

**ATTITUDES AND BELIEFS ABOUT VOLUME-BASED  
PRICING: A FOUR CITY COMPARISON**

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**ABSTRACT**

This article examines the public's opinions of solid waste management issues in three counties in downstate Illinois. The responses of residents of communities with a volume-based pricing system for garbage collection were compared with responses of residents of communities without such a system. Contrary to our expectations, respondents exposed to volume-based pricing systems did not differ from those respondents who had not experienced these systems in their level of agreement with various statements pertaining to volume-based pricing. Furthermore, the self-reported waste reduction behaviors of residents in the various communities did not differ as a function of the type of collection system imposed. However, respondents' self-reported waste reduction behavior was found to be related to certain beliefs about volume-based pricing, particularly related to its function as a reminder about goods that people purchase and consume.

The management of the increasing amounts of solid waste produced by their populations is a continuing problem in both industrialized and developing nations. The United States and other industrialized nations are of particular interest due to the large number of convenient, disposable, and non-recyclable goods that enter the waste stream after being used by consumers in these countries. Over the past several years, research has indicated the usefulness of promoting recycling as a "low technology" solution to the waste management problem.

Recycling does not provide a definitive solution by itself, however. The amount of waste diverted from the waste stream due to recycling efforts depends in part on market forces, existing technology that produces materials that can be recycled, and on the cooperation of businesses, households, and individuals who must ensure that recyclable goods are actually recycled.

The U.S. Environmental Protection Agency has stressed the importance of waste reduction as an additional alternative to more strict technological means of waste management, such as incineration or landfilling. Waste reduction has only recently received attention by researchers. While existing literature has addressed personal characteristics that may motivate individuals to perform waste reduction behaviors, few studies have examined external incentives that may lead to initiation of these behaviors. While managers of conservation programs might find it difficult to design interventions focusing on personality variables, it is easier for them to imagine interventions that focus on modifying people's behaviors through means of external incentives or modifying their attitudes and beliefs about waste reduction through information campaigns.

This article examines pay-for-use fee structures as one type of external incentive for waste reduction. Pay-for-use fee structures (e.g., volume-based pricing [1]) entail charges for waste hauling services that are contingent on the amount of waste a household produces. Households that produce large amounts of waste receive higher fees than households that produce smaller amounts. The study was designed to examine the relationships between attitudes toward pay-for-use fee structures, experience with volume-based fee structures, and people's perceptions of how volume-based fees would affect their waste reduction behavior.

## RELATED LITERATURE

### **Waste Reduction Behavior and Its Antecedents**

Waste reduction refers to a category of behaviors rather than a single action. This category contains a wide variety of behaviors, ranging from thinking of alternative uses of products (e.g., donating used items), to making environmentally-responsible decisions about what products to purchase (e.g., buying items that are not overly packaged), to adjusting the amount that is purchased (e.g., buying items in large quantity or in bulk). Many waste reduction behaviors are performed at, or before, the point of purchase of products, while recycling behaviors are always performed after these products have been consumed. Distinctions between waste reduction and recycling are important to consider, as many researchers (e.g., [2]) have argued that no single set of antecedents can account for all categories of conservation behavior. Recent research indicates that people do distinguish between these types of behaviors [3]; thus our review is limited to the antecedents of waste reduction behavior.

Findings from some studies support the idea that attitudes, particularly attitudes that are matched in context and specificity to the phenomenon of interest, are related to waste reduction behavior. In an early study of consumer behavior, Balderjahn revealed that antecedents of conservation behavior vary across types of behaviors [4]. While the size of the respondents' residences, their educational level, and their attitudes toward pollution served as predictors of energy conservation, respondents' attitudes toward an environmentally-aware lifestyle served as predictors of their purchase and use of environmentally-safe products. In a more recent study of consumers, Mainieri et al. found that participants' specific attitudes about environmental consumerism were related to their reported purchase of environmentally-beneficial products and to their general environmental purchasing behaviors [5].

Evidence also exists for the idea that people's norms and motives are related to the types of attributes people consider when they make purchasing decisions. In a recent study, Ebreo, Hershey, and Vining found that the degree of importance people place on the conservation aspects of products is positively related to their felt obligation to act in an environmentally responsible way and on the degree to which they were motivated by concern for the environment [6].

Additional research indicates that people may behave in ways that benefit the environment due to self-protective, perhaps even selfish, reasons rather than more altruistic ones. Baldassare and Katz [7], for example, found that people who believed that environmental problems pose a personal threat to their health were more likely to buy environmentally safe products.

### **Motivating People to Engage in Waste Reduction**

No matter what specific motives for engaging in waste reduction are held by city residents, program managers and government officials are more likely to be concerned about the practical side of waste reduction. Waste reduction can clearly cut the costs of operating a household, a business, or a government body through the resulting savings in disposal and waste management costs. Thus, managers and officials are interested in encouraging residents to support waste management programs through participation, that is, through engaging in environmentally responsible behaviors.

Existing research, however, indicates that people are not actively engaging in these behaviors to a great degree. Tracy and Oskamp [8], for instance, found limited degrees of participation on both an individual and household level in various environmentally responsible behaviors, with a majority of respondents reporting that they only performed one or two of the presented behaviors. In fact, in comparison to other conservation behaviors, waste reduction behaviors are performed relatively infrequently. Evidence for this assertion is provided by Lorber [9], Mainieri et al [5], Tracy and Oskamp [8], and others. Even within the general category of waste reduction behaviors, some

actions are performed more frequently than others. In an intervention study, DeYoung et al. found that people were more likely to change behaviors performed in their homes than they were to change public behaviors such as shopping, that would result in source-reduction [10]. In addition, Scott and Willits' respondents reported that they were more likely to purchase products that result in lower levels of pollution than products that were packaged in recyclable containers [11].

The relatively low rate of participation in waste reduction might be explained by the public's lack of familiarity with these behaviors in comparison to recycling behaviors, which have been promoted in various media campaigns over the past several years. These campaigns, for the most part, have stressed the actions taken at the level of individuals and households with less of an emphasis on workplace behaviors, despite the fact that waste reduction efforts in private business and industry would greatly contribute to the diversion of materials from the waste stream. Such an argument is raised by DeYoung et al. who state that waste reduction activities that occur in one's home may be more familiar than those that occur outside the home [10].

People also may be less knowledgeable in general about the relation between specific waste reduction actions and their effects on the environment. Consider people's knowledge about environmentally-conscious purchasing behavior. For example, Linn, Vining, and Feeley found that people could easily give examples of products available in recyclable packaging, but had a more difficult time finding examples of products with "least waste packaging" or that were less toxic to the environment [12].

The public's unfamiliarity with waste reduction indicates that programs targeting this method of handling the solid waste problem must deal with finding ways of increasing awareness of methods to reduce waste and then methods for encouraging people to initiate, and then maintain, these behaviors. Some of these methods may be social while others may be directed at individuals. However, social norms concerning this category of behaviors may not exist in communities where the behaviors are infrequently performed, so role models who engage in the desired behaviors and other persons who can serve as providers of social support for persons who may want to begin reducing waste, may not be readily available. In addition, individuals may have positive attitudes toward the environment and be motivated to protect it but may still not engage in these behaviors due to a variety of reasons which may be related to their beliefs about waste management. They may: 1) lack the required knowledge, 2) believe that waste reduction behaviors are not effective, 3) think that the costs of performing these behaviors outweigh the benefits, or 4) believe that it is more important to recycle. Municipal programs which focus on intrinsic forms of motivation (e.g., norms, attitudes) thus may not be an effective means of leading people to engage in waste reduction (although they certainly are important in terms of maintaining these behaviors), unless they address the beliefs held by city residents.

## Research on Fee-For-Use Systems

The imposition of fee-for-use systems represents one form of extrinsic motivation that can be used to encourage people to engage in waste reduction activities. There are actually several fee-for-use systems. The two major systems are volume-based pricing and unit-based pricing. In unit-based pricing, households are charged by the number of containers of waste material they generate, while in volume-based pricing, households are charged according to the weight of the materials they produce, regardless of the number of containers into which the materials are placed.

The majority of articles published to date on fee-for-use systems are located in the economic and management literature (e.g., [13-18]) or in journals written for waste management professionals (e.g., [19-23]). Findings from this body of work indicate that unit-based and volume-based pricing systems lead to different waste management outcomes. Fullerton and Kinnaman [14], for example, demonstrate that use of a price-per-bag system results in an increase in recycled materials and reduction in the number of waste containers but not in the actual volume of materials. Other work (e.g., [16]) has shown that other waste management programs, such as recycling and yard waste collections, benefit from the imposition of fee-for-use systems. Previous work also indicates that public reaction to these programs is not necessarily positive, but varies depending on the existing waste management infrastructure. Canterbury [19], for instance, found that increased cost of waste disposal facilitates acceptance of fee-for-use programs.

In the present research, we investigated the public's beliefs about fee-for-use systems, specifically volume-based pricing of waste collection, and the perceived effects of the pricing system on waste reduction behavior. The selection of communities that differed in their waste management infrastructure (i.e., with or without volume-based pricing in effect) allowed us to examine how residents' beliefs may vary as a result of experience with this system.

## Research Context

The data analyzed in the following three studies were obtained as part of a larger project on issues related to waste reduction in downstate Illinois. Residents of four different communities (two of which had implemented volume-based pricing and two of which had not) were involved as respondents. Under volume-based fee structures, household that produce large amounts of solid waste are charged more for their waste hauling services than households that generate smaller amounts of waste. Charges received by residents in the volume-based pricing communities can lead to conservation and waste reduction efforts by increasing residents' awareness of the amount of waste they produce and/or by the cost contingencies that are created. Therefore, we expected that residents of these communities

would be more likely to report wanting to initiate waste reduction than residents of the other communities.

### **Purpose of the Research**

The intent of the studies was to examine people's beliefs and attitudes toward volume-based pricing systems for garbage collection. We compared the responses of people who reside in various communities to determine if experience with volume-based pricing systems would influence these responses. More specifically, the purpose of the studies was to: a) identify residents' relevant beliefs about volume-based pricing and b) investigate the relationship between residents' exposure to volume-based pricing systems and their beliefs about these systems and the predicted effects on their own behaviors.

## **INTERVIEW STUDIES**

### **Study One**

Given the lack of empirical work on the wide array of waste reduction behaviors that individuals can perform, this first study was designed to explore waste reduction behavior in a general way, using a small number of residents of Champaign, Urbana, and Monticello as respondents. Monticello was selected because the city had implemented volume-based pricing for its garbage collection and it is geographically close to the other communities. We chose to distinguish Champaign and Urbana due to controversies surrounding the future waste management plans in Urbana. No similar controversy existed in Champaign at the time the data were collected. In this manner we could compare the responses of residents living in communities in which volume-based pricing for waste collection is available with those of residents living in communities where it is unavailable.

We were unsure of the direction of the effects due to the availability of volume-based pricing. On the one hand, volume-based pricing represents an economic incentive for persons to reduce waste, as greater volume is associated with higher costs. However, we were unsure as to whether the difference in costs would be of psychological importance to our respondents. There also might be some difference between persons who have to pay more as a result of this pricing system and those who end up paying less. Persons who have to pay more under volume-based pricing (in comparison to the system previously used) may perceive that the system results in a financial loss, while those persons who pay less under the system view it as representing a financial gain. Also, concerns other than economic ones may play a role in people's evaluation of volume-based pricing systems. Larger families consume a greater amount of goods than smaller ones (generally speaking) and would be expected to generate more waste. Perhaps persons who live in different size households have different views of their consumption and waste generation behaviors, leading to varying

views of the need to conserve resources and to reduce waste. In any case, the first study represents an initial step at answering some of these questions.

### *Participants*

Research participants were selected from the local telephone directories for the communities of Champaign, Urbana, and Monticello, using a systematic sampling method. A sufficient number of names was selected from these directories to result in a total of at least thirty respondents, assuming a 50 percent response rate.

The interview sample consisted of thirty-three persons, ten residents of Champaign, ten residents of Urbana, and thirteen residents of Monticello. Ten of the respondents were male and twenty-three were female. The majority (22) indicated that they lived in a house rather than in an apartment or other type of dwelling (11). The average size of respondents' households was three persons. Respondents represented a wide range of educational levels, from grade school to post-baccalaureate training, with fourteen being the average number of years of schooling. Respondents also represented a wide age range, from nineteen to eighty-two, with the average being forty-six years of age. The majority of the respondents (27) categorized themselves as white rather than as a member of an ethnic minority group.

### *Interview Procedure*

Participants responded to a set of questions which were read to them during the phone interview. Interviewers called persons from the list of names comprising the sample, following a written protocol explaining how to handle refusals, answering machines, and other non-contact calls. After three attempts, a new name was selected from the list. Interviewers introduced themselves by name and then stated that the purpose of the study was to examine consumer behavior. This was done to avoid cuing participants at the beginning as to the exact nature of the study. Participants were also told that they could refuse to continue the interview at any time and that their responses would remain confidential.

### *Results*

Respondents were asked to respond to two questions. Prior to these questions, a definition of volume-based pricing was read, to ensure that all respondents understood the concept. The first question asked respondents to list the advantages of volume-based pricing, while the second question asked respondents to list the disadvantages of these systems. As with the other open-ended items appearing in the interview schedule, all responses were subjected to content analysis.

Table 1 presents the percentage of persons in each community who listed each advantage of volume-based garbage collection systems. As can be seen, the economic benefit of volume-based pricing was the most frequently mentioned

advantage, followed by various environmental benefits. Issues such as the fairness of the system and its convenience were mentioned less frequently. Interestingly, only one respondent believed that volume-based pricing systems would lead people to think about waste generation. Chi-square tests were performed on these data to determine if residents of the three communities differed in the frequency of mentioning the various advantages. These analyses showed that the responses of the residents in these communities were similar. Note, however, that the lack of differences is partially a result of the small number of respondents.

Table 2 presents the percentage of persons in each community who listed each disadvantage of volume-based garbage collection systems. Interestingly, volume-based pricing was viewed as an economic loss by many respondents. The fact that some people would end up paying more for garbage collection was the most frequently mentioned disadvantage, followed by consideration for the system's effect on larger households and the amount of effort required by the

Table 1. Percentage of Respondents Who Named Various Advantages of Volume-Based Pricing Systems

Advantage	Champaign	Urbana	Monticello	Combined
Garbage collection would cost less	20.0	20.0	30.8	24.2
People would recycle more	20.0	20.0	0.0	12.1
People would reduce waste	30.0	10.0	0.0	12.1
Respondent doesn't produce much garbage	20.0	0.0	15.4	12.1
Environmental concern	10.0	20.0	0.0	9.1
Volume-based pricing is fair	0.0	20.0	7.7	9.1
People would compact garbage	10.0	0.0	7.7	6.1
Volume-based pricing is easy	0.0	0.0	15.4	6.1
People would think about waste	10.0	0.0	0.0	3.0



system. Issues related to the fairness of the system, consumer control, and the impact on small business owners were mentioned less often. Chi-square tests were performed on these data to determine if residents of the three communities differed in the frequency of mentioning the various disadvantages. These analyses showed that the responses of the residents in these communities were similar. Based on these results and the results of the analyses on the advantages of volume-based pricing, we tentatively conclude that volume-based pricing has little effect on respondents' beliefs about this type of garbage collection system.

Table 2. Percentage of Respondents Who Named Various Disadvantages of Volume-Based Pricing Systems

Disadvantage	Champaign	Urbana	Monticello	Combined
Volume-based pricing is more costly	30.0	30.0	7.7	21.2
Larger households pay more	10.0	30.0	7.7	15.2
It takes effort	10.0	10.0	15.4	12.1
People lack control	10.0	10.0	0.0	6.1
Small business people lose	0.0	20.0	0.0	6.1
Garbage is unsightly	10.0	0.0	0.0	3.0
It's hard for the elderly	10.0	0.0	0.0	3.0
Garbage attracts animals and pests	10.0	0.0	0.0	3.0
People have trash anyway	10.0	0.0	0.0	3.0
It's easier not to reduce waste	0.0	10.0	0.0	3.0
Garbage contractors profit	10.0	0.0	0.0	3.0
Volume-based pricing is unfair	0.0	0.0	7.7	3.0

We performed an analysis to determine if residents of the three communities would differ in the number of named advantages and disadvantages of volume-based pricing. The number of advantages named by Champaign residents (mean = 1.30), Urbana residents (mean = .90), and Monticello residents (mean = .92) did not differ statistically ( $F(2,30) = .49$ , ns). The number of disadvantages named by Champaign residents (mean = 1.30), Urbana residents (mean = 1.20), and Monticello residents (mean = .46) also did not differ statistically ( $F(2,30) = 2.56$ , ns).

### *Summary*

Few differences in attitudes were found between the three communities. All respondents were less favorable toward the idea that garbage bills should be based on the amount that each household throws away. This is a curious result given the availability of volume-based pricing in the City of Monticello; we had expected residents of this community to have more favorable attitudes toward this system due to their first-hand experiences.

## **Study Two**

Based on the Study 1 findings, we developed an improved interview schedule. We selected a second sample of residents of Champaign and Urbana. Rather than return to Monticello, which is a relatively small city, we decided to obtain a sample of residents of Springfield. Springfield was selected because the city had recently implemented a volume-based pricing system of garbage collection and because the demographic profile of the community was more similar to that of Champaign-Urbana. The purpose of Study Two was to attempt to replicate the Study One findings using information from a different, larger community that had implemented volume-based pricing.

### *Participants*

Participants were selected from the local telephone directories for the communities of Champaign, Urbana, and Springfield, using a systematic sampling method. A sufficient number of names was selected from the directories to result in a total of at least thirty-six respondents. Again, a response rate of 50 percent was assumed.

The total sample consisted of thirty-two persons, thirteen residents of Champaign, eight residents of Urbana, and eleven residents of Springfield. Thirteen of the respondents were male and nineteen were female. The majority (59.4%) indicated that they lived in a house rather than in an apartment or other type of dwelling (40.6%). The average size of respondents' households was two persons. Respondents represented a wide range of educational levels, from grade school to post-baccalaureate training, with fifteen being the average number of years of

schooling. Respondents also represented a wide age range from twenty-one to seventy-nine with the average being forty-six years of age. The majority of the respondents (81.3%) categorized themselves as white rather than as a member of an ethnic minority group.

### *Procedure*

Participants responded to a set of questions which were read to them during the phone interview. Interviewers called persons from the list of names comprising the sample, following a written protocol explaining how to handle refusals, answering machines, and other non-contact calls. After three attempts, a new name was selected from the list. Interviewers introduced themselves by name and then stated that the purpose of the study was to examine consumer behavior. This was done to avoid cuing participants at the beginning as to the exact nature of the study. Participants were also told that they could refuse to continue the interview at any time and that their responses would remain confidential.

### *Results*

Table 3 presents the percentage of persons in each community who listed each advantage of volume-based garbage collection systems. As can be seen, the economic benefit of volume-based pricing was the most frequently mentioned advantage, followed by various environmental benefits. Issues of fairness and the perceived small amount of trash generated by the respondent were the least frequently mentioned advantages.

Chi-square analyses were performed on these data to determine if residents of the three communities differed in the frequency of mentioning the various advantages. These analyses showed that, overall, the responses of the residents in these communities were similar. The sole exception was the notion that volume-based pricing systems would lead people to think more about their behavior ( $\chi^2(2) = 6.68, p < .03$ ). One hundred percent of Urbana and Springfield residents did not mention this as a reason for reducing waste, while 30.8 percent of Champaign residents did mention this.

Table 4 presents the percentage of persons in each community who listed various disadvantages of volume-based garbage collection systems. The perceived higher cost and the fact that larger households would be paying more for garbage collection were the two most frequently mentioned disadvantages of volume-based pricing systems. The least frequently mentioned disadvantages were the effort required to participate in the system and the fact that people will always have trash.

Chi-square analyses were performed on these data to determine if residents of the three communities differed in the tendency to list various disadvantages. The

Table 3. Percentage of Respondents Listing Various Advantages of Volume-Based Pricing Systems

Advantage	Champaign	Urbana	Springfield	Combined
Garbage collection would cost less	46.2	37.5	9.1	31.3
People would recycle more	7.7	37.5	36.4	25.0
People would reduce waste	30.8	12.5	18.2	21.9
People would think about waste	30.8	0.0	0.0	12.5
Environmental concern	0.0	0.0	9.1	3.1
Volume-based pricing is fair	0.0	12.5	0.0	3.1
Respondent doesn't produce much trash	0.0	0.0	9.1	3.1
People would compact garbage	0.0	0.0	0.0	0.0
Volume-based pricing is easy	0.0	0.0	0.0	0.0

results of these analyses indicate that, generally, the responses of residents in these communities did not differ. Note that many of the disadvantages mentioned by respondents in Study One were not mentioned by respondents in this study. The results do corroborate those of the earlier study in that volume-based pricing appears to have had little effect on the beliefs respondents hold about these systems of garbage collection.

Respondents were also asked about the effects of volume-based pricing on the behavior of members in their household. Persons who lived in communities where volume-based pricing systems did not yet exist were asked to predict how their behavior would change, while those persons who lived in communities with existing systems were asked to comment on how volume-based pricing had affected their waste reduction behavior. Respondents were also asked a similar question focusing on the effects of volume-based pricing on the behavior of the members of the "average" household in their community.

Table 4. Percentage of Respondents Listing Various Disadvantages of Volume-Based Pricing Systems

Disadvantage	Champaign	Urbana	Springfield	Combined
Volume-based pricing is more costly	23.1	12.5	27.3	21.9
Larger households pay more	15.4	25.0	9.1	15.6
People have trash anyway	0.0	12.5	9.1	6.3
It takes effort	7.7	0.0	9.1	6.3
Garbage is unsightly	0.0	0.0	0.0	0.0
Garbage attracts animals and pests	0.0	0.0	0.0	0.0
Garbage contractors profit	0.0	0.0	0.0	0.0
It's hard for the elderly	0.0	0.0	0.0	0.0
People lack control	0.0	0.0	0.0	0.0
Small business people lose	0.0	0.0	0.0	0.0
It's easier not to reduce waste	0.0	0.0	0.0	0.0
No storage space	0.0	0.0	0.0	0.0
Volume-based pricing is unfair	0.0	0.0	0.0	0.0

Table 5 presents the percentage of respondents in each community who believed that household behavior would change or did change with the implementation of volume-based pricing. Contrary to what we expected, residents of the three communities did not differ in their assessments of how volume-based pricing would affect behavior within their households or within other households in their community. Another way of looking at these data is to compare the percentages across the two questions. Note that, across all three communities, respondents

Table 5. Percentage of Respondents Who Stated That  
Volume-Based Pricing Would Affect Household Behavior

	Champaign	Urbana	Springfield	Combined
Own household	15.4	25.0	9.1	15.6
“Average” household in community	69.2	37.5	45.5	53.1

were more likely to say that volume-based pricing affects the behavior of other people rather than affecting their own behavior!

### *Summary*

The findings obtained in Study Two were similar to those obtained in Study One, in that few differences in predicted behavior and beliefs were found between respondents from the three communities. Residents of the three cities did not differ in terms of their beliefs about volume-based pricing. Generally, respondents from all three cities believed that less costly garbage collection, increased recycling, and increased waste reduction were the advantages of volume-based pricing systems, while increased cost and increased payments by persons living in large households were listed as disadvantages of volume-based pricing. Interestingly, respondents in all three cities believed that the implementation of a volume-based pricing system in their community would have more effects on the behaviors of other people rather than on their own behavior! We have no data to investigate the reasons for this phenomenon. However, we speculate that respondents either thought that they are already doing what they can to help solve the solid waste problem or that they do not desire nor understand how to implement the changes in their lifestyle that extensive waste reduction efforts would entail.

As was true of Study One, the small sample size within each community may account for the equivocal results of Study Two. It is also possible that not enough time had elapsed to observe changes brought about by Springfield’s volume-based program; the program had been in place for less than two years at the time the data were collected. In fact, a few of the Springfield respondents indicated during the interviews that they were unaware of the fact that the city had implemented such a program!

## **SURVEY STUDY**

Given the findings of the two interview studies, we decided to investigate waste reduction behavior in the three communities of Springfield, Champaign, and Urbana in more detail through a written questionnaire. This decision was also

based on the fact that many potential respondents stated that they could not participate in the phone interviews, due to the time required. A written form of the questions gave respondents more time to think about their responses to the items; this was considered particularly important for the items pertaining to waste reduction. Random samples of households in the communities were selected to participate in this part of the research project.

We elected to conduct a survey of residents of the three communities. As few studies on source reduction and volume-based pricing have incorporated measures of attitudes and beliefs, we adapted materials from previous studies of recycling behavior to investigate consumer opinions of the role of waste reduction in solid waste management. Measures were selected with the following goals in mind: 1) assessment of the self-reported frequency of recycling and source reduction behavior and 2) identification of attitudes and beliefs related to volume-based pricing systems and solid waste management in general.

### **Participants**

The total sample consisted of sixty-three persons: twenty-three residents of Champaign, twenty-four residents of Urbana, and sixteen residents of Springfield. Twenty-five of the respondents were male while thirty-eight were female. The majority (66.7%) indicated that they lived in a house rather than in an apartment (28.6%) or other type of dwelling (4.8%). The average size of respondents' households was two persons. Respondents represented a wide range of educational levels, from grade school to post-baccalaureate training. The majority of respondents (47.6%) had attended college for one to four years. A sizeable percentage (31.7%) had some post-baccalaureate training. Respondents also represented a wide age range, from twenty to ninety-one. The average age of the respondents was forty-four. The majority of the respondents (69.8%) categorized themselves as white rather than as a member of an ethnic minority group (6.4%). However, quite a few respondents (23.8%) declined to answer the question pertaining to ethnicity.

### **Sampling Procedure**

Research participants were selected from the local telephone directories for the communities of Champaign, Urbana, and Springfield, using a systematic sampling method. All entries selected in this manner were screened such that businesses and professional offices were deleted from the sample. A list of 45 names in each community were included in the research sample of 135 names.

The initial mailing for the sample was conducted during the third week of April 1995. This mailing consisted of a copy of the questionnaire, a postage-paid return envelope, and a cover letter signed by one of the investigators. The cover letter informed addressees of the purpose of the study, ensured them of the confidentiality of their responses, and stressed the importance of their participation. The

cover letter also described the incentive used to encourage participation—entry of respondents' names into a drawing for a \$50 reward. Respondents became eligible for the drawing by returning a signed form, which contained their name and address, with the questionnaire. Confidentiality was maintained by separating the form from the questionnaires immediately upon their receipt.

A week later, reminder postcards were mailed to remind respondents to return the questionnaire. A second mailing was sent about ten days later to all persons who had not yet responded and whose materials had not been returned unopened. This follow-up mailing included a second copy of the questionnaire, another postage-paid return envelope, and a different cover letter that reemphasized the importance of each respondent to the survey's success. The overall response rate, including those questionnaires that were returned unopened (due to the addressee moving out of the area) was 46.7 percent.

## Results

### *Beliefs about Volume Based Pricing*

As one of the major goals of the present study was to examine consumers' reactions to volume-based pricing systems, a set of sixteen items was included to assess their attitudes and beliefs. Items included here were based on the information derived from the telephone interviews and from information contained within Environmental Protection Agency material on volume-based pricing. Respondents indicated the degree to which they agreed with each item, using a 4-point scale, ranging from 1 = "strongly disagree" to 4 = "strongly agree."

As can be seen in Table 6, respondents generally agreed with many of the items. Note that respondents were most likely to agree with statements pertaining to the effects of volume-based pricing systems on conservation behavior. Interestingly, respondents also agreed with the notion that volume-based pricing systems are fair to consumers. Respondents were least likely to agree that volume-based pricing systems increase the costs of garbage hauling operations.

We conducted a one-way multivariate analysis of variance, using the ratings of the individual items as the dependent variables and city of residence as the independent variable to determine if residents of the three communities differed in their endorsement of these various beliefs about volume based pricing systems.<sup>1</sup> The results indicated that respondents' place of residence did not affect their

<sup>1</sup>We investigated the usefulness of the sociodemographic variables as predictors of respondents' recycling motives by performing several two-way multivariate analyses of variance, using the respondents' ratings of the individual belief statements as the dependent variables and each sociodemographic variable as the independent variable. These analyses revealed that the sociodemographic variables were not predictive of respondents' waste reduction beliefs. No differences in importance ratings of these motives were found for respondents in the different education, housing, employment, occupation, gender, and ethnic group categories.



importance ratings (Wilks lambda = .46,  $F(32,74) = 1.10$ , ns). We thus conclude that the existence of volume-based pricing in Springfield had little effect on residents' beliefs about this type of system, as residents of this community had similar beliefs as residents of the other two communities.

#### *Perceived Behavioral Effects of Volume-Based Pricing*

In a different set of questions, respondents were asked to assess the effect of volume-based pricing on their own conservation behavior. Residents of the city of Springfield, a community that has volume-based pricing for its trash collection, were asked to assess the effect the system currently has on their behavior, while residents of Champaign and Urbana (communities without volume based pricing systems) were asked to predict changes in their behavior as a result of implementation of such a system in their communities.

We performed two chi-square tests, one on each behavior, to determine if residents of the three communities believed their behavior changed or would change due to volume-based pricing. The results of these analyses are depicted in Table 7. The results indicated that respondents' place of residence did not affect their behavioral assessments. As can be seen, the majority of respondents in each community believed that they did/would recycle and reduce waste at a level similar to what they did while a volume-based pricing system was not in effect. About a third of the respondents believed that they would recycle more, and slightly more than that amount believed that they would reduce waste more in response to volume-based pricing.

#### *Relations among Beliefs and Behaviors*

Respondents also indicated how often they performed twelve different waste reduction behaviors. Ratings were made on a 5-point scale with 1 = "less than once a year" to 5 = "at least weekly." Several one way analyses of variance using community as the independent variable, were performed to determine if residents in the three communities differed in their performance rates. None of the overall statistical tests were significant; residents of the three communities did not differ in their self-reported behaviors. Table 8 contains the respondents' reports of their own behavior.

Another goal of the study was to examine the relations between the beliefs held by residents and their behaviors. We examined this issue by computing the Pearson product moment correlations between the individual belief and waste reduction items, across the entire sample of respondents. The majority of the belief items were unrelated to respondents' self-reported behaviors. However, meaningful, interpretable, and statistically significant associations were obtained between respondents' behaviors and their beliefs that volume-based pricing encourages people to think about what they buy and what they throw away, and causes people to change their buying and consuming behaviors. These correlations are provided in Table 9.

Table 6. Average Levels of Agreement with Belief Items

Belief	Champaign	Urbana	Springfield	Combined
Volume-based pricing:				
Encourages recycling	3.48	3.54	2.93	3.38
Reduces the amount of waste people discard	3.13	3.04	3.00	3.06
Encourages people to think about what they buy and what they throw away	3.09	3.12	2.86	3.05
Is fairer to consumers	3.13	3.04	2.79	3.02
Increases illegal dumping	3.13	2.88	2.71	2.93
Reduces waste disposal costs	3.04	2.96	2.71	2.93
Leads people to compact waste in trash bins	2.87	3.00	2.78	2.90
Increases administrative costs of garbage collection	2.91	2.87	2.69	2.84
Encourages composting	2.65	3.04	2.50	2.77
Encourages people to learn more about how their behaviors affect the environment	2.83	2.83	2.57	2.77
Reduces hauling fees for consumers	2.81	2.74	2.57	2.72
Increases burning of waste by households	2.96	2.70	2.28	2.70
Encourages dumping wastes into sewers or commercial/public receptacles	2.74	2.75	2.50	2.69

Table 6. (Cont'd)

Belief	Champaign	Urbana	Springfield	Combined
Causes people to change their buying and consuming behaviors	2.65	2.62	2.50	2.61
Is unfair to residents of multi-family housing (e.g., apartments)	2.56	2.54	2.46	2.53
Increases hauler operating costs	2.41	2.50	2.36	2.43

Response scale: 1 = strong disagreement, 4 = strong agreement

Table 7. Percentage of Respondents Predicting Various Behavioral Changes

Activity	Champaign	Urbana	Springfield	Combined
Would recycle:				
Less	0.0	0.0	1.43	3.3
The same	65.2	75.0	50.0	65.6
More	34.8	25.0	35.7	31.1
Would reduce waste:				
Less	0.0	0.0	13.3	3.2
The same	47.8	66.7	46.7	54.8
More	52.2	33.3	40.0	41.9

## Discussion

The results obtained in Study Three corroborated the results of the two interview studies. Few differences in beliefs were found between residents of Springfield and residents of the other two communities. The use of a written questionnaire rather than reliance on data collection via a telephone interview allowed us to incorporate additional questions. Inclusion of items assessing respondents' self-reported waste reduction behavior allowed us to examine the relations among respondents' beliefs and their self-reported behaviors. In general, our results showed that only a few of respondents' beliefs about volume-based pricing systems influenced their reported tendency to engage in waste reduction behaviors.

Table 8. Respondents' Average Self-Reported Performance of Various Waste Reduction Behaviors

Belief	Champaign	Urbana	Springfield
Composted organic waste	2.00	2.38	1.50
Bought products in bulk	2.61	2.54	2.50
Used rechargeable batteries	1.82	2.67	2.33
Used a reusable bag	3.68	2.88	2.93
Sold/donated used items	2.19	1.96	1.80
Bought items in recyclable containers	3.00	3.32	3.47
Avoided buying nonrecyclable products	2.32	1.91	2.07
Used cloth rather than disposable diapers	1.07	1.24	1.09
Avoided single use items	2.67	2.45	2.29
Avoided restaurants using styrofoam containers	1.86	2.09	2.38
Avoided items with excessive packaging	2.95	2.59	2.00
Bought items with refillable or reusable containers	3.09	2.91	2.93

## GENERAL DISCUSSION AND CONCLUSION

The three studies summarized here were conducted to examine whether familiarity with volume-based pricing systems affects beliefs, by comparing the responses of people who reside in communities with and without these programs in effect. First we attempted to identify the relevant beliefs held by the public and then investigated the relationship between residents' exposure to volume-based pricing systems and their beliefs about these systems and the predicted effects on their own behaviors.

Contrary to our expectations, the statistical analyses of the information collected from residents of communities with and without pay-for-use fee structure

Table 9. Correlations between Respondents' Beliefs and Waste Reduction Behaviors

Behavior	Belief	
	Thinking about Buying	Change Buying
Avoided single use items	.31*	
Bought items with refillable or reusable containers	.27*	
Avoided items with excessive packaging	.27*	.30*
Sold or donated used items		.33*
Avoided buying a nonrecyclable product		.37**
Avoided restaurants using styrofoam containers		.30*

**Note:** Only statistically significant correlations are presented in the table.

\* $p < .05$

\*\* $p < .01$

systems indicated that the response of residents living in these various communities were generally similar in their beliefs. Based on these results, we tentatively conclude that the implementation of pay-for-use fee structures does not influence these variables. As noted earlier, the results (particularly those obtained through the interviews) should be interpreted with caution due to the small sample sizes. However, we are relatively confident that the data obtained in the project yield some useful information, as the results obtained from the survey data are somewhat similar to those obtained from the interview data. However, we recommend that these findings be replicated with larger samples of respondents from other communities.

Despite the small number of respondents, our studies reveal some interesting differences between the methodologies used in collecting data about respondents' beliefs. In the interview studies, the fairness of pay-for-use fee structure systems is mentioned relatively infrequently, yet it is one of the questionnaire items that is rated rather favorably by survey respondents. Economic concerns such as the cost of garbage collection are the most frequently mentioned advantages and disadvantages of pay-for-use fee structures, yet it is not the most strongly endorsed item in the questionnaire data. These findings suggest that the salience

of different aspects of pay-for-use fee structure systems vary as a result of the methods used to solicit respondents' opinions and that future studies need to take this into account.

Interestingly, our findings indicate that respondents were more likely to believe that volume-based fee systems would have a greater effect on the behavior of other persons than on their own behavior. One explanation for this result is found in the risk perception literature. In that work, a similar phenomenon exists where people are more likely to agree that other persons are at risk more than they themselves are, despite having equal information about the existence of risk. In both instances, the lack of concern over one's own behavior might be due to people's beliefs that the risks are not personally relevant [24]. Other work on the risk judgments of consumer products has shown that people tend to recommend those products that they perceive as being personally safe, while judgments of the riskiness of the same products in terms of the environment does not explain additional variance in people's recommendations [25]. The research further supports the idea that educational campaigns that promote waste reduction and similar behavioral changes should help individuals understand how these behaviors are relevant to their own lives.

We further recommend that future research compare communities that have had volume-based programs in place for different lengths of time, thus allowing for differences in people's familiarity with the programs. We also recommend that a more thorough comparison be made between communities that have different forms of pay-for-use fee structures, as the possibility exists that elements of the programs in the communities we studied were weak incentives for waste reduction. Future research can address the particular elements in these programs that motivate people to recycle and to reduce waste.

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## REFERENCES

1. United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Pay As You Throw: Lessons Learned about Unit Pricing*, U.S. Government Printing Office, Washington, D.C., 1994.

2. P. C. Stern and S. Oskamp, Managing Scarce Environmental Resources, in *Handbook of Environmental Psychology*, I. Altman and D. Stokols (eds.), John Wiley, New York, pp. 1044-1088, 1987.
3. N. Linn, A. Ebreo, and J. Vining, Understanding Household Conservation Behavior: Distinguishing Waste Reduction from Recycling, Unpublished manuscript, University of Illinois, Urbana-Champaign, 1999.
4. I. Balderjahn, Personality Variables and Environmental Attitudes as Predictors of Ecologically Responsible Consumption Patterns, *Journal of Business Research*, 17, pp. 51-56, 1988.
5. T. Mainieri, E. G. Barrett, T. R. Valdero, J. B. Unipan, and S. Oskamp, Green Buying: The Influence of Environmental Concern on Consumer Behavior, *Journal of Social Issues*, 137, pp. 189-204, 1996.
6. A. Ebreo, J. Hershey, and J. Vining, Reducing Solid Waste: Linking Recycling to Environmentally Responsible Consumerism, *Environment and Behavior*, 31, pp. 107-135, 1999.
7. M. Baldassare and C. Katz, The Personal Threat of Environmental Problems as a Predictor of Environmental Practices, *Environment and Behavior*, 24, pp. 602-616, 1992.
8. A. P. Tracy and S. Oskamp, Relationships among Ecologically Responsible Behaviors, *Journal of Environmental Systems*, 13, pp. 115-126, 1983-1984.
9. D. J. Lorber, Municipal Solid Waste Policy and Public Participation in Household Source Reduction, *Waste Management and Research*, 14, pp. 125-143, 1996.
10. R. DeYoung, A. Duncan, J. Frank, N. Gill, S. Rothman, J. Shenot, A. Shotkin, and M. Zweizig, Promoting Source Reduction Behavior: The Role of Motivational Information, *Environment and Behavior*, 25, pp. 70-85, 1993.
11. D. Scott and F. K. Willits, Environmental Attitudes and Behavior: A Pennsylvania Survey, *Environment and Behavior*, 26, pp. 239-260, 1994.
12. N. Linn, J. Vining, and P. A. Feeley, Toward a Sustainable Society: Waste Minimization through Environmentally Conscious Consuming, *Journal of Applied Social Psychology*, 24, pp. 1550-1572, 1994.
13. R. Cate, Source Reduction on a Budget, *Public Management*, 77, pp. 22-25, 1995.
14. D. Fullerton and T. C. Kinnaman, Household Responses to Pricing Garbage by the Bag, *American Economic Review*, 86, pp. 971-984, 1996.
15. T. Kutzmark and J. Canterbury, One Step Closer to a Sustainable Future (Pay As You Throw Pricing), *Public Management*, 78, pp. 4-9, 1996.
16. M. L. Miranda and J. E. Aldy, Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities, *Journal of Environmental Management*, 52, pp. 79-93, 1998.
17. D. V. Nestor and M. J. Podolsky, Assessing Incentive-Based Environmental Policies for Reducing Household Waste Disposal, *Contemporary Economic Policy*, 16, pp. 401-411, 1998.
18. J. D. Reschovsky and S. E. Stone, Market Incentives to Encourage Household Waste Recycling—Paying for What You Throw Away, *Journal of Policy Analysis and Management*, 13, pp. 120-138, 1994.
19. J. L. Canterbury, Building a Consensus for Pay As You Throw, *Biocycle*, 37, pp. 39-40, 1996.
20. R. Cuthbert, Variable Disposal Fee Impact, *Biocycle*, 35, pp. 63-65, 1994.

21. C. L. McAdams, Variable Rate Pricing: Weighing the Options, *Waste Age*, 26, pp. 115-116, 1995.
22. C. Miller, Pay As You Throw: Less Weight? More Stuffing, *Waste Age*, 24, pp. 29-30, 1993.
23. L. Skumatz, Continued Growth for Variable Rates, *Biocycle*, 36, pp. 36-38, 1995.
24. L. Sjoberg, Risk Perceptions: Experts and the Public, *European Psychologist*, 3, pp. 1-12, 1998.
25. H. Schutz and P. M. Wiedemann, Judgments of Personal and Environmental Risks of Consumer Products—Do They Differ? *Risk Analysis*, 18, pp. 119-129, 1998.

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