Factors Associated with Backyard Composting Behavior at the Household Level

William M. Park, Kevin S. Lamons, and Roland K. Roberts

Communities in most states are under pressure to reduce the amount of solid waste going into landfills. Many are making efforts to encourage their citizens to practice backyard composting. A logit regression analysis was conducted to identify factors associated with backyard composting of yard and food wastes in a case study area. Sample data were obtained through a September 1997 telephone survey of 865 households residing in single-family dwellings in Knox County, Tennessee. Findings indicate that a number of variables reflecting complementary behavior, attitudes, knowledge, and peer influence were significantly related to composting behavior. Policy implications of these findings are outlined.

Key Words: composting, food waste, solid waste, yard waste

During the 1990s, most states enacted municipal solid waste management legislation establishing a goal to achieve a certain recycling rate or to reduce the amount of waste reaching landfills or incinerators by a certain percentage relative to a base year. As of 2001, very few states had met or even come close to achieving their goals (Goldstein and Madtes, 2001). A general recognition now exists that substantial further increases in recycling rates for traditional materials (e.g., aluminum, steel, glass, plastics, and newsprint) will be difficult to achieve. Attention in recent years has thus been increasingly focused upon organic materials which can be composted, especially yard waste and food scraps.

Based on U.S. Environmental Protection Agency (EPA) estimates, 230 million tons of municipal solid waste were generated in 1999. Of this amount, 12.1% was estimated to be yard waste, and 10.9% food waste (U.S. EPA, 2002). To address the yard waste component, 21 states have implemented some form of ban on disposal of yard wastes in landfills, and many communities have established programs providing curbside collection and composting of yard wastes (Goldstein and Madtes, 1999). According to EPA, about 45% of the yard waste in the United States was collected, composted, or recycled in some way in 1999, but at an estimated cost of nearly $90 per ton (U.S. EPA, 1999). With regard to food waste, EPA estimated only 5% was composted or recycled in 1999, while a 2000 study in Seattle found that the largest portion of waste not already addressed by recycling programs is compostable food, representing about 31% (Bagby and Tarnecki, 2001).

Results of pilot programs have shown curbside collection of food residuals adds another level of complexity and cost to a solid waste management system (Farrell, 2001). Consequently, some solid waste management specialists have emphasized the potential contribution backyard composting (BYC) can make. A study of 20 BYC programs operating during 1993–1994 concluded their cost per ton of waste diverted—at generally less than $20 per ton—was much lower than the cost per ton for traditional collection and disposal systems (Applied Compost Consulting, 1996).

Tennessee's 1991 Solid Waste Management Act required solid waste regions (one or more counties) to reduce the tonnage of disposed waste per capita by 25% by 1996. About half of the 63 regions in the

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state failed to achieve the goal by that date, and were granted a five-year extension. In 1998, the methodology for calculating progress toward the 25% waste reduction goal was modified to account for the differential impact of economic growth across regions, and the deadline was extended to 2003. Many regions projected in their original plans to achieve as much as 10% waste reduction by diverting yard waste and other organic material through BYC programs. However, very little progress in this regard can be documented to date.

A number of articles in waste industry magazines have described community programs designed to encourage BYC. Some have reported estimates of the percentage of households practicing BYC ranging from 2% to 60% (Riggle, 1996a, b; Sherman, 1996a, b; Vossen and Rilla, 1997). Others have documented the impact of subsidized sales of bins for BYC on participation and diversion at the household or community level (Pick, 1999; Leighton, 1999; Farrell, 2000; Foseid, 2001). However, none have reported a systematic analysis of how household characteristics and other factors may influence BYC behavior. Neither could studies of the factors influencing BYC behavior be identified from the academic literature. Thus, guidance to policy makers regarding strategies to increase BYC is extremely limited.

The research reported in this article seeks to address this gap by analyzing data from a survey of households in Knox County, Tennessee. The objective of this study was to identify factors associated with household BYC behavior. The research approach drew on insights from the extensive literature in the social and behavioral sciences which has focused on explaining solid waste generation and recycling behavior. While the findings from that literature are somewhat mixed and inconsistent, they do provide important context for the study at hand.

Solid Waste Generation and Recycling Literature

Economists have tended to focus on the influence of price or other implicit cost factors in explaining household behavior with respect to solid waste management. In the 1970s, a number of studies (see Wertz, 1976, for a good example) analyzed the price elasticity for solid waste disposal, typically by conducting cross-sectional studies involving many communities.

More recently, several economists have employed a case study approach to examine the impact of unit pricing on household recycling activity (Fullerton and Kinnaman, 1994; Hong, Adams, and Love, 1993; Morris and Holthausen, 1994). The general finding from this line of inquiry has been that price matters, although demand appears to be inelastic. Skumatz (1996) concluded from a cross-sectional regression analysis of several hundred U.S. communities that, with other factors controlled, unit pricing increases recycling by 5–6 percentage points and yard waste diversion by 4–5 percentage points. In a companion study, Skumatz (2000) also found unit pricing increased source reduction by 5 percentage points. However, the share of source reduction attributed to BYC could not be estimated.

Given most households face a marginal price of zero for solid waste disposal, several economists have sought to identify nonprice factors which explain variation in the amount of solid waste disposed of or recycled. Epp and Mauger (1989) sought to explain variation in the amount of solid waste generated for disposal among households in State College, Pennsylvania. They found the amount of solid waste put out for collection was positively related to weekly food expenditure and negatively related to a higher score on a general environmental attitude index.

Based on the results of a cross-sectional analysis of 58 municipalities in New Jersey and Pennsylvania, Duggal, Saltzman, and Williams (1991) reported recycling of newspaper and glass was greater in municipalities with higher income levels, higher education levels, and more frequent curbside pick-up of recyclables. Jakus, Tiller, and Park (1996) conducted a case study employing rural household-level data from Williamson County, Tennessee. They found the amount of newspaper delivered to drop-off recycling sites was positively related to income and negatively related to an implicit cost factor, which was constructed on the basis of households' opportunity cost of time and an estimate of the time requirement for recycling.

Scott (1999) sought to identify factors influencing household recycling intensity, as represented by an index based on how consistently each of 12 materials were recycled. With data from 6,673 households in four Toronto-area communities, Scott determined that recycling intensity was positively related to age, feelings of social pressure, and the extent to which other waste diversion practices had been adopted. Motivations related to general concern about the environment and minimizing the need for additional landfills were not found to be significant predictors.

A related line of inquiry, mainly conducted by other social scientists, has focused on identifying factors which differentiate between recyclers and nonrecyclers. In the lone study conducted by economists, Jakus, Tiller, and Park (1997) found that drop-off recycling participation was related to household production technology factors (storage space, time required, and amount of material generated). Further, households with friends who recycle, were older, were college graduates, and had incomes between $35,000 and $65,000 in 1992 were more likely to be recyclers. Variables designed to capture the potential impact of county information, education, and incentive programs to encourage recycling did not prove to be statistically significant.

Over the past decade or so, there have been numerous studies from a sociological or psychological perspective seeking to differentiate between those who recycle and those who do not. These studies have generally focused on the influence of demographic factors, social norms, knowledge, and attitudes on behavior. Some of these investigations considered the importance of convenience and rewards as well.

Jones (1989–1990) noted paper recycling by university faculty was influenced by both behavioral beliefs held by people themselves and normative beliefs held by significant others. Jones also cited findings from other literature suggesting one-time extrinsic rewards generally do not lead to sustained behavior changes, emphasizing the importance of continuing institutional support in the form of convenient options, information, and appeals by authorities. Findings reported by Vining and Ebreo (1990) revealed greater information, convenience, and monetary incentives contributed to recycling behavior, while general environmental attitude and social influences were not important factors.

Using a marketing approach, Granzin and Olsen (1991) sought to characterize paper recyclers by examining numerous specific variables under four broad categories: (*a*) demographics; (*b*) personal values; (*c*) information, knowledge, and influences; and (*d*) elements of helping. Their results showed recycling participants were more likely to be older and female; to hold values associated with altruism, frugality, and the environment; to be influenced by family and friends; and to have a sense of responsibility to act where they perceive a need exists and they believe they can make a difference.

Oskamp et al. (1991) also investigated variables within four broad categories, including: (*a*) demographic, (*b*) knowledge, (*c*) attitudinal, and (*d*) behavioral. Recycling participation was observed to be positively related to income, living in a single-family residence, social influences of friends and neighbors, and specific attitudes toward recycling. Recycling participation was not related to more general attitudes about the environment.

Vining, Linn, and Burdge (1992), in a factor analysis of recycling motivations in four Illinois communities, reported that motivations related to altruism and personal inconvenience were rated most important, followed by those related to household storage, economic incentives, and finally social influence. More recently, Ewing (2001) concluded the importance of normative factors related to the expectations of family members and of friends and neighbors appears similar to an altruistic factor (i.e., that recycling helps protect the environment) and a convenience factor in explaining curbside recycling participation. Bratt (1999), on the other hand, found expectations of family members to be an important factor, but with only a "loose connection" between assumed environmental consequences and recycling behavior.

Schultz and Oskamp (1996) explored the role of effort as a moderator of attitude-behavior relationships. Comparing the findings from previous studies, they discovered, as hypothesized, a stronger relationship between environmental concern and recycling participation was generally found in drop-off recycling programs (high effort) than in curbside recycling programs (low effort).

In a 1996 study by DeYoung, intrinsic satisfaction related to avoiding wasteful practices, being self-sufficient, and "making a difference" were considered more important by respondents than one-time monetary incentives in sustaining recycling behavior. More recently, DeYoung (2000) further explored the connection between intrinsic satisfaction and various environmentally responsible behaviors, arguing for the importance of three types of intrinsic satisfaction related to behavioral competence, frugality in consumption, and participation in maintaining a community.

Godbey, Lifset, and Robinson (1998) developed a strong conceptual argument for the importance of time use and perceptions of availability of time in explaining participation in recycling and composting in the United States, particularly given recent trends in household size and structure. They drew upon time diary research for insights into this likely connection.

One additional line of research worth noting includes studies from applied behavioral science

reporting on experiments involving "interventions" aimed at encouraging recycling behavior. Porter, Leeming, and Dwyer (1995) have provided an excellent review of 27 articles describing 31 experiments. Twenty-one of these experiments manipulated antecedent conditions through written and oral prompts, commitment strategies, environmental alterations, or goal setting. Eleven manipulated consequences through feedback, rewards, or penalties. The general conclusion of their review is that while all studies noted at least some success in increasing recycling, few reported the positive impact was sustained after the intervention was discontinued.

One study in Porter, Leeming, and Dwyer's review set (Cobern et al., 1995) focused on yard waste, specifically the practice of grass cycling (i.e., leaving grass clippings on the lawn). The group of participants who agreed to grass cycle for four weeks and talk to their neighbors about it showed a higher level of grass cycling a year later than both the group agreeing only to grass cycle for four weeks and the control group. Neighbors of the first group also demonstrated significantly more grass cycling than neighbors of the control group. The authors suggest the maintenance of grass cycling behavior results from learning through experience, that the anticipated cost ("their lawn will not look good") is actually zero, and the benefits of saving time, effort, and money are real.

In contrast, the general lack of maintenance of recycling behavior reported in other studies may be due to the fact that the household-level costs are quite visible and continue, whereas the benefits are less personal and immediate. Porter, Leeming, and Dwyer, in their concluding discussion, recommend further attention to assessing strategies for waste reduction (e.g., grass cycling or BYC) in contrast to recycling, as well as additional research to identify individual differences between recyclers and nonrecyclers.

General Methodology

A household was assumed to make the decision whether to compost or not based on the perceived costs and benefits accruing to its members. Drawing upon the approaches and findings from the literature summarized above, six general types of factors were hypothesized to influence households' perceptions of benefits and costs of composting: (*a*) complementary behavior, (*b*) attitudes, (*c*) peer influence, (*d*) knowledge, (*e*) institutional arrangements, and (*f*) socioeconomic characteristics. Survey questions were developed to obtain data on specific variables representing these factors. Some knowledge variables relate to a waste reduction law specific to Tennessee and Knox County programs, and may not be present in other communities.

Knox County represented a particularly instructive case study area for two reasons. First, it encompasses households for whom the collection of solid waste and its funding are handled in three different ways. Approximately half of Knox County households (about 75,000) reside within the City of Knoxville, which funds curbside collection of household waste and unbagged yard wastes with property tax revenues. The other half of county households either subscribe to private haulers for curbside pick-up of household waste and bagged or bundled yard wastes, or deliver those materials to one of seven county convenience centers, which are funded with property tax revenues. Second, for several years the county has sponsored a number of programs to encourage BYC.

Data were collected through a telephone survey conducted by the University of Tennessee's Social Science Research Institute in September 1997. The sample was limited to households residing in single-family dwellings, i.e., those for whom BYC is likely to be possible. Calling was done over a two-week period, Sunday through Thursday, from 6:00–9:00 p.m., commencing on September 8. A random-digit-dialing technique was employed, with initial screening to eliminate households residing in multi-family dwellings. A total of 865 surveys were completed—400 (or 46%) for households residing within the City of Knoxville and 465 (or 54%) for households residing outside the city limits.

Due to the survey's single-family dwelling restriction, and perhaps to other factors which tend to affect success in contact and completion for telephone surveys, the sample was not representative of Knox County households overall with respect to socioeconomic characteristics. Based on comparisons with 1990 Census data, sample households were older, had attained more education, earned higher incomes, and were more likely to own their own home than Knox County households overall. These differences were expected given the absence of multiple-family dwellings in the sample.

Specific Models

Five separate logit models (Greene, 1990) were estimated, each with a binary dependent variable indicating whether the household actively composted

Table 1. Independent Variables: Definitions and Summary Information

Factor Group/ Variable Name	Variable Definition	Hypothesized Impact on BYC	Mean or Percentage
Complementary Behavior:			
AVID RECYCLER	Household recycles four or more types of materials (1 = yes, 0 = no)	+	46.4%
ENVIRO ORG MEMBER	Household holds membership in any organization dedicated to environment protection (1 = yes, 0 = no)	+	12.9%
GARDENER	Household has a flower or vegetable garden (1 = yes, 0 = no)	+	68.4%
Attitudes:			
YARD WASTE BAN	Respondent supports ban on disposal of yard wastes in landfills (1 = support, 0 = oppose)	+	50.6%
TOO MUCH EFFORT	Respondent thinks composting requires too much effort to be worthwhile (1 = yes, 0 = no)	–	21.6%
TOO MUCH SPACE	Respondent thinks composting requires too much yard space to be worthwhile (1 = yes, 0 = no)	–	16.9%
Peer Influence:			
FAMILY OR FRIENDS	Household has family members, friends who compost (1 = yes, 0 = no)	+	43.0%
CHILD INTEREST	Household includes school-aged child(ren) who have expressed interest in recycling or composting (1 = yes, 0 = no)	+	19.7%
Knowledge:			
WASTE DECOMPOSITION	Respondent believes most materials decompose quickly in landfills (1 = yes, 0 = no)	–	40.4%
WASTE REDUCTION LAW	Respondent is aware of 1991 Tennessee Solid Waste Management Act requiring 25% reduction in tonnage waste per capita (1 = yes, 0 = no)	+	16.7%
MASTER COMPOSTER PROG	Household is familiar with Knox County's Master Recycler and Composter Program (1 = yes, 0 = no)	+	9.4%
SUBSIDIZED BIN SALES	Household is familiar with Knox County's subsidized backyard composting bin sales (1 = yes, 0 = no)	+	26.6%
Institutional Arrangements:			
CITY RESIDENT	Household located within city limits of Knoxville (1 = yes, 0 = no)	–	46.2%
Socioeconomic Characteristics:			
OWN HOME	Household owns place of residence (1 = yes, 0 = no)	+	88.5%
AGE	Respondent's age (in years)	+/–	49.6
EDUCATION	Respondent is a college graduate (1 = yes, 0 = no)	+	42.1%
INCOME	Household annual taxable income (range = 1–5):	+/–	
	1 = < $12,500		9.8%
	2 = $12,500 to $25,000		14.3%
	3 = $25,000 to $35,000		18.0%
	4 = $35,000 to $50,000		19.5%
	5 = > $50,000		38.4%

grass, leaves, shrub and tree trimmings, food, or any of these four materials. Of the 865 survey respondents, the following percentages indicated they practiced BYC as their primary disposal method for each of the four materials: grass, 19.2%; leaves, 20.2%; shrub and tree trimmings, 10.8%; and food, 9.5%. At least one of the four materials was composted by 27.9% of the respondents. A significant number of additional respondents reported they "piled up yard waste at the back of their lot" (grass, 6.4%; leaves, 9.8%; shrub and tree trimmings, 15.8%). While this activity might well be considered "passive" BYC, these responses were not considered BYC for the regression analyses.

Independent Variables

Information regarding the independent variables employed is summarized in table 1. Three binary variables reflecting complementary behavior were included. *AVID RECYCLER* indicated whether the household recycled four or more types of materials.

Four was selected as the threshold level for defining an "avid" recycler because most recycling programs include at least four basic materials (aluminum cans, steel cans, glass bottles, and newspapers). Such complementary behavior was expected to increase the likelihood of BYC. Included, with similar reasoning, was *ENVIRO ORG MEMBER*, a variable identifying whether the household held membership in any organization dedicated to protection of the environment. The third binary variable indicated whether the household had a flower or vegetable garden (*GARDENER*). Presence of this behavior was expected to increase the perceived benefits of composting in providing a valued soil amendment and perhaps offsetting out-of-pocket expenses.

The next factor group included three binary variables associated with attitudes. *YARD WASTE BAN* indicated whether the respondent supported a ban on disposal of yard wastes in landfills. Support of this ban was expected to increase the likelihood of BYC. The other two variables in this group, *TOO MUCH EFFORT* and *TOO MUCH SPACE*, reflected whether the respondent thought composting requires too much effort or too much yard space to be worthwhile. Holding either of these two attitudes was expected to reduce the likelihood of BYC.

Peer influence was represented by two binary variables. *FAMILY OR FRIENDS* indicated whether the household had family members or friends who compost, and *CHILD INTEREST* denoted whether the household included school-aged children who had expressed an interest in recycling or composting. Both variables were expected to exhibit a positive relationship with BYC.

Four binary variables were included to reflect the respondent's knowledge concerning landfills, state law, and local programs. Regarding landfills, respondents were asked whether they believed most materials decompose quickly in landfills (*WASTE DECOMPOSITION*), which is not generally the case. If a respondent believed this to be true, he/she would seem less likely to practice BYC. A second variable (*WASTE REDUCTION LAW*) determined whether the respondent was aware that the 1991 Tennessee Solid Waste Management Act requires counties to reduce the tonnage of waste per capita going into Class I landfills by 25%. Awareness was hypothesized to make a household more likely to practice BYC. The remaining two knowledge variables identified whether the household was familiar with Knox County's Master Recycler and Composter Program (*MASTER COMPOSTER PROG*) or subsidized backyard composting bin sales (*SUBSIDIZED BIN SALES*). Awareness was expected to be positively related to BYC.

Institutional arrangements were reflected in only one variable, *CITY RESIDENT*, indicating whether the household was located within the city limits of Knoxville. Households within the city have access to "free" pick-up of yard wastes at the curb, and thus would appear less likely to practice BYC. City residents may also be less likely to compost than non-city residents because lot sizes are generally smaller in the city.

The final factor group is comprised of four standard socioeconomic variables. The binary variable *OWN HOME* indicated whether the household owned their place of residence, and was hypothesized to be positively related to BYC. The continuous variable *AGE* represented the respondent's age in years. The hypothesized relationship between age and BYC was considered indeterminate, because influence in either direction could be reasonably argued. The binary variable *EDUCATION* identified whether the respondent was a college graduate or not, a factor expected to increase the likelihood of BYC. Income level (*INCOME*) was represented as a class variable. Five income ranges were established in the questionnaire with the hope of having approximately 20% of households in each range. As seen in table 1, the income ranges should have been adjusted upward, as 38.4% of households fell in the highest range (> $50,000). The hypothesized relationship between income and BYC was considered indeterminate.

Results

The results from the estimation of the logit models are summarized in table 2. Four to seven independent variables in each model proved to be statistically significant at the 10% level. Only *YARD WASTE BAN*, the variable related to support for banning yard wastes from landfills, in the food model had a significant coefficient with a sign contrary to what was expected. Three independent variables were significant in all five models: *GARDENER*, representing complementary behavior; *TOO MUCH EFFORT*, the respondent's attitude toward the amount of effort required; and *FAMILY OR FRIENDS*, the influence of family or friends. With respect to overall goodness of fit, each of the models had a highly significant log-likelihood score. All five models had strong predictive characteristics, with each correctly predicting household BYC behavior in 75% to 81% of the observations.

Table 2. Results from Logit Regression Models

	Dependent Variables									
	Grass		Leaves		Shrub		Food		Any Material	
Independent Variables	Param. Est.	Prob. Level	Param. Est.	Prob. Level	Param. Est.	Prob. Level	Param. Est.	Prob. Level	Param. Est.	Prob. Level
Intercept	!2.70	0.00	!2.81	0.00	!3.38	0.00	!3.49	0.00	!3.13	0.00
AVID RECYCLER	0.29	0.24	0.35	0.14	!0.09	0.74	0.73	0.02	0.38	0.08
ENVIRO ORG MEMBER	!0.04	0.89	!0.17	0.55	0.11	0.73	0.56	0.10	0.33	0.23
GARDENER	1.22	0.00	0.87	0.00	0.81	0.06	1.09	0.03	1.03	0.00
YARD WASTE BAN	!0.14	0.56	!0.02	0.90	!0.10	0.71	!0.54	0.09	!0.25	0.27
TOO MUCH EFFORT	!1.14	0.01	!0.86	0.04	!1.08	0.06	!1.45	0.06	!1.04	0.00
TOO MUCH SPACE	!0.32	0.55	!1.14	0.08	!0.35	0.60	!1.08	0.31	!0.76	0.12
FAMILY OR FRIENDS	0.73	0.00	0.80	0.00	1.06	0.00	1.04	0.00	0.94	0.00
CHILD INTEREST	0.23	0.39	0.46	0.08	0.24	0.43	0.35	0.30	0.05	0.83
WASTE DECOMPOSITION	!0.05	0.83	!0.02	0.93	0.18	0.52	0.20	0.54	!0.14	0.52
WASTE REDUCTION LAW	0.66	0.02	0.30	0.30	0.21	0.54	0.65	0.08	0.18	0.50
MASTER COMPOSTER PROG	!0.17	0.62	0.18	0.60	0.20	0.60	!0.29	0.51	!0.06	0.83
SUBSIDIZED BIN SALES	0.26	0.30	0.10	0.67	0.56	0.05	0.79	0.01	0.44	0.05
CITY RESIDENT	!0.14	0.57	0.03	0.87	!0.38	0.19	!0.21	0.51	!0.02	0.90
OWN HOME	1.23	0.02	0.98	0.04	0.64	0.28	0.01	0.97	0.96	0.02
AGE	!0.01	0.07	0.00	0.95	!0.01	0.15	!0.00	0.72	0.00	0.46
EDUCATION	0.41	0.12	0.32	0.21	0.36	0.24	0.61	0.07	0.52	0.02
INCOME	!0.17	0.13	!0.19	0.08	0.02	0.87	!0.23	0.12	!0.13	0.18
Log Likelihood	62.226	0.00	60.618	0.00	48.603	0.00	56.540	0.00	99.563	0.00
Prediction Success:										
% concordant	75.7		74.8		76.7		80.8		78.0	
% discordant	24.0		24.9		22.9		18.8		21.8	
% tied	0.3		0.3		0.4		0.4		0.2	
No. of observations	506		469		531		533		533	

Notes: Refer to table 1 for definitions of independent variables. Probability level is the probability that the independent variable is actually unrelated to the dependent variable, based on a standard *t*-ratio test.

Within the individual models, the following observations can be made regarding significant variables in addition to the three noted above. Composting of grass was more likely by households in which the respondent was aware of the 25% waste reduction requirement in state law and by households who owned their own home. Composting of grass was also more likely the younger the age of the respondent. Composting of leaves was more likely by households who viewed yard space as less of a limitation, owned their own home, had children who expressed interest in recycling or composting, and had lower incomes. Composting of shrub and tree trimmings was more likely by households who were aware of the subsidized bin sale program. Composting of food was more likely by households in which four or more materials were recycled, the respondent was aware of the 25% waste reduction requirement and the subsidized bin sales, and the respondent had completed a college education. In addition to the three variables significant in all five models, other variables significant in the "Any Material" model (last column of table 2) included those related to avid recycling, awareness of the subsidized bin sale program, home ownership, and education level.

The coefficients of the independent variables found to be statistically significant at the 10% level were used to estimate the impact of a one-unit change on the probability of BYC, assuming all other variables to be at their means or modal levels. These values are summarized in table 3. Gardening increased the probability of BYC for particular materials by 2–8%, and for any material by 13%. The comparable impacts from having family or friends who compost were 5–13% and 20%, respectively. Home ownership, having a college education,

Table 3. Estimates of the Impact of a One-Unit Change in the Independent Variable on the Probability of BYC

Independent Variables	Dependent Variables				
	Grass	Leaves	Shrub	Food	Any Material
	<!!!!!!!!!!!!!! Change in Probability of BYC !!!!!!!!!!!!!!>				
Intercept	0.55	0.59	0.57	0.51	0.64
AVID RECYCLER	—	—	—	0.03	0.07
ENVIRO ORG MEMBER	—	—	—	—	—
GARDENER	0.08	0.08	0.02	0.02	0.13
YARD WASTE BAN	—	—	—	!0.01	—
TOO MUCH EFFORT	!0.07	!0.08	!0.03	!0.02	!0.13
TOO MUCH SPACE	—	!0.09	—	—	—
FAMILY OR FRIENDS	0.10	0.13	0.08	0.05	0.20
CHILD INTEREST	—	0.07	—	—	—
WASTE DECOMPOSITION	—	—	—	—	—
WASTE REDUCTION LAW	0.09	—	—	0.02	—
MASTER COMPOSTER PROG	—	—	—	—	—
SUBSIDIZED BIN SALES	—	—	0.03	0.03	0.08
CITY RESIDENT	—	—	—	—	—
OWN HOME	0.08	0.08	—	—	0.12
AGE	!0.00	—	—	—	—
EDUCATION	—	—	—	0.02	0.10
INCOME	—	!0.02	—	—	—

Notes: Refer to table 1 for definitions of independent variables. Changes in probabilities are included only for independent variables significant at the 10% level. The values listed represent the change in probability that a household composts due to a one-unit increase in the independent variable.

and awareness of the subsidized bin sale program increased the likelihood of backyard composting of at least one material by 12%, 10%, and 8%, respectively. Holding the attitude that composting requires too much effort to be worthwhile reduced the likelihood of BYC of at least one material by 13%. Also of particular interest is the finding that awareness of the 25% waste reduction requirement appears to have a greater positive impact on the likelihood of grass composting (9%) than food composting (2%).

Conclusions and Policy Implications

The results from the logit model analyses were highly consistent with expectations, and provide support for many hypotheses regarding factors influencing BYC. However, the findings do suggest there may be important differences in the factors influencing food waste composting as compared to yard waste composting. For communities like Knox County desiring to increase the percentage of households practicing BYC, the findings appear to have a number of policy implications.

To encourage BYC in general, programs might well be designed to target gardeners, increase the visibility of composting, and counter the attitude that BYC requires too much effort to be worthwhile. With regard to the latter, communities may want to consider a unit pricing or "pay-as-you-throw" system for financing solid waste management, which would give an explicit economic incentive for households to practice BYC. However, an array of other factors (e.g., the equity of the cost distribution and the potential for illegal disposal) must be considered as well in judging the overall merits of unit pricing in a specific community's solid waste management system.

Since expression of interest on the part of children was observed to stimulate composting of leaves, expanded educational programs would appear warranted, addressing other materials if this is not already being done. Efforts to increase awareness of the state's 25% waste reduction requirement hold promise for increasing composting of grass, or as an alternative, "grass cycling," which simply involves leaving grass clippings on the lawn.

As noted earlier, only 9.5% of sample households composted food wastes, while more than twice as many households composted one or more yard waste materials. This level of food composting is not surprising given the distinctive requirements of food composting, i.e., activity takes place on practically a daily basis and an enclosed composting container is generally needed to protect from pets or rodents. Nor are the particular factors associated with food composting surprising. A clear target audience would be highly educated, avid recyclers.

In the case of Knox County, avid recyclers could be targeted by providing written information or conducting demonstrations at the dozen or so multi-material recycling drop-off centers located throughout the city and county. Expansion of the subsidized bin sales program should be considered, as well as the idea of holding the bin sales at these recycling drop-off centers. Publicizing the 25% waste reduction requirement may encourage further food composting; however, as noted above, unit pricing would give households an explicit economic incentive to contribute to this goal.

To our knowledge, this study represents the first attempt to identify factors associated with BYC through systematic analysis of data from a random survey of households in a case study community. While further studies of this sort at a community level would be useful, another potentially fruitful line of further research would be to conduct a cross-sectional analysis with communities as the unit of observation. This would allow for investigation of how community characteristics, including the financing approach used to support the solid waste management system, affect the percentage of households practicing BYC across communities.

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