The Flu Shot Study: Using Multiattribute Utility Theory to Design a Vaccination Intervention

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Differences between the multiattribute utility (MAU) profiles of participants who had previously gotten flu shots and those who had not done so were used to design an informational brochure urging influenza vaccination. The effectiveness of the MAU brochure was evaluated in a VA ambulatory care clinic with a long-standing influenza vaccination program. The target population for the intervention was high-risk clinic patients who had not gotten a shot the previous year. Participants received either a letter urging them to get a flu shot, or a letter plus the informational brochure. A significantly larger proportion of the patients who received the brochure got shots; 36% versus 23% for the letter only. While a 13 percentage point increase is modest, influenza and related complications (preventable through vaccination) are the fourth-leading killers of older persons. Adding a MAU-based brochure to an ongoing vaccination program is inexpensive and may save additional lives.

Multiattribute utility (MAU) schemes have been applied to important personal decisions to achieve either, or both, of two goals: to provide decision makers with a decision aid, and/or to facilitate the development of interventions designed to influence personal decisions. Decision aids

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use MAU schemes to structure the components of relatively complex and infrequent decisions (e.g., the decision to have a baby; Beach, Campbell, & Townes, 1979). The decision aid helps people think through their decisions in a more systematic and thorough manner than they otherwise might. This is done in the belief that a thoroughly reasoned decision has a greater chance of proving to be personally satisfying than a less reasoned one, no matter what the outcome of the decision.¹

To achieve the second goal, MAU schemes are used to ascertain the relative contributions to the final decision of the possible consequences of the decision, i.e., the degree to which the consequences are perceived to argue for or against the course of action under consideration. The consequences that argue most strongly for and against a decision are then used to guide the development of an intervention to influence the decision.

An example of the use of a MAU-based intervention was reported by Beach, Mai-Dalton, Marshall, and Beach (1981). MAU was used to identify the consequences that had the greatest influence on people’s decision to commute by public transit (bus) or by private car. One negative consequence of commuting by car (high monetary cost) was identified as most important to one group of car drivers, but as rather unimportant to another group of drivers. The intervention consisted of sending some free bus tickets to members of both groups. The result was that the members of the group for which cost was important switched to the bus, but the tickets had no effect on bus use by the members of the other group.

The present study refines and extends the Beach et al. (1981) study. Instead of changing the consequences (i.e., the free tickets in the previous study), however, an educational intervention was used to induce the decision makers to decide to perform the behavior of interest. The decision in this study was whether or not to get an influenza vaccination (flu shot). The participants were patients of an ambulatory care clinic at a large Veterans Administration Medical Center who were at high risk for influenza complications (65 years of age or older and/or persons with certain chronic illnesses; Immunization Practices Advisory Committee, 1984). For these individuals, influenza is a very serious disease that often leads to complications, like pneumonia, which may result in hospitalization or even death (Barker & Mullooly, 1982; Housworth & Langmuir, 1974). Despite the wide availability of safe and effective vaccines (Nolan, 1981; Retailliau et al., 1980), annual vaccination rates are low, estimated at 20% nationally (Barkdoll, 1976; Kavet, 1976), and influenza and re-

¹ To our knowledge, no one ever has tested this belief. We suspect that only decision theorists really care much about whether decisions are made correctly. Decision makers simply care about whether the decision that is to be made will turn out to be correct, i.e., that the decision’s consequences will prove to be agreeable.
lated complications currently constitute the fourth-leading cause of death for high-risk persons in the United States (Surgeon General's Report, 1979).

This study was conducted in a setting in which an active influenza vaccination program had been in place since 1978. As a part of routine clinical activities, high-risk patients are mailed letters annually inviting them to obtain flu shots from a special vaccination clinic during a 2-week period in late autumn. While vaccination rates have gradually improved in the last few years, approximately 34% of high-risk patients fail to obtain a shot in any given year. Furthermore, patients who do not get a flu shot in a given year are at least three times more likely to fail to get a shot the following year than are patients who got the shot during the previous year. Thus, the aim of this research was to induce patients who had not gotten a shot the previous year to get one during the year in which the study was performed, which we shall call the intervention year.

The intervention consisted of a mailed informational brochure. The brochure was based upon the results of an earlier MAU study in this same setting. The earlier study was aimed at discovering, for high-risk patients, which consequences argued for, and which argued against, getting a flu shot. The brochure and an accompanying letter that explained where and when to get the shot were sent to patients prior to the 2-week special flu shot clinic in October of the intervention year. The question was whether this intervention, which was tailored to this specific population, would result in an increase in decisions to obtain a flu shot among those patients who had not gotten a shot the previous year.

METHODS

Participants and Design

Study participants were recruited from the patient population cared for in the Medical Comprehensive Care Unit (MCCU), a long-term care, general medical clinic of the Seattle Veterans Administration Medical Center. Patients were eligible for the study if (1) they were active patients in the clinic; (2) they were at high risk for influenza complications because of age (65 years of age or older) and/or medical diagnosis (diabetes, chronic lung disorders like bronchitis or emphysema, or chronic heart disorders like congestive heart failure); (3) they did not reside in a nursing home; and (4) they did not have severely disabling mental, visual, or hearing impairments. Of the more than 2100 clinic patients, 1093 were eligible.

This study was part of a larger project that was carried out over 3 consecutive years. In the first year, face-to-face interviews were conducted and the MAU scheme was developed. In the second year the MAU scheme was used to ascertain the relative contributions of perceived con-
sequences of getting the flu and of getting a shot to the decision about whether or not to get a shot. In the third year, an intervention was designed using the MAU results from the second year. This intervention was an informational brochure that was sent to a sample of patients who had not obtained a flu shot the previous year. After the "flu shot season" a follow-up was conducted to see to what degree the brochure had influenced participants to get shots. Because the first 2 years of the study have been reported elsewhere (Carter, 1983; Carter, Beach, Inui, Kirscht & Prodzinski, 1986) only the relevant details are given here.

Since influenza vaccine is available for only a limited time each year, data collection was scheduled to occur within specific intervals surrounding the flu shot season: participant interviews were conducted prior to the flu shot season (July through September); flu shot intervention materials were mailed in early October, approximately 10 days prior to the opening of the special 2-week flu shot clinic; and patients’ flu shot status was assessed through a brief follow-up questionnaire in late January after the end of the flu shot season. Since influenza vaccinations are available from many sources (e.g., community clinics and other VA clinics), self-reports are important in obtaining an accurate estimate of vaccination status (Larson et al., 1979). Over the course of this study, approximately 80% of participants who got flu shots were vaccinated in the clinic. A high degree of agreement (94%) was found between self-reports and clinic records for those persons who reported getting a flu shot from the clinic.

**Year 1: Developing the MAU Scheme**

The content for the MAU scheme was based on concerns about flu and flu shots expressed by a stratified (age, diagnosis, and prior year flu shot status) random sample (N = 63) of high-risk clinic patients during hour-long exploratory interviews conducted the first year. Review of interview data led to the identification of 15 categories of perceived consequences of getting the flu and of getting a flu shot that formed the basis for the hierarchical scheme illustrated in Fig. 1.

Since most participants were old and ill, large "worksheets" (18 × 22 in.), corresponding to the two major subcategories were developed. The lowest level categories contain brief paragraphs, obtained from patient interviews, that describe both pro and con consequences.

**Year 2: Contributions of Consequences for Shot Takers and Shot Nontakers**

In the second year, a stratified (age, diagnosis, and prior year flu shot status) random sample of 517 patients, drawn from the eligible high-risk
FIG. 1. Hierarchical structure of the MAU scheme.

Clinic patient population (excluding those who participated in the development of the MAU scheme), participated in MAU interviews. An interviewer led the participant through the procedure step by step. For each consequence shown in Figs. 2 and 3 the interviewer read the descriptive paragraph, and participants distributed the 10 "weights" between the two pans on the "balance scales" (at the left of each paragraph in Figs. 2 and 3). While some modifications were made for this application and population (see Carter et al., 1986), the weights assigned by participants indicated the degree to which the consequences in the paragraph (and similar ones that may have occurred to the participant) argued for getting a flu shot or against getting a flu shot.

After the participant had assigned for and against weights to the perceived consequences in each branch of the hierarchy (e.g., the pair of consequences, discomfort and complications, that constitute the "Health" branch shown in Fig. 2), he or she was asked to divide 10 weights among the consequences to indicate the relative importance of each to the decision. This same procedure was followed for the three branches on each worksheet (e.g., Health, Activities, and Other People in Fig. 2) and for the Flu Worksheet versus the Shot Worksheet, to indicate their relative importance to the decision.

As has been the practice in previous research (e.g., Beach et al., 1981), the weights were all converted to decimal numbers (i.e., 10 = 1.0, 9 = 0.9, etc.), and the importance weights were multiplied down the branches of the hierarchical tree (Fig. 1). Then, the importance weights were mul-
A. POSSIBLE EFFECTS OF THE FLU ON YOUR HEALTH

1. DISCOMFORT
   Examples: Some people think that having the flu is not too bad, a lot like having a cold; they may be uncomfortable, have a mild fever, feeling achy, but it will go away in a few days. Other people think that they will be miserable if they get the flu (fever, congestion, nausea, vomiting, diarrhea, and that it might last a week or even a month or longer).

2. COMPLICATIONS
   Examples: Some people are healthy or they feel that they could get over the flu without much trouble. Others think they are in pretty good shape, but have some of age or lowered resistance, having the flu might lead to other problems, like pneumonia. Still others already have health problems (asthma, arthritis, diabetes, heart problems, or lung problems) and they worry about the flu making these problems worse or killing them.

B. POSSIBLE EFFECTS OF THE FLU ON YOUR ACTIVITIES*

1. WORK AND CHORES
   Examples: Some people think that having the flu wouldn't keep them from doing the routine things they usually do. Other people think that if they had the flu they would not be able to go to work or do anything strenuous (go outdoors, do the shopping, or work around the house). Others think they would have to give up all routine activities (work, cooking, shopping, etc.) and stay in bed or lie around the house.

2. RECREATION AND PASTIMES
   Examples: Some people think that having the flu would not keep them from doing their hobbies or social activities. Others think that the flu would make them give up most of the activities that they do for fun (dancing, singing, working on the car, walking and exercising, gardening, hunting, golf, going to visit friends, spending time with their family, going to meetings).

C. POSSIBLE EFFECTS OF THE FLU ON OTHER PEOPLE*

1. NEEDING SOMEONE'S HELP
   Examples: Some people think that they could take care of themselves if they got the flu and would not need help from anyone else. Others think they would have to depend on someone else for help with cooking meals and shopping, etc. Some have a spouse, relative, friend, or neighbor who could provide that help. Others have no one to help them and would have to go to the hospital if they got the flu.

2. GIVING THE FLU TO OTHERS
   Examples: Some people don't worry about giving the flu to others; they may not have a family or see many people. Others think about giving the flu to younger children, perhaps grandchildren, and would have to stay away from them until they are well. Other people are concerned about giving the flu to their spouses, family, friends, or anyone else and would tell everyone to stay away.

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Fig. 2. The "Flu" component of the MAU scheme. *In original, each paragraph was presented with scales like those shown in "A".
A. POSSIBLE EFFECTS
A FLU SHOT MAY HAVE ON YOUR HEALTH

1. DISCOMFORT
Examples: Some people don’t mind having shots. Others don’t like being stuck with needles but see shots as a necessary fact of life. Other people are afraid of shots and would find almost any excuse to keep from getting a flu shot.

FOR AGAINST

0 0 0 0 0

2. SIDE EFFECTS
Examples: Some people have had flu shots for years and say they never had any bad effects. Others say they get a sore arm, headache, mild fever, or actually get the flu from the flu shot. Other people are afraid of flu shots because a few years ago some people got very sick, and some died after having had the Swine flu shot.

FOR AGAINST

0 0 0 0 0

3. COMPLICATIONS
Examples: Some people believe that the flu shot is safe and will not affect their other health problems. Others think that the flu shot may not mix well with their other medications. Other people worry that the flu shot might complicate their other health problems, like allergies, asthma, diabetes, or high blood pressure.

FOR AGAINST

0 0 0 0 0

B. MAKING A SPECIAL TRIP TO GET A FLU SHOT*

1. TRANSPORTATION
Examples: Some people have no difficulty getting to the hospital; they either drive their own car or can easily take the bus. Others have difficulty; gas is expensive, taxi fare is high, they may have trouble driving because of a health problem, they have trouble finding hospital parking, they have to have someone drive them, or they may have a long ride on the bus, perhaps involving several transfers or an inconvenient schedule.

REMEMBERING AND FINDING TIME
Examples: Some people easily remember to go get a flu shot, they mark their calendars and go when the time comes. Others have difficulty remembering to go and may not remember to go get a flu shot. Some people don’t mind the time it takes to get to the hospital and get the shot. Others have trouble finding the time, maybe they can’t get off work, and some don’t like to spend time waiting at the hospital.

3. BEING AT THE HOSPITAL
Examples: Some people enjoy being at the hospital, they see old friends and visit, read a magazine or a book, see doctors and nurses whom they know and like, and some say that being in worse shape than they are makes them appreciate their own health and keeps them from getting depressed. Others don’t feel one way or the other about being at the hospital; it is just routine or a necessary evil. Either people don’t like hospitals; they think hospitals are unpleasant places, and they dislike seeing other people in bad shape.

FOR AGAINST

0 0 0 0 0

C. OTHER PEOPLE’S OPINIONS ABOUT THE FLU SHOT*

1. FAMILY
Examples: Some people say that what their family thinks of the flu shot is of no concern to them and that they make their own decisions. For other people, what their family members think or have experienced has a great influence on their decision about the flu shot.

2. FRIENDS
Examples: Some people don’t care what their friends think about the flu shot, they make their own decisions. Other people listen to what their friends have to say and use their friends’ experiences and opinions to make a decision about whether or not to get a flu shot.

3. YOUR DOCTOR
Examples: Some people wonder if their doctor really knows what he or she is doing; they worry about being experimented upon, and they would rather make up their own minds about the flu shot. Other people think that the doctor knows what is good for them and will only take the flu shot if their doctor recommends it.

FIG. 3. The “Shot” component of the MAU scheme. *In original, each paragraph was presented with scales like those shown in “A”.
tiplied times the "for" weights and times the "against" weights in the scales for each perceived consequence. The difference between these two products yields what we call the net weighted relative utility (NWRU) for getting a flu shot for each perceived consequence (although the formal criteria for regarding these numbers as formal utility measures are not strictly met). NWRU can range from −1.00 to 1.00, with 0.00 indicating that the weighted "for" and "against" arguments exactly balance each other, and positive and negative numbers indicating that the balance favors getting the shot or not getting the shot, respectively. The NWRU for each paragraph indicates which categories of consequences have the greatest relative pro or con influence on a participant's thinking about getting a shot, and serves as the basis for the desired intervention.

Differences between participants who get flu shots and those who do not. Of the 517 original participants, data for 479 (93%) were suitable for analysis. While all participants were able to complete the interview, 8 could not be contacted to determine vaccination status, and data from 30 were excluded from analyses because they died during the study observation period or because their doctor recommended that they not get a flu shot because of egg allergy or severe illness.

Based upon vaccination status, participants were divided into two groups: those who got a shot, called the shot group (n = 345) and those who did not, called the no-shot group (n = 134). The mean net weighted relative utilities (NWRU) were computed for each of the 15 paragraphs on the MAU sheets (Figs. 2 and 3) for each group and are presented in Fig. 4.

Values of NWRU above 0.00 in Fig. 4 argue for getting a shot and values below 0.00 argue against. Note that for the shot group all 15 perceived consequences argue for getting a shot or are neutral (at or near 0.00). In contrast, for the no-shot group 4 paragraphs argue for getting a shot (i.e., 1, 2, 6, and 15, Fig. 4), 2 paragraphs argue against (i.e., 8 and 9, Fig. 4), and the remaining 9 are neutral. That is, for these latter patients, the discomfort and complications resulting from the flu, the possibility of giving the flu to others, and their doctor's recommendation all argue for getting the shot. On the other hand, the possible adverse side effects of the shot and possible complications resulting from interactions between the shot and existing illnesses and other medications argue against getting it.

Year 3: The Intervention Year

The brochure. At the end of the second year, the six perceived consequences that differentiated shot and no-shot groups were used to design
an informational brochure about the flu and flu shots (Figs. 5 and 6). Its content included legitimate information that further strengthened the pro-shot argument for MAU consequences that argued most strongly for getting a shot and included legitimate counterarguments for each consequence that argued most strongly against getting a shot. These arguments are incorporated into the answers (“Flu Facts from Your Doctor”) to five

![FIG. 5. The intervention brochure: Cover and high-risk screening questions.](image-url)
A FLU QUIZ

FLU FACTS FROM YOUR DOCTOR

IF YOU ARE AT RISK, IT IS IMPORTANT THAT YOU GET A FLU SHOT EVERY YEAR.
REMEMBER, FLU VACCINE IS AVAILABLE ONLY IN THE FALL.

1. TRUE  False
   The flu is like a bad cold. People usually get over it in a week or so and don't have any trouble.

2. True  False
   The flu is not very contagious (catching). If you stay away from people when you have it, you probably will not give it to anyone.

3. True  False
   The flu shot doesn't work so there is no point in taking it.

4. True  False
   The flu shot does not mix well with other medicines and may make certain illnesses worse.

5. True  False
   You can get a bad reaction or get the flu from a flu shot.

6. True  False
   Your doctor wants you to get a flu shot.

Each year, many older persons, or others with major illnesses, such as HIV, report from influenza. Influenza is now the 4th leading killer of older persons.

IF YOU ARE AT RISK, IT IS IMPORTANT THAT YOU GET A FLU SHOT EVERY YEAR.
REMEMBER, FLU VACCINE IS AVAILABLE ONLY IN THE FALL.

Remember to get your FLU SHOT AT THE SEATTLE MEDICAL CENTER, MCCU CLINIC BUILDING 18, ROOM 152.

REMEMBER TO GET YOUR FLU SHOT AT THE SEATTLE MEDICAL CENTER MCCU CLINIC BUILDING 18, ROOM 152

FIG. 6. The intervention brochure: Flu quiz and reminders.
of six "Flu Quiz" questions in the intervention brochure. Because some knowledge of the effectiveness of influenza vaccine is fundamental to the initiation of the decision process, an item describing flu shot effectiveness was added to the content of the brochure (Question 3, Fig. 6). In addition, two reminder cards with special flu shot clinic times and location were included; one card had adhesive on the back and instructed the participant to stick it on the refrigerator door or on the calendar, and one card was to be put in his or her wallet or purse.

A sample of 284 high-risk patients who had not obtained a flu shot in the second year was identified. These patients were stratified by age (65 years of age or older, or less than 65 years of age) and diagnosis (diabetes, chronic lung or heart disease) and randomly assigned to one of four groups that were mailed one of the following interventions in early October: (1) the standard clinic letter; (2) the standard letter plus the brochure; (3) an augmented letter; or (4) an augmented letter plus a brochure. The standard letter contained the following message:

The flu season is approaching, and because of your age and/or medical condition you have a greater chance of getting a complication from the flu. We have flu vaccine that is safe and effective, and your MCCU doctor recommends that you receive it. Since there are different kinds of flu each year, it is important that you get a flu shot every year. This year's vaccine is for the "regular" flu, not the Swine flu.

The letter also included the time and location of the special flu shot clinic, was signed by the MCCU clinic chief on behalf of the clinic staff (whose names were listed at the bottom of the letter) and also included a list of local health department vaccination sites. This letter has been revised and refined on the basis of several years of clinical use. Since it represents the current standard practice in this clinic, the participants who received this letter constituted the control group for the study.

In the augmented letter a statement was added to the text of the standard letter that alluded to last year's vaccination status ("Last year, 70% of your fellow MCCU veterans were vaccinated and protected against the flu. We hope to see you this year"). This message contained both normative information and concern on the part of the Medical Center and was included to see if this change in the standard letter would influence shot getting.

At the end of the flu shot season, each participant was mailed a vaccination status questionnaire. An attempt was made to contact each participant who did not respond to the initial mailing, with second mailings and follow-up telephone contacts. Responses to this questionnaire and clinic vaccination records were used to determine shot status for the intervention year.
TABLE 1
PERCENTAGE OF PARTICIPANTS IN EACH EXPERIMENTAL CONDITION WHO OBTAINED A FLU SHOT AT THE END OF THE INTERVENTION YEAR

<table>
<thead>
<tr>
<th>Intervention</th>
<th>n</th>
<th>Percent (n) obtained shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard letter</td>
<td>57</td>
<td>19 (11)</td>
</tr>
<tr>
<td>Augmented letter</td>
<td>57</td>
<td>26 (15)</td>
</tr>
<tr>
<td>All letters</td>
<td>114</td>
<td>23 (26)</td>
</tr>
<tr>
<td>Std. letter + brochure</td>
<td>66</td>
<td>32 (21)</td>
</tr>
<tr>
<td>Aug. letter + brochure</td>
<td>55</td>
<td>42 (23)</td>
</tr>
<tr>
<td>All brochures</td>
<td>121</td>
<td>36 (44)</td>
</tr>
</tbody>
</table>

RESULTS

Two hundred thirty-five (83%) participants who had not gotten a shot the previous year remained in the study at the end of the intervention year. The number of participants in each group and the percentage who got a shot during the intervention year are summarized in Table 1.

Overall, a significantly larger percentage of participants who were mailed a brochure (36% versus 23% for the letter-only groups) got a flu shot during the intervention year \([t(233) = 2.20, p < .025, \text{one-tailed test}]\). The difference between the standard letter (19%) and the augmented letter (26%) is not statistically significant. Adding the brochure to the standard letter or the augmented letter, however, resulted in a statistically significant increase of 13 percentage points for the standard letter (19% versus 32%; \([t(121) = 1.68, p < .05, \text{one-tailed test}]\), and 16 percentage points for the augmented letter (26% versus 42%; \([t(110) = 1.82, p < .05, \text{one-tailed test}]\).

The significant differences that result from adding the brochure to either version of the letter indicate a reliable increase in the percentage of participants who got a shot, an increase of the magnitude of 13–16 percentage points. In contrast, the augmented version of the letter did not produce a statistically significant increase in the shot rate over the standard version of the letter. Moreover, the difference in shot rates between all recipients of the standard letter (32/123 = 26%) and all recipients of the augmented letter (38/112 = 34%) is not statistically significant. These two insignificant differences indicate that augmentation of the standard

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2 Of the 284 participants randomly assigned to study groups, 235 (83%) remained in the study at the end of the intervention year. Thirty-seven patients (13%) were found to be ineligible because of change of residence (no current address, moved out of area, or to a nursing home) or death. Two participants could not be contacted, and one refused to provide vaccination status information. Data from an additional 9 patients were excluded from analysis because the patient died during the observation period or their physician recommended not getting a flu shot as a result of egg allergies or severe illness.
letter with positive, but not specifically relevant, information did not reliably increase the percentage of participants who got a shot.

CONCLUSIONS

The results of the second year of this study showed distinct differences between the NWRU profiles of participants who got shots the previous year and those who had not (Fig. 4). Subsequent use of these results to design an intervention brochure significantly influenced the flu shot rate among participants who had not gotten a shot earlier—usually a rather refractory group. It is not possible, however, to evaluate the relative effectiveness of the individual elements of the brochure (graphic design, specific questions, reminders). A stronger test of the value of knowing the most influential consequences would have resulted from a comparison of two brochures—one addressing relevant MAU consequences and one addressing irrelevant MAU consequences. Because of the seriousness of this disease for the target population and the standard clinic use of a highly effective intervention, it was not appropriate to include a "placebo" message in this study. Nevertheless, the fact remains that the brochure had a significant effect upon those intervention year patients who had not received a flu shot the previous year. Of all the brochure recipients, 36% got a shot compared to 23% of those who received either version of the usual letter cue without the brochure.

While this vaccination rate increase of 13 percentage points may seem modest by some standards, it was achieved in a setting that has had a long-standing and very effective influenza vaccination program. Not only was the target population familiar with the flu shot program as a result of prior letters and medical advice, but the individuals influenced by the brochure had been refractory to clinic efforts to encourage vaccination during the year prior to the intervention. In this context, and in view of the absolute number of persons who are at risk for influenza complications (all persons 65 years of age or older, for example) as well as the seriousness of these complications, even a modest increase in the shot rate makes the MAU brochure an attractive intervention. Reduction in influenza-related hospitalizations (conservatively estimated to cost $1500 each; Carter, 1983) likely to result from the addition of a MAU-based intervention would more than offset the cost of adding the brochure to an existing vaccination program.

Aside from the cost effectiveness aspects, the results of this study, together with the results of the Beach et al. (1981) study, strongly suggest that the MAU scheme used in these studies is able to identify the important determinants of personal decisions. Moreover, knowledge of the identity of these determinants can provide guidance in designing and executing interventions to influence those decisions—free tickets in the one
case and educational information in the present case. In the two studies in question, the impact of the interventions was rather small; about 19 percentage points in the Beach et al. (1981) study and 13 percentage points in the present study. However, for large populations even these percentages could have enormous monetary and practical implications.

REFERENCES


RECEIVED: April 8, 1985