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An Evaluation of the Costs and Benefits of Iowa's Expanded Food and Nutrition Education Program (EFNEP): Final Report

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An Evaluation of the Costs and Benefits of Iowa's Expanded Food and Nutrition Education Program (EFNEP): Final Report

Abstract

The Expanded Food and Nutrition Education Program (EFNEP) is an educational intervention program designed to help limited income adults with young children acquire the knowledge, skills, attitudes, and changed behavior leading to the improvement of the total family diet and nutritional well-being. The Federal program operates at approximately \$60 million per year, and has been in existence since 1969. This study estimates the costs and benefits of Iowa EFNEP to measure the net economic impact of the program from September 1998 to February 2000 for the seven Iowa counties offering the program to eligible participants.

Keywords

Agriculture, Rural Sociology, Economic Development

Disciplines

Agricultural and Resource Economics | Agriculture | Growth and Development | Rural Sociology

**An Evaluation of the Costs and Benefits of Iowa's
Expanded Food and Nutrition
Education Program (EFNEP)
Final Report**

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Education Program (EFNEP)**

Final Report



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 . . . and justice for all

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Executive Summary

The Expanded Food and Nutrition Education Program (EFNEP) is an educational intervention program designed to help limited income adults with young children acquire the knowledge, skills, attitudes, and changed behavior leading to the improvement of the total family diet and nutritional well-being. The Federal program operates at approximately \$60 million per year, and has been in existence since 1969.

This study estimates the costs and benefits of Iowa EFNEP to measure the net economic impact of the program from September 1998 to February 2000 for the seven Iowa counties offering the program to eligible participants. **The study finds that Iowa EFNEP returns a benefit-cost ratio of \$10.75/\$1.00.**

The methods used are based upon the March 1999 Virginia Cooperative Extension Program Report, *Applying Cost Benefit Analysis to Nutrition Education Programs: Focus on the Virginia Expanded Food and Nutrition Education Program*.

The challenge in doing such a cost-benefit study is to quantify the “improved health” of program participants. This study uses current health care costs, as well as current wage rates, to quantify the benefits that occur with changes in nutritional habits. Data on the nutritional habits of the participants are collected using 24-hour food recall data and nutrition behavior checklist questions from the EFNEP Evaluation/Reporting System (ERS). These data, along with evidence concerning the relationship of various food practices and nutritional behavior to the onset of diseases, are used to determine a specific percentage of those practicing “optimal nutritional behavior” for each disease.

The relevant nutrition-related diseases and conditions are broken into three categories. Type A diseases are considered life-threatening diseases, in which the average onset of such a disease can be delayed only

through good nutritional habits. The diseases included in this category are stroke, hypertension, colorectal cancer, and heart disease. Type B diseases are non-life threatening diseases. Good nutritional and food-related habits contribute to avoiding these diseases. These diseases include osteoporosis, foodborne illness, obesity, diabetes, and commonly occurring infant diseases. Finally, Type C diseases are conditions that require a one-time treatment and can be avoided through good nutritional habits. For this study, low birthweight babies are considered Type C conditions. The sum of the positive outcomes related to optimal nutrition behavior for these three types of diseases is considered to be the tangible benefit of EFNEP. The benefits for EFNEP over this time period totaled \$14,354,479. The tangible costs of EFNEP include the sum of all statewide salary costs, part-time county wage costs, transportation costs for the participants, as well as county rent, utility, travel, supplies, and fixed costs. These costs totaled \$1,334,848 for the same time period.

A number of sensitivity analyses help determine a credible range for the benefit-cost figure. One analysis uses more recent medical findings to determine the percentage of participants practicing optimal nutritional behavior. Because the incidence rate for osteoporosis is higher, this analysis leads to a benefit-to-cost figure of \$12.50/\$1.00. Another analysis cuts the number of participants practicing optimal nutritional behavior by 75 percent to simulate the possibility that more participants stop practicing optimal nutritional behavior in the future. The analysis gives a benefit-to-cost ratio of \$2.64/\$1.00. The results of this cost-benefit analysis give additional support for the findings in the Virginia study, and show that large economic savings exist because of the EFNEP program. The finding of a favorable benefit-cost ratio lends support to efforts to increase funding for such nutrition education programs, and thus, achieve savings in health care costs.

I. Introduction

The Expanded Food and Nutrition Education Program (EFNEP) is an educational intervention program designed to help limited income adults with young children acquire the knowledge, skills, attitudes, and nutritional behavior leading to the improvement of the total family diet and nutritional well-being. The Federal program operates at approximately \$60 million per year, and has been in existence since 1969.

The objective of this study of Iowa EFNEP is to quantify the costs and benefits of the program, so as to help determine the net economic impact of the program and to give decision-makers a solid base from which to compare EFNEP to other publicly funded programs.

The methods used in the Iowa study are based on the March 1999 Virginia Cooperative Extension Program Report, *Applying Cost Benefit Analysis to Nutrition Education Programs: Focus on the Virginia Expanded Food and Nutrition Education Program*.

Cost-benefit analysis is a widely recognized method of comparing the means of programs that attempt to achieve different ends. Its popularity derives from the fact that both the benefits and costs are measured in like monetary terms. This study, along with the Virginia study, is among the few that have used cost-benefit analysis to measure the net economic impact of nutrition education programs.

The obvious challenge in using a cost-benefit study for this kind of project is to quantify the benefits from changed nutritional behavior. In 1993, a new reporting system was implemented for EFNEP that measures behavior change of participants in the program. The system, known as EFNEP Evaluation/Reporting System (ERS), compares the participant's daily nutritional intake to the Food Guide Pyramid recommendations. Also, the system measures changes in behavior related to food resource management, food

safety, and nutrition practices. While such a system has been helpful in determining the relative strengths and weaknesses within the program, it had not been used in determining an overall benefit measured in terms of cost savings. This study uses ERS data to determine the benefits brought about by this program.

II. Study Perspective

The primary audience for this report is state and federal decision-makers who make decisions about the feasibility and efficiency of government programs. This study will assist decision-makers by quantifying the costs and benefits, both direct and indirect, so that an overall statewide cost-benefit analysis can be made. Because program funding comes from constrained sources, costs are measured by foregone opportunities to invest in other programs, measured in dollar terms. Benefits are improvements attributed to the program, realized by anyone on the state or federal level, and measured in dollar terms.

III. Study Scope

All costs and benefits for this study of Iowa EFNEP were collected from September 1998 to February 2000. The period of evaluation covers this 18-month period. Seven Iowa counties—Black Hawk, Dubuque, Linn, Polk, Scott, Pottawattamie (western half), and Woodbury—conducted EFNEP during this time and were included in the study.

IV. Description of EFNEP

A. EFNEP in Iowa

EFNEP is targeted toward low-income households, with low-income defined to be at or below 185 percent of the poverty income level. Various investigations of low-income households have revealed that members of these households are most likely to come from minority backgrounds and may not have completed high school.

Moreover, such households have a tendency toward poor diet and less-than-average nutritional intake. This population is at a high risk for chronic disease and shortened life expectancy due to a high consumption of fatty foods and lower consumption of fruits, vegetables, milk, and other foods rich in necessary nutrients. EFNEP state and county statistics for Fiscal Year 2000 show that most of the seven counties participating in the Iowa EFNEP have higher poverty rates and lower health averages than the state average. Five of the seven counties have higher food stamp participation rates than the State average of 4.8 percent. Six of the seven have higher infant mortality rates than the state average of 8.5 percent. Most of these counties also have single parent rates and child poverty rates above the state averages.

B. Program Objectives and Delivery

EFNEP was created in 1968 out of concern for the increasing incidence of hunger and malnutrition among low-income groups. The United States Department of Agriculture (USDA) started EFNEP in November 1968 with a \$10 million grant to the Cooperative Extension System. Today, EFNEP is run by land-grant universities in all fifty states and in American territories.

The focus of EFNEP is nutrition education. The goal of the program is to assist limited resource audiences in acquiring the knowledge, skills, attitudes, and changed behaviors necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being (Chipman and Kendall, 1989).

The philosophy of EFNEP is based on three concepts: education, modified nutrition information, and indigenous paraprofessionals. First, professional nutrition and health specialists teach paraprofessionals about health and nutrition concepts. The paraprofessionals, in turn, teach low-income families. Second,

the subject matter taught by the paraprofessionals to families is based on conventional knowledge regarding health and nutrition, but modified in order to accommodate the highly restricted budget of low-income households. Third, paraprofessionals are hired who are indigenous to the target audience, since they are more likely to influence the participants into a long-term change in their food consumption habits.

The goals of EFNEP are to help participants in five areas. First, the program strives to improve diets and nutritional welfare for the whole family. Second, the program helps increase participants' knowledge of the essentials of human nutrition. Third, EFNEP strives to increase the ability of participants to select and buy food that satisfies nutritional needs. Fourth, the program helps improve practices in food production, storage, preparation, safety, and sanitation. Fifth, EFNEP increases the ability of participants to manage food budgets and related resources such as food stamps.

Iowa EFNEP is delivered either in the home or in small group settings. Approximately 51 percent of participants receive lessons in the home, where the lesson is individualized to the needs of the participant and consists of a poster-type lesson, written materials, and hands-on activities. The curriculum for this type of delivery was developed cooperatively by Iowa State University Extension and Kansas State University Extension. Approximately 37 percent of EFNEP participants receive lessons in small groups. The *Building a Healthy Diet* curriculum was developed by Iowa State University Extension to include group discussion and experiential learning activities designed to draw upon the learner's current knowledge and experience and to facilitate active learner participation. About 12 percent of participants receive a combination of in-home lessons and group lessons. All lessons end by having participants set mini-goals to achieve a changed nutrition behavior for themselves or their family or to acquire a new skill. Information in the

lessons is based on the current recommendations given in the Food Guide Pyramid and Dietary Guidelines for Americans—provided by the USDA—and on food labeling requirements of the Food and Drug Administration (FDA) and USDA.

V. Assessing the Effect of EFNEP on Behavior

EFNEP paraprofessionals keep confidential records for each family involved in the program. In 1993, EFNEP implemented a new computerized EFNEP ERS, which allows for summary results of the behavior changes for participants at the local, state, and national levels. The summary reports are useful for management purposes and for assessing individual participant needs. Two assessment instruments are used: a 24-Hour Food Recall and a Food Practice Checklist (Appendix D).

The 24-Hour Food Recall is a widely used dietary analysis technique that determines actual food intake. This personalized data set then can be used to encourage participants to improve their dietary intake. The Food Practice Checklist is administered both at entry and exit and measures a variety of nutrition, food safety, and resource management practices. This tool helps determine the effectiveness that EFNEP has had in changing the behavior of the participants during the time that they were involved in the program.

Both the 24-Hour Food Recall and the Food Practice Checklist help to determine how successful EFNEP has been in improving the nutrition behaviors of the families involved in the program. During the study period from September 1998 to February 2000, 1,881 people completed both the entry and exit 24-Hour Food Recall and the Food Practice Checklist. For the purposes of this study, these people “graduated” from the program. From these data, it is possible to determine a percentage of the entire “graduating” group who have improved their nutritional intake and have

thus decreased their chances of disease. For example, 33 percent of the individuals interviewed at exit showed a positive change in their consumption of basic food groups and consumed at least two servings of dairy per day. This report shows that these individuals were practicing good preventative behavior in regard to osteoporosis. The determination of such “healthy” nutritional lifestyles is discussed shortly. In summary, if ERS data show that there have been significant lifestyle changes, then there should be large savings in health care costs over many years due to these improvements in nutritional behavior.

The key assumption in this study is that EFNEP graduates who have shown improvements in their nutritional behavior while involved in the program will continue to practice such behavior well into the future. Recent studies indicate that there is retention of nutritional behavior, at least from six months to five years into the future. These studies (Del Tredici et al., 1988; Brink and Sobal, 1994; Torisky et al., 1989; Nierman, 1986) showed that individuals continue to score well on questions related to basic food group consumption and food-related practices. Therefore, we assume that improvements shown by EFNEP participants will continue well into the future.

VI. Methodology

A. Definitions

This cost-benefit analysis uses the Virginia study’s definitions for indirect and direct costs and benefits. Benefits are defined as all positive consequences that result from actions of the EFNEP program. Direct benefits are positive results accruing directly to EFNEP participants in ways in which the program was specified. Indirect benefits are any positive benefits that may occur to program participants or non-participants in ways not originally specified.

Costs are the value of time and resources used in all phases of the EFNEP program. Direct costs are the resources that are actually budgeted for the EFNEP program. Indirect costs, although not included in actual budget costs, are resources that are removed from productive use elsewhere, resulting in a cost to the overall economy. For EFNEP, examples often cited include childcare costs and in some instances, increased expenditures for food. In Iowa, most of the education of the individuals occurs in the home, so childcare costs appear to be very small. While it is possible that increased food expenditures are a real indirect cost for Iowa EFNEP, questions concerning its magnitude and definition made the measurement of such a cost impractical.

Further qualification is needed when describing how various costs or benefits are priced. When the market prices a resource, the resource, whether a benefit or cost, has a tangible value (i.e., able to be valued in the market). When the market cannot value a cost or benefit of a program, then it is called an intangible cost or intangible benefit. For EFNEP, these intangible benefits might include greater attention to children's health or better household management. Due to the difficulty in measuring intangible benefits or intangible costs, they are not included in this study. The decision-maker should keep these potential intangible benefits and costs in mind when considering the benefit-cost ratio estimated based on tangible values only. Sassone and Schaffer (1978:35) addressed this issue when they stated:

When decision-makers choose between alternatives, they implicitly value the incommensurables [primarily intangible benefits]; analysts simply face the problem of having no generally accepted procedure for quantitatively integrating these terms into their analysis and of presenting an analysis with marred neatness.

This study measures the tangible benefits of the program by measuring the amount of health care costs avoided due to a better diet. Research has shown that there is a direct correlation between a poor diet and an increased likelihood of acquiring a serious disease. Individuals who consume diets that are high in calories, fat, saturated fat, cholesterol, and salt, and that have low amounts of fiber, fruits, vegetables, and whole grain products have a greatly increased risk of coronary heart disease, some cancers, as well as stroke and diabetes. Other health conditions such as obesity, hypertension, osteoporosis, and some pregnancy problems are also affected by diet. Some researchers indicate that at least 20 percent of the annual deaths from heart disease, cancer, stroke, and diabetes could have been prevented or at least delayed had the person eaten more nutritiously (Frazao, 1996).

A critical assumption is that a large correlation exists between nutritional behavior and disease prevalence. Because scientific opinion concerning the exact magnitude of this correlation is varied, this study uses conservative values for how diet correlates to disease.

B. Benefits

There is a significant time dimension to benefits received from nutrition education. When looking at the benefits, it is important to remember the economic concept of present value: the fact that a dollar tomorrow is worth less than a dollar today. So, if the cost of treating a person can be pushed further into the future, then there is a significant benefit gained by society from the treatment costs saved in earlier periods. A discount rate of five percent is used here.

As was done in the Virginia study, the benefit from avoiding or delaying diseases is calculated in three different ways based on the characteristics of each disease. Type A diseases are life-threatening diseases that, according to scientific evidence, can be positively affected by good nutritional habits. This study uses a

conservative approach that suggests that the onset of colorectal cancer, heart disease, stroke, or hypertension could be delayed through good life-long nutritional habits. The direct tangible benefit of delaying the onset of a Type A disease would be the present value of the delay in the cost of treatment into the future. For example, if the average onset of a given disease occurred at age fifty-five, and good nutritional habits delayed that onset until age sixty, then the present value of the medical costs saved by delaying the onset by five years is the direct benefit. The indirect benefit of delaying the onset of a Type A disease is the present value of the wages that were not lost from age fifty-five to age sixty.

Type B diseases are non-life-threatening diseases that are also positively affected by good nutritional and food-related habits. For the diseases of osteoporosis, Type 2 diabetes, obesity, infant diseases, and foodborne illness, this study assumes that the costs of treating these diseases could be completely avoided in the future if EFNEP participants begin practicing good nutritional habits at an early age. If participants are able to change their behavior such that the disease is avoided, then the direct benefit is the present value of all the treatments, from the average age of onset of the disease through the end of the average lifespan. The indirect benefit is the present value of morbidity costs avoided from the average age of onset until the average retirement age (65 years).

Finally, Type C diseases are those which only have a one-time cost. In this study, it is only the costs associated with giving birth to a low-birthweight baby. Because the cost occurs during the same year as the study, the direct benefit is the non-discounted cost of treatment of a low birthweight baby. While the benefits of avoiding having a low birthweight baby go well into the future, such benefits are not included in these calculations.

It should be noted that there are many more benefits to avoiding these diseases than are calculated here. For example, one benefit of the improved nutritional habits of the participants is improving the habits that are taught to their children, friends, and family. The problem, as the Virginia study noted, is that there is no way to adequately calculate positive externalities from ERS data. While there would be a large amount of practical knowledge gained by the next generation, there is no way to accurately monetize such benefits.

C. Tangible Benefits

The determination of the total benefits is based on estimated numbers of participants in EFNEP who had reported behavioral changes that have been shown to decrease the probability of contracting a given disease or condition. Because the criteria for considering a participant to be avoiding a given disease or condition are slightly different for each disease, numbers are determined separately for each disease or condition. Since the criteria are based on data from entry and exit 24-Hour Food Recall data, only the data from those who had “graduated” are used. For the purposes of this study, “graduates” are defined as those who completed both the entry and exit interviews. In this study, there were 1,881 participants who graduated. The percentage of graduates who are practicing “optimal nutritional behavior” for each disease is then calculated using the criteria that is discussed in the next section.

Also, a set of estimated percentages is used to determine the number of respondents who, according to the best information and statistics available to date, will have changed their behavior such that there will be legitimate cost savings. These percentages are as follows: (i) the incidence rate of the disease or condition in a low-income population; (ii) the incidence of the disease or condition that is related to diet; and finally, (iii) the percent of the EFNEP graduates who are practicing optimal nutritional behavior. The first

two of these percentages are based on published scientific evidence, while the last percentage is the percentage that was found using the specific dietary criteria for each disease or condition. After these are

calculated, the last step is to calculate the present value (PV) of the benefits from avoiding the given disease or condition. These three parts are then multiplied together to find the total benefit for each disease.

Figure 1. Equations Used to Calculate Benefits

The total benefit for each disease is calculated as:

Total Benefit for Each Disease = (Annual number of graduates in EFNEP) x {(Incidence Rate of the Disease/Condition in the low-income population) x (Incidence Rate of the Disease related to Diet) x (Percent of Graduates passing conditions for each Disease)} x (Estimated benefit for avoiding Disease).

The direct benefit for avoiding Type A Disease is:

Direct Benefit for Type A Disease = $PV_{average\ age} - PV_{delayed\ onset\ age}$, where $PV_{average\ age}$: (Medical Costs per year) x (average number of years between age of onset and age of death), discounted to 1999 dollars, after “setting ahead” to the average age of onset.

$PV_{delayed\ onset\ age}$: (Medical Costs per year) x (average number of years between age of onset and age of death), discounted to 1999 dollars, after “setting ahead” to (average age of onset + number of years which the “optimal nutritional behavior” (ONB) is able to delay onset of the disease).

The indirect benefit for avoiding Type A Disease is:

Indirect Benefit for Type A Disease = $PV_{average\ age} - PV_{delayed\ onset\ age}$, where $PV_{average\ age}$: (Morbidity Costs per year) x (average number of years between age of onset and age of death), discounted to 1999 dollars, after “setting ahead” to the average age of onset.

$PV_{delayed\ onset\ age}$: (Morbidity Costs per year) x (average number of years between age of onset and age of death), discounted to 1999 dollars, after “setting ahead” to (average age of onset + number of years which ONB is able to delay onset of the disease).

The direct benefit for avoiding Type B Disease is:

Direct Benefit for Type B Disease = (Medical Costs per year) x (average number of years between age of onset and age of death), discounted to 1999 dollars.

The indirect benefit for avoiding Type B Disease is:

Indirect Benefit for Type B Disease = (Morbidity Costs per year) x (average number of years between age of onset and age of death), discounted to 1999 dollars.

The benefit for avoiding Type C Disease is:

Benefit for Type C Disease = Medical Cost of treating Type C disease.

As explained earlier, all benefits can be categorized into either direct or indirect benefits. The exact nature of the direct and indirect benefits depends on the type of disease or condition that is under consideration. For Type A diseases, the direct benefit is the difference between two sums of present values: one, the summation of the present values of medical costs from average age of onset to average age of death, and two, the summation of the present value of the medical costs from the delayed age of onset to the delayed age of death.

The indirect benefit for Type A diseases is an estimate of the present value of the lost wages due to an early death.

For Type B diseases, there are not two parts to the estimate because the benefit is based on foregone medical costs of avoiding the disease or condition altogether. Therefore, the direct benefit is the cost of treatment per year discounted to 1999 dollars from average age of onset to average age of death.

The indirect benefit for Type B diseases is the amount of lost wages per year (Morbidity Costs) from average age of onset to average age of death.

Finally, for Type C diseases, the benefit generated is one time only. Therefore, this study uses the current cost of treating the condition as the total benefit for Type C. Since these are current health care costs, they are already at 1999 dollars and do not need to be discounted.

D. Determining Percentages of Participants Practicing Optimal Nutritional Behavior (ONB)

This study follows the methodology of the Virginia study for determining whether a graduate was practicing optimal nutritional behavior to avoid or delay the onset of a given disease. In taking a conservative approach to measuring the overall change in behavior, the Virginia study planners hoped to “minimize the error based on the assumption that graduates would continue to practice the nutritional behaviors acquired in EFNEP for their lifespan and accrue the identified benefits” (Lambur, et al., 15).

To determine whether a graduate is practicing ONB, this study uses criteria based on entry and exit food recall questions and the Food Practice Checklist (FPC). In keeping with a “conservative” approach, the requirements for ONB for each question are strict. The FPC questions measure food consumption behaviors and food handling practices on a scale from 1 to 5, where 1 indicates that the respondent “never performs” the action, and 5 indicates that the respondent “almost always” performs the action. In addition, the food recall questions require the graduates to state their daily consumption of foods from different food groups. For a respondent to pass a given requirement and be considered practicing ONB, the graduate had to have a score of either 4 or 5 when a larger score was required, and a score of either 1 or 2 when a lower score was required. Additionally, the graduate had to pass the appropriate requirement for a minimum number of servings of food in a certain food group over the 24-hour period. These requirements follow the method of the Virginia study. However, as demonstrated in table 1, the exact questions used are somewhat different.

Table 1. Requirements for Graduates to Be Practicing Optimal Nutritional Behavior for Each Disease or Condition for Food Practice Checklist and Food Groups Scores

Disease/ Condition	FPC Question	FPC Score	Food Group Requirement	Servings Req.
Colorectal Cancer	How often do you think of healthy food choices?	>= 4	Fruit + Vegetables	>= 5
	How often do you use the "Nutrition Facts" label?	>= 4	Other	<= 4
Heart Disease	How often do you prepare food without salt?	>= 4	Fruit + Vegetables	>= 5
	How often do you use the "Nutrition Facts" label?	>= 4	Other	<= 4
Stroke	How often do you prepare food without salt?	>= 4	Fruit + Vegetables	>= 5
	How often do you use the "Nutrition Facts" label?	>= 4	Dairy	>= 2
Hyper- tension	How often do you prepare food without salt?	>= 4	Fruit + Vegetables	>= 5
	How often do you use the "Nutrition Facts" label?	>= 4	Dairy	>= 2
Osteoporosis	How often do you think of healthy food choices?	>= 4	Dairy	>= 2
Diabetes	How often do you think of healthy food choices?	>= 4	Fruit + Vegetables	>= 5
	How often do you use the "Nutrition Facts" label?	>= 4		
Obesity	How often do you think of healthy food choices?	>= 4	Fruit + Vegetables	>= 5
	How often do you use the "Nutrition Facts" label?	>= 4	Other	<= 4
Foodborne Illness	How often do you let food sit out more than 2 hours?	<= 2		
	How often do you thaw frozen foods at room temperature?	<= 2		
Infant Diseases	How often do you think of healthy food choices?	>= 4		
	Nursing = True			
Low Birth- weight	How often do you use the "Nutrition Facts" label?	>= 4		
	Pregnant = True			

Table 2 shows the raw numbers of Iowa EFNEP graduates who, based on the previously stated conditions, are considered to be practicing optimal nutritional behavior (ONB) first at entry and then at exit. The difference between these figures, is considered to be the result of EFNEP, and is recorded in the table as the "difference" for each disease or condition. The percentage listed for each disease is the percentage of all Iowa EFNEP graduates who developed ONB for that specific disease or condition between entry and exit.

In order for a given participant to be considered practicing ONB for a certain disease, the participant had to fail the qualifications at entry and pass them at exit. This approach is conservative: there were a considerable number who either passed the qualifications at entry or exit but who had not been interviewed at either entry or exit. By not including these individuals, our method is directly comparable to that used in Virginia. The Iowa study only includes those respondents as practicing ONB who both failed at entry and passed at exit.

Table 2. Iowa EFNEP Graduates Practicing Optimal Nutrition Behavior (ONB) at Entry and Exit or Graduation Rates with ONB

Number with Optimal Nutrition Behavior				
Disease	Entry	Exit	Difference	Percent of Total Achieving ONB at Graduation
C-R Cancer	17	196	179	9.52%
Heart Disease	9	110	101	5.37%
Stroke	6	167	161	8.56%
Osteoporosis	341	962	621	33.01%
Diabetics	30	321	291	15.47%
Obesity	17	196	179	9.52%
Foodborne Illness	633	1401	768	40.83%
Infant Diseases	57	126	69	3.67%
Low-Birthweight	20	80	60	3.19%

E. Quantifying Direct Tangible Benefits

As mentioned, the direct tangible benefits for the EFNEP program are the foregone medical costs of diseases or conditions that could be avoided or delayed through good nutritional behavior. While there is uncertainty regarding the exact degree to which nutrition plays a role in the onset of these diseases or conditions, it is generally acknowledged that nutrition does play a major role. In order to be consistent with the Virginia report, many of the same statistics concerning average age of onset and age of death were used in this study. Many of the same sources were used to determine the direct and indirect costs for each disease, but were adjusted for inflation to the year 1999. Appendix B gives the statistics and sources necessary for the quantification of the tangible benefits.

F. Quantifying Indirect Tangible Benefits

In addition to the foregone medical costs, a total benefit for EFNEP also includes the indirect benefit of the program. The indirect benefit is the value of the production that the EFNEP participant brings to the economy in the time that he or she would have otherwise been incapable of working because of his

or her health. This indirect tangible benefit of the value of production that could now be produced added to the direct benefit determine the total benefits of the program.

In this treatment, the individual is treated as a “capital investment,” with the objective of creating productive (economic) output (Warner and Luce, 1982).

To determine the value of this capital investment, this study makes several assumptions concerning the work circumstances of EFNEP participants. For the most part, EFNEP participants are either homemakers or are low-wage income earners. The wage that many of these homemakers would make in the market is likely to be far below the median wage. However, because these homemakers are providing many intangible benefits to their home and their children, it is appropriate that we should impute a higher wage rate than they would otherwise receive for childcare services in order to account for these “intangibles.” We use an estimated hourly wage of \$7.60 per hour for all EFNEP participants. This estimate captures some intangibles, and is consistent with that used in the Virginia study (Lambur, et al., p. 14).

Next, the average number of workdays lost after the onset of each disease is found based on statistics from recent medical reports. The product of the number of workdays lost per year and the “daily wage” (8 hours x \$7.60) is then the value of earnings lost per year due to the presence of the disease or condition. The estimated value of earnings lost for each year incurred is discounted, from age of onset to age of death. For a Type A disease, the indirect benefit is the present value of pushing back the end of one’s working career by the length of time that good nutritional habits are able to prolong such a career. For a Type B disease, the indirect benefit is simply the sum of the discounted values of the indirect benefits. Because Type C diseases are immediate, there is no indirect benefit for a Type C disease.

G. Costs of EFNEP

Similar to the benefits analysis of EFNEP, costs are divided into direct and indirect costs. The direct costs are the prices of resources used in directly conducting the program. The indirect costs are the prices of resources used indirectly as a result of conducting the program. Therefore, direct costs are salaries and benefits of EFNEP employees, office space, utilities, equipment, supplies, training costs, and staff travel. The indirect costs could include such things as lost wages of participants, transportation expenses of participants, and childcare expenses. Again, these indirect costs are largely irrelevant due to the fact that most of the education takes place in the home of the participant. Because a small percentage of participants travel to meetings, transportation costs are included as the only indirect cost. An explanation of each of the costs is included below.

Salaries and Benefits Salary costs are reported in one of two ways. Many EFNEP employees are paid a state salary by EFNEP. These salary costs are included

on the spreadsheet as “State” level salary costs. Other professionals, paraprofessionals, and staff are employed by Iowa State University Extension at the county level and devote only part of their time to EFNEP-related projects. In this case, each county is asked to estimate the percentage of time spent by each employee on EFNEP-related projects per year. The cost for each employee is then estimated by multiplying this percentage times his or her salary or earnings over the 18-month period. This is done for every employee in the county and totals are determined for each county and for the state.

Office Space Because EFNEP is a part of the Extension program, EFNEP projects are done in offices rented by Extension. Therefore, each county director is asked to estimate the percentage of his or her office space that is used for EFNEP projects. This percentage is then multiplied by the rent cost over the eighteen-month period to find a total cost of office space for the county and for the state.

Utilities The cost for utilities used by EFNEP is found in the same way as the cost of office space. The estimated percentage of office space used for EFNEP is multiplied by the total utilities bill to estimate the county EFNEP total for utilities. Adding all the county’s utility bills gives a state total.

Equipment/Supplies/Training The county director again estimates the percentage of supplies or training materials that are needed for EFNEP-related projects. This may or may not be the same percentage that is used for Office Space and Utilities. This percentage is then multiplied by the total supplies and training costs for the extension office over the 18-month period. A state total is the sum of the costs of the seven county programs.

Staff Travel Travel expenditures include mileage in personal cars, meals, and fares for public transportation. Each county reports the total amount expended for staff travel; the statewide total is the sum of the seven county costs.

Transportation Cost (Indirect Costs) Each county director is asked to estimate the percentage of participants who travel to meetings. They also estimate the average round-trip distance that each participant travels when attending a meeting. The rate of \$0.31 per mile, along with the estimated distance traveled, is used to determine the transportation cost per county. A grand total for transportation costs across the state of Iowa is determined as a sum of the county estimates.

All the preceding costs are totaled for a subtotal of EFNEP costs.

The estimated subtotal is adjusted for excess costs associated with the government activity. Whenever a government program is financed by taxes, the

increased tax collection that results from more government spending causes distortions in various prices throughout the economy. Because of the price distortions, the economy loses some of its production capabilities. This loss in productivity is usually estimated as a percentage of the marginal amount of taxes that are raised from a pre-existing tax base. This marginal welfare cost is called the “marginal excess burden” (MEB). While there is considerable disagreement over the exact magnitude of the marginal excess burden, most economists agree that the MEB, at least in the United States, is not trivial. Therefore, we include an estimated cost of the marginal excess burden to avoid falsely accepting the relative efficiency of a government program based on an assumption of no efficiency losses. This loss in welfare to the entire economy has been estimated to be anywhere from 17 to 56 cents per dollar of marginal tax revenue collected. The measure most frequently used for MEB is 17 percent, as demonstrated by Ballard, Shoven, and Whalley (1985). The 17 percent figure was used in the Virginia study, and it is used in this study as well.

VII. Results

Table 3 gives a summary of the costs of conducting EFNEP. A county-by-county summary appears in Appendix A. The total costs calculated remain constant under various assumptions in the sensitivity analysis section.

Table 3. Summary of Iowa EFNEP Costs

Cost	Sub-Total	Total
Salary Costs (State)		\$1,017,188
Salary Costs (County)	\$51,825	
Rent Costs	\$42,287	
Utilities Costs	\$ 9,859	
Supplies Costs	\$11,676	
Other Fixed Costs	\$ 7,403	
Transportation Costs	\$ 768	
Total County Costs		\$ 123,818
Marginal Excess Burden		\$ 193,841
Total Admin. Cost		\$1,334,847

Tables 4 through 13 provide the results of calculating the direct tangible benefits for each disease or condition.

Table 4. Estimation of EFNEP Benefits: Heart Disease

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of heart disease in the population	31.00%
C) Incidence rate of heart disease related to diet	26.00%
D) Percent of graduates practicing optimal nutritional behavior related to heart disease	5.37%
E) Estimated number of graduates to accrue benefits	8.19
F) Present value of benefits related to heart disease	\$ 721.85
TOTAL DIRECT BENEFIT OF DELAYING HEART DISEASE	\$ 5,914.77

Table 5. Estimation of EFNEP Benefits: Stroke

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of stroke in the population	1.70%
C) Incidence rate of stroke related to diet	—
D) Percent of graduates practicing optimal nutritional behavior related to stroke	8.56%
E) Estimated number of graduates to accrue benefits	2.74
F) Present value of benefits related to stroke	\$ 14,139.04
TOTAL DIRECT BENEFIT OF DELAYING STROKE	\$ 38,701.82

Table 6. Estimation of EFNEP Benefits: Hypertension

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of hypertension in the population	37.40%
C) Incidence rate of hypertension related to diet	45.00%
D) Percent of graduates practicing optimal nutritional behavior related to hypertension	8.56%
E) Estimated number of graduates to accrue benefits	27.10
F) Present value of benefits related to hypertension	\$ 717.97
TOTAL DIRECT BENEFIT OF DELAYING HYPERTENSION	\$ 19,455.97

Table 7. Estimation of EFNEP Benefits: Cancer

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of cancer in the population	15.00%
C) Incidence rate of cancer related to diet	35.00%
D) Percent of graduates practicing optimal nutritional behaviors related to cancer	9.51%
E) Estimated number of graduates to accrue benefits	9.39
F) Present value of benefits related to cancer	\$ 17,137.49
TOTAL DIRECT BENEFIT OF DELAYING CANCER	\$ 160,944.39

Table 8. Estimation of EFNEP Benefits: Osteoporosis

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of osteoporosis in the population	28.00%
C) Incidence rate of osteoporosis related to diet	—
D) Percent of graduates practicing optimal nutritional behavior related to osteoporosis	33.30%
E) Estimated number of graduates to accrue benefits	145.36
E) Present value of benefits related to osteoporosis	\$ 68,308.59
TOTAL DIRECT BENEFIT OF AVOIDING OSTEOPOROSIS	\$ 11,875,948.56

Table 9. Estimation of EFNEP Benefits: Obesity

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of obesity in the population	37.00%
C) Incidence rate of obesity related to diet	50.00%
D) Percent of graduates practicing optimal nutritional behavior related to obesity	9.51%
E) Estimated number of graduates to accrue benefits	33.09
F) Present value of benefits related to obesity	\$ 12,191.45
TOTAL DIRECT BENEFIT OF AVOIDING OBESITY	\$ 403,456.21

Table 10. Estimation of EFNEP Benefits: Diabetes

A) Annual number of graduates in EFNEP		1,881
B) Incidence rate of diabetes in the population		14.50%
C) Incidence rate of diabetes related to diet		45.00%
D) Percent of graduates practicing optimal nutritional behavior related to diabetes		15.47%
E) Estimated number of graduates to accrue benefits		18.99
F) Present value of benefits related to diabetes	\$	47,887.89
TOTAL BENEFIT OF AVOIDING DIABETES	\$	909,254.22

Table 11. Estimation of EFNEP Benefits: Foodborne Illness

A) Annual number of graduates in EFNEP		1,881
B) Incidence rate of foodborne illness in the population		2.80%
C) Incidence rate of foodborne illness related to diet		100.00%
D) Percent of graduates practicing optimal nutritional behavior related to foodborne illness		40.83%
E) Estimated number of graduates to accrue benefits		21.50
F) Net present value of benefits related to foodborne illness	\$	19,689.57
TOTAL BENEFIT OF AVOIDING FOODBORNE ILLNESS	\$	423,400.92

Table 12. Estimation of EFNEP Benefits: Low Birthweight Infants (LBW)

A) Annual number of graduates in EFNEP		1,881
B) Incidence rate of LBW in the population		7.00%
C) Incidence rate of LBW related to diet		100%
D) Percent of graduates practicing optimal nutritional behaviors related to LBW		3.20%
F) Estimated number of graduates to accrue benefits		4.39
E) Present value of benefits related to LBW	\$	35,406.00
TOTAL DIRECT BENEFIT OF AVOIDING LBW	\$	155,574.53

Table 13. Estimation of EFNEP Benefits: Commonly Occurring Infant Diseases (COID)

A) Annual number of graduates in EFNEP	1,881
B) Incidence rate of COID in the population	100.00%
C) Incidence rate of COID related to diet	100.00%
D) Percent of graduates practicing optimal nutritional behaviors related to COID	3.67%
E) Estimated number of graduates to accrue benefits	69.03
E) Present value of benefits related to COID	\$ 1,537.00
TOTAL DIRECT BENEFIT OF AVOIDING COID	\$ 106,103.26

Table 14 shows the results of calculations for the indirect tangible benefits.

Table 14. Estimation of Indirect Program Benefits

	Heart Disease	Stroke	Hypertension	Obesity	Diabetes	Foodborne Illness
A) Average age of onset for the disease	55	45	30	23	40	23
B) Average age delayed onset resulting from EFNEP	60	50	35	65	65	65
C) Average number of annual lost work days	58	60	41	1.83	0.60	1.50
D) Estimated number of graduates to accrue benefits	8.19	2.74	27.10	33.09	18.99	21.50
E) Present value of lost earnings due to disease	\$ 693.61	\$2,242.38	\$ 4,916.94	\$ 2,080.40	\$ 270.84	\$ 1,705.31
TOTAL INDIRECT BENEFITS	\$5,683.38	\$6,137.91	\$133,242.14	\$68,847.45	\$5,142.48	\$36,670.68

Finally, table 15 lists all the aforementioned program costs and both direct and indirect costs.

Table 15. Summary of EFNEP Benefits and Costs (See amendment in Appendix D)

ANALYSIS SUMMARY

Direct Benefits

Heart Disease	\$ 5,914.77
Stroke	\$ 38,701.82
Hypertension	\$ 19,455.97
Cancer	\$ 160,944.39
Osteoporosis	\$11,875,948.56
Obesity	\$ 403,456.21
Diabetes	\$ 909,254.22
Foodborne Illness	\$ 423,400.92
LBW Babies	\$ 155,574.53
COID	\$ 106,103.26
Total Direct Benefits	\$14,098,754.65
Total Benefits	\$14,354,478.68

Indirect Benefits

Heart Disease	\$ 5,683.38
Stroke	\$ 6,137.91
Hypertension	\$133,242.14
Cancer	
Osteoporosis	
Obesity	\$ 68,847.45
Diabetes	\$ 5,142.48
Foodborne Illness	\$ 36,670.68
LBW Babies	
COID	
Total Indirect Benefits	\$255,724.03

Administration Costs

Salaries/Benefits	\$1,017,188.91
Salaries (County)	\$51,825.34
Office Space	\$42,287.26
Utilities-	\$9,859.02
Supplies/Training	\$11,676.00
Staff Travel	\$7,403.06
Transportation Costs	\$767.58
MEB	\$193,840.73
TOTAL ADMIN. COST	\$1,334,847.90

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$13,019,630.78

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
10.75 - 1

The direct and indirect benefits are summed and compared to the total administrative cost. The calculated net present value of the EFNEP program is the total benefit minus the total costs, or \$13,079,631 for the 18-month period. The benefit-

cost ratio is determined by dividing the total benefits by the total costs. This ratio is used to compare results to other programs or projects. The benefit-cost ratio estimated for EFNEP expressed in dollar terms is \$10.75/\$1.00.

VIII. Sensitivity Analysis

Some of the key assumptions and estimates in this cost-benefit study can be varied to get a range of values in which the “true” cost-benefit value is likely to reside. “In essence, sensitivity analysis proposes ‘what if’ scenarios by manipulating certain variables to determine minimum and maximum values of the analytic measures” (Disbrow and Bertram, 1984).

In this sensitivity analysis, four assumptions are varied. First, the methodology of calling someone a “graduate” of EFNEP is examined. Second, the assumption of perfect retention of dietary behavior is changed, and a smaller percentage of ONB-practicing graduates is assumed. Third, the incidence rates and medical costs of these diseases and conditions in the low-income population are updated. Fourth, a higher discount rate of 10 percent, instead of 5 percent, is used to determine another cost-benefit ratio.

A. Modified Graduation Rates

As mentioned before, someone is considered to be a “graduate” only if he or she completed both an entry and exit 24-hour food recall survey. The graduate is considered to be practicing ONB for each disease if he or she had failed the test at entry, but passed at exit. In this section, a new method is introduced that expands upon the method used by the Virginia study. This method tries to account for those graduates practicing ONB whose changes were a result of outside causes. A few graduates started with ONB status, but lost their ONB status for a certain disease during the evaluation period. Such changes are not likely to be attributable to EFNEP, and therefore, this number is used as a proxy for changes in behavior not attributable to EFNEP. This change in how ONB graduates are determined decreases the percentage of graduates said to be practicing ONB for each disease or condition. Tables 16 and 17 demonstrate these new percentages and the new cost-benefit figures.

Table 16. Modified Method for Calculating Graduates

	Cancer	Heart Disease	Stroke/ Hypertension	Osteoporosis	Diabetes	Obesity	Foodborne Illness	Infant Diseases	Low Birth- weight
Entry ^a	17	9	6	341	30	17	633	57	20
Exit ^b	196	110	167	962	321	196	1401	126	80
Difference	179	101	161	621	291	179	768	69	60
Lost ONB at Exit	24	10	4	104	22	24	46	27	22
Modified Difference	155	91	157	517	269	155	722	42	38
Percent	8.24	4.84	8.35	27.49	14.30	8.24	38.38	2.23	2.02

^aNumber of responses-entry, 3,997.

^bNumber of responses-exit, 1,881.

Table 17. Benefit-Cost Estimates: Modified Graduation Rates

Results

Direct Benefits

Heart Disease	\$ 5,331.00
Stroke	\$ 37,707.15
Hypertension	\$ 18,955.94
Cancer	\$ 139,451.29
Osteoporosis	\$ 9,890,013.57
Obesity	\$ 349,577.20
Diabetes	\$ 840,487.10
Foodborne Illness	\$ 398,004.54
LBW Babies	\$ 108,416.00
COID	\$ 58,400.16
Total Direct Benefits	\$11,846,343.95
Total Benefits	\$12,059,324.50

Indirect Benefits

Heart Disease	\$ 4,549.50
Stroke	\$ 5,311.34
Hypertension	\$115,298.63
Cancer	
Osteoporosis	
Obesity	\$ 52,983.46
Diabetes	\$ 4,221.93
Foodborne Illness	\$ 30,615.69
LBW Babies	
COID	
Total Indirect Benefits	\$212,980.55

Analysis of Results

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$10,701,949.60

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
8.88 - to - 1

B. Lower Retention of Optimal Nutritional Behavior (ONB)

While there is considerable evidence suggesting that EFNEP graduates do retain good nutritional habits for at least five years into the future, such an assumption greatly influences the end result. Because no studies have been done of these graduates concerning their retention rates for more than five years since graduation, a sensitivity analysis is done that assumes a far lower percent of the graduates are still practicing ONB. This is done by decreasing the number of graduates by one-half and by three-quarters. The cost-benefit ratio for these two analyses is shown below.

Table 18. Benefit-Cost Estimates: Lower Retention of Optimal Nutritional Behavior (50% reduction)

Direct Benefits		Indirect Benefits	
Heart Disease	\$ 2,957.39	Heart Disease	\$ 2,841.69
Stroke	\$ 19,350.91	Stroke	\$ 3,068.96
Hypertension	\$ 9,727.99	Hypertension	\$ 66,621.07
Cancer	\$ 80,472.19	Cancer	
Osteoporosis	\$5,937,965.59	Osteoporosis	
Obesity	\$ 201,728.10	Obesity	\$ 34,423.73
Diabetes	\$ 454,627.11	Diabetes	\$ 2,571.24
Foodborne Illness	\$ 211,705.65	Foodborne Illness	\$ 18,335.79
LBW Babies	\$ 77,787.27	LBW Babies	
COVID	\$ 53,051.63	COVID	
Total Direct Benefits	\$8,022,631.48	Total Indirect Benefits	\$127,862.46
Total Benefits	\$8,150,493.94		

Analysis of Results

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$5,819,861.39

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
6.00 - to - 1

The Benefit Cost ratio is \$6.00/\$1.00 if the number of graduates is reduced by 50 percent. If the number of graduates who practiced ONB is reduced by 75 percent instead, this analysis yields a ratio that is the lowest of all of the analyses: a benefit cost ratio of \$2.64/\$1.00.

Table 19. Benefit-Cost Estimates: Lower Retention of Optimal Nutritional Behavior (75% reduction)

Direct Benefits		Indirect Benefits	
Heart Disease	\$ 1,478.69	Heart Disease	\$ 1,420.84
Stroke	\$ 9,675.46	Stroke	\$ 1,534.48
Hypertension	\$ 4,863.99	Hypertension	\$33,310.53
Cancer	\$ 40,236.10	Cancer	
Osteoporosis	\$2,968,982.79	Osteoporosis	
Obesity	\$ 100,864.05	Obesity	\$17,211.86
Diabetes	\$ 227,313.56	Diabetes	\$ 1,285.62
Foodborne Illness	\$ 105,852.82	Foodborne Illness	\$ 9,167.89
LBW Babies	\$ 38,893.63	LBW Babies	
COVID	\$ 26,525.81	COVID	
Total Direct Benefits	\$3,524,686.90	Total Indirect Benefits	\$63,931.23
Total Benefits	\$3,588,618.13		

Analysis of Results

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$2,231,243.23

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
2.64 - to - 1

C. Revised Incidence Rates and Costs

The third sensitivity analysis uses a few new statistics concerning incidence rates and costs that have come into use since the publication of the Virginia study.

When no new statistics are available, the figures in the Virginia study are used again, but the medical costs are updated to 1999. Appendix C shows the changes that were made for this sensitivity analysis. Higher incidence rates for osteoporosis have recently been estimated by the National Osteoporosis Foundation to be 33.75 percent, significantly higher than the 28.00 percent used in this study. Because osteoporosis costs are high, the revised incidence rate sharply increases the overall benefit of EFNEP, despite the fact that there are lower incidence rates and cost figures for some of

the other conditions. The result is a Benefit Cost ratio of \$12.50/\$1.00. The result of this third sensitivity analysis is shown in table 20.

One other aspect of the osteoporosis data was explored. Although poor nutritional habits are suspected to be the major cause of osteoporosis, conclusive medical evidence is not available for determining what percentage of cases might be affected. This study uses a 100 percent rate. Making the assumption that poor nutritional habits caused only half the cases would reduce the overall benefit from EFNEP for avoiding the onset of osteoporosis to \$5,990,131.90 (based on original incidence rate values). This leads to an estimated benefit to cost ratio of \$6.34/\$1.00.

Table 20. Benefit-Cost Estimates: Updated Disease Information

Direct Benefits		Indirect Benefits	
Heart Disease	\$5,914.77	Heart Disease	\$5,683.38
Stroke	\$48,120.83	Stroke	\$5,668.54
Hypertension	\$14,956.13	Hypertension	\$102,425.44
Cancer	\$153,265.04	Cancer	
Osteoporosis	\$14,440,496.55	Osteoporosis	
Obesity	\$239,892.88	Obesity	\$40,936.32
Diabetes	\$1,180,818.15	Diabetes	\$6,678.36
Foodborne Illness	\$423,400.92	Foodborne Illness	\$36,670.68
LBW Babies	\$155,574.53	LBW Babies	
COID	\$106,103.26	COID	
Total Direct Benefits	\$16,768,543.07	Total Indirect Benefits	\$198,062.72
Total Benefits	\$16,966,605.79		

Analysis of Results

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$15,609,232.89

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
12.50 - to - 1

D. Discount Rate

The discount rate that often is used in most health-related studies is 5 percent. Because there is some uncertainty about using this value, a sensitivity analysis is done using a discount rate of 10 percent. This will

greatly decrease the present value of the benefits from avoiding or delaying the onset of each disease or condition. The cost-benefit ratio for this analysis is \$2.81/\$1.00, as shown in table 21.

Table 21. Benefit-Cost Estimates: Revised Discount Rate

Direct Benefits		Indirect Benefits	
Heart Disease	\$ 2,046.67	Heart Disease	\$ 1,966.78
Stroke	\$ 19,043.66	Stroke	\$ 3,020.23
Hypertension	\$ 16,595.18	Hypertension	\$113,648.77
Cancer	\$ 134,787.56	Cancer	
Osteoporosis	\$2,554,618.18	Osteoporosis	
Obesity	\$ 214,731.32	Obesity	\$ 36,642.64
Diabetes	\$ 236,405.69	Diabetes	\$ 1,337.07
Foodborne Illness	\$ 208,904.54	Foodborne Illness	\$ 18,093.06
LBW Babies	\$ 155,574.53	LBW Babies	
COID	\$ 106,103.26	COID	
Total Direct Benefits	\$3,648,810.60	Total Indirect Benefits	\$174,708.56
Total Benefits	\$3,823,519.16		

Analysis of Results

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$2,466,144.26

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
2.82 - to - 1

IX. Conclusions

Under the initial assumptions and conditions, this study shows a cost-benefit ratio of \$10.75/\$1.00 for the Iowa EFNEP program. This indicates significant return from dollars spent on the EFNEP program. The sensitivity analyses show the range of the benefit cost ratio to some of the assumptions, a range of \$2.64/\$1.00 to \$12.50/\$1.00. The estimate of \$10.75/\$1.00 agrees with the high figure found by the 1999 Virginia EFNEP report. Due to the similarities in the programs across state lines, the estimate suggests that such high returns can be seen in other states as well.

The results of this study are particularly relevant in today's political climate due to increased awareness of health care costs. The finding of a favorable benefit/cost ratio lends weight to efforts to increase funding for such nutrition education programs, and achieve savings in health care costs.

X. References

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XI. Appendices

Appendix A. Total Iowa EFNEP Costs

EFNEP costs by type	Sub-Total	Total
<u>State level costs</u>		
Total salary cost paid at state level	\$1,017,188.91	
Total of state level cost		\$1,017,188.91
<u>County level costs</u>		
Total salary cost paid at county level	\$ 51,825.34	
Total rent cost	\$ 42,287.26	
Total utilities cost	\$ 9,859.02	
Total supplies cost	\$ 11,676.00	
Total other fixed cost	\$ 7,403.06	
Total transportation cost	\$ 767.58	
Total of county level cost	\$ 123,818.26	
Marginal excess burden		\$ 193,840.73
Total Iowa EFNEP administrative cost		\$1,334,847.90

Appendix B. Figures and sources used in determining the benefits of Iowa EFNEP

Disease/Condition	Incidence Rate in Low-Income Pop.		Incidence Rate Due to Diet	
	Percentage	Source	Percentage	Source
<u>Type A Diseases</u>				
Colorectal Cancer	15%	Healthy People 2000 (1990)	35%	McGinnis and Foege (1993)
Heart Disease	31.20%	National Health Interview Survey (1994)	26%	Lambur, et al. (1999) Survey (1994)
Stroke	1.70%	Lambur, et al. (1999)	NA	
Hypertension	37.40%	National Health Interview Survey (1994)	45%	Lambur, et al. (1999)
<u>Type B Diseases</u>				
Osteoporosis	28%	Lambur, et al. (1999)	NA	
Type 2 Diabetes	14.50%	National Health Interview Survey (1994)	45%	Lambur, et al. (1999)
Obesity	37%	Third National Health and Examination Survey	50%	Lambur, et al. (1999)
Foodborne Illness	2.80%	Buzby, et al. (1996)	100%	Lambur, et al. (1999)
Commonly Occurring Infant Diseases	100%	Lambur, et al. (1999)	NA	
Low Birthweight Infants	7.30%	National Center for Health Statistics	100%	Lambur, et al. (1999)

Appendix B continued

Disease/Condition	Average Age of Onset		Onset of Disease Delayed	
	Age	Source	Number of Years	Source
Colorectal Cancer	36	National Research Council (1989)	5	Lambur, et al. (1999)
Heart Disease	55	Kris-Etherton and Kummer (1993)	5	Lambur, et al. (1999)
Stroke	45	National Research Council (1989)	5	Lambur, et al. (1999)
Hypertension	30	National Research Council (1989)	5	Lambur, et al. (1999)
Osteoporosis	45	National Research Council (1989)	5	Lambur, et al. (1999)
Type 2 Diabetes	40	Lambur, et al. (1999)		
Obesity	23	Average Age of EFNEP homemaker		
Foodborne Illness	23	Average Age of EFNEP homemaker		
Commonly Occurring Infant Diseases	0	Infant		
Low Birthweight Infants	0	Infant		

Disease/Condition	Survival Time after Treatment		Cost of Treatment	
	Number of Years	Source	Per Patient Per Year Adjusted to 1999 Dollars	Source
Colorectal Cancer	5	Healthy People 2000 (1990)	\$34,480.00	Healthy People 2000 (1990)
Heart Disease	5	National Research Council (1989)	\$3,670.00	American Heart Assoc., (1998)
Stroke	10	National Research Council (1989)	\$24,000.00	Healthy People 2000 (1990)
Hypertension	20	National Research Council (1989)	\$380.00	Frazao (1996)
Osteoporosis			\$12,340.00	Barefield (1996)
Type 2 Diabetes			\$6,450.00	National Institute-Diabetes Digestive and Kidney Diseases (1995)
Obesity			\$652.00	National Institute-Diabetes Digestive and Kidney Diseases (1995)
Foodborne Illness			\$1,053.00	Lambur, et al. (1999)
Commonly Occurring Infant Diseases			\$1,604.00	Bailey and Deck (1993)
Low Birthweight Infants			\$36,943.00	Hori (1992)

**Appendix C. New figures and sources used in the sensitivity analysis section
(new figures and sources shown in italic type)**

Disease/Condition	Incidence Rate in Low-Income Pop.		Incidence Rate Due to Diet	
	Percentage	Source	Percentage	Source
Type A Diseases				
Colorectal Cancer	15%	Healthy People 2000 (1990)	33%	<i>American Cancer Society (2000)</i>
Heart Disease	31.20%	National Health Interview	26%	Lambur, et al. (1999) Survey (1994)
Stroke	1.57%	<i>American Heart Association and CDC (2000)</i>	NA	
Hypertension	28.75%	<i>Center for Disease Control (2000)</i>	45%	Lambur, et al. (1999)
Type B Diseases				
Osteoporosis	33.75%	National Osteoporosis Foundation (2000)	NA	
Type 2 Diabetes	14.61%	<i>American Heart Association and CDC (2000)</i>	58%	<i>Finnish Diabetes Prevention Study (2000)</i>
Obesity	37%	Third National Health and Examination Survey	50%	Lambur, et al. (1999)
Foodborne Illness	2.80%	Buzby, et al. (1996)	100%	Lambur, et al. (1999)
Commonly Occurring Infant Diseases	100%	Lambur, et al. (1999)	NA	
Low Birthweight Infants	7.30%	National Center for Health Statistics	100%	Lambur, et al. (1999)

Disease/Condition	Average Age of Onset		Onset of Disease Delayed	
	Age	Source	Number of Years	Source
Colorectal Cancer	36	National Research Council (1989)	5	Lambur, et al. (1999)
Heart Disease	55	Kris-Etherton and Kummer (1993)	5	Lambur, et al. (1999)
Stroke	45	National Research Council (1989)	5	Lambur, et al. (1999)
Hypertension	30	National Research Council (1989)	5	Lambur, et al. (1999)
Osteoporosis	45	National Research Council (1989)	5	Lambur, et al. (1999)
Type 2 Diabetes	40	Lambur, et al. (1999)		
Obesity	23	Average Age of EFNEP homemaker		
Foodborne Illness	23	Average Age of EFNEP homemaker		
Commonly Occurring Infant Diseases	0	Infant		
Low Birthweight Infants	0	Infant		

Appendix C continued

Disease/Condition	Survival Time after Treatment		Cost of Treatment	
	Number of Years	Source	Per Patient Per Year Adjusted to 1999 Dollars	Source
Colorectal Cancer	5	Healthy People 2000 (1990)	\$34,480.00	Healthy People 2000 (1990)
Heart Disease	5	National Research Council (1989)	\$3,670.00	American Heart Assoc., (1998)
Stroke	10	National Research Council (1989)	\$19,035.79	American Heart Assoc., (2000)
Hypertension	20	National Research Council (1989)	\$380.00	Frazao (1996)
Osteoporosis			\$12,340.00	Barefield (1996)
Type 2 Diabetes			\$6,450.00	National Institute-Diabetes Digestive and Kidney Diseases (1995)
Obesity			\$652.00	National Institute-Diabetes Digestive and Kidney Diseases (1995)
Foodborne Illness			\$1,053.00	Lambur, et al. (1999)
Commonly Occurring Infant Diseases			\$1,604.00	Bailey and Deck (1993)
Low Birthweight Infants			\$36,943.00	Hori (1992)

Appendix D. Addendum to An Evaluation of the Costs and Benefits of Iowa's Expanded Food and Nutritional Education Program

Costs and benefits were reanalyzed in March 2002. The scope of the revised calculation covered the same time frame as the original study (September 1998 to February 2000), but included only six Iowa EFNEP counties -- Black Hawk, Linn, Polk, Scott, Pottawattamie (western half), and Woodbury. The revised results show the following:

Amended Table 15: Summary of EFNEP Benefits and Costs

ANALYSIS SUMMARY

Direct Benefits

Heart Disease	\$3,927.11
Stroke	\$25,730.84
Hypertension	\$12,935.27
Cancer	\$116,953.29
Osteoporosis	\$8,893,715.30
Obesity	\$293,179.11
Diabetes	\$631,162.59
Foodborne Illness	\$310,367.75
LBW Babies	\$131,754.51
COID	\$75,411.98
Total Direct Benefits	\$10,495,137.75
Total Benefits	\$10,672,074.36

Indirect Benefits

Heart Disease	\$3,773.24
Stroke	\$4,081.13
Hypertension	\$88,603.26
Cancer	
Osteoporosis	
Obesity	\$50,033.62
Diabetes	\$3,569.67
Foodborne Illness	\$26,875.69
LBW Babies	
COID	
Total Indirect Benefits	\$176,936.61

Administration Costs

Salaries/Benefits	\$1,017,188.91
Salaries (County)	\$50,062.70
Office Space	\$40,393.42
Utilities	\$9,440.42
Supplies/Training	\$10,918.37
Staff Travel	\$6,675.19
Transportation Costs	\$767.58
MEB	\$193,025.92
Total admin. costs	\$1,328,472.51

1) Net Present Value = Benefit - Cost

This project yields a net benefit of
\$9,343,601.85

2) Benefit-Cost ratio = Benefit/Cost

This project yields a Benefit-Cost ratio of
8.03 - to - 1

(See Amendment in
Appendix D)

Adult Family Record

Iowa Expanded Food and Nutrition Education Program

1. Program assistant's name: _____		2. PAID#: _____	
3. Name _____ (First) (MI) (Last)		4. ID#: _____	
Address _____ (City) (Zip)		5. Enrolled in EFNEP before? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Phone () _____		6. If yes, did you receive a certificate of completion? <input type="checkbox"/> Yes <input type="checkbox"/> No	
7. Age _____	11. Race: Check the category you identify with. ____ (1-00) White (non-Hispanic) ____ (2-00) Black (non-Hispanic) ____ (3-00) Am Indian/Alaskan Native ____ (4-00) Hispanic ____ (5-00) Asian or Pacific Islander	12. Place of residence: (circle one) 1 Farm 2 Towns under 10,000 & rural non-farm 3 Towns and cities 10,000-50,000 4 Suburbs of cities over 50,000 5 Central cities over 50,000	
8. Sex <input type="checkbox"/> F <input type="checkbox"/> M		9. Pregnant? <input type="checkbox"/> Yes <input type="checkbox"/> No	
10. Breast-feeding? <input type="checkbox"/> Yes <input type="checkbox"/> No		13. Total household income last month: \$ _____	
14. Type of instruction: (1) Group (2) Individual (3) Both (4) Other		17. Entry date: ____ / ____ / ____	
15. List names of children through age 19 in household and their ages.		18. Subgroup: (A) EFNEP (W) _____ (B) FNP (X) _____ (M) Have a Healthy Baby (Y) _____ (W) Promise Jobs (Z) _____	
(1)	Age	19. Assistance programs that the family participates in at ENTRY: (circle)	
(2)		WIC/CSFP	Y N
(3)		Food Stamps	Y N
(4)		FDPIR (Food Distribution Prog. on Indian Res.)	Y N
(5)		Commodities (TEFAP)	Y N
(6)		Head Start	Y N
16. Number of other adults in household (not counting client): _____		Child Nutrition	Y N
		FIP/TANF	Y N
		Other _____ (Specify)	Y N
20. Comments 			

Entry EFNEP Survey

Client's name	Client's ID#
Entry date:	Check if interview <input type="checkbox"/>

This is a survey about ways you plan and fix foods for your family. As you read each question, think about the recent past. This is not a test. There are not any wrong answers. If you do not have children, just answer the questions for yourself.

<i>For these questions, think about how you usually do things. Please put a check in the box that best answers each question.</i>	Do Not Do 1	Seldom 2	Some- times 3	Most of the Time 4	Almost Always 5
(1) How often do you plan meals ahead of time?					
(2) How often do you compare prices before you buy food?					
(3) How often do you run out of food before the end of the month?					
(4) How often do you shop with a grocery list?					
(5) This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?					
(6) How often do you thaw frozen foods at room temperature?					
(7) When deciding what to feed your family, how often do you think about healthy food choices?					
(8) How often have you prepared foods without adding salt?					
(9) How often do you use the "Nutrition Facts" on the food label to make food choices?					
(10) How often do your children eat something in the morning within 2 hours of waking up?					

Lessons

Date completed (one-to-one lessons)

- _____ Food Guide Pyramid
- _____ Fruits
- _____ Vegetables
- _____ Milk Products and Calcium Sources
- _____ Grains
- _____ Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts
- _____ Fat and Cholesterol
- _____ Breakfast
- _____ Cooking
- _____ Eating Right During Pregnancy
- _____ Feeding Your Baby
- _____ Feeding Children
- _____ Snacks
- _____ Food Safety
- _____ Shopping for Food
- _____ Resource Management I
- _____ Resource Management II
- _____ Breast-feeding

Date completed (group lessons)

- _____ Food Guide Pyramid
- _____ Vegetable and Fruit Food Groups
- _____ Choose a Healthful Breakfast
- _____ Breads, Cereals, Rice, Pasta
- _____ Snacks
- _____ Say Yes to Family Mealtime
- _____ Making Family Mealtime Work
- _____ Parents and Children: Partners for Healthy Eating
- _____ Feeding Children as They Grow
- _____ Financial wellness: Start on the right track
- _____ Financial wellness: Follow your plan
- _____ Financial wellness: Give yourself credit
- _____ The dairy foods
- _____ Meal planning
- _____ Shopping smart
- _____ Let's get moving
- _____ You can build a healthy diet
- _____ It's all about you

Teaching Record

Date	
Mini-Goal	
Date	
Mini-Goal	
Date	
Mini-Goal	
Date	
Mini-Goal	

