Analysis of National Solid Waste Recycling Programs and Development of Solid Waste Recycling Cost Functions: Summary Statistics for Data Set No. 1

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The following data set consists of municipal solid waste recycling program activities for 158 U.S. municipalities who have operated recycling programs since 1989. The data were collected between April and June 1997 for calendar year 1996. There are 197 variables pertaining to such issues as costs, decision-making processes, problems in the recycling programs, and operational features. Methodology for the data set collection effort is included in Appendix A.

1. Participation in the recycling program is:

		N	%
1	Mandatory	80	50.6
2	Voluntary	78	49.4

2. The recycling program includes solid wastes produced by:

		N	%
1	Single Family Residences	156	100
2	Multi-family Dwellings	136	87.2
3	Commercial Businesses	96	61.9
4	Industrial Firms	49	31.6
5	Public Institutions	92	59.4
6	Waste Treatment Plants	14	9.0
7	Others:		
	Churches	1	

3. What materials are included in your recycling program?

		N	%
1	Glass	154	98.1
2	Aluminum	152	96.8
3	Newspaper	156	99.4
4	(PET) Plastics	129	82.2
5	(HDPE) Plastics	130	82.8
6	Other Plastics	35	22.3
7	Corrugated Paper/Cardboard	141	89.8
8	Mixed Paper	117	74.5
9	White Office Paper	123	78.3
10	Tin Cans/ Other Metals	144	91.7
11	Phone Books or Magazines	132	84.1
12	Used Oil	96	61.1
13	Yard Trimmings	103	65.6
14	Others:		
	clothing, white goods	9	
	asphalt shingles	1	
	household mail, mixed paper	3	
	concrete	1	
	lead acid batteries	3	
	appliances	2	
	tires, & scrap metal	17	
	deposit law bottles & cans	1	
	HH hazardous wastes	4	
	milk, juice cartons	1	
	paperboard	1	

4. How important a problem is each of the following for the recycling program? *(In Percents)*

	Not at all Important 1	Somewhat Unimportant 2	Somewhat Important 3	Important 4	Very Important 5	N
a. Theft/ scavenging of recyclables	40.6	24.5	21.3	5.2	8.4	155
b. Financing the recycling program & securing an adequate budget	13.6	7.1	18.2	20.1	40.9	154
c. Lack of reliable material markets	14.4	8.5	26.1	27.5	23.5	153
d. Unfunded state mandates	16.4	15.1	19.7	21.1	27.6	152
e. Obtaining information about best recycling practices	22.4	19.7	28.9	17.1	11.8	152
f. Getting residents to participate	12.3	11.0	18.1	23.2	35.5	155
g. Meeting recycling goals or targets	14.9	11.0	24.7	21.4	27.9	154

5. In 1996, about how many tons of non-composted, recyclable materials were recovered or collected as part of the local recycling program? (N =131)

Mean Tons: 7,016.77
Median Tons: 2,000.00

6. Are yard trimmings in your city diverted to a composting facility?

		N	%
1	No	51	32.9
2	Yes	104	67.1

If Yes, about how many tons were diverted from disposal by composting in 1996? (N=84)

Mean tons composted in 1996: 8,982.826
Median tons composted in 1996: 1,693.420

7. In your estimation, what percentage of the total municipal solid waste stream in 1996 was diverted diverted from disposal by recycling the materials in your program (including any diversion of yard trimmings)? (N=138)

Mean Percent: 33.07
Median Percent: 33.00

8. In 1996, about how many households were eligible to participate in the recycling program? (N=139)

Mean Number of Households: 28,557.12
Median Number of Households: 4,000.00

9. About what percentage of these eligible households actually participated in the recycling program? (Consider yard trimmings in this figure *only* if they are collected along with other recyclables at the curb). (N=139)

Mean Percent Participation: 72.80
Median Percent Participation: 80.00
Modal Percent Participation: 90.00

10. This estimate of recycling participation is based on:

		N	%
1	A weekly set-out rate	51	37.0
2	A monthly set-out rate	27	19.6
3	Total tons of recyclables divided by average set-out weight/ household	22	15.9
4	Sign-ups or subscriptions for recycling service	9	6.5
5	Field observations	72	52.2
6	Survey(s)	16	11.6
7	Others:		
	Yearly reports	1	
	Not able to measure	1	
	Number provided by contractor	1	
	Bi-weekly set-outs	3	
	Weigh materials	2	
	A guess	1	
	Recycling manager estimate	2	

11. Has your city set a goal for recycling a proportion of its waste stream?

		N	%
1	No	70	46.7
2	Yes	80	53.3

If Yes, what is this goal? Mean = 41.292 % of the waste stream by 2000 (modal year).

12. The collection point(s) for recyclables: (N=156)

		N	%
1	Curbside	127	81.4
2	Back-door	14	9.0
3	Unstaffed drop-off collection site(s)	52	33.3
4	Staffed drop-off collection site(s)	76	48.7
5	Buy-back collection site(s)	12	7.7
6	Others:		
	Alley	1	
	Dumpsters for multi-family & businesses	1	
	Residents bring to recycling center	1	

13. Recyclable materials are collected by:

		N	%
1	City crews	71	45.2
2	Private contractor(s) selected by the city government	73	46.5
3	Private contractor(s) selected by the individual	24	15.3
4	A volunteer or non-profit community organization	12	7.6
5	Another unit of government besides the city	10	6.4
6	Others:		
	county services drop-off site	1	
	solid waste district	1	
	residents drop-off	3	
7	Not applicable	13	8.3

14. If curbside (or backdoor) collection service is provided, how frequently are recyclables collected? (N=153)

		N	%
1	More than once a week	1	0.7
2	Weekly	92	60.1
3	Every two weeks	27	17.6
4	Monthly	2	1.3
5	Frequency of collection depends on material type	5	3.3
6	Not applicable	26	17.0

15. Is the curbside (or backdoor) pickup of recyclables scheduled for the *same* day as the collection of other solid wastes? (N=150)

		N	%
1	No	31	20.7
2	Yes	92	61.3
3	Not applicable	27	18.0

16. If your city collects recyclables at the curb or backdoor, what is the typical size of the collection crew? (N=140)

		N	%
1	One person	56	40.0
2	Two persons	46	32.9
3	Three persons	24	17.1
4	Not applicable	26	18.6

17. How are recyclable materials generally separated from other solid wastes? (N=157)

		N	%
1	The household or business separates materials, by type, into different bins or bags for curbside or backdoor pickup	77	49.0
2	The collector separates recyclables at curbside since households may commingle materials	36	22.9
3	Recyclable materials are separated at a processing facility	61	38.9
4	Residents take recyclables to the boxes or bins at drop-off sites	70	44.6
5	Others:		
	Yard waste in $1 bags, recyclables commingled	1	
	Newsprint bundled separately	1	
	Businesses use drop-off boxes	1	

18. Does your community require waste generators to use special containers to separate recyclable materials from other solid wastes?

		N	%
1	No	52	33.5
2	Yes	103	66.5
	Type Container Used:		
	Bins	89	68.5
	Bags	25	19.2
	Carts	18	13.8

How do participants acquire these containers?

		N	%
1	Participants purchase them from the city or authorized dealer	10	9.6
2	Participants supply their own container(s)	14	13.5
3	The city provides containers at no direct cost to the participant	80	76.9
		104	100.0

Number of containers provided each resident:

	N	%
One Bin	47	61.0
Two Bins	16	20.8
Three or more Bins	14	18.2
	77	100.0

Bin Size:
Range: 5 to 100 gallons
Mean: 18.67 gallons
Median: 16 gallons
Mode: 18 gallons

19. Are any sanctions or penalties imposed for improper separation or failure to separate recyclables as required? (N=153)

		N	%
1	No	69	45.1
2	Yes	84	54.9

What enforcement tactics are used? (N=150)

		N	%
1	Verbal or written warnings	54	36.0
2	Fines or other financial penalties	23	15.3
3	Refusal to pick up all or some of the trash	50	33.3
4	Tag bags with reminders/ recycling instructions	54	36.0

20. What type of collection vehicles and equipment are used to collect recyclable materials included in your program? (N=143)

		N	%
1	Rear-loading garbage truck(s)	55	38.5
2	Center-loading refuse packer truck(s)	6	4.2
3	Side-loading refuse truck(s)	35	24.5
4	Dual side loader truck(s)	22	15.4
5	Co-collection truck(s) to pick up both refuse and recyclables	7	4.9
6	Refuse truck(s) that pulls compartmented trailer(s) for recyclables	6	4.2
7	Pickup trucks that pull compartmentalized trailer(s)	19	13.3
8	Dump truck(s)	12	8.4
9	Roll-off container truck(s)	27	18.9
10	A garbage truck (of any capacity) modified to segregate recyclables	17	11.9
11	Automated packer truck(s)	5	3.5
12	Other vehicle/equipment used:		
	Compartmentalized recycling truck	12	
	Customized recycling truck; built own	2	
	Partitioned flat-bed truck	1	
	Center-loading w/ separate compartments for paper and containers	1	
	Front loading 1-pass trucks	3	
	Tractor Trailers	1	
	Van & trailer	1	
	Gaylords	1	
	Forktruck	1	
	1-man side-loading recycling truck	1	
	satellite collection trucks	1	
	100yd. push-out, closed-top trailers	1	
	Wayne side-loaders, 1-man operation	3	
	Trough-loading side compartments	1	

21. How are the collected recyclable materials processed (sorted, cleaned, or compacted) prior to sale or shipment to market?

		N	%
1	A city owned & operated MRF	30	19.9
2	An MRF owned & operated by another unit of local government	23	15.2
3	A regional, non-profit authority	8	5.3
4	A local, non-profit agency or organization	5	3.3
5	A privately owned & operated MRF	86	56.6
6	A state operated processing facility	3	2.0
7	Others:		
	County owns MRF	2	
	City owns processing equip. & employees separate materials	3	
	City owned MRF: contractor operates	3	
	Privately owned processing center; operated by volunteers	1	

22. Does your community have a variable fee pricing system for residential solid waste collection/disposal service?

		N	%
1	No	109	70.8
2	Yes	45	29.2

Modal Year system implemented: 1990

Type of variable fee pricing system:

		N	%
1	Weight-based	2	4.5
2	Volume-based	42	95.5
	If volume-based used:		
	1 Charges vary based on container size	23	56.1
	2 Generators purchase bags	8	19.5
	3 Generators buy tags or stickers	10	22.4

23. Are yard trimmings banned from the landfill used to dispose of municipal solid wastes?

		N	%
1	No	66	44.0
2	Yes	84	56.0

24. Non-recyclable solid wastes in the city are collected by: **(N=156)**

		N	%
1	City or town crews	59	37.8
2	The same private contractor that collects recyclable materials	69	44.2
3	A private contractor different from the recycling contractor	30	19.2
4	Others:		
	All private haulers by individual subscription	1	
	Citizens drop-off at transfer station	5	
	Private contractors that we compete with	1	
	Residents drop-off at recycling center	4	
	Some businesses contract with different collection firms	1	
	Various private contractors	3	
	City collects in 2 regions; private contractor collect in 1 region	1	

25. Please rate the overall importance of each factor in the decision process concerning any significant change(s) made in the design of the recycling program in the 1990s. *(In Percents)*

	Not Important 1	2	Somewhat Important 3	4	Very Important 5	N
a. Citizen opinion survey results	8.1	10.8	33.8	24.3	23.0	148
b. Meetings with community groups	11.5	10.8	36.5	24.3	16.9	148
c. Advice from other local officials with recycling experience	7.3	4.7	31.3	35.3	21.3	150
d. State directives or mandates	6.5	6.5	17.6	28.1	41.2	153
e. Published reports or studies of other city recycling programs	10.6	17.9	35.8	24.5	11.3	151
f. Advice from non-profit/ volunteers with recycling expertise	12.5	21.7	34.2	23.7	7.9	152
g. In-house local government staff analysis of recycling issues	7.2	5.3	23.7	39.5	24.3	152
h. Advice from private industry executives or specialists	17.6	15.7	29.4	26.8	10.5	153
i. Directives by local elected officials	5.9	9.8	13.1	36.6	34.6	153
j. Changes in material market prices	11.1	11.8	19.6	31.4	26.1	153
k. Cost of collecting particular recyclable materials	8.4	9.7	20.1	27.3	34.4	154

26. From your vantage point as recycling coordinator, how would you rate the current level of support for the city's recycling program among each of these groups: *(In Percents)*

	Very Weak 1	Weak 2	Moderate 3	Strong 4	Very Strong 5	Total N
a. Local residents	0.0	1.9	15.9	51.0	31.2	157
b. The business community	1.3	13.7	46.4	28.8	9.8	153
c. The city or town council	0.6	2.5	19.7	38.9	38.2	157
d. The mayor or chief executive	0.7	3.3	13.2	36.8	46.1	152
e. The public works director	2.1	2.8	17.5	37.8	39.9	143
f. Local public schools	2.6	9.9	25.2	37.7	24.5	151

27. Please circle the letter next to *any* method used in 1996 to publicize the recycling program. (N=155)

	N	%
a. Direct mail	102	65.8
b. Free television public service announcements	54	34.8
c. Free radio public service announcements	35	22.6
d. Free newspaper public service notices	66	42.6
e. Paid television commercials	7	4.5
f. Paid radio commercials	16	10.3
g. Paid newspaper ads	60	38.7
h. Special educational programs about recycling in public schools	90	58.1
i. Speeches by city officials to schools or local groups about recycling	74	47.7
j. Window displays or posted notices in neighborhoods	29	18.7
k. Billboard ads	9	5.8
l. Neighborhood or community information meetings	53	34.2
m. Appointment of "block leaders" to encourage neighbors to recycle	11	7.1
n. Distribution of pamphlets, brochures, or bumper stickers	106	68.4
o. Contract with advertising specialist(s) to promote local recycling	10	6.5
p. Other publicity strategies:		

School field trips & programs for elementary school kids	2
Business signs, pamphlets given to new residents with blue bins	1
SE Wisc. SW coalition advertising	1
Internet	3
Retail publicity	1
Info distributed at transfer station	3
Newsletter w/ garbage bill	7
Weekly newspaper columns	4
Cooperation w/ neighboring cities	1
Community TV station airs recycling videos	3
Awards	1
Do not pick up trash if recyclables are in it	1
Press conferences	1
Door-to-door canvasses	2
Variable rate system is biggest incentive	1
Make program mandatory	1
Freebies: pencils, pens, magnets, rulers	1
Busboards	1

28. Which *one* of the above methods or incentives, in particular, has been *especially* effective in encouraging more people to recycle regularly?

Four Cited Most Frequently

	N
1). Direct mail	44
2). Distribution of pamphlets, brochures, or bumper stickers	24
3). Special educational programs about recycling in public schools	18
4). Paid newspaper ads	10

29. In 1996, what was your city's total cost (all direct and indirect costs) for the recycling program, *excluding* any revenue from material sales? (N=105)

Mean: $470,056.12
Median: $178,000.00
Range: $423.60 to $6,230,000.00

30. In 1996, about how much total revenue was obtained from the sale of all recyclable materials collected in your city? (N=108)

Mean: $151,571.85
Median: $ 13,048.02
Range: $414.30 to $3,000,000.00

31. For each of the following materials included in your recycling program, about how many tons of each was collected in 1996, and what was the average price per ton obtained for that material?

Material Types	Mean Tons Collected	N	Average Price/Ton	N
Aluminum	286.383	93	$704.992	53
Newspaper	3008.607	104	$ 15.598	63
Plastics --PET	119.886	82	$143.487	42
Plastics -- HDPE	181.645	51	$151.875	35
Glass (av. for all types)	917.072	91	$ 18.789	54

32. What strategies were used for marketing recyclables in 1996?

		N	%
1	The city joined in a cooperative marketing program	16	23.5
2	Materials were stored and then sold to the highest bidder when sufficient quantities were obtained	18	26.5
3	The city negotiated contract(s) for the sale of materials	33	48.5

What was the typical time frame for these contracts?

1 Less than one year	5	14.7
2 One to two years	16	47.1
3 Three or more years	13	38.2
4 Other marketing strategies used:		
County markets recyclables	9	
Private hauler/broker collects and sells recyclables & the city gets a lower price for recycling collection service	7	
BFI markets materials w/ a 50/50 split of recycling revenues	1	
City receives recycling revenue from contractor when the value of recyclables exceeds operating costs of program. No money received in 1996.	1	
Bids are invited for marketing & processing of materials	1	
Direct sale via telephone calls	1	
The MRF markets the recyclables & may keep revenues	5	
Contractor or city shops around for best price	8	
Franchisee negotiates sale of materials	2	
ONP given to farmers	1	
SW Authority (non-profit) markets materials & keeps revenue	3	
Contractor sells & keeps revenues unless price exceeds est. level	11	
Informal arrangements with buyers; no formal contracts	4	
Coordinator sells on a daily basis	2	
Contractor operates MRF & city gets 25% of materials sales	1	
Private, non-profit does all marketing & keeps revenues	1	

33. In 1996, who assumed the market risk for material price changes?

	N	%
1 City absorbed all market risk for material price changes	49	36.0
2 Market risk for price changes was shared by city and contractor	27	19.9
3 The contractor absorbed all market risk for material price changes	48	35.3
4 Not sure/ don't know	12	8.8
	136	100.0

34. Does your city levy a specific fee for recycling collection service?

	N	%
1 No	122	81.9
2 Yes	25	16.8

If Yes, what are these monthly rates?

Mean per household = $4.07 (N= 20)
Mean per business = $9.38 (N= 4)

35. What was the total number of tons of municipal solid waste disposed/ incinerated in 1996 and what was the total disposal cost for this amount?

Tons disposed in 1996 (N=112)

Mean:	51,937.09
Median:	5,530.33
Mode:	13,000.00

1996 disposal cost (N=91)

Mean:	$1,951,192.00
Median:	$330,000.00
Mode:	$200,000.00

36. Methods of solid waste disposal/handling used in 1996:

		N	%
1	Sanitary landfill in your county	76	51.4
2	Sanitary landfill located in another county in your state	46	31.1
3	Sanitary landfill located in another state	14	9.4
4	Incinerator	10	6.7
5	Incinerator with waste to energy (WTE) capability	33	22.1
6	Composting	63	42.3
7	Other:		
	County disposes of solid wastes	3	

37. In 1996, what was the total collection cost for all non-recyclable municipal solid wastes? (N=64)

Mean: $2,705,860.85
Median: $318,629.00
Mode: $150,000.00

38. What was the 1996 tipping fee at the sanitary landfill and the incinerator (if one was used)?

	Per ton for the sanitary landfill	Per ton for the incinerator
Mean:	$47.99	$63.24
Median:	$45.00	$50.00
Mode:	$55.00	$45.00
	(N=88)	(N=29)

39. About how many years of useful life remain in the landfill used to dispose of municipal solid wastes?

	Years remaining
Mean:	15.27
Median:	12.00
Mode:	20.00
	(N= 77)

40. About how many years of useful life, if any, have been added to the sanitary landfill due to waste diversion from recycling or composting? (N=32)

	Years added
Mean:	5.56
Median:	5.00
Mode:	5.00

41. In terms of *managing* your city's recycling program, what value would you place on each of the following types of information? *(In Percents)*

	Low Value 1	Moderate Value 2	High Value 3	N
a. Alternative methods & equipment for collecting recyclables	19.4	47.2	33.3	144
b. How other cities finance their recycling program	26.4	45.8	27.8	144
c. Strategies for sustaining citizen participation in recycling	3.4	29.7	66.9	148
d. Key provisions of municipal contracts for recycling services	21.4	36.6	42.1	145
e. Successful material marketing strategies used by other cities	22.0	43.3	34.8	141
f. Determining the most efficient recycling collection routes	31.7	33.8	34.5	142
g. Price projections for materials	15.6	48.9	35.5	141
h. Recycling's environmental benefits	6.2	47.6	46.2	145

42. In your opinion, what significance, if any, does each of these factors have in the annual discussions among local officials regarding continued funding for the recycling program?

	Not Significant 1	Somewhat Significant 2	Very Significant 3	N
a. Recycling's political popularity	11.3	31.8	57.0	151
b. The need to extend landfill life	27.8	35.4	36.8	144
c. State mandate or reduction goals	8.6	40.4	51.0	151
d. Environmental benefits of recycling	9.3	36.4	54.3	151
e. The cost of recycling versus the cost of solid waste disposal	9.2	30.9	59.9	152

43. In your judgment, what has been the single *most* critical problem or challenge for the city's recycling program in the 1990s?

	Number of Responses	
1. Educate public/citizens about items collected & Securing their continued cooperation to recycle; sustaining support to achieve reduction goals; getting citizens to see value in a program that costs them money.	32	
2. Funding the recycling program	19	
3. Markets for recyclables; instability of market prices	41	
4. Attempt to site a new landfill	1	
5. Reduction in State Grant funding levels		4
6. Unwillingness of council and mayor to remove SW recycling from tax rate and institute a volume-based system	5	
7. No Critical Problem (we've been recycling since 1982 & everything is going well).		3
8. Getting rid of materials (marketing)	2	
9. Recycling in multi-family dwellings	4	
10. Material collection & processing needs to be more efficient	3	
11. Decline in the paper market	1	
12. Marketing yard wastes (humus, mulch or compost) --which is most cost-efficient?	2	
13. Expanding materials list (recycled)	2	
14. Gaining public acceptance of pay by the bag for yard waste collection	1	
15. Competition from private haulers of recyclables; making sure that they separate materials properly to comply with state law.		2
16. Finding an equitable way for each customer to pay their cost of recycling	1	
17. Developing a more efficient collection system	1	
18. Private trash haulers do not want to participate in recycling	1	
19. Getting right vehicles for recycling	1	
20. Commercial/small business participation in recycling	1	
21. Plan to open County MRF	1	
22. Contamination of materials in commercial and multi-family recycling	1	
23. Foresee no critical problems	1	
24. Weather	1	
25. City landfill is losing money; this stymies recycling & some politicians	1	
26. Phenomenal growth in recycling program; from 500,000# in 1990 to 6,259,000# in 1996	1	
27. Staffing shortages in recycling department	1	
28. Back yard trash burying	1	
29. State mandates without state funds for recycling	1	
	N=136	

44. During the next two years or so, which of the following do you see as the *most likely* scenario for the recycling program?

	N	%
1 A **cut-back** or reduction in the types of materials recycled or the level of recycling service offered	13	8.7
2 **Maintenance** of the current level of recycling service	70	46.7
3 **Expansion** of the recycling program (either in terms of geography types of generators, or types of materials included)	67	44.7
	150	

45. The position of the recycling coordinator is:

		N	%
1	Full-time	67	46.5
2	Part-time	77	53.5
		144	100

Other positions held by the "part-time" recycling coordinators:
(N=57)

		N	%
1	Public works Director or Asst. Director	26	45.6
2	Engineering in public works	2	3.5
3	City, town, or borough manager	9	15.8
4	Street Commissioner	3	5.3
5	City Clerk or Treasurer	4	7.1
6	Volunteer	5	8.8
7	Health inspector or codes enforc.	5	8.8
8	Consultant	1	1.8
9	Policy analyst	1	1.8
10	Fire Department	1	1.8

46. The highest level of formal education completed by recycling coordinator:

		N	%
1	High school	14	10.1
2	Some college or technical training	45	32.4
3	College bachelor's degree	54	38.8
4	Master's degree	25	18.0
5	Doctoral degree	1	0.7
		139	

47. Which range includes the 1996 salary of the recycling coordinator?

		N	%
1	Volunteer, no formal salary paid	13	10.2
2	Less than $10,000	9	7.0
3	$10,000 to 19,999	9	7.0
4	$20,000 to 29,999	20	15.6
5	$30,000 to 39,999	26	20.3
6	$40,000 to 49,999	29	22.7
7	$50,000 or more	22	17.2
		128	

48. Coordinator's years of experience in solid waste management:

	Years Experience
Mean	8.95
Median	8.00
Mode	10.00
Range	.5 to 37
	(N=138)

	N	**%**
Requests for copy of Executive Summary of Survey Results:	115	72.8

APPENDIX A

Recycling Solid Wastes: A Survey of Experienced Municipal Programs

Data and Methods for the 1997 Survey

The 1997 mail survey is a panel study of the recycling programs in the cities that responded to a survey conducted in 1990 by David H. Folz at the University of Tennessee, Knoxville. During March and April 1990, Dr. Folz conducted a national mail survey of municipal solid waste recycling coordinators. Municipal coordinators in 25 states were identified through contacts with state officials, interest group organizations, and recycling businesses in all 50 states. The 1990 survey targeted all of the coordinators in 24 states and those in a randomly selected 10% sample of coordinators in New Jersey. The population size for the 1990 survey consisted of 450 recycling coordinators. The original mailing and a second mailing approximately 5 weeks later yielded 264 useable responses for a return rate of 58.7%. The regional and population distributions of these responses were similar to those for the cities that were identified as operating a municipal recycling program in early 1990. Funding for the 1990 survey project was provided by a University of Tennessee Graduate School professional development grant.

In early 1997, officials in the 50 states were contacted to obtain the most recent available lists of municipal recycling contacts. These lists were used to cross-check the original 1990 mailing list for the 264 cities. Based on these comparisons, we ascertained that, between 1990 and 1997, 14 cities either discontinued their programs, or another level of government such as a county or township assumed responsibility for recycling services in the city. In the majority of these cases (11 cities), another level of government now provides recycling service. One city in the original 450 population responded to the 1990 questionnaire some months after data analyses were performed in 1990. This city was included in the 1997 survey target population of 251 cities believed to offer municipal solid waste recycling services.

The first mailing of the 1997 questionnaire package occurred on April 24, 1997. This package included the instrument, a cover letter, and a postage-paid business reply envelope. Follow-up mailings to remaining non-respondents occurred on June 6, 1997 and June 26, 1997. Four of the 251 cities in the 1997 target population wrote to indicate that they no longer were responsible for recycling services in their cities because the county had assumed responsibility for this service. Consequently, the size of the target population for the 1997 survey consists of 247 cities. The 1997 survey project was funded **entirely** by a grant from the University of Tennessee Waste Management Research and Education Institute.

There were 158 useable responses received for a return rate of 63.9% (158/247). The geographic profiles for responding cities in 1990 and 1997 are generally similar:

Region	Percent in 1990	Percent in 1997
Northeast	55	47.4
Midwest	23	27.6
South & Border	7	7.7
West & Mountain	15	17.3

The length of the 1990 and 1997 instruments is virtually identical. The order in which questions appear and the wording of questions that measure concepts common to both instruments have been preserved as closely as possible to permit valid comparative analysis. However, several questions from the 1990 instrument do not appear in the 1997 version. These have been replaced by new questions that facilitate investigation of some of the issues specifically related to the objectives of this research project.

The summary statistics presented above follow the order and basic wording of the questions in the 1997 questionnaire instrument.