

EFNEP computer simulation: dust off old files

Richard A. Krueger

We can learn from the past, but only if the information is available and usable. In most human tasks, from repairing an automobile to managing a complex human service program, experiences are useful tools. The auto mechanic makes use of a "flat rate manual" to estimate the amount of time required to repair a malfunction. This manual is compiled from the experiences of other mechanics who've done the same job.

Working with people in human service programs is more complex than fixing automobiles, yet the records of the past can help us plan time more effectively.

Minnesota Study

During the past decade, thousands of individuals have participated in EFNEP (Expanded Food and Nutrition Education Program). In Minnesota, the teaching method used has largely been one-to-one contact with paraprofessional aides. Careful analysis of these interactions provides insights into the nature and causes of faster and more efficient nutritional performance on the part of the program participants.

EFNEP is unique from other programs in Extension in its potential for obtaining precise data on program inputs and outputs. From its inception, EFNEP units have maintained comprehensive files of homemaker data. These records include nutritional performance measurements, instructional time, and socioeconomic characteristics.

These data on previously enrolled EFNEP homemakers represent a resource that can benefit program managers. One method of using this resource is represented in a Minnesota study that focused on a computer simulation of EFNEP, based on data analysis of previously enrolled homemakers.

Richard A. Krueger: Assistant Extension Specialist, Home Economics Family Living, University of Minnesota—St. Paul. Accepted for publication: January, 1980.

This simulation allowed for experimenting with EFNEP "on paper" without the actual investment of costly human and material resources.¹

Building Computer Model

The computer simulation model was based on a sample of 90 former EFNEP homemakers in the city of Minneapolis during the period 1971 to 1978. The EFNEP reporting forms and interviews with the supervisory home economist provided the information to construct a theoretical model of the nutritional changes in the homemakers.

Causal Map

A set of patterns or trends emerged from the data analysis that explained the nutritional changes occurring in the homemaker. These trends are arranged in a pattern to form a hypothesis of causal action or a causal map. This causal map, Figure 1, shows the feedback relationships in the nutritional progression of an individual homemaker. The causal map selected is adapted from the "General Theory" of human service delivery suggested by Levin and Roberts.²

The causal map reflects several basic factors in the relationship between aide and EFNEP client. The aide is influenced by the previous nutritional performance of the homemaker. Each time the aide measures the participant's

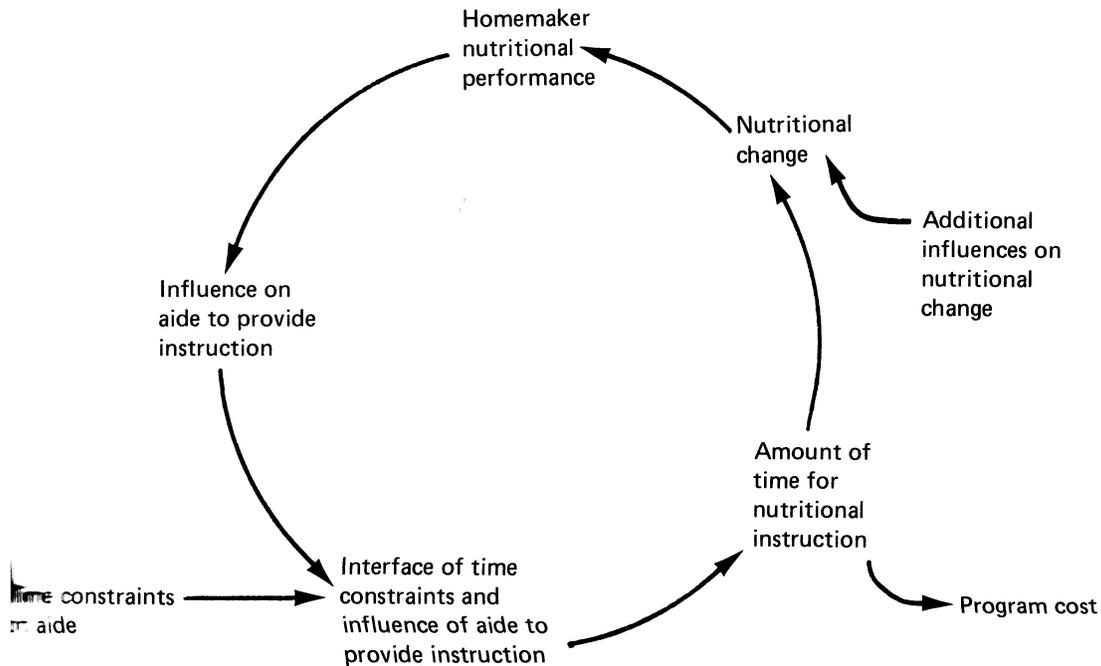


Figure 1. Causal map of nutritional performance of EFNEP homemaker.

nutritional performance, the measurement influences the aide's future behavior. As a result of this assessment, the aide may provide more or less help in the coming month. This factor alone, however, doesn't control the actual amount of time. Time constraints, like a caseload of other homemakers and additional duties, limit the actual amount of instructional time to a particular participant.

*Nutritional
Change
Influences*

The homemaker makes nutritional changes that are influenced by the amount of nutritional instruction provided by the aide. In addition, other factors also influence the nutritional change of the participant. In the sample studied, six additional influences were identified through multiple regression analysis:

1. The initial diet recall score of the participant when he/she entered EFNEP.
2. The concentration of participants from ethnic groups within the aide's caseload.
3. The degree of specificity versus generality of aide instruction.
4. The use of food stamps by the participant when he/she entered EFNEP.
5. Whether the 24-hour diet recall is taken on a Monday.
6. The amount of dollars spent on food for each family member.

These 6 factors, plus the number of hours of instructional help given by the aide, explain about 59% of the influence on the participant's nutritional change.

*Trends and
Relationships*

In this study, EFNEP homemakers historically have made predictable nutritional changes that were associated with forces in their environment. EFNEP assumes that aide instruction results in homemaker nutritional improvement. These past data allow us to determine the specific amount of improvement for each additional hour of instructional time. Not all homemakers receive the same amount of nutritional instruction. The amount of aide instruction is predictable and measurable based on the homemaker's nutritional adequacy and the length of program participation.

It's trends like these, derived from the historical data that are valuable in constructing a computer model. These trends and relationships can be expressed in mathematical formulas. The computer simulation is a series of formulas or equations, arranged in a sequence, based on the experiences of aides and EFNEP participants. Using these equations

the computer calculates a projection of the future nutritional performance of a homemaker. Of particular interest to the observer is the relationship between the program cost and the participant's nutritional changes. By selectively changing the model, the computer operator can project the cost effectiveness of a variety of policy alternatives.³

Computer simulation can be a useful management and training tool in programs such as EFNEP. Potential policies can be identified, modeled, and assessed with a minimum amount of cost and time. . . .

Results of Study

The greatest amount of homemaker nutritional improvement occurs during the first six months, followed by modest nutritional improvement during the second six-month period. Limited additional nutritional change occurs after 12 months of EFNEP participation.

Program participants differ in their ability to make nutritional improvements, but in a predictable way. The ability to make nutritional improvements is associated with socioeconomic characteristics of the participants and the aide instructor.

The cost effectiveness of EFNEP depends on several factors: socioeconomic characteristics of the homemakers, the graduation level for the homemakers, the amount and timing of nutritional instruction from the aide, and the method and quality of nutritional instruction.

The paraprofessional aides make important judgments about the allocation of instructional help to program participants. The aides make the key decisions on how much help to provide, when to provide it, and who receives the help.

Implications

Extension decision makers face key decisions on the future direction of EFNEP:

1. What's an acceptable level at which homemakers should be graduated from the program? This question focuses first on the nutritional adequacy of the graduated participant and second on the program cost of various levels of graduation. According to the simulation model, the cost effectiveness is increased as the graduation level is reduced.
2. Mastery nutritional performance—where all homemakers are able to achieve the nutritional performance goal—is possible, but it requires sizable amounts of

resources and a modified instructional delivery system. Mastery nutritional performance wasn't occurring in the sample studied; however, it's possible with intensive aide instruction to participants. The simulation revealed that the program cost per participant would approach \$1,350 for the slowly progressing participant, \$416 for the average progressing participant, and as little as \$25 for the rapidly progressing participant.

3. Program managers must reexamine the procedures for relating to slowly progressing homemakers. Guidelines are needed for handling the participants who are unable or unwilling to make nutritional progress. Individuals who are likely to graduate from EFNEP can be identified early, within the first three months of participation, by careful analysis of available data and more frequent performance measurements. The present procedures of taking homemaker performance measurements on a six-month basis need revision. More measurements, especially early in the program, would result in a more usable assessment of nutritional progression.

Conclusion

Our past 10 years of experience with EFNEP can be a significant asset in the decade ahead. Thousands of EFNEP participants have contributed to the information that can prove helpful in making future management decisions. The files of participant information can tell us much about the amount of help needed for nutritional improvement, the effectiveness of various methods of instruction, why some participants make rapid progress and others make no progress when nutritional instruction is most effective, and when it tends to be of limited value in improving nutritional competency.

Computer simulation can be a useful management and training tool in programs such as EFNEP. Potential policies can be identified, modeled, and assessed with a minimum amount of cost and time. In addition, staff members can practice decision-making skills and observe the projected consequences with a minimum of delay.

Footnotes

1. Jay W. Forester, *Industrial Dynamics* (Cambridge, Massachusetts: The M.I.T. Press, 1961), p. 49.
2. Gilbert Levin and Edwards B. Roberts, *The Dynamics of Human Service Delivery* (Cambridge, Massachusetts: Ballinger, 1976), pp. 17-24.
3. Herbert A. Simon, *The New Science of Management Decision* (Englewood Cliffs, New Jersey: Prentice-Hall, 1977), pp. 57-62.