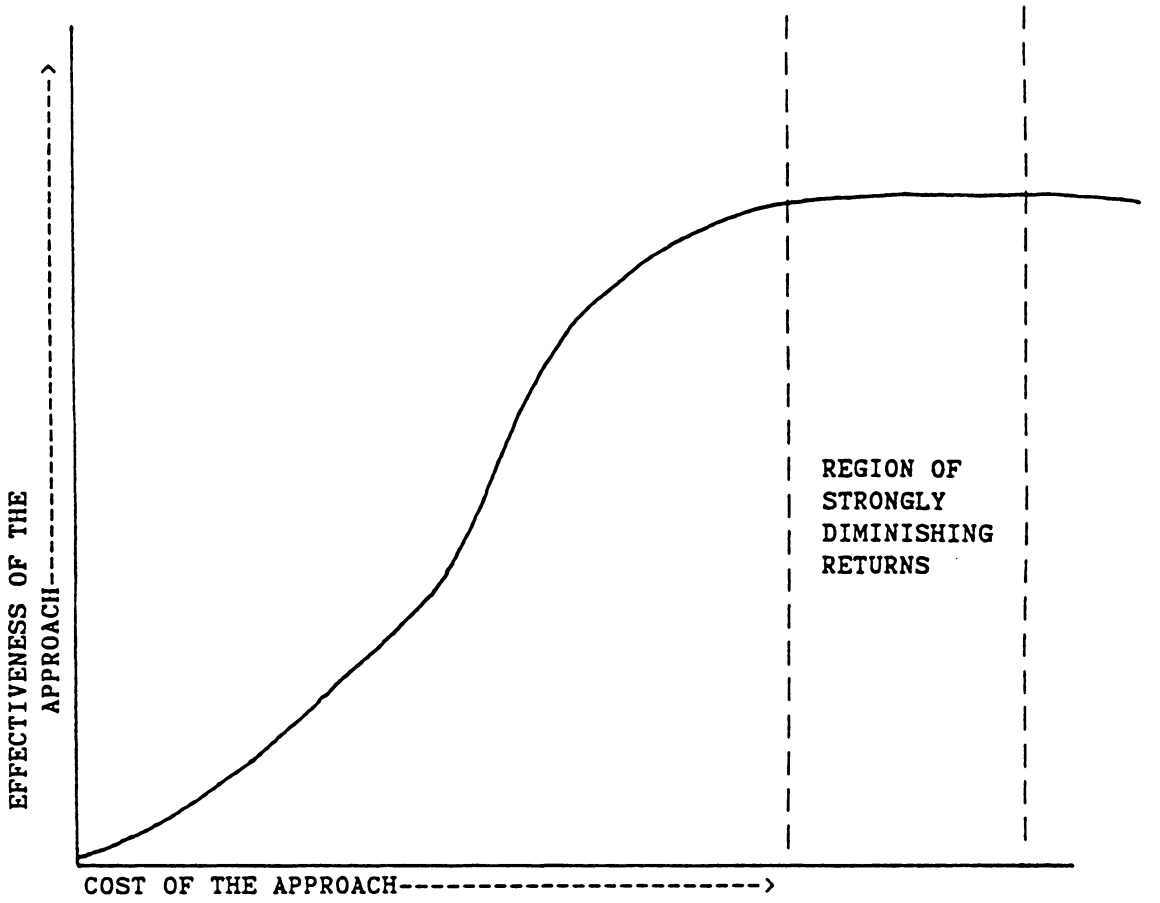

Figure 1. Typical cost effectiveness curve. Increase in costs results in increased effectiveness until a region of diminishing returns is reached.

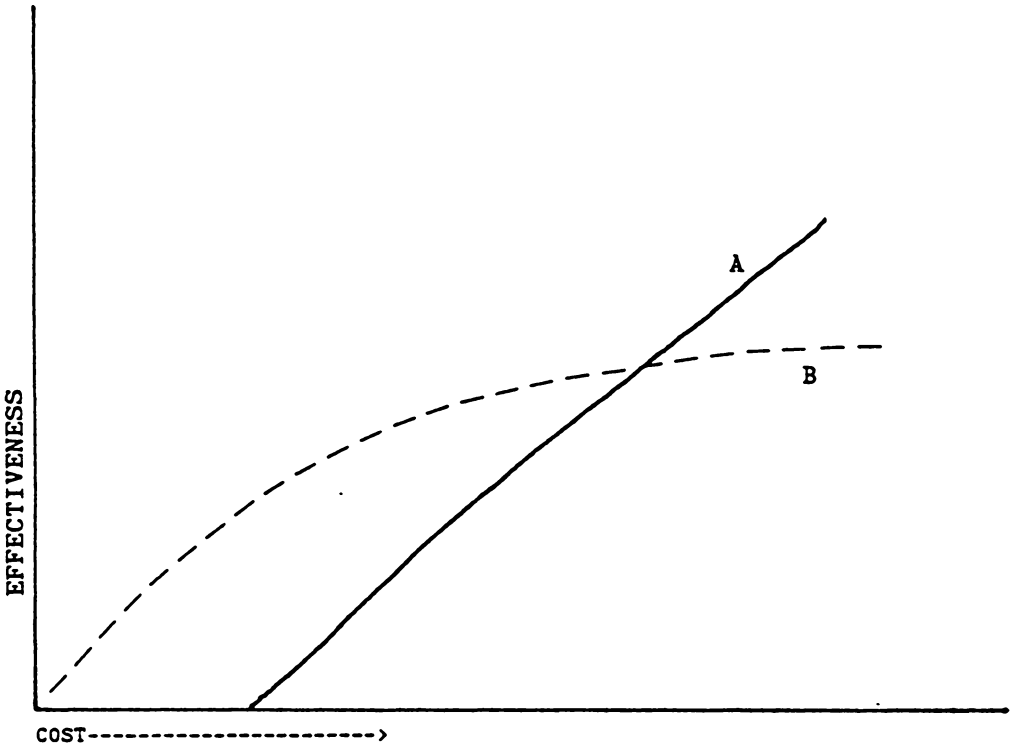

Figure 2. Comparison of alternatives. At the point where cost effectiveness curves of Alternatives A and B intersect, cost and effectiveness are identical.

(20).

A subjective judgment by the decision-maker is required. The question is whether the gain in effectiveness of A over B at a higher cost is worth while. Subjective judgments are often required in CEA; therefore, the decision-maker needs as much definitive information as possible.

It is often assumed that CEA overcomes the problem of monetizing outputs that is required of CBA (14). However, whenever some or all of the outputs of a proposed action are not monetized, the accept-reject decision is complicated by the necessity of comparing unlike units - dollar costs compared to units of output.

CBA IN HEALTH/NUTRITION/EDUCATION

Health

The major purpose of health programs has been identified as saving lives and reducing illness. The problem of valuing benefits per life saved or per illness avoided was first addressed by Weisbrod (21), Mushkin (22), and Klarman (23). They defined a death avoided as a loss of production avoided. Thus, the present value is an economic benefit to be credited to the measure responsible for saving life. The first step in estimating it was described as ascertaining what the average person whose life is made safer will earn over the rest of his life. This depends upon the age at death, the probability of survival to each higher age, the proportion of people at each age who will both be in the

labor force and employed and their contribution to production at each age.

In practice, Weisbrod (21) was able to construct estimates for men and women but not for any particular risk group. He took earnings in a recent year without making any addition for future productivity increases. The question of whether housewives' services should be included as lost production produced much discussion. Klarman (23) pointed out that the distribution of diseases between the sexes is not uniform, so that the relative economic benefits of different health programs will be affected by the weight given to housewives' services. The real issue was not whether to measure this, but how to. Two possibilities were provided. One possibility was to estimate their opportunity cost - what housewives could earn in paid jobs. Another possibility was to use replacement cost - what it would cost to hire a housekeeper.

A larger question that Weisbrod (21) addressed was that of consumption. If society loses the production of the deceased, does it not also gain by not having to supply what he consumes? Weisbrod, who believed that consumption should be deducted, argued that using marginal rather than average consumption was relevant. Using family budget data, he calculated for each age bracket a weighted mean of the marginal consumption of persons in mean-income families of all sizes.

Mushkin (22) describes problems with making estimates for the reduction of illness. Mushkin stated that there are many variables such as heredity and educational level, that affect a person's life expectancy and productivity, Therefore, it is difficult to sort out the influences of a particular health program.

Today, the valuation of extended life, or an improved quality of life remains difficult. Before valuing human life, the analyst must resolve the potential moral questions. Implicitly, governments, courts, and individuals place values on human lives, diseases, deaths, and disabilities. When the decisions become explicit, with assigned dollar values, strong objection will arise. Life valuation is a benefit that most likely will need to be defended (26).

Two approaches have been used to value the benefit of extended human life, or an improved quality of life. They are known as the human capital approach and the willingness to pay approach. The first, the human capital approach, uses future earnings of the service beneficiaries. The calculation requires first an estimate of the additional years of work resulting from the service or treatment. The earnings of each future year is computed. Discounting is usually performed to make the dollars of the future comparable with the value of today's dollars (22). This method of valuation is considered to be inequitable to some

population groups. Women and nonwhites tend to earn less than men and whites. Children, the elderly, and homemakers often do not produce income, or produce only limited income. Therefore, the human capital approach favors the employed, white, male population.

In an attempt to include an individual's desire to reduce his or her chance of death or disability, attempts at direct measuring of willingness-to-pay for this reduction have also been attempted (22). This is the only approach that is fully consistent with the underlying criterion. The analyst seeks to discover the answer to the question: "what price will individuals be willing to pay to reduce the risk of illness?" Another way of looking at the question is to ask: "what price would individuals be willing to pay to improve the ratio of quality life years to total life years?" Suggested measures include consumer surveys and values from market behaviors (8, 22).

Education

Some studies (24, 25) have concentrated on the costs of education, including imputed earnings foregone and on those benefits of education which take the form of higher incomes. Weisbrod (24) also classified external benefits which were considered to be unmeasurable. These benefits included: residence-related (e.g., mothers who are able to go out to work when children are at school); employment-related (e.g., mutual benefits conferred by employees in a factory); and

those which accrue to society in general.

Difficulties with CBA's in the area of education have been described. The first difficulty was identified as the use of a current cross-section analysis to predict a future time series (24). Secondly, Weisbrod suggested the complication that the value of extra education includes the value option which it confers to obtain still further education. Another major difficulty in the estimate of returns was discussed by Becker (25), who noted that income depends upon other variables besides age and education.

Nutrition

Efficiency assessments have increased in the social program area (including nutrition) in the last decade. Rossi (16) stated that efficiency assessments in the social program area have their analogue in the business world, where costs are constantly being compared with profits. The idea of judging the utility of social intervention efforts in terms of efficiency has gained widespread acceptance in the area of health/nutrition education. However, Rossi (16) states that correct procedures for actually conducting CBA's remain an area of considerable controversy. Since their conception, methods and procedures of such analyses have undergone continual refinement, but the area is still referred to as an "emerging field". Rossi also notes that it may be impractical or unwise to conduct CBA's in the social program area.

The American Dietetic Association has produced a report, Costs and Benefits of Nutritional Care Phase I (27). This report stimulated the development of research protocols that could be used in the conduct of CBA of nutrition counseling services provided in ambulatory health settings. It was pointed out that CBA's in the health care field concentrated on certain areas, but application to nutrition/health education programs have been few.

Problems with Application of CBA in Health/Nutrition Education Programs

CBA studies have a number of limitations which are particularly noticeable in the evaluation of health and nutrition education programs such as EFNEP. The first problem is that of understanding and adopting the underlying economic criterion. To non-economists, CBA has become a generic term embracing a wide range of evaluative procedures which lead to a statement assessing costs and benefits relevant to project alternatives. The theoretical foundation is mis-understood and/or ignored by the vast majority of people conducting CBA's in the health/nutrition education area.

Part of this mis-understanding is seen in the notion of selecting a perspective of analysis that is presented in the sociology literature. Rossi (16) stated that three perspectives (or accounting stances) may be taken: 1) individual, 2) program sponsor, 3) and society.

He suggested (16) that the perspective of the individual be taken when individuals benefit most directly from the program. Rossi states that the program sponsor perspective is most appropriate where there are clear policy choices involving alternative programs that a sponsor may support, under fixed budgetary conditions where new revenues will not be generated to fund additional projects. The third perspective (societal) is acknowledged as being quite difficult to conduct, and it is sometimes suggested that this perspective should not be attempted (16).

The problem of adopting the underlying economic criterion as well as the issue of whether CBA's based on economic theory would be useful to the decision-maker will be discussed later in the paper with specific reference to EFNEP.

Problems of establishing cause and effect:

The major problem in the application of CBA methodology or any evaluation technique has been the lack of research establishing and quantifying the link between nutrition programs and changes in health status.

Recognizing the problem of establishing cause and effect, Tolpin (28) stated that more information must be available:

1) health problems must be clearly identified

2) consequences of the nutrition program must be enumerated so that benefits can be calculated

3) technology to control or eliminate the problem must be

known so that direct costs can be calculated

4) the effectiveness of technology must be assessed so that calculation of direct and indirect benefits reflects program efficiency.

Tolpin (28) states that it is necessary to quantify the relationship between the change in nutritional behaviors and the change in health status. The quantitative link is redefined into the following steps:

1) the magnitude of the change in health status relative to a change in risk factor

2) the magnitude of the change in the risk factor relative to a change in a nutrition factor

3) the magnitude of the change in the nutrition factor relative to a change in nutrition services.

Researchers in the area of health and nutrition have not been able to establish these linkages. However, each of the linkages must be established and effects quantified in terms of increased productivity or costs averted. After those linkages are established, outcomes of programs may be quantified in terms of reductions in productivity loss and/or in medical services.

Problems of evaluating effects and other methodology problems

Green (29) has identified two levels of program effects (outcome variables): 1) impact, and 2) outcome. Green defines impact effects as the immediate effects of the

program -knowledge, attitudes, beliefs, and behavior change.

Outcome effects are described by Green as the ultimate effects of a program, such as mortality and morbidity decreases and increased productivity. Green states that the outcome information is what is required for CBA, as these are effects which are efficiency related (29).

Researchers, attempting to conduct a CBA, are faced with a number of application problems when evaluating effects. Most obvious is the difficulty of putting a dollar or other value weight upon output variables. Not all benefits or all costs are readily expressed in appropriate terms. For certain types of benefits and liabilities, dollar values are especially difficult to obtain. For improved self esteem, parent-child or marital relationships, for example, assignment of dollar values is particularly difficult. In these cases, however, the benefits may be partially reflected in costs avoided by the provision of the service. Examples of costs that may be avoided include: crisis intervention services, costs of institutionalization, increased legal and consumption services that accrue from separation and divorce, and medical and psychological care of battered or otherwise abused family members (30).

CBA also requires the analyst to make assumptions that will directly affect the outcome of the analysis. Thus, the choice of assumptions often implicitly reflects the biases or view of the analyst. What one must seek in setting

standards for CBA in evaluating programs and projects is a consistency in application of the CBA analytical methods (16).

Other problems, which are inherent to other evaluation techniques, are related to time: 1) when the benefits and costs occur, and 2) the length of time benefits and costs last. Most nutrition education programs are of a relatively short duration, but their objectives - particularly those that are behavior oriented - focus on "lifetime" changes. Despite long-range expectations, evaluations of effectiveness of nutrition education programs are generally confined to a pre-test of either knowledge or behavior change that is given at the beginning of enrollment and a post-test given at program completion. Researchers have conducted studies attempting to measure how long clients' retention of knowledge and behavior change lasts. These studies have measured clients' knowledge and behavior change a year or two after they have completed the program. However, these studies have been few, and have not measured "lifetime" changes (31).

Specific Health/Nutrition Education Related CBA's

Many nutrition professionals, including those in EFNEP, have attempted to document benefits of their programs and to assign value weights to these benefits. EFNEP reports program results annually through the use of the computerized Narrative Accomplishment Reports (NARS) (32).

Benefits of EFNEP that are reported in NARS are assigned a value that is called "quantified impact". The quantified impact includes "income extended through programs such as Food Stamps and Women Infants and Children Supplemental Feeding Program (WIC)", and amount of money homemakers save by gardening. The "quantified impacts" also include knowledge gain, dietary practices improved, and improved management and food buying skills. These benefits are either reported in numbers of homemakers receiving the benefits or are assigned dollar values. Although income extended and money saved can be calculated, it appears that the assignment of dollar values to the other impacts has been arbitrary. For example, in Virginia, knowledge gained from EFNEP has been assigned a value of $20.00 per participant. The assigned dollar values differ from state to state. Discussion with the National Program Director (33) led to the conclusion that these dollar values are only estimates of the value of the benefit - the values are not based on research or other documentation.

A "quantitative assessment" of the effects of EFNEP was conducted in 1981 (34). The evaluators assessed the following benefits: nutrition knowledge; managing food resources; dietary intake; cost efficiency; and cost effectiveness. They defined cost efficiency as the number of clients served for a given level of resources. They defined cost effectiveness as the amount of education or

nutrition gain for a given level of resources. The evaluators stated that they did not make a calculation of cost effectiveness, because the necessary information was not available to them.

A recent study conducted by University of Michigan's Institute of Public Policy Studies (35) compared the costs of conducting EFNEP with supposed benefits to society. The researchers determined health-related savings that could be realized by society as a result of conducting the EFNEP program for one year. They calculated a benefit to cost ratio of 24.41:1 at a 4% discount rate, and 16.49:1 at a 6% discount rate. The researchers conclude "EFNEP clearly is worthwhile undertaking."

The University of Michigan research is difficult to critique due to its vagueness. Several specific problems exist:

1) The researchers did not address any underlying criterion, and did not appear to adopt the Potential-Pareto Criterion.

2) Evidence is lacking to demonstrate both qualitatively and quantitatively the exact nature of the linkages between EFNEP services and improvement of health status.

3) The methodology section is particularly ambiguous - reproducible methods of conducting the research are not presented.

4) Assumptions were not implicitly or explicitly made.

The Michigan EFNEP (36) documents numbers of EFNEP

graduates that no longer receive welfare payments, crediting EFNEP with being responsible for this. They state that this saves the state over $13,000 every month. Michigan EFNEP also states that over 24 families have had their children returned to their homes because EFNEP paraprofessionals taught homemakers to improve their living environment. They estimated that this has saved the state over $50,000 a year in foster care costs. Even though these benefits to EFNEP participants occurred, a cause-effect linkage has not been documented, and it is therefore difficult to credit EFNEP entirely for these benefits.

EFNEP has documented evaluations which have been called cost effectiveness analyses (37, 38, 39). These analyses have compared cost of program delivery to number of families served. These analyses have been useful for comparing alternative teaching methods. A CEA encompassing all of EFNEP benefits and compares these benefits to costs has not been found.

In other nutrition programs (40, 41, 42), researchers identify outputs, but often make no attempt at the assignment of a specific dollar value to these outputs. These programs have also conducted evaluation procedures which they have called (CEA).

Abbott Laboratories (40) has compiled a booklet entitled "The Cost-Effectiveness of Nutritional Support" that reviews current research in the area of CEA studies in nutritional

support. Certain studies reviewed provide careful analyses of the direct costs (hospital charges) and indirect cost (morbidity, length of stay, and mortality) associated with complications of malnutrition. These researchers conclude that if nutritional support is provided, these costs can be averted. However the studies do not provide adequate linkages between nutrition support and the avoidance of complications. The studies also do not include the costs associated with nutritional support. The other research reviewed by Abbott Laboratories lists benefits of nutritional support, although no cost analysis was conducted (40).

Abbott Laboratories concluded that nutritional support should be included in optimal care for hospital patients because of its cost-effectiveness. However, cost effectiveness was not established by the articles presented.

As with most CEA research in the area of nutrition, no model was presented in the Abbott Laboratories publication, and many of the studies they reviewed that were entitled CBA actually only addressed one side of the ratio. Few CBA studies have been conducted which evaluate education programs, and none have been specifically oriented to nutrition education.

Nutrition and health-related CEA's exist that provide further insight into the methods involved and problems encountered. Rogers, Eaton, and Bruhn (41) reviewed two

studies of malnutrition in preschool age children. No standard criteria were formulated for these studies so relative costs for their levels of significance could not be assessed. This same problem existed in nine other health promotion programs that they reviewed. The criteria for cost effectiveness and for success of health promotion were seldom clearly defined or precisely measured. In addition, the use of convenience samples of self-selected participants rather than random selection does not allow for generalization to other populations. Until these problems are resolved, the health promotion CEA information cannot be compared on the basis of costs and benefits.

Wylie (42) suggested a method by which school health education programs can be evaluated in CEA terms. The methodology presented uses Shepard and Thompson's CEA model (43) which has been altered to assign monetary values to health outcomes of benefits. Wylie suggests that further research be conducted in an attempt to discover a more accurate method of determining net health effects or benefits resulting from health education programs.

A CEA study was conducted in 1980 to compare three programs designed to eliminate severe vitamin A deficiency in the Philippines (44). The researchers considered results from both the participant and the social perspectives. The effectiveness parameter was designed as the probability of preventing blindness, morbidity, and mortality. Both

benefits and costs were discounted to their present value. Participant and social costs included direct costs but excluded indirect costs. The "social benefit-cost ratios" were calculated for the three programs. The authors concluded that two of the three programs produced "significant net benefits".

Dahms (45) compared behavioral therapy and pharmacologic treatment of obesity in a low income outpatient population. The program of behavioral therapy was administered by a dietitian and the treatment groups were seen by physicians. Significant difference existed in weight loss between patients treated with drugs, placebo, or behavioral therapy. The authors concluded that patients receiving behavioral therapy achieved the most weight loss while requiring less use of professional time - thus at a lower cost. The researchers did not include specific cost data, nor conduct actual cost benefit analysis.

EFNEP Benefits and Costs

Expected/Anticipated benefits are derived from program objectives (16). Benefits are defined using Green's (29) terminology as the effects of a program - both "impacts" and "outcomes". A flow chart has been developed for EFNEP to aid in identification of benefits (See Figure 3).

Impacts

The "impacts" have been documented in the NARS reports (32), and in evaluative research for EFNEP (47, 48, 49).

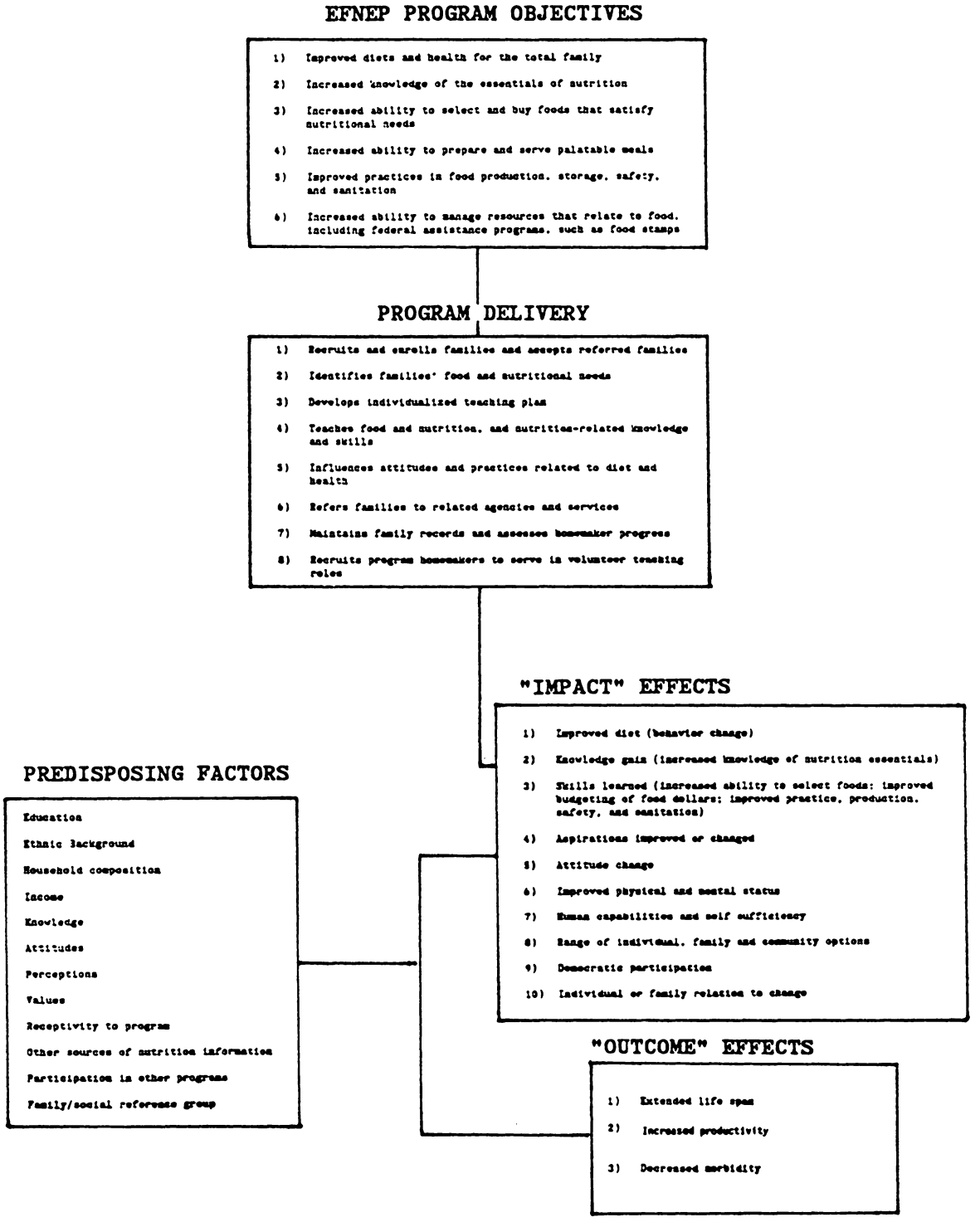

Figure 3. EFNEP Benefits

EFNEP does have a positive impact on the diet and resource management habits of program families. On entering EFNEP, homemakers report relatively diets of low nutritional value, with the greatest deficiencies in the milk, vegetable, and fruit groups (2, 46). These homemakers have reportedly improved their food and nutrition knowledge, food shopping and budget management skills, and dietary practices, after completion of the program.

The California EFNEP Evaluation Study researchers (47) evaluated the effectiveness of the California program. The eating habits of 683 persons were studied in a group receiving EFNEP instruction and a control group (328 participants) that received no instruction. The 24-hour recall was used to measure dietary habits. At the beginning of the study, there were no differences in food recall scores between the EFNEP and the control groups. After six months of instruction in the EFNEP group, there was significant increase in food recall score for that group, and no change in the score for the control group. The improvements observed in the EFNEP group resulted from increased intakes from the milk, and fruit and vegetable groups which were low before entry into the program. The researchers concluded that EFNEP is effective in producing significant changes in the eating habits of the clients that it serves.

A longitudinal study of the 444 Michigan EFNEP

participants was conducted to determine if participants retained their improved food and nutrition knowledge and practice five years after participating in a nine month EFNEP program (48). The researchers concluded that EFNEP participants retain post-instruction change scores for knowledge and dietary practices for five years as measured by the 24-hour recall and a family survey.

Torisky et al. (49) evaluated the extent and retention of dietary improvement in Virginia EFNEP participants. Dietary improvement was assessed using the 24-hour food recall in a sample of 180 homemakers who had completed six to eighteen months of instruction in EFNEP. Diet scores increased slightly ($p \geq .01$) from program entry to exit; greatest increases were in average daily servings from milk and fruit-vegetable groups. Slight but significant ($p \geq .01$) regression occurred in average diet score and servings of milk from entry to follow-up six to 36 months after leaving the program. High average educational gain and program benefit scores at follow-up were evidence that EFNEP was successful from the perspective of homemakers served.

Outcomes

"Outcome" effects of EFNEP have been called "spinoffs" in EFNEP reports (32, 50) and include: 1) decreased morbidity and mortality of individuals and families, 2) attainment of high school diplomas or college degrees, and 3) real income gain of both EFNEP families and paraprofessionals.

The Mississippi Extension Service (51) conducted a study which documented the positive effect EFNEP had upon teaching paraprofessionals to understand career options, apply for and keep jobs, and acquire specific job skills. They documented numbers of paraprofessionals that obtained jobs after working for EFNEP, and also the income that they received. The evaluators stated that 90 percent of the paraprofessionals that left EFNEP were employed, and that the average income earned was double what they had earned from EFNEP. The paraprofessionals surveyed credited the attainment of the new job and higher income to what they had learned from working in EFNEP.

Although it is widely accepted by EFNEP professionals that these benefits are results of EFNEP, many variables such as other education, and influences of family and friends also affect whether these benefits exist. Research documenting a cause-effect relationship between EFNEP and each of these benefits was not found.

EFNEP Costs

All projects require the use of scarce resources which, if not used in the subject project, would yield benefits in alternative uses. The cost of these resources, referred to as opportunity costs, is their value in the highest valued alternative use. The cost of a resource used in a project is the maximum willingness-to-pay for it in another use. To calculate these costs, one must examine the opportunity cost

for each individual resource.

List of EFNEP Resources

Participants are not charged for EFNEP services. Resources required from the participants are limited to:

A) Time spent receiving education

B) Travel costs (if participants are required to travel to group classes).

C) Food Costs (if families provide the food for demonstrations).

D) Cost of utilities during the demonstrations (if conducted in the participant's home).

The primary resources in conducting EFNEP include the following (these vary from state to state):

A) Professional personnel time

program planning

intellectual preparation

materials development

presentations

evaluation

training and supervision of paraprofessional staff

B) Support staff time

correspondence

materials preparation

documentation and report preparation

C) Materials

supplies for demonstrations (such as food provided by

EFNEP)

purchased materials (such as printed information)

D) Travel and support related to the program

per diem support expenses

mileage

E) Facilities - The value of the facility used by the professional and paraprofessionals, and facility rental for programs.

CHAPTER 3 ANALYSIS AND DISCUSSION

In this chapter, the use of CBA in EFNEP is reviewed using two criteria. (A summary of the process used in deciding whether CBA can appropriately be applied to EFNEP is presented in Figure 4). The criteria to be employed in systematically examining CBA for EFNEP are as follows:

I. Theoretical Considerations - adoption of the underlying criterion - can the criterion appropriately be applied to EFNEP?

II. Application of the CBA model - can it be made operational?

Theoretical Considerations - adoption of the underlying criterion - can the criterion appropriately be applied to EFNEP?

Welfare economists assume that each individual is the best judge of his or her own welfare, and also that preferences and happiness are usually equivalent (14). Assuming that social welfare is determined by the well-being of individuals, then individual preference should be a good indicator of individual well-being. The CBA model looks at behavior and infers preferences from it. The model does not address the issue of why certain preferences are held.

This outcome that represents a change in preferences cannot be dealt with by the underlying criterion. The efficiency criterion cannot be applied when preferences are

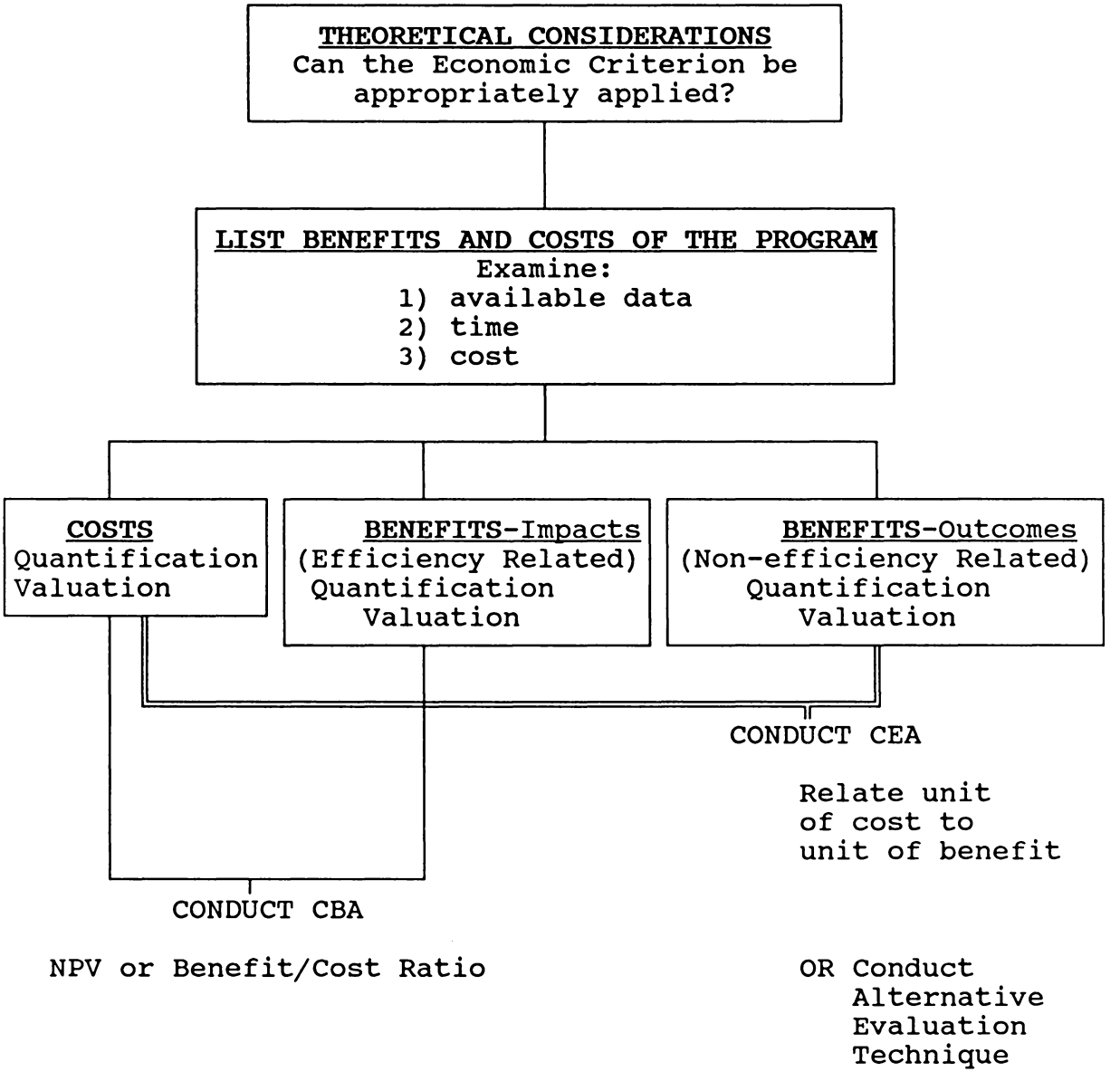

Figure 4. Decision process in applying CBA to EFNEP.

changed.

The intent of EFNEP is to educate clients about nutrition, sanitation, safety, and food preparation practices, as well as to then teach the clients to use this knowledge to change eating behaviors. To the extent that these changes are intended to satisfy a person's own preferences more efficiently, they can be considered an efficiency related benefit. On the other hand, if it is the intent of EFNEP to persuade people to prefer food that someone else thinks is good for them, even if they do not care about the supposed nutritional benefits, the changes are not efficiency related.

For example, if a client of EFNEP were interested in consuming the "right" amount of iron and thought that he was getting enough iron, and then EFNEP taught the client a way to get iron in his diet that he was not aware of, this would fall within the scope of the criterion. If, however, the client was not interested in iron, and did not know how to consume iron in his diet, and EFNEP taught him to be concerned with iron, EFNEP changed preferences, which cannot be dealt with in the underlying criterion. On the other hand, the client may have a preference for overall good health. In this case, EFNEP's education about the importance of iron for overall good health, and how to consume iron in his diet could be dealt with in the criterion.

After examining EFNEP benefits, it appears that while some efficiency related benefits exist, others exist that are not efficiency related. The benefits improved diet, knowledge gain, skills learned, aspiration and attitude change, and the others listed as "impact" effects are not considered efficiency related. For example, the benefits described as attitude and aspiration change are particularly problematic. The change in attitudes and aspirations appear to be a direct change in preference.

Because the criterion is based on individual preferences it also cannot deal with paternalism, and is not concerned with equity. There are numerous rationales for public support of the education of or investment in its citizens. A form of paternalism, which may be defined as a system under which an authority undertakes to supply needs or regulate conduct of those under its control in matters affecting them as individuals as well as in their relations to authority and to each other is one of these rationales. It is often assumed that consumers are able to understand the implications of their actions. However, with the paternalistic viewpoint, it is believed that consumers are not able to understand the implications of their actions, and therefore, choices should be made for them. Paternalism is in direct conflict with the underlying criterion.

The second rationale regards the long run aspect of distribution of income. Whether or not society has an

intensive transfer program to reduce the variance of the income distribution today, it might also try to equalize the chances of sons and daughters of all income groups for higher incomes tomorrow. The best way to do this is to support the education, health, and job training prospects of disadvantaged individuals. The underlying criterion of CBA does not address equity. However, to the extent that aggregate incomes rise, the change is efficiency related.

If it is assumed that each individual is the judge of his or her own welfare, and that preferences and happiness are equivalent (given perfect information), a program that changes preferences, is paternalistic, and is concerned with equity, the underlying criterion cannot be adopted. Examination of EFNEP's program objectives, reveals that EFNEP is concerned with education of clients with imperfect knowledge. The stated objectives are not concerned with changing preferences, are not paternalistic, and are not concerned with equity. However, it is argued that the actions of EFNEP change clients' preferences, and that the mission of EFNEP is paternalistic and concerned with equity, and therefore falls outside the scope of the underlying criterion.

Application of the CBA model - can it be made operational?

If it is assumed that in some cases EFNEP teaches clients' to do more efficiently what they want to do themselves, then the benefits can be considered efficiency related. Three

outcomes are labeled efficiency related -extended life span, increased productivity, and decreased morbidity.

Even if these benefits can satisfy the underlying criterion, operational problems exist. The first problem that must be addressed for these benefits is whether a cause-effect linkage can be established. The second problem addressed is if the willingness-to-pay for these benefits can be measured.

Time is a critical consideration in measuring the benefits of a program. The longer the time between the intervention and the measurement of its effect, the more difficult it is to link the program to its hypothesized effect. One must account for environmental, biological, and behavioral changes. This is particularly important when considering impacts of health and nutrition programs, because they take time to manifest and are often spread over the individuals' lifetimes.

Although the significant relationship of nutrition factors to health status is widely accepted, documented evidence is lacking from EFNEP to demonstrate the exact nature of the linkages between nutritional services and improvement or maintenance of health status (28). Standardized, objective evaluation with relevant effect definition and measurement, is needed for EFNEP in order to enumerate the benefits of such services to individuals and to society.

Quantification and valuation of "outcome" effects

If a linkage can be shown to relate EFNEP services to "outcome" effects it is important to consider quantification and valuation of these effects.

A listing of EFNEP "outcomes" follows with a discussion of the quantification techniques. A discussion of methods that may be used to assign a dollar value on these benefits will then be discussed.

Increased Productivity

Increased income is both a symptom of the change and a possible way of measuring increased productivity. The impact or change in purchasing power is of both the homemakers, their family members, and of the paraprofessionals. If the homemaker, as a result of EFNEP obtained employment which provided a higher income than was currently received, this increased productivity is considered an efficiency-based benefit to society. The paraprofessional that gains training from EFNEP and obtains employment in a higher income position in the workplace is also considered an efficiency-based benefit. No attempt is currently being made to quantify this benefit. This information may be obtained from the individuals and from employment records. The wage rate is a reflection of the value of the marginal product which the employee contributes. The wage rate can be used to place a value on this benefit.

Decreased morbidity

This benefit is defined as a decrease in the relative incidence of disease. No attempt is currently being made to quantify this benefit by EFNEP. The willingness-to-pay to reduce the risk of illness provides a measure of this benefit. The market price of physician and medical facility costs could be used, but this information only would provide a partial measurement. as it does not value how a person feels about the reduced risk.

Extended life span

This "outcome" would be difficult if not impossible to quantify. No attempt is currently being made to quantify this benefit by EFNEP. A measure of willingness-to-pay could be appropriately assigned to this efficiency-based effect. Valuation of human life has been discussed in the review of literature.

Utility of Results

If EFNEP can adopt the economic criterion, and make CBA operational, EFNEP must still consider the usefulness of the results in decision-making. Utility of results is perhaps the most important consideration before deciding to conduct any evaluation. A CBA which estimates a "grand index" of social welfare in the form of a Cost/Benefit ratio or Net Present Value cannot encompass every facet of EFNEP that should be considered in making a decision. The evaluation procedure that is most likely to be useful would be one that

describes the essence of available information regarding the impacts on social welfare in a form that allows the decision-maker to choose between alternatives.

An evaluation procedure for EFNEP is more likely to be used as a means of communicating to decision-makers the essence of available information regarding impacts on social welfare of one or more proposed actions in a form that allows the decision maker to make comparisons between alternatives. If the usefulness of an evaluation procedure is to be judged on its performance in accomplishing the purpose, then a Cost/Benefit Ratio or Net Present Value may be less important.

CHAPTER 4 CONCLUSIONS

Executive Order 12291 requires Federal agencies to perform benefits assessments and prohibits them from taking regulatory action unless potential benefits exceed potential costs. Professionals in health/nutrition and education programs have attempted to conduct Cost Benefit Analysis (CBA) to satisfy this Executive Order; however, the model, while labeled CBA, has not been appropriately applied. The analyses do not appear to conform to the CBA model which has its theoretical base in welfare economics literature. It is unclear what underlying criterion has been applied. Therefore, the interpretation of results is problematic.

After systematically evaluating CBA for EFNEP, it may be concluded that the welfare economics model of CBA is not an appropriate evaluation technique for EFNEP and similar programs. While EFNEP has some outputs that are efficiency related, other important outputs fall outside the scope of CBA. The examination reveals that the measurement of the efficiency-related outputs is not practical.

The utility of results is also an important consideration. As Suchman (55) points out, evaluation must be recognized as a process which permeates all echelons or levels of the system. Weiss (56) contends that an evaluation should contain useful information to the policy-maker through the program director and practitioners to the consumers of the

service. This information, if properly utilized by government decision-makers, can serve as a valuable tool for prioritizing alternatives. Given the results of this examination, it may be concluded that making an investment decision based solely on CBA is inappropriate. Cost Effectiveness Analysis (CEA) might be appropriate if the desired outputs can be agreed upon (through political powers, or other measures). CEA may be used to determine the least cost method of achieving these outputs.

Both qualitative and quantitative evaluation results serve a useful purpose in decision-making. The meaningfulness and utility of results are the most important considerations when making a decision about the evaluative approach to apply.

LITERATURE CITED

(1) Executive Order 12291. Federal Register. No. 8, Feb 17, 1981.

(2) EFNEP - Historical and Statistical Profile. U.S.D.A., Science and Education Administration, Washington, D.C.,1983.

(3) EFNEP Policies. Extension Service. U.S.D.A., Washington, D.C., 1983.

(4) Prest, A.R., and Turvey, R.: Cost benefit analysis: A survey. The Econ J 75:683, 1965.

(5) Warner, K.E., and Luce, B.R.: Cost Benefit And Cost Effectiveness Analysis In Health Care. Ann Arbor, MI: Health Administration Press, 1982.

(6) Fleming, P.L.: Cost effectiveness/cost benefit analysis strategies. Comm Nutr 1(1):231, 1982.

(7) Sassone, P.G., and Schaffer, W.A.: Cost-Benefit Analysis: A Handbook. New York: Academic Press, 1978.

(8) Mishan, E.J.: Cost-Benefit Analysis. London: George Allen and Unwin, 1982.

(9) Dupuit, J.: On the Measurement of Utility of Public Works, International Economics Papers, 1844.

(10) Eckstein, O.: Water Resource Development. Cambridge, Mass.: Harvard University Press, 1958.

(11) McKean, R.: Efficiency in Government Through Systems Analysis. New York: John Wiley and Sons, 1958.

(12) Dasgupta, Ajit, Pearce, D.W.: Cost Benefit Analysis: Theory and Practice. New York: Barnes and Nobles, 1972.

(13) Peters, G.H.: Cost Benefit Analysis and Public Expenditure. Great Britain: International Economic Affairs, 1973.

(14) McAllister, D.M.: Evaluation in Environmental Planning. Cambridge, Mass. The MIT Press, 1986.

(15) Dunlop, D.W.: Benefit cost analysis: A review of its applicability in policy analysis for delivering health services. Soc Sci Med 9:133, 1975.

(16) Rossi, P.H., and Freeman, H.E.: Evaluation: A Systematic Approach. Beverly Hills: Sage Publications, 1982.

(17) Jacobs, P.: The Economics Of Health And Medical Care. Baltimore: University Park Press, 1980.

(18) Singer, N.: Public Microeconomics: An Introduction To Government Finance. Boston: Little, Brown and Company,1976.

(19) Hatry, H.P. and Cotton, V.F.: Program Planning for State, County, City. Washington, D.C.: George Washington University, 1967.

(20) Hegsted, D.M.: The development of a national nutrition policy. J Am Diet Assoc 62:394, 1973.

(21) Weisbrod, B.A.: Economics of Public Health: Measuring the Economic Impact of Diseases. Philadelphia: University of Philadelphia Press, 1960.

(22) Mushkin, S.J.: Biomedical Research: Costs And Benefits. Cambridge, MA: Ballinger Publishing Co., 1979.

(23) Klarman, H.E.: Syphilis Control Problems. In Dorfman, R. Benefits of Government Investments. Washington, D.C.:Brookings Institution, 1965.

(24) Weisbrod, B.A.: Education and Investment in Human Capital. J Pol Econ, Vol. LXX (Supplement), 1962.

(25) Becker, G.S.: Human Capital. New York: Columbia University Press, 1964.

(26) Thompson, M.S.: Benefit-Cost Analysis For Program Evaluation. California: Sage Publications, 1980.

(27) Costs and Benefits of Nutritional Care: Phase 1. Chicago: The American Dietetic Association, 1979.

(28) Tolpin, H.G.: Economics of health care. J Amer Diet Assoc 76:217, 1980.

(29) Green. L.W.: How to evaluate health promotion. Hospitals 53:106, 1979.

(30) Smith, W.: Cost effectiveness and cost benefit analysis for public health programs. Pub Health Rep 83:899, 1968.

(31) Edwards, P.K., Acock, A.C., and Johnston, R.L.: Nutrition behavior change: Outcomes of an educational approach. Eval Rev 9(4):441, 1985.

(32) Narrative Accomplishment Reports (NARS), EFNEP, 1987.

(33) Discussion with National Program Leader, Nancy Leidenfrost, U.S. Department of Agriculture Extension Service,April, 1988.

(34) Wagner, M.M., and Machover, M.H.: An Evaluation of the Effectiveness of Alternative Recruitment and Nutrition Education Methods in EFNEP: Executive Summary. Washington D.C. Education and Human Services Research Center, 1981.

(35) University of Michigan, Institute of Public Policy:Executive Summary. Michigan: University of Michigan, 1985.

(36) Michigan EFNEP: 1987 Michigan EFNEP Results. Michigan: Michigan State University, 1988.

(37) Leidenfrost, N.B.: Extension Service Update: Food, Nutrition, and Health. Washington D.C.: U.S. Department of Agriculture, April, 1988.

(38) Neilan, A.M.: EFNEP Innovative Projects: Evaluating the Effectiveness of Small Group Methods in Nutrition Education for Young Mothers Receiving Public Food Assistance. Virginia: Cooperative Extension Service, 1985.

(39) S.R.I International: An Experimental Evaluation of Nutrition Education Methods. Washington D.C.:U.S. Department of Agriculture, Food and Nutrition Services, Office of Analysis and Evaluation. Virginia, 1984.

(40) Abbott Laboratories: The Cost-Effectiveness Of Nutrition Support. Abbott Diagnostics Division, Chicago, 1985.

(41) Rogers, P.J., Eaton, E.K., and Bruhn, J.G.: Is health promotion cost effective? Prev Med 10:324, 1981.

(42) Wylie, W.W.: Cost-benefit analysis of a school health education program: One method. J School Health 53: 371, 1983.

(43) Shepard, D.S., and Thompson, M.S.: First principles of cost effectiveness analysis in health. Pub Health Rep 94: 535, Nov-Dec, 1979.

(44) Popkin, B.M., Florentino, S.S., Fernandez, T., and Latham, M.C.: Benefit-cost analysis in the nutrition area: A project in the Philippines. Soc Sci and Med 14: 207, 1980.

(45) Dahms, W.T.: Treatment of obesity: Cost-benefit assessment of behavioral therapy, placebo, and two anorectic drugs. Am J Cl Ntr 31: 774, 1978.

(46) Romero, V.A., Medeiros, D.M., and Melcher, L.: Use and effectiveness of Wyoming EFNEP's Lesson Series. J Ntr Ed 20(1): 231, 1988.

(47) Block, A., Laughlin, S., Tredici, A.D., and Omelich, C.: California EFNEP Evaluation Study. California Extension Service, California: University of California,1985.

(48) Nierman, L.G.: A Longitudinal Study of the Retention of Foods and Nutrition Knowledge and Practices From Michigan EFNEP. Michigan: Michigan State University, 1986.

(49) Torisky, D., Hertzler, A., Mifflin, B.: Evaluation of EFNEP in Selected Areas of Virginia: Extent and Retention of Dietary Improvement and Related Family Factors. Virginia: Virginia Polytechnic Institute and State University, 1987.

(50) U.S. Department of Agriculture Extension Service: EFNEP: The Spinoffs of a Successful Program. Washington D.C.: U.S. Department of Agriculture, 1984.

(51) Mississippi Cooperative Extension Service: An Impact Study of Selected Extension Programs that Assist People to Recognize and Pursue Economic Opportunities. Mississippi: Miss. State Univ., 1980.

(52) Popkin, B., and Lidman, R.: Economics as an aid to nutritional change. Am J Clin Ntr 25: 331, 1972.

(53) Cutt, J.A.: A Planning, Programming and Budgeting Manual. New York: Praeger Publishers, 1974.

(54) Green, L.W.: Toward cost benefit evaluations of health education. Health Ed Monogr 62:394, 1973.

(55) Suchman, E.A.: Evaluation Research: Principles and Practice in Public Service and Social Action Programs. New York: Russell Sage Foundation, 1967.

(56) Weiss, C.H.: Evaluation Research: Methods of Assessing Program Effectiveness. New Jersey: Prentice Hall, 1971.

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