Cost-Effectiveness Model for Youth EFNEP Programs: What Do We Measure and How Do We Do It?

Elena Serrano, Virginia Polytechnic Institute and State University
Mary McFerren, Virginia Polytechnic Institute and State University
Michael Lambur, Virginia Polytechnic Institute and State University
Michael Ellerbock, Virginia Polytechnic Institute and State University
Kathy Hosig, et al.

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Introduction

The Expanded Food and Nutrition Education Program (EFNEP) is one of USDA’s hallmark nutrition education programs. The goal of EFNEP is to assist limited resource audiences in “acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being.”1 EFNEP uses a unique and effective peer-education model in which para-professionals of the same socio-demographic community, usually indigenous to the target population, to perform health education services. Begun in the late 1960s, EFNEP operates in all 50 states and the six US territories, and has benefited over 25 million individuals in its history. In 2009, EFNEP was appropriated $66.15 million dollars.2 EFNEP has adult and youth components. For the adult component, EFNEP is delivered as a series of six or more lessons. At one time, EFNEP was delivered to the homemaker in her home and to small groups of 2-4 adults. Today, adults are taught individually in their homes, in neighborhood groups, or even large groups of up to 35 adults at cooperating agencies. For the youth component, EFNEP varies from location to location and state to state. Education is delivered in group settings through school enrichment, before or after school programs, day camps, community centers, and neighborhood groups. Lesson topics include nutrition, food management, food preparation, food safety, fitness, and maintaining a healthy weight. As a result, it is difficult to study the impact of youth EFNEP, which may explain why there has only been one published effectiveness study of youth EFNEP.3 No economic evaluations of youth EFNEP have been conducted. The effectiveness of EFNEP on participants’ behaviors have been relatively well-studied for adults,4-7 including several cost-benefit and cost-effectiveness analyses for EFNEP.8-11

The purpose of this study was to gather and document opinions from experts in EFNEP, economics, nutrition, physical activity, behavioral interventions, and evaluation research in order to create a cost-effectiveness model and accompanying online software. These tools would ideally enable state and national level Extension faculty, administrators, and researchers to calculate and communicate the cost-effectiveness of their respective youth targeted nutrition education programs as they relate to overweight and obesity prevention.

Background Information: Why Cost-Effectiveness?

A cost effectiveness analysis (CEA) calculates the cost of achieving some
measureable effect. In this study, investigators seek to determine the economic or financial cost of producing
an impact as a result of participation in youth EFNEP. The key formula in a CEA is called the incremental cost
effectiveness ratio (ICER):

\[ \text{ICER}(p) = \frac{C_1(p) - C_2(p)}{E_1(p) - E_2(p)} \]

where \( p \) denotes the program, \( C(p) \) is the cost of the programs 1 (treatment or new intervention) and 2
(control or "old" intervention), and \( E(p) \) is the effect (impacts) of programs 1 and 2. In general, the ICER is
used to compare the cost and effectiveness of new and old(er) devices, techniques, drugs, or interventions.

Since this study will not compare youth EFNEP programs to a control or other program, the CER is defined as:

\[ \text{CER}(p) = \frac{C(p)}{E(p)} \]

Cost-effectiveness analyses differ from cost-benefit analyses (CBA). Existing studies for the adult EFNEP programs focus more on cost-benefit analyses (CBA). The CBA is

\[ \text{NB}(p) = B(p) - C(p) \]

where \( p \), again, denotes the program, \( NB(p) \) net benefit of the program, \( B(p) \) total benefits, and \( C(p) \), total
costs, all measured in dollars. Benefits include both direct benefits, such as increases in life expectancy, and
indirect benefits, such as increased productivity at work. Correspondingly, the CBA conversion requires a
multitude of decisions and assumptions, such as: diseases avoided by following an optimal diet; incidence of
the disease/condition that is attributable to diet; optimal nutritional behavior; and cost of disease/condition
avoided. As a result, the Panel on Cost-Effectiveness in Health and Medicine (PCEHM) highly recommends
the CEA:

[The] health sector has traditionally favored economic analyses that assess cost
per unit of health effect, resisting the use of the closely associated technique of
cost benefit analysis (CBA), where both costs and benefits are measured in
dollars. A number of ethical difficulties ranging from macro issues, such as the
effect of valuing the time people spend pursuing medical treatment according to
their wages, are already embedded in CEA. CBA adds an additional difficulty in
that it presumes to put a dollar figure on the value of human life and uses
controversial methods to do so. The panel has shared the dominant bias of the
health sector-that monetizing the price of life in these ways introduces ethical
concerns that are avoided by CEA, albeit at the sacrifice of generalizability.
Though none of the CBA EFNEP studies considered youth, it is clear that the difficulties associated with CBAs would be exacerbated in a youth study, because of the increased uncertainties in dealing with a longer life span. As a result, it was determined that CER would be utilized rather than CBA.

**Methodology**

**Participants.** The expert workshop panel consisted of 12 state and national experts: seven females, five males (n=12); average age of 51.5 (n=11); 21.3 years of related work experience (n=11); and were predominantly white and non-Hispanic (n=12) with one individual being Native American Indian and another Latina/Hispanic. The panel had expertise in EFNEP (including state coordinators), health economics, nutrition, physical activity, behavioral interventions, and evaluation research. All participants attended an expert panel workshop in Blacksburg, Virginia, on May 11 and 12, 2009. All participants provided informed consent, with the proposed research approved from the Virginia Polytechnic Institute and State University Institutional Review Board.

**Workshop Overview.** Each workshop participant received meeting materials two weeks prior to the workshop, containing background information on relevant topics (EFNEP, cost-effectiveness ratio), biosketches of all workshop participants, and workshop objectives. The two main objectives of the workshop (see figure 1) were:

- **Conceptualization –** Determine (based on consensus) the conceptual constructs that need to be measured in terms of the costs of the program and the effects (impacts) of the program based on justified arguments and with an emphasis on overweight/obesity prevention.
- **Instrumentation –** Determine (based on consensus) the instruments that can be utilized in measuring the conceptual constructs for costs and effects (impacts) of the program based on justified arguments.

The first day was devoted to content with keynote presentations on: EFNEP; youth EFNEP evaluation; cost-effectiveness; and the Virginia youth EFNEP curriculum proposed, as a case study, to be used to gather data for the creation of a model. The second day focused on discussion of the conceptualization and instruments for determining costs, followed by conceptualization and instruments for determining effects.

**Analysis.** A stenographer (certified court reporter) transcribed each panelist’s comments and non-verbal communication (nodding, shaking of head). The workshop was also tape recorded using two digital audio-recorders placed on separate tables. Two panelists took notes during the meeting to document major

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viewpoints and decisions, affirmed by both verbal and non-verbal communication. The stenographer’s transcripts were converted directly into two separate Microsoft Word (2007) documents for each day of the workshop (126 and 198 pages, respectively) from .txt files. Where the stenographer indicated that comments were inaudible, two members of the expert panel compared the transcripts to the audio recording and workshop notes for completeness. Required clarifications were discussed between the two panelists until consensus was reached, with any missing information added and highlighted in the transcript. The two panelists then independently reviewed the complete transcripts manually, using the constant comparative analytic framework outlined by Krueger. Data were grouped together by discussion points and themes, identified by frequency and extensiveness of their respective discussions compared to other topics, and placed in categories. Descriptive summaries of the points and counterpoints, including extracted quotes, and the final decision made by group consensus were also generated. The two reviewers then compared, contrasted, and discussed their respective findings to generate a final report. Selected quotes that best described the viewpoints were chosen; they are highlighted in italics in the results. All members of the expert panel reviewed the final results and discussion to ensure that they fully represented the panel’s opinions and the context of the discussion and recommendations.

Results

GENERAL

Target Audience of Cost-Effectiveness Model. Workshop attendees felt it necessary to explicitly define the target audience for any cost-effectiveness model that was developed. In this regard, a number of EFNEP stakeholders were identified including state and national legislators. However, workshop participants indicated that the key target audience for the cost-effectiveness model would be State EFNEP Coordinators. Consensus was that State Coordinators could, in turn, share cost-effectiveness data with their key stakeholders to demonstrate success or to be used as a metric to encourage quality improvement. For the remainder of the workshop, the discussion focused on identifying costs and effects that would be appropriate and available at the state level.

CONCEPTUALIZATION

Costs C(p). For the most part, consensus was obtained easily for the cost side of the CEA (tables 1 and 2) with the exception of a few items. The central idea that emerged is to use cost categories from accounting and economics for classifying and collecting cost data. It was noted however, that in some states, data are entered at the local level by the educator teaching the classes. In other states, the data entry is done at the state level. Further, the administrative structure of EFNEP varies from state to state. For example, some have multi-county supervisors, others do not.

Direct costs will be divided between adult and youth components with the educator’s percent appointment to youth EFNEP being used to calculate labor, utilities, and capital costs for that respective site (table 1). Finally, cost data should only be gathered and collected for programs that consist of a series of six or more lessons, not for one-time presentations.

Behavioral Effects E(p). A significantly greater portion of the workshop was devoted to effects (impacts) than costs. Several challenges were noted in evaluating youth EFNEP, including: the high degree of variation in programming; age-dependent curricula to accommodate a wide range of cognitive developmental levels; a wide age range (pre-K to 12th grade); and focus, ranging from knowledge gains, skills learned, and behaviors changed. A great deal of discussion revolved around what effects could be expected from youth EFNEP (table 2), including: What is the evidence supporting the effectiveness and efficacy of EFNEP? Does behavior change take place? What are the long-term impacts? What instruments have been tested with youth EFNEP? The panelists also discussed using Quality Adjusted Life Years (QALYs) as the measure of the effect. QALYS involves translating knowledge, skills, attitudes, and behavior (the actual stated goals and desired effects of the program) into number of life years saved (as mentioned earlier under CEA versus CBA). The expert panel felt that there was insufficient evidence in the literature for making this translation with any reasonable level of confidence, particularly among youth. Given the state of evidence and the “political” importance of EFNEP as a program that elicits behavior change, the panel ultimately decided that the final cost-effectiveness model should allow for the calculation of cost-effectiveness for knowledge, skills, attitudes, and behavioral effects as these are the stated goals of the program. The State Coordinator then has the flexibility to determine which effects to ultimately include in the model. Ideally, all effects would be aligned with the following youth EFNEP indicators related to nutrition and health, along with an impact indicator on physical activity:
1. Youth now eat a variety of foods
2. Youth increased knowledge of the essentials of human nutrition
3. Youth increased their ability to select low-cost, nutritious foods

**INSTRUMENTATION**

**Costs** $C(p)$. While one goal of the workshop was to identify instruments to measure cost, the collection of cost data was viewed as being rather simple and straightforward and founded on basic accounting and economic principles which did not lend themselves to measurement concerns like reliability, validity, and sensitivity. No specific instruments were identified per se to collect cost data – outside of cost-sharing spreadsheets that are routinely collected for the Supplemental Nutrition Assistance Program – Education Program (SNAP-ED) program. Therefore, corresponding cost instruments will be developed with flexibility to allow for differences in collection procedures across states.

**Behavioral Effects** $E(p)$. There was collective agreement that measuring program effects would be the most difficult challenge in this endeavor. It was recommended that the project coordinators reach out to the broader research arena, as well as to the EFNEP/SNAP-ED youth evaluation project database, to identify appropriate instruments that are ideally reliable, valid, and sensitive (i.e. ability to measure appropriate change). The panel identified several possible survey instruments to gather effects data: National Longitudinal Survey of Youth; California Youth EFNEP WalkFit evaluation; California Youth EFNEP EatFit evaluation; California Youth EFNEP Kids KarToons (cartoon-style evaluation booklet); Texas School Physical Activity and Nutrition (SPAN) Project (4th, 8th, 11th grade); Coordinated Approach to Child Health (CATCH) (3-5 grade); the Youth Risk Behavioral Surveillance System (9th-12th grade); and the Quality of Well-Being Scale. A subset of the workshop participants will serve as an advisory panel to provide feedback on instruments that are developed.

**ADOPTION AND IMPLEMENTATION OF MODEL**

**Characteristics of a Cost-Effectiveness Model.** While participants agreed that a cost-effectiveness model was invaluable, they also stressed the importance of the following characteristics in order to enhance its adoption:

- Doable – “make the assessment as easy as possible”

Believabl – “the personal confidence of whether or not I actually believe that is the contribution our work is making”

Explainable – “I, as a state coordinator, need to be able to take this formula and be able to explain it to anybody that says, ‘How did you arrive at that number?’ I think you really need to have it not only verbally; but you have to hand it to them one, two, three, step-by-step how to explain it so that they can feel credible.”

Clear - “Able to answer, ‘So what? What do I get out of this?’”

Adoptable – “And relatively easy and relatively soon.”

A suggestion was made to target select states to adopt and implement the model, understanding that some states will be early adopters and others laggards, aligned with the Diffusion of Innovations theory. Further, for the cost-effectiveness model to be utilized, it was suggested that sample evaluation instruments be posted online and accompany the final model and software for state EFNEP coordinators to use.

**COST-EFFECTIVENESS MODEL AND SUSTAINABILITY OF EFNEP**

Importance of a Cost-Effectiveness Model. There was consensus that a cost-effectiveness model for youth programs was critical for supporting, advocating for, and sustaining EFNEP, as stated by one workshop participant: “We need to do a better job of proving this (EFNEP cost-effectiveness) value so that we build or maintain our political capital.” Additionally, the model can help identify programs that are more or less cost-effective, which can, in turn, lead to productive discussions about why.

Several concerns were raised about youth EFNEP that clearly affected cost-effectiveness interpretations and overall sustainability of youth EFNEP. For example, the next generation of federal youth program reporting software should include physical activity indicators, particularly given the significance of physical activity in overall health and weight maintenance. Perhaps EFNEP should consider nationalized, standardized curricula and evaluation to help promote consistency across states. It will be critical to assess the public value of EFNEP. In addition, longitudinal and randomized control trials assessing program effectiveness should be conducted.

**Discussion**

While there is a significant need for information on the cost-effectiveness of youth EFNEP, one of the barriers to providing critical data is a lack of consensus on the appropriate outcomes that should provide the
basis for such an analysis. For example, is it enough to demonstrate that the programs significantly change children’s nutrition knowledge or attitudes towards healthful eating at a reasonable cost? Or changed behavior? Or change objectively assessed body composition? Or show long-term health benefits? The results from this expert panel workshop helped identify inputs and outcomes needed for the development of a cost-effectiveness model and software program that can be used by EFNEP state coordinators to analyze their respective youth programs. However, several concerns were raised, beyond the scope of the study, namely the lack of longitudinal and randomized control trials, along with reliable, valid, and sensitive (i.e. ability to measure appropriate change) survey instruments, to determine the program’s overall effectiveness. As noted by one workshop participant, “We would do well to remember the advice of Voltaire: ‘The perfect is the enemy of the good.’ We are trying to make progress here. We’re trying to create something that would be useful out in the field. It is not going to be perfect. We are going to have to make compromises. We are going to have to make tradeoffs, so let’s recognize that we have to make improvements and we are not going to end up with something perfect, but can we get something that is better than what we have now…which is nothing.”
References


5. Dickin KL, Dollahite JS, Habicht JP. Nutrition behavior change among EFNEP participants is higher at sites that are well managed and whose front-line nutrition educators value the program. J Nutr 2005;135:2199-205.


