New York City Department of Sanitation
John J. Doherty, Commissioner

Recycling at Home: NYC Resident Attitudes, Awareness, and Behavior

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Recycling at Home: Resident Attitudes, Awareness, and Behavior

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PART 1: OVERVIEW; GENERAL POPULATION - 2005 VS. 2001

INTRODUCTION

During May and June of 2005, the New York City Department of Sanitation, Bureau of Waste Prevention, Reuse and Recycling (DSNY BWPRR), through a consultant, conducted standardized telephone survey interviews to gauge New York City residents' attitudes and behaviors concerning the curbside/containerized recycling program that serves all 8 million New Yorkers. This type of research had not been conducted since March of 2001.

DSNY conducted the 2005 public awareness research for several reasons. First, temporary but major changes in the recycling program had occurred, with the suspension of glass and plastics recycling between 2002 and 2003. Plastics recycling was reintroduced to the Program in July 2003, with glass added back in April 2004. While the range of materials accepted under the residential recycling program were the same in 2005 as they had been in 2001, it was possible that the temporary changes in the intervening years had affected attitudes or behaviors. A survey would test this.

Second, survey research would be useful to complement the 2004-2005 Waste Characterization Study (WCS), a four season effort that began in May 2004 with a Preliminary Study and concluded in August 2005. This study quantified the composition and generation rates for residential refuse and recycling by taking thousands of 100-200 hundred pound samples from randomly selected refuse and recycling trucks, and sorting them into 91 material categories. To capture the diversity of New York City, the WCS took enough samples to be able to characterize the waste among eight different housing density/income groupings: high, medium, and low income; and high, medium, and low density (with low income/low density not assessed as this demographic does not exist in New York City). [1] Conducting a concurrent telephone survey among these same eight housing density/income groupings would provide useful data about the connection between waste composition/generation and resident behaviors and attitudes.

Finally, this research would serve as a new "baseline" against which to test NYC residents' awareness of recycling program advertising when it is launched in media venues throughout the City and would add to the amount of longitudinal data measuring changes over time.

METHODOLOGY

A total of 1200 interviews with the General Population were conducted in May and June of 2005. Respondents were selected at random using a combination of listed numbers and random digit dialing, and balanced to reflect New York City's diversity in terms of housing density, income, and other demographic factors.

Interviewers, working on behalf of DSNY BWPRR through its market research firm, identified themselves as calling from a private research group interested in civic and environmental attitudes, not as representatives of DSNY, the Recycling Program, or any government entity. Interviews consisted of

[1] For more information about the NYC Residential and Street Basket Waste Characterization Study, go to: http://www.nyc.gov/html/nycwasteless/html/recycling/waste_char_study.shtml

18 major questions, utilizing a variety of question formats including closed- and open-ended, and averaged 20 minutes in length. All interviews were carried out with adult heads of households who stated that they were involved in decision-making about recycling and refuse in the home.

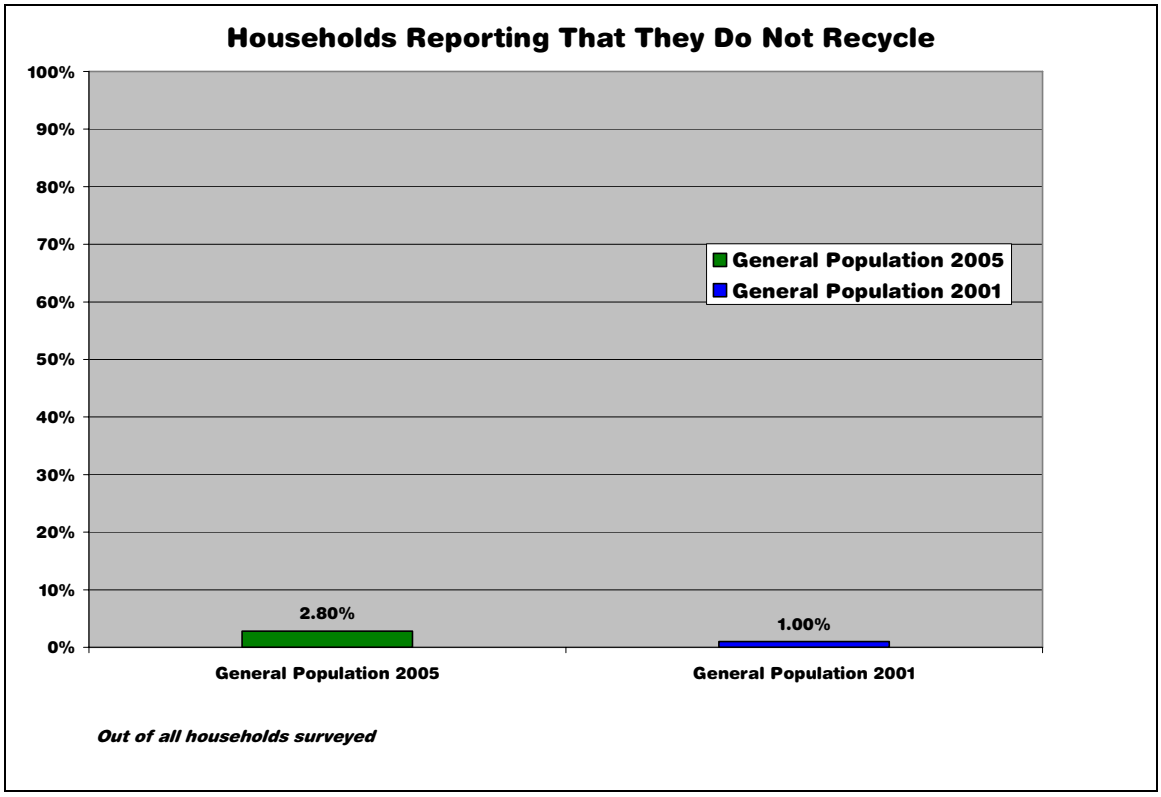
MAJOR FINDINGS: 2005 vs. 2001

The following are the major findings that emerge in comparing the 2005 survey to the 2001 market research survey. The 2001 survey assessed attitudes and behaviors concerning recycling, waste reduction, and litter prevention. The 2005 survey focused exclusively on recycling. Because the 2001 and 2005 surveys were not identical, their results are not strictly comparable. Nonetheless, comparing the responses that were identical or similar between the two surveys indicates directions in public participation and opinion. These are highlighted here.

Strong participation

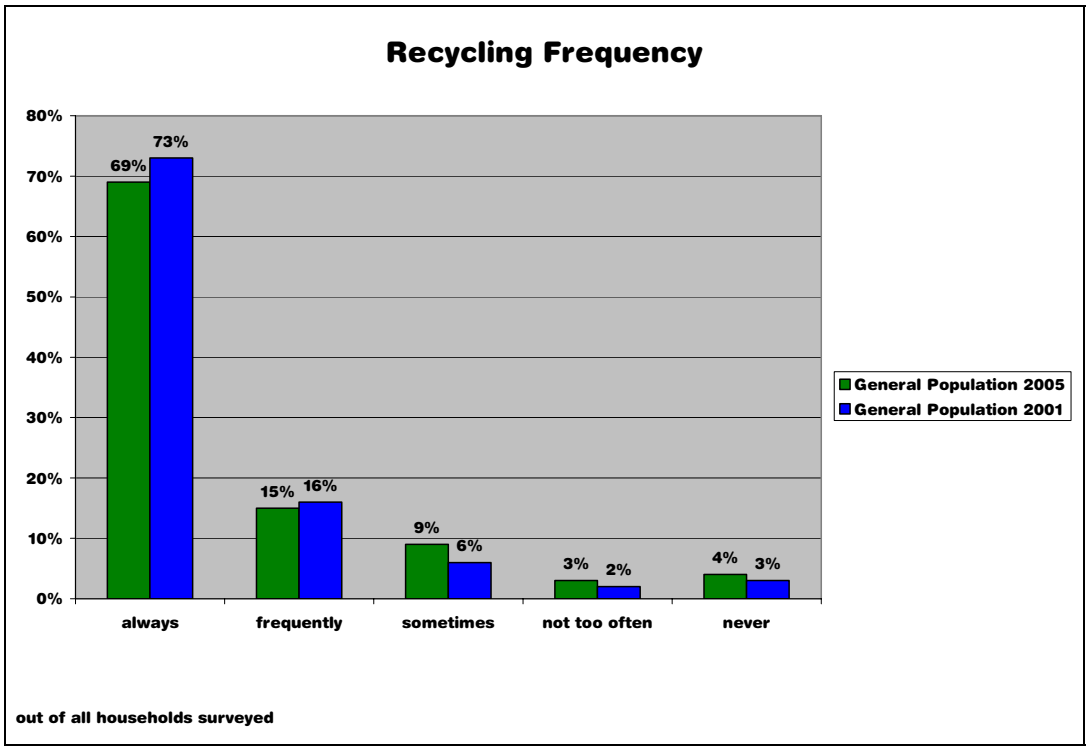
One of the first questions that the survey asked was who in the household was responsible for making decisions about recycling. In 2001, 1% of respondents reported that their household did not recycle in response to this question; in 2005, a similarly low 2.8% did [Chart 1].

Chart 1



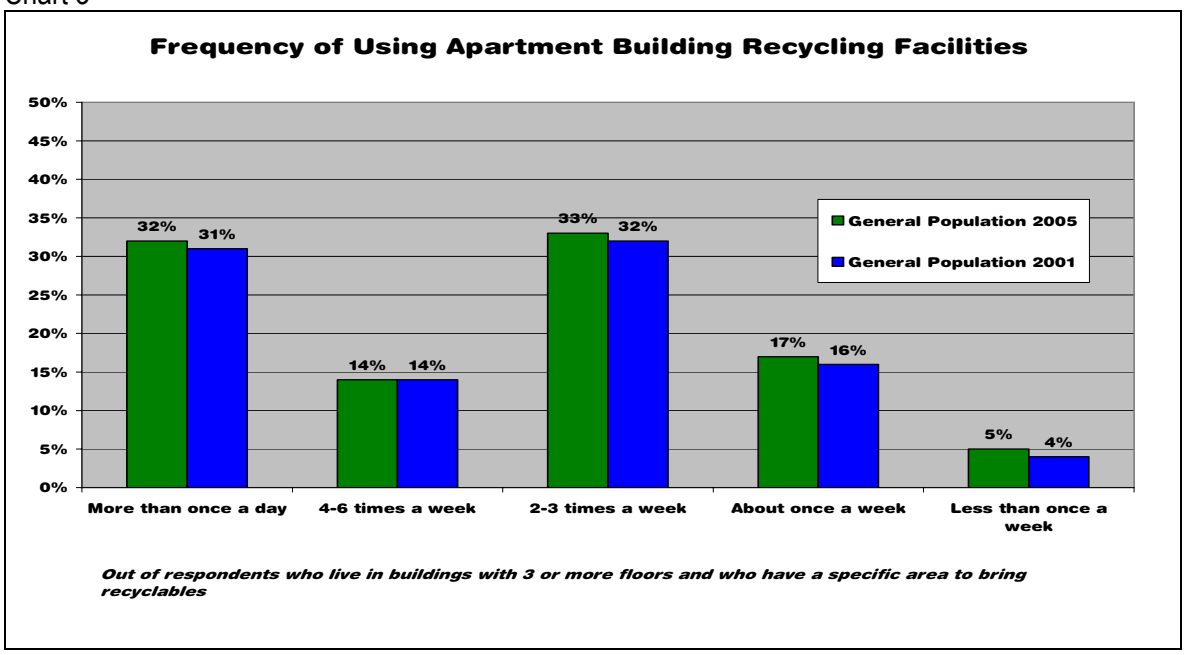
When, further on in the interview, respondents were asked how often they recycle (as opposed to *if* they recycle), nearly 85% of survey respondents reported "always" or "frequently" recycling in 2005. This figure is down slightly from 2001, when 89% reported always/frequently recycling. Nonetheless, the overwhelming majority of New Yorkers are actively recycling [Chart 2].

Chart 2



Similar trends were found among apartment dwellers, defined as residents living in buildings with three or more floors. When asked how often they recycle, the majority in 2005, as in 2001, reported recycling more than once a week [Chart 3].

Chart 3

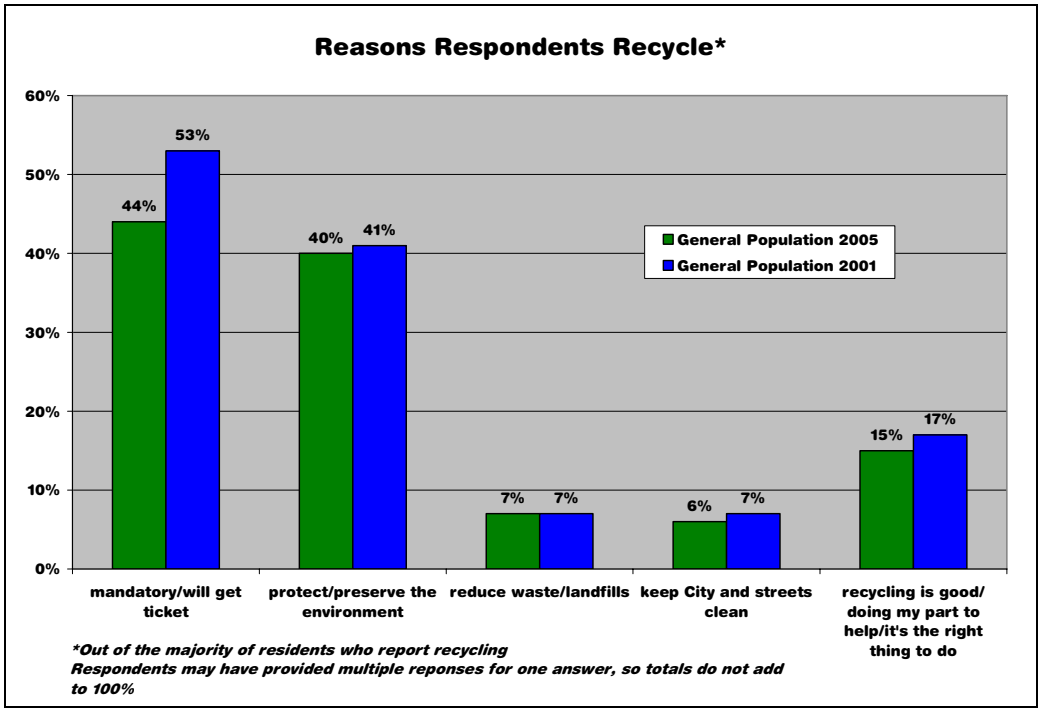


It should be noted that the participation data in the questions above is self-reported and, as such, may be biased by the respondent's desire to appear more compliant or politically correct, even to an interviewer not affiliated with DSNY. However, self-reports are the only available metric for household-level participation and do demonstrate trends over time.

Similar Recycling Motivations

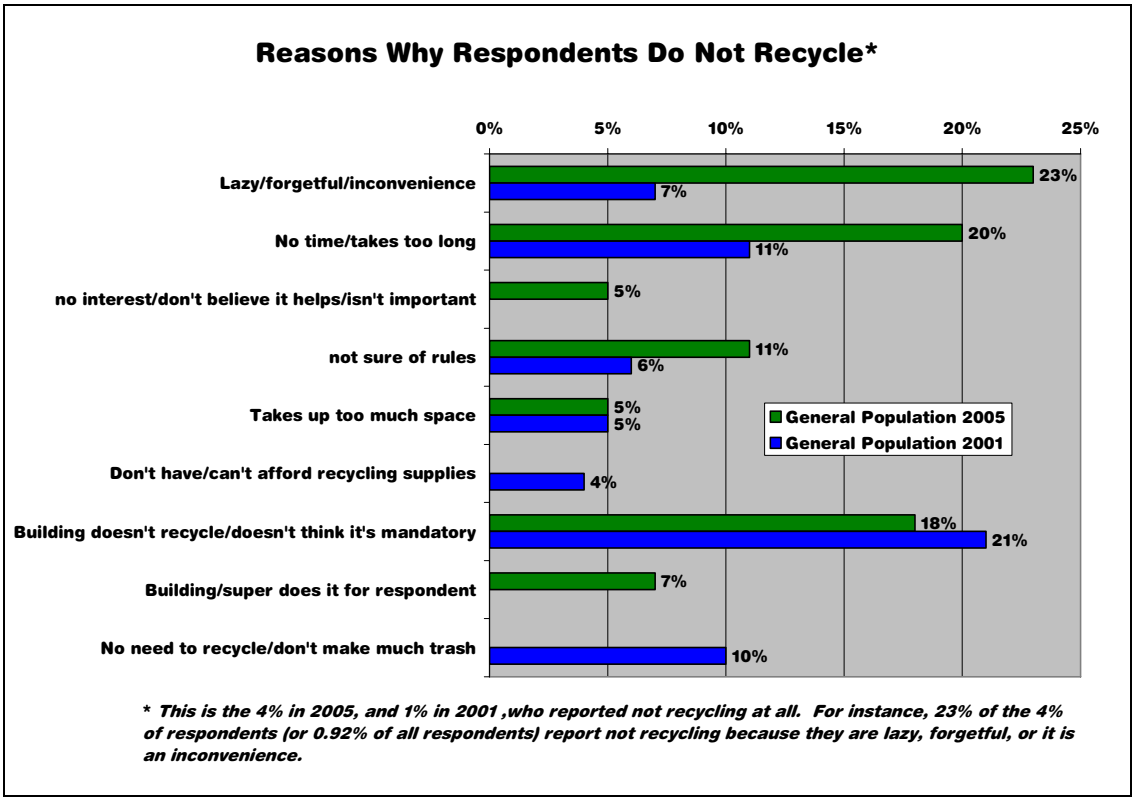
In 2005, when those who reported always or frequently recycling were asked why they recycle, the most common answers focused on the fact that recycling is required by law and enforced (44%), and the feeling that recycling has environmental benefits (40%). Similar trends were seen in 2001 [Chart 4].

Chart 4



Among the small number (4%) of 2005 respondents who admit they never recycle, only 11% reported confusion about rules or what to recycle. Apathy and inconvenience were cited most frequently (48% -- a combination of "inconvenient" [23%], plus "no time" [20%], plus "no interest" [5%]). Structural reasons were also common, with 18% of respondents reporting that their building did not provide recycling services and 5% reporting that recycling takes up too much space in the home. [Chart 5 next page].

Chart 5



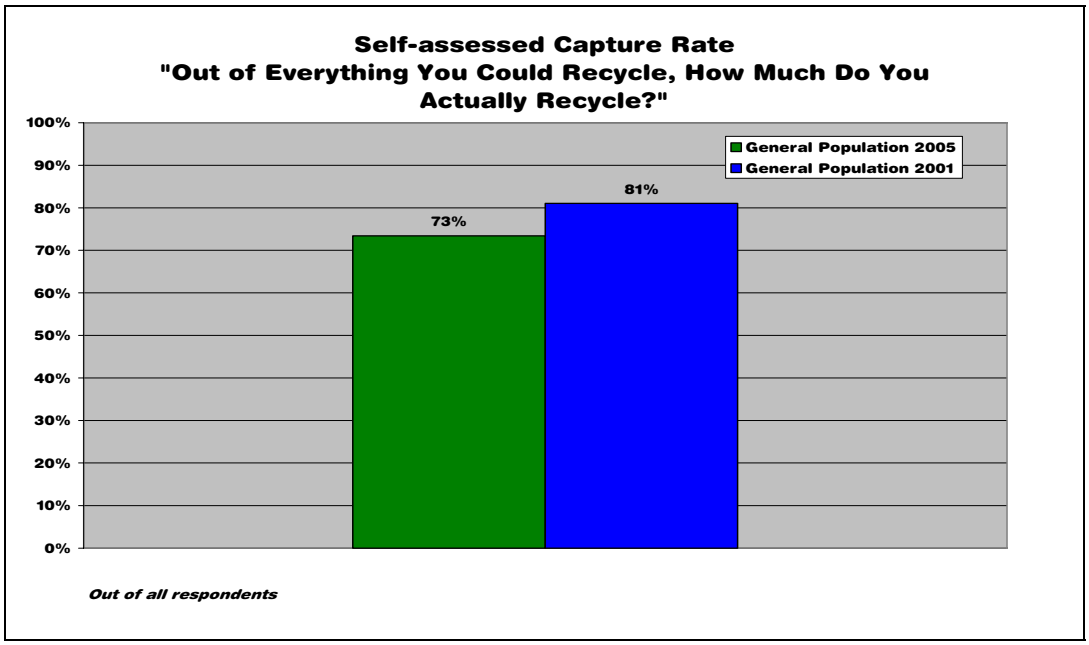
High levels of self-assessed capture rate

The question, "out of everything you know to be recyclable, how much do you actually recycle, on average each week," is designed to elicit self-reported capture rates (see box for definitions of Diversion Rate and Capture Rate). This information is more useful as a recycling indicator than self-reported diversion because (1) household consumption patterns and rates vary, and (2) it more closely probes the householder's intuitive sense of recycling compliance. While the mean response to this question in 2005 (73%) declined somewhat from rates in 2001 (80%), it still remains high [Chart 6 next page].

Diversion Rate: How much of *all waste* (trash plus recyclables) is actually recycled. Measured as a % of total weekly waste generated that goes into the recycling bin.

Capture Rate: How much of *everything that could be recycled* is actually recycled. Measured as % of weekly

Chart 6



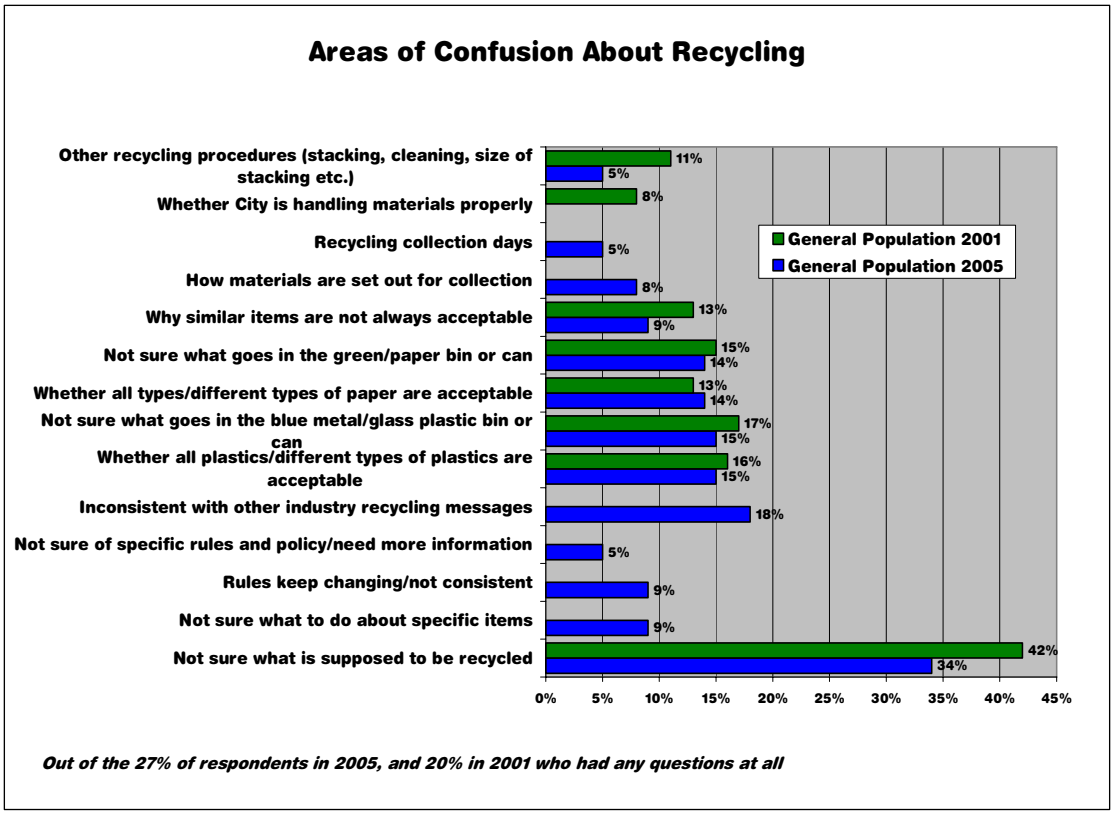
As with participation, self-reported capture rates may be biased upward. Measured capture rates assessed during the WCS show the average capture rate to be closer to 60%. Nonetheless, this metric is useful in confirming steadiness in program compliance over time.

Low Levels of Self-Reported Confusion

Another finding that contradicts conventional wisdom on the effects of the temporary suspensions to the recycling program was the relatively modest numbers of respondents who had any questions about the program, or found it confusing in any way. In 2001, this percentage was 20%; in 2005, it had risen, but only to 27%.

Among those expressing some uncertainty, most questions were centered on whether specific items are accepted or not. As Chart 7 on the next page shows, relatively few (only 9% of the 27% with questions) cited changing rules or lack of consistency in the recycling program as a source of confusion.

Chart 7



Consistency in Tested Knowledge

The 2005 survey confirmed that New Yorkers know very well what to recycle, but remain somewhat confused about what not to recycle. The 2001 survey did not ask about the recyclability of items, but there is information on tested knowledge in prior surveys conducted between 1995 and 2000[2].

In 2005, as in the past, over 90% of respondents identified newspapers, cardboard boxes, metal cans, plastic bottles and jugs, and glass bottles and jars as recyclable. Knowledge rates for other types of paper and cardboard, including cereal boxes, paperback books, paper bags, and pizza cartons, were over 70%; while knowledge that mixed paper and discarded mail/junk mail/envelopes should be recycled was slightly lower (over 60%).

Chart 8 on the next page shows the recyclable materials used to test respondents' knowledge and at what rate they were correctly identified as recyclable.[3] Chart 9 shows the non-recyclable materials used in the test, and at what rate they were incorrectly identified as recyclable.[4]

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[2] . For details on this research, see Recycling: What Do New Yorkers Think?, at www.nyc.gov/ nycwasteless, under *Recycling in NYC: Research Reports.*

[3] It should be noted that large metal household appliances placed at curbside for disposal are typically not bagged or put in a bin. Thus, whether these items are set out by the resident as recycling or, mistakenly, as refuse, the likelihood is high that they will be properly recycled by the sanitation workers collecting MGP recycling.

Chart 8

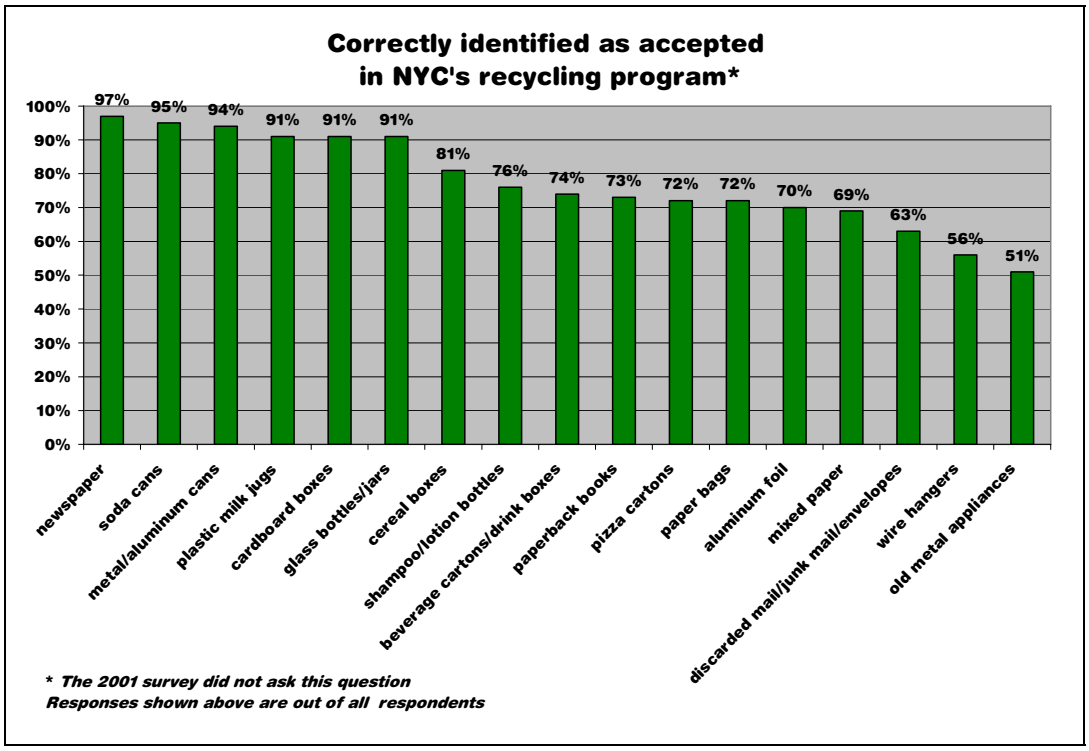
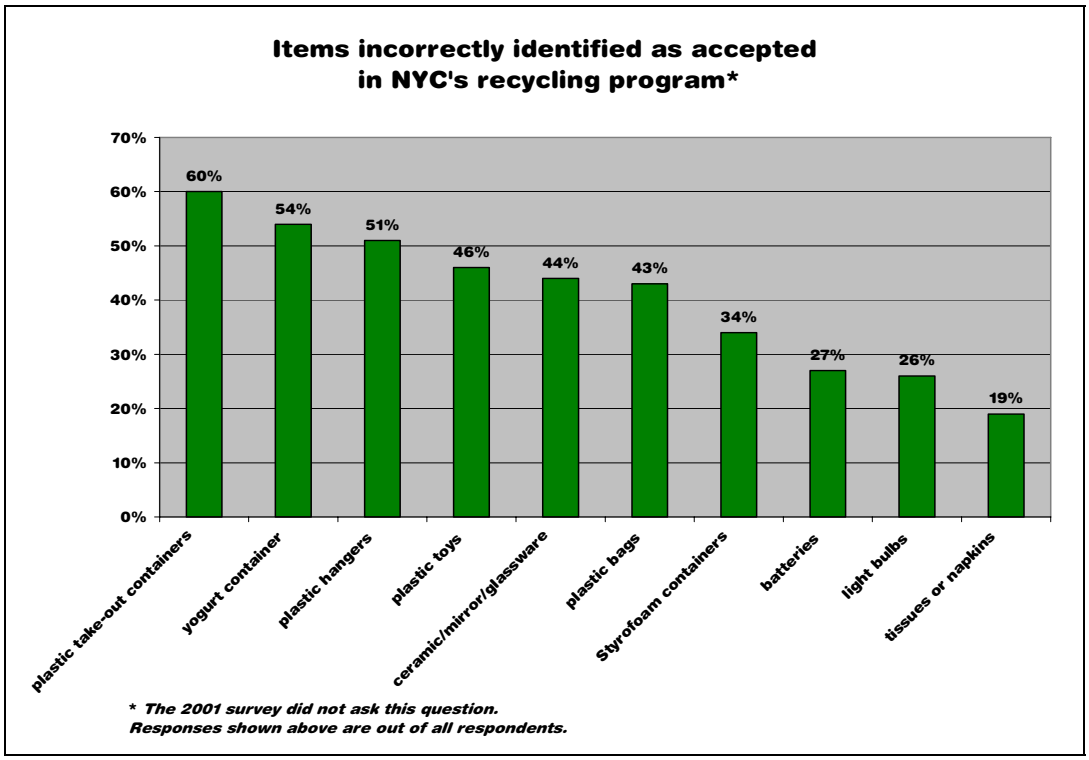


Chart 9



[4] Readers can find full information on what is and what is not accepted in NYC's curbside recycling program, and how to prepare materials for set-out, at the Department of Sanitation's recycling website: www.nyc.gov/nycwasteless

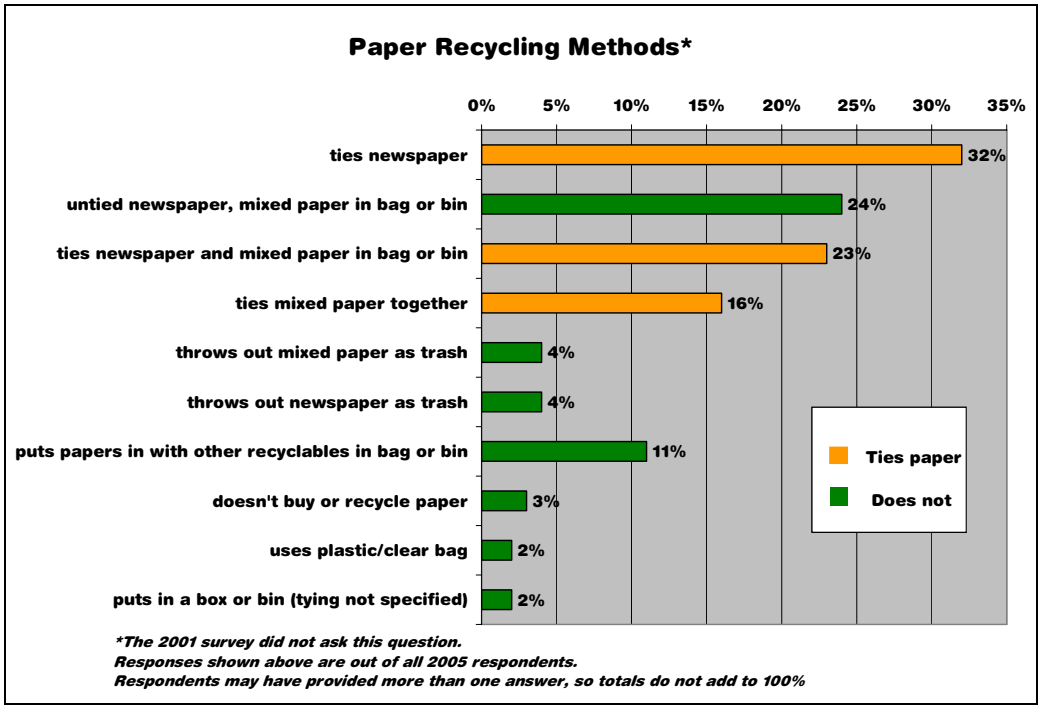
Factors Influencing Paper Capture Rates

DSNY BWPRR's recent Waste Characterization Study[5] documented that capture rates for mixed paper, defined as junk mail, smooth cardboard, white and colored paper, manila folders and envelopes, and soft cover books[6] are lower than those for MGP, and significantly lower than capture rates for newspaper and corrugated cardboard.

One reason hypothesized for this was that respondents erroneously perceive the need to tie papers for recycling, rather than storing them loose in bins or clear plastic bags. Because most mixed paper does not easily lend itself to tying, this misperception could be inhibiting greater mixed paper capture.

The results of the 2005 market research support this hypothesis. A minority of respondents correctly place mixed paper and newspapers untied in a bin or bag; it is a much more common practice to tie papers before placing within or next to a recycling bin or bag, as indicated by the orange (lighter) bars in Chart 10, below. DSNY does not require residents to bundle any paper other than large pieces of corrugated cardboard, and would recommend that apartment buildings not instruct their residents to do so either as it appears to discourage full compliance with mixed paper recycling resulting in valuable paper ending up in black bags instead of clear bags.

Chart 10



Appeal of DSNY's Public Education

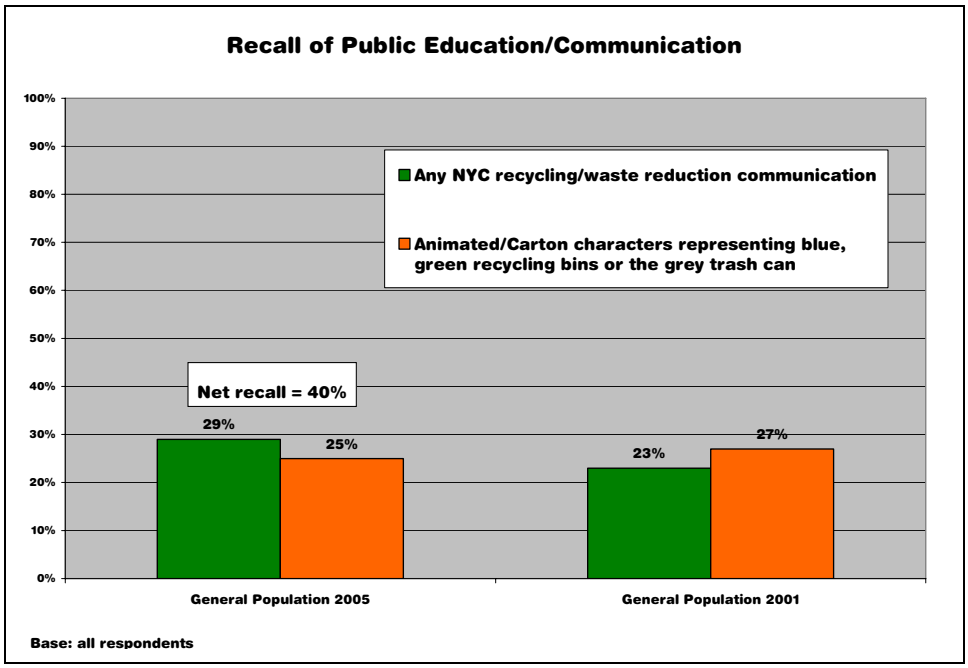
In the 2005 survey, about 40% of all respondents recalled seeing some form of DSNY public education about recycling in the past few months, a similar rate of recall to the 2001 data. . In the 2005 survey,

[5] For full information about the NYC residential and Street Basket Waste Characterization Study, go to http://www.nyc.gov/html/nycwasteless/html/recycling/waste_char_study.shtml

[6] NYC Department of Sanitation Digest of Codes

25% spontaneously mentioned the recycling bin and bag characters, and the other characters symbolizing refuse, compost, leaves, electronics, and textiles which are the cornerstone of DSNY's public education program. This figure is down slightly from 2001 (27%). However, recall of any DSNY/recycling related material had a higher recall rating than in 2001 [Chart 11].

Chart 11



All respondents were asked to rate whatever material related to recycling they recalled as coming from DSNY. 65% described the material as extremely, very, or somewhat appealing; 23% had no opinion; and 12% described the material as extremely, very, or somewhat unappealing [Chart 12].

Chart 12

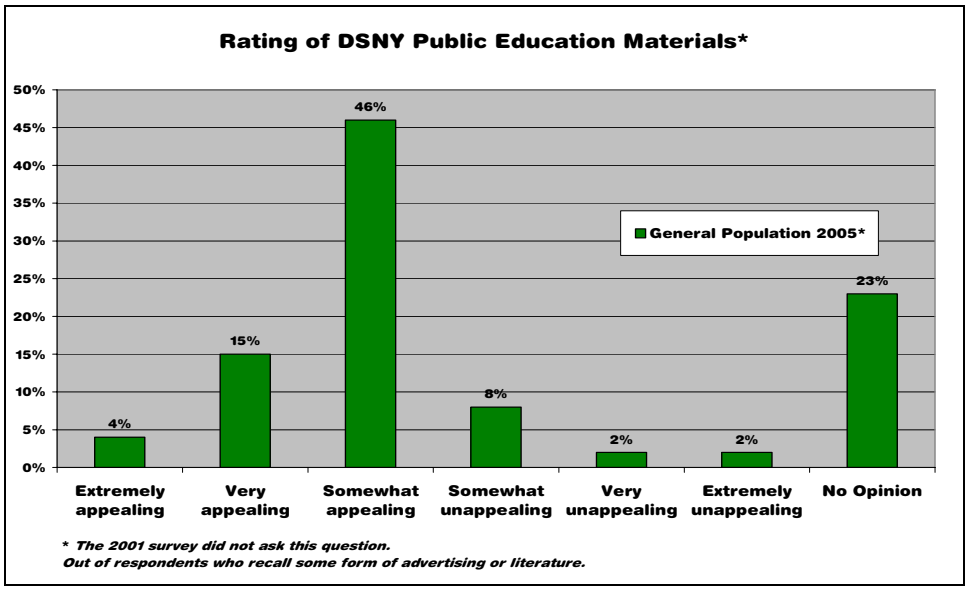


Table 1 below shows more details on the analysis of how DSNY's public education materials are perceived. Keep in mind that the percentages along the right hand side of the table are out of a percentage of the whole – either the 65% that found DSNY material appealing, or the 12% who found it unappealing.

Table 1

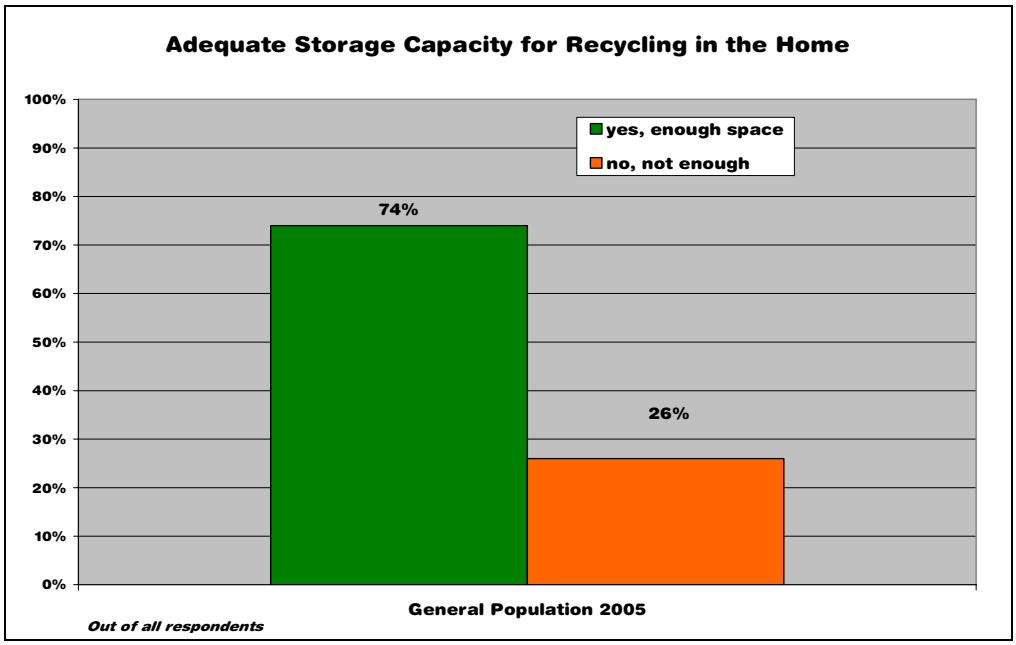
Out of the 65% who found DSNY public education appealing	
Good/effective presentation of materials	30%
Informative/educational/good explanations/directions/rules	15%
Easy to understand/message clear/simple/lots of pictures	12%
Increases awareness/stresses importance of recycling/environmental/ cleanliness concerns	9%
Good/satisfied with literature/advertising	4%
Good/effective presentation for children	3%
Out of the 12% who found DSNY public education unappealing	
Poor/ineffective presentation of materials	32%
Hard to understand/can't read/should be in more languages/ pictures instead of words	15%
Not interesting/boring/don't remember it	12%
Haven't seen/don't see much/enough/need more literature/advertising	8%
Negative mentions of recycling program	8%
Not enough information/need more specifics	3%

Structural Characteristics Related to Recycling

New York is unlike any other city in the U.S. because its housing stock is dominated by apartment buildings. The 2005 telephone survey research asked a number of questions regarding storage space within the respondent's apartment; the setup of recycling areas within the building; and the superintendent's role in building recycling. This was done in order to dovetail the telephone survey results with a portion of the Waste Characterization Study research pertaining to the effect that a building's physical/structural characteristics have on its recycling infrastructure and services, and the ultimate capture and diversion rates of an individual building.

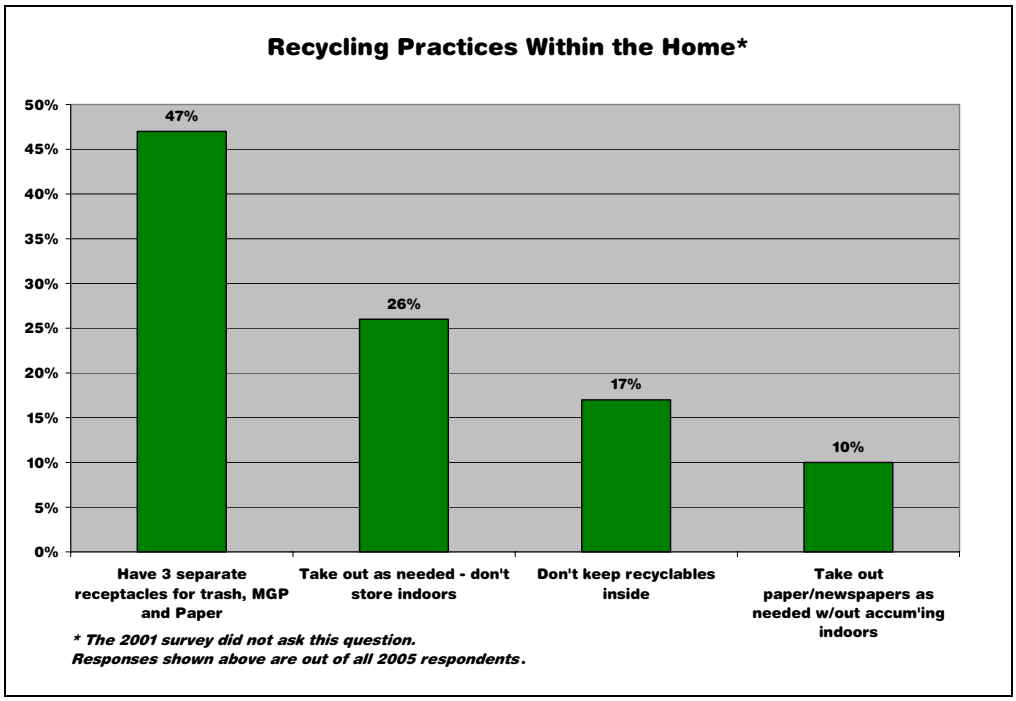
The results show that most respondents who live in apartment buildings with three or more floors enjoy satisfactory service and do not perceive structural problems that inhibit recycling compliance. 74% of respondents said they have adequate space inside their home or apartment to keep recyclables, as well as refuse [Chart 13, next page].

Chart 13



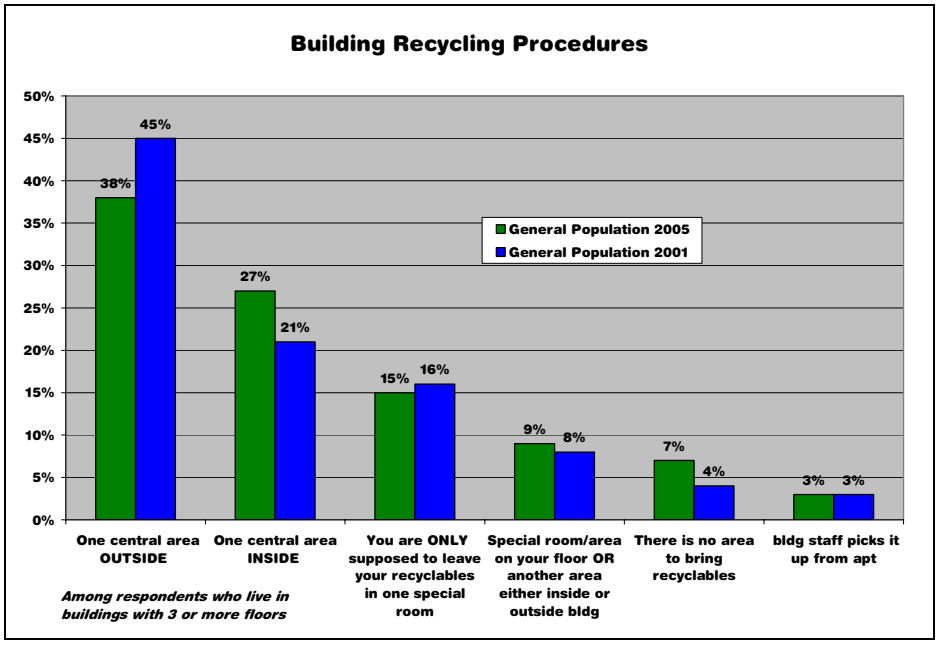
A little less than half of all respondents regularly store recycling in their homes, with the remainder taking recyclables out with them daily [Chart 14].

Chart 14



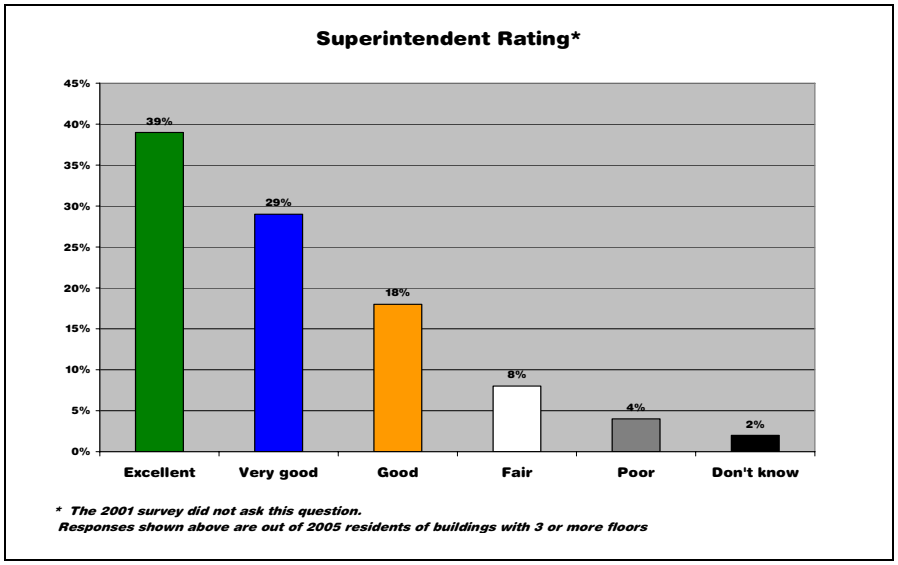
Among apartment dwellers, over a third are required to bring recycling to a central area outside the building. This figure is down slightly from 2001. Since convenience is an important factor in successful recycling, this is an improvement; more buildings have the more convenient, indoor collection mechanisms for their tenants. 27% have one central area inside the building, and almost 10% have access to recycling areas on each floor. 7% report no area to which to bring their recycling, an increase from 2001 [Chart 15].

Chart 15



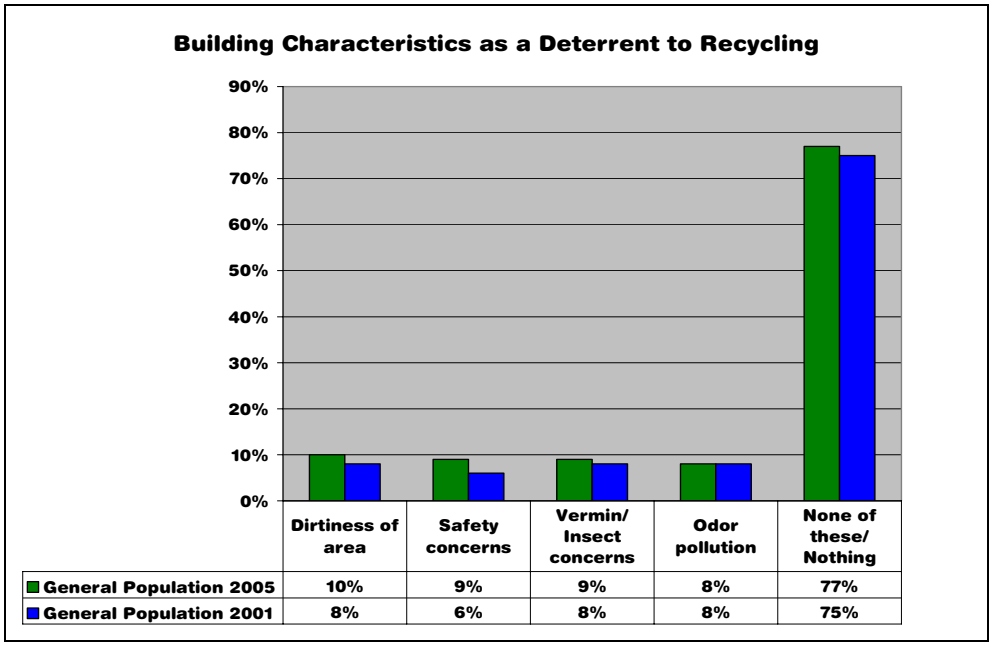
86% of respondents in apartment buildings with three or more floors rate their superintendent's performance in servicing the recycling area as excellent, very good, or good [Chart 16].

Chart 16



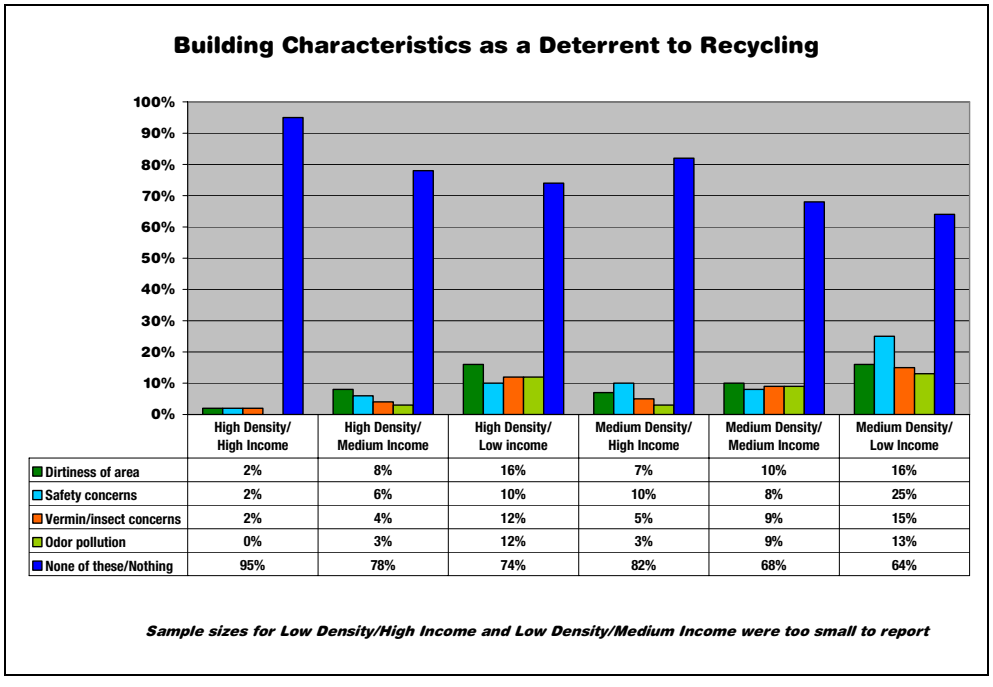
Respondents who live in buildings with three or more floors were asked if there was anything about the recycling area in their building that deters them from recycling more often. General Population results are shown in Chart 17.

Chart 17



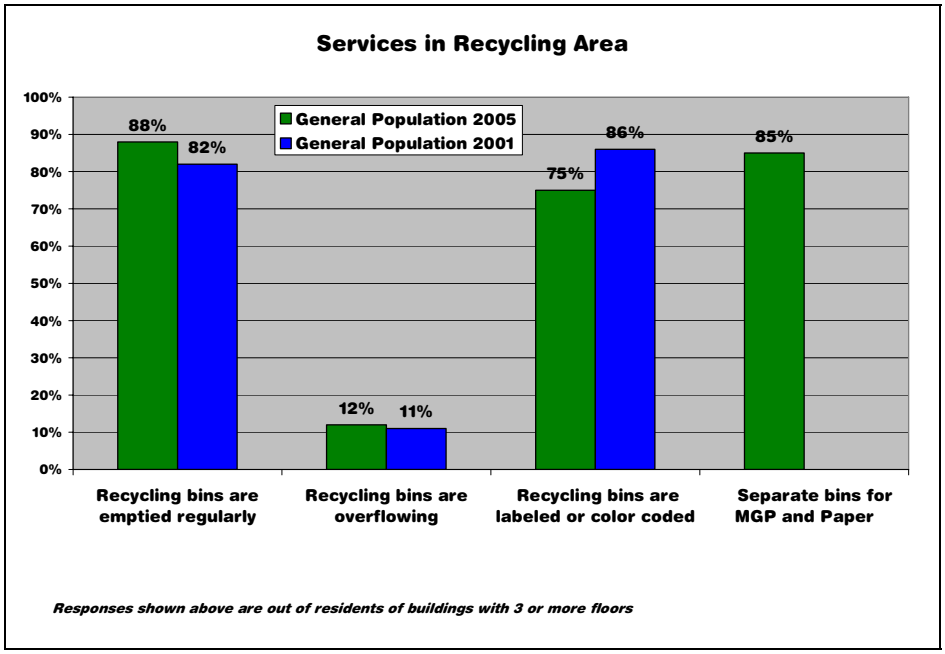
Of the 23% who cited concerns over their recycling area's dirtiness, safety, or odor, the majority of complaints were reported from respondents living in High and Medium Density/Low Income areas [Chart 18].

Chart 18



88% of respondents who live in apartment buildings with three or more floors report that their bins are emptied regularly; 75% that the bins are labeled or color-coded; and 85% report that there are separate Paper and MGP bins in their recycling area [Chart 19].

Chart 19



CONCLUSION

No major shifts in attitudes or behaviors since 2001

The 2005 survey data reveals that, on the whole, residential behaviors and attitudes with respect to recycling have not changed despite the temporary cuts to the program from 2002 through 2004.

Section 2.4.7.1 of the Draft Comprehensive Solid Waste Management Plan calls upon DSNY to conduct new market research on public attitudes and awareness of waste prevention, reuse, and recycling. The results of this survey research conducted in 2005 fulfill this mandate, and demonstrate that, despite changes in the New York City Recycling Program, knowledge about and approval of the program remains strong. This finding is not surprising in light of the rapid rebound in the diversion rate that was seen after reinstatement of the full Recycling Program, including plastics and glass collection, in April of 2004. During suspension, the curbside diversion rate ranged from 11% to 15%. Post-reinstatement, it has fluctuated between 16% and 18%.

Findings from the Waste Characterization Study suggest that a 25% diversion rate may be the maximum attainable under the current program, given that only 35% of all the waste that New Yorkers generate consists of paper, metal, glass, or plastics presently designated for recycling. This expectation is buttressed by the observation that there are no clear instances of lack of knowledge, enthusiasm, or arrangements to recycle among New Yorkers as a whole.

The next section will look at the effect of income and housing density on diversion rate in different areas of the City.

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PART 2: FOCUS ON INCOME, HOUSING DENSITY, AND DIVERSION RATES

INTRODUCTION

The survey results discussed in the previous section show average responses for the "General Population", a group of 1200 individuals randomly selected to represent New York City's diversity in housing density and income. The General Population research was structured so that differences among residents of areas with various income and housing density characteristics could be examined as well. This process began by classifying the 2,000+ Census Tracts in New York City according to average housing density and median household income [Tables 2 and 3].

Table 2 Housing Density and Income Definitions

	High	Medium	Low
housing density	67% units in structures of 10 units or more	all others	67% of units in structures of 2 or fewer units
median household income	greater than $46,193	all others	less than $30,763

Table 3 Housing Density and Income Groups

High Density / High Income	Medium Density / High Income	Low Density / High Income
High Density / Medium Income	Medium Density / Medium Income	Low Density / Medium Income
High Density / Low Income	Medium Density / Low Income	(Low Density / Low Income)

Since there are no populated Census Tracts in New York City that meet the Low Density/ Low Income category, this density/income combination was excluded from our study, leaving eight density/income groups to be compared.

Surveys were administered randomly to 150 respondents from each of the eight remaining density and income categories.

To calculate "General Population" results from these eight groups of 150 interviews, the respective percentage of the population in New York City living in Census Tracts of each of the eight density/income strata was used as a weight [Table 4 on next page]. For example, the responses for "Medium Density/Medium Income" respondents were given a weight of 18%, and those of "High Density/Medium Income" were given a weight of 9%, because these are the corresponding percentages of all individuals living in the City with these density/income characteristics.

Table 4 Summary of General Population Samples and their weights

Summary of General Population Samples Market Research 2005			
	Unweighted		Weighted
	Actual # of Interviews	Percentage of Population	Number of equivalent interviews
Total General Population	1200	100%	1200
High Density/High Income	150	11%	132
High Density/Low Income	150	22%	263
High Density/Medium Income	150	9%	106
Medium Density/High Income	150	6%	67
Medium Density/Medium Income	150	18%	216
Medium Density/Low Income	150	14%	169
Low Density/High Income	150	15%	176
Low Density/Medium Income	150	6%	71

Low Diversion District Surveys

An identical and concurrent survey was administered to 1,000 randomly selected residents living in the twenty Community Districts that have traditionally shown the lowest average diversion rates in the City and the results categorized for these purposes as "Low Diversion Districts" (LDDs). The twelve districts with the lowest average diversion rates were classified as "Bottom Tier" districts; with the next eight lowest districts classified as "Lower Tier" districts [Table 4].

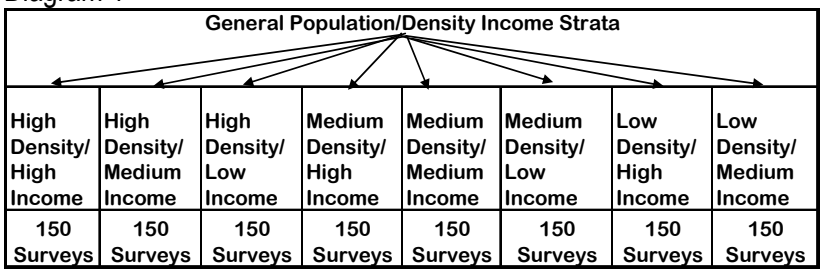
Table 5: Lower and Bottom Tier Community Districts

Summary of Low Diversion District Samples Market Research 2005							
Bottom Tier Districts (<12% diversion rate)				Low Tier Districts (12% - 15%)			
Diversion Rate 7/04-9/05	Borough	District	Number of Surveys	Diversion Rate 7/04-9/05	Borough	District	Number of Surveys
8.5%	Bronx	1	50	13.6%	Bronx	7	50
8.3%	Bronx	2	50	12.5%	Brooklyn	5	50
7.3%	Bronx	3	50	12.9%	Brooklyn	8	50
7.5%	Bronx	4	50	13.8%	Brooklyn	14	50
12.0%	Bronx	5	50	13.5%	Brooklyn	17	50
9.0%	Bronx	6	50	13.4%	Manhattan	9	50
10.0%	Bronx	9	50	12.4%	Manhattan	11	50
10.5%	Brooklyn	3	50	13.2%	Manhattan	12	50
11.1%	Brooklyn	4	50				
11.4%	Brooklyn	9	50				
8.7%	Brooklyn	16	50				
9.5%	Manhattan	10	50				
18.3% Citywide average							

The diagrams on the next page illustrate the research data's organizational structure and how the categories can be summarized in several ways. All the data from the eight Housing Density and Income strata can be aggregated to arrive at a General Population category. Where there is sufficient

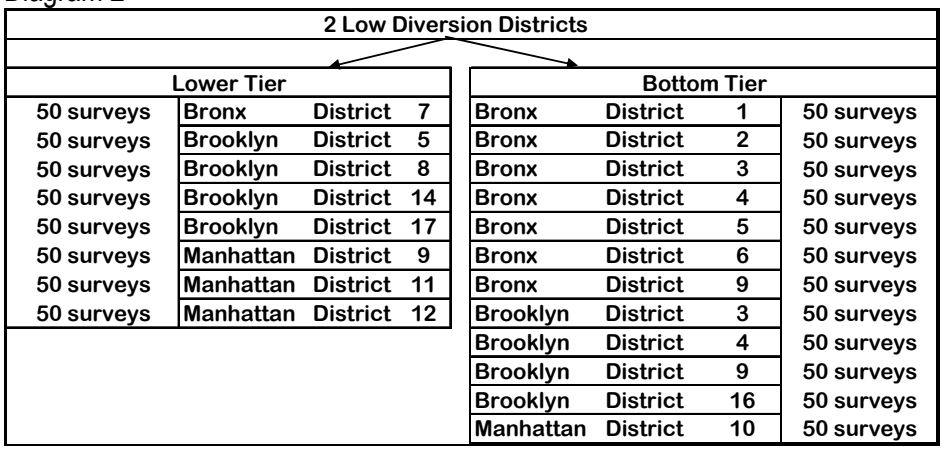
data[7], we can compare results among different Housing Density and Income strata within the General Population. So we can compare each strata to the General Population, and each strata to other strata

Diagram 1



Additionally, the General Population results, which represent a weighted average of the eight housing density/income strata, can be compared to results from the LDDs; again, we can compare average results for Lower Tier and Bottom Tier Low Diversion Districts to the General Population Average or to each other.

Diagram 2



It should be noted that although most of the LDDs are High or Medium Density and Low Income, the LDD results are presented separately from the General Population results for High and Medium Density/Low Income groups.

Before presenting survey results on different density/income groups of the General Population, or on LDD groups, it will be useful to review tonnage data from DSNY curbside collections to examine further the relationships between housing density, income, and the recycling diversion rate.

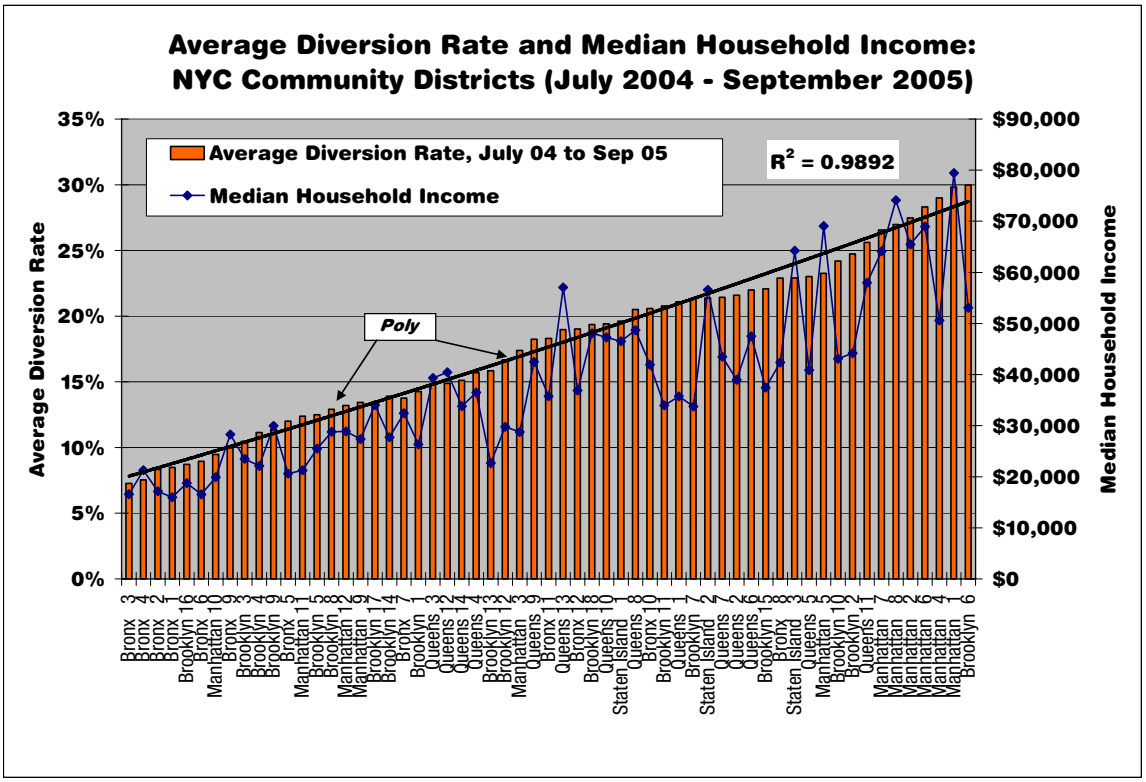
Recycling Diversion Rates

The "Diversion Rate" is an important indicator of recycling participation. It reflects the percentage of all waste generated that is "diverted" from disposal, and can calculated by dividing the number of tons of recyclables collected by the number of tons of recyclables plus the number of tons of refuse collected.

[7] If very few members of the general population share a response to a certain question, there will not be enough data to compare results by density and income group

DSNY's daily records of recycling and refuse collections allow us to track the diversion rate over time, both citywide and by individual Community District. If we look at how diversion rates vary by Community District, certain patterns emerge. There is a clear correlation between the diversion rate and a Community District's median household income. Chart 1 below presents New York City's 59 Community Districts organized from lowest to highest recycling diversion rate. It shows that, as income increases, so does the recycling diversion rate [Chart 20].

Chart 20

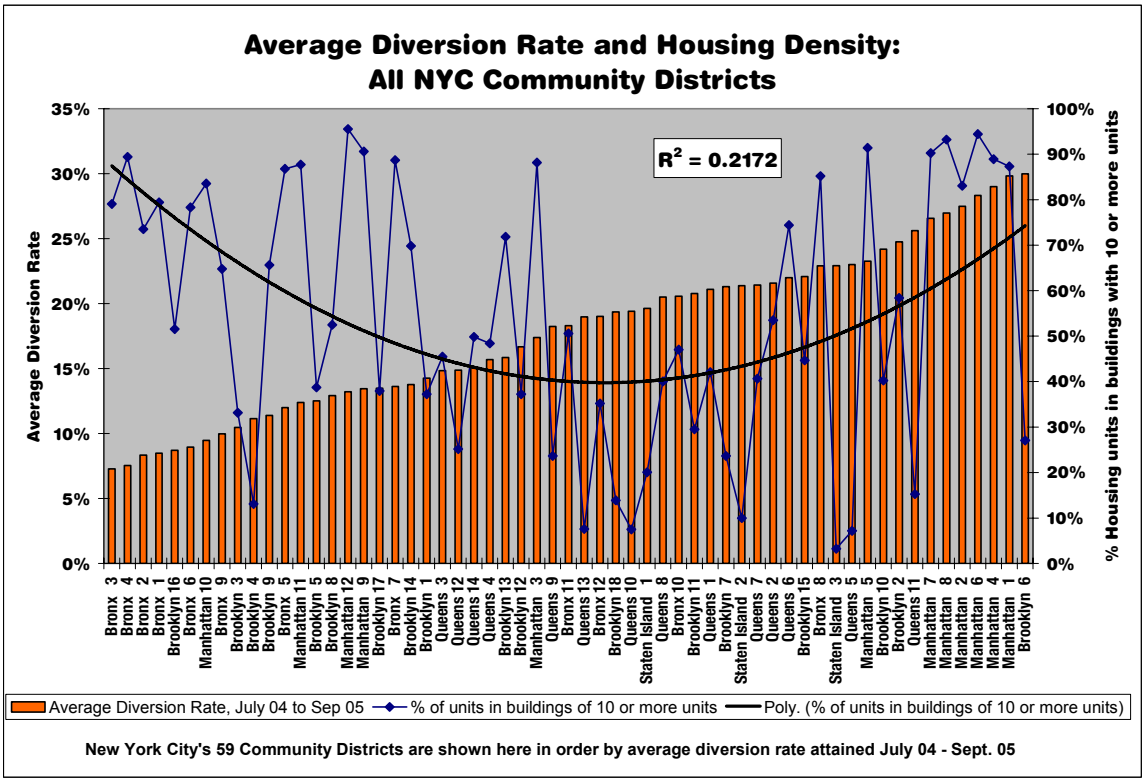


The line marked "Poly." in the chart above is a polynomial trendline. Trendlines are used to graphically display trends in data and to analyze problems of prediction. A trendline is most reliable when its R-squared value is at or near 1.

The effects of housing density on the diversion rate are more complex. At first glance, there does not appear to be any correlation between housing density and diversion rates [Chart 21]. Density fluctuates greatly as the diversion rate increases. The polynomial trendline suggests that diversion rates may be very low or very high in areas of High Density, and tend to fall in between extremes in Lower or Medium Density areas, but the low R-squared value suggests that this is not a very reliable indicator of what is going on.

It should be noted that in Chart 21 on the next page, density is measured using the percentage of buildings with 10 or more residential units within a Community District. Density may also be measured by other metrics, such as percent of buildings with 3 to 9 units, or the number of persons per acre. However, none of these interrelated metrics suggest a direct correlation between housing density and recycling diversion rates.

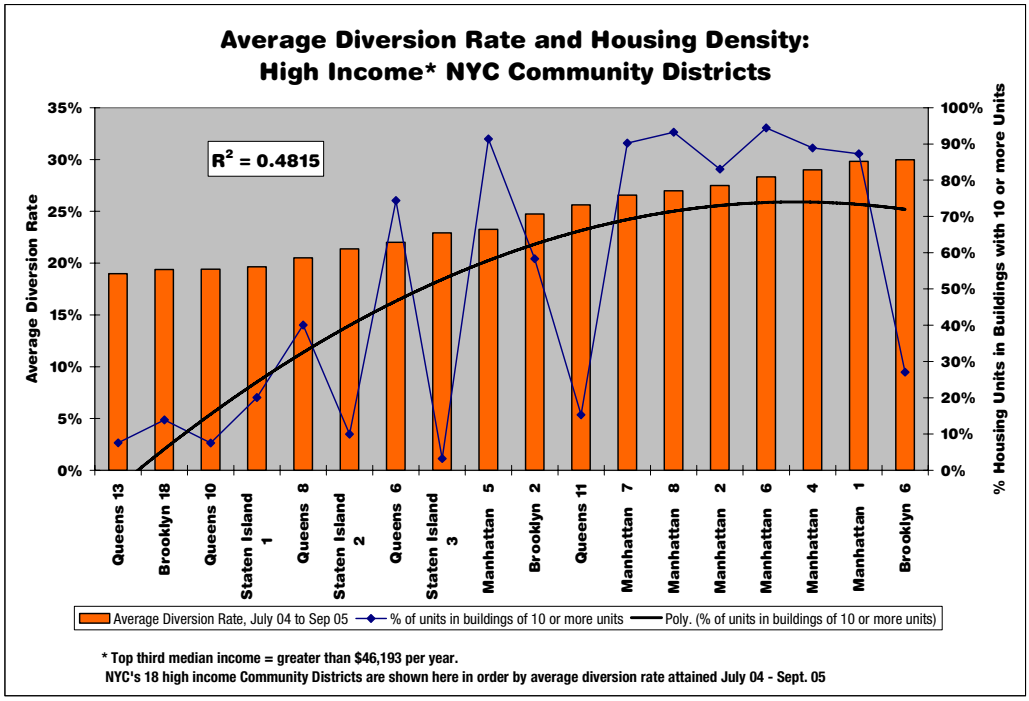
Chart 21



The black solid line in the chart above is a polynomial trendline. Trendlines are used to graphically display trends in data and to analyze problems of prediction. A trendline is most reliable when its R-squared value is at or near 1.

When income is considered in conjunction with density, however, a more complex relationship emerges among High Income districts. The High Income districts that are more densely populated have higher diversion rates than those that are less densely populated, but this relationship is not as strong as the one between income and diversion rate independent of density [Chart 22 on next page].

Chart 22



The black solid line in the chart above is a polynomial trendline. Trendlines are used to graphically display trends in data and to analyze problems of prediction. A trendline is most reliable when its R-squared value is at or near 1.

In Medium and Low Income districts, housing density does not appear to have a clear or strong effect on recycling diversion rates [Charts 23 and 24].

Chart 23

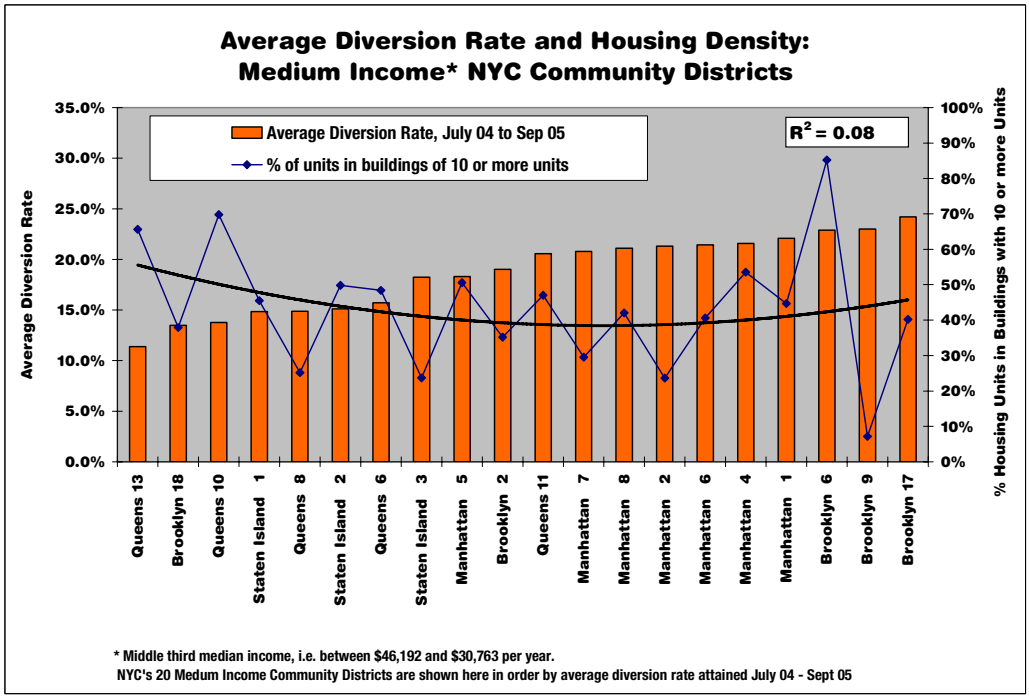
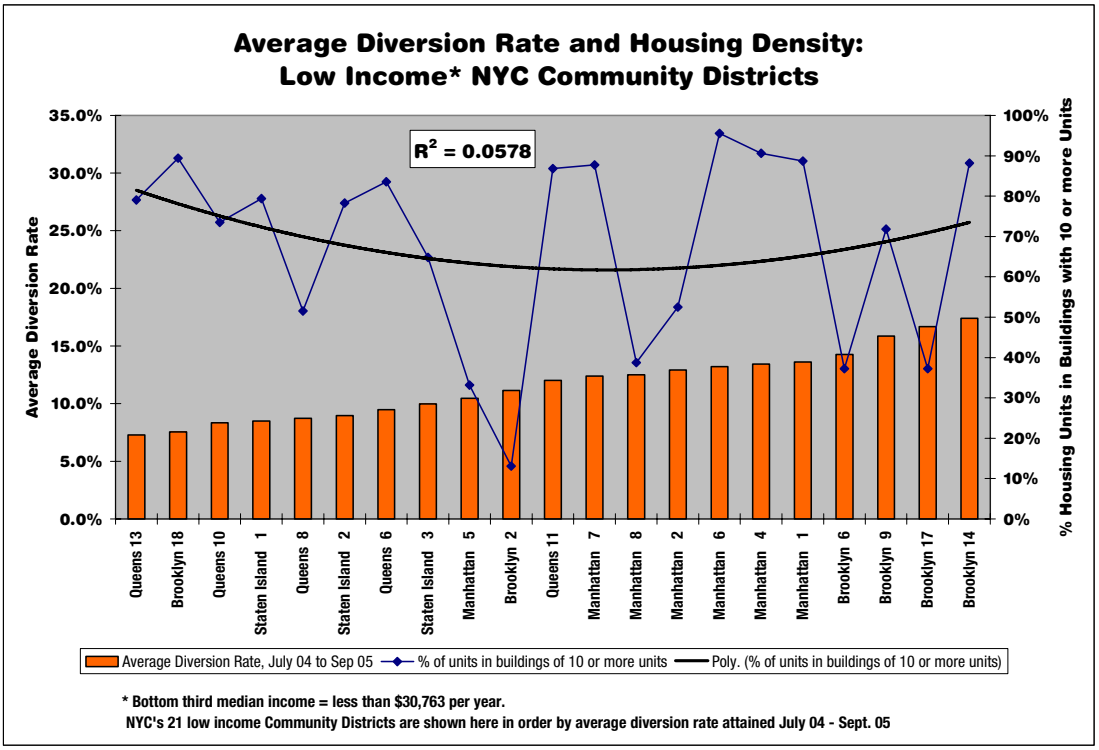


Chart 24



The line marked "Poly." in the above two charts is a polynomial trendline. Trendlines are used to graphically display trends in data and to analyze problems of prediction. A trendline is most reliable when its R-squared value is at or near 1.

From these explorations of the data, it appears as if there is a significant positive correlation between income and diversion rate. In addition, among High Income residents, the denser the neighborhood, the higher the recycling diversion rate.

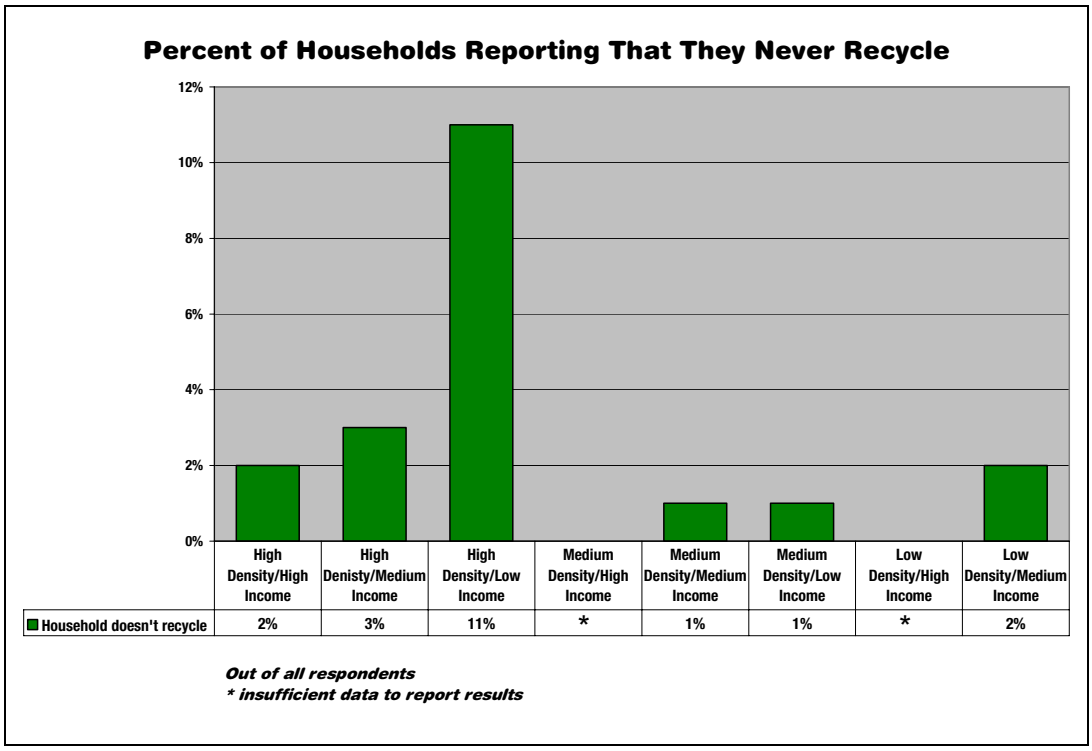
SURVEY FINDINGS

Surveys administered to the eight density/income groups comprising the General Population, as well as the Bottom and Lower Tier LDDs, were examined to investigate the relationships between housing density, income, and a lower-than-average diversion rate.

Non-Participation

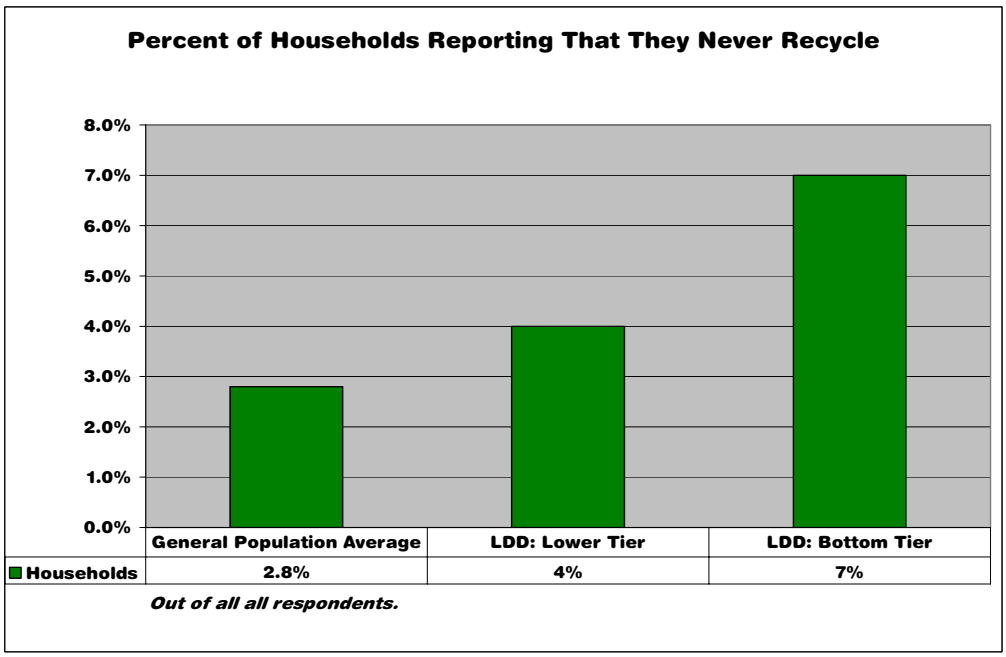
The 2005 General Population Market Research findings suggest that respondents from High Density/Low Income districts participate less in recycling than do other groups [Chart 25 next page].

Chart 25



There were also slightly lower than average levels of participation in recycling among residents of Bottom Tier LDDs , although residents of Lower Tier LDDs were similar to the average [Chart 26]. As opposed to 4% of the General Population and Lower Tier districts, 7% of respondents in Bottom Tier districts report not recycling at all.

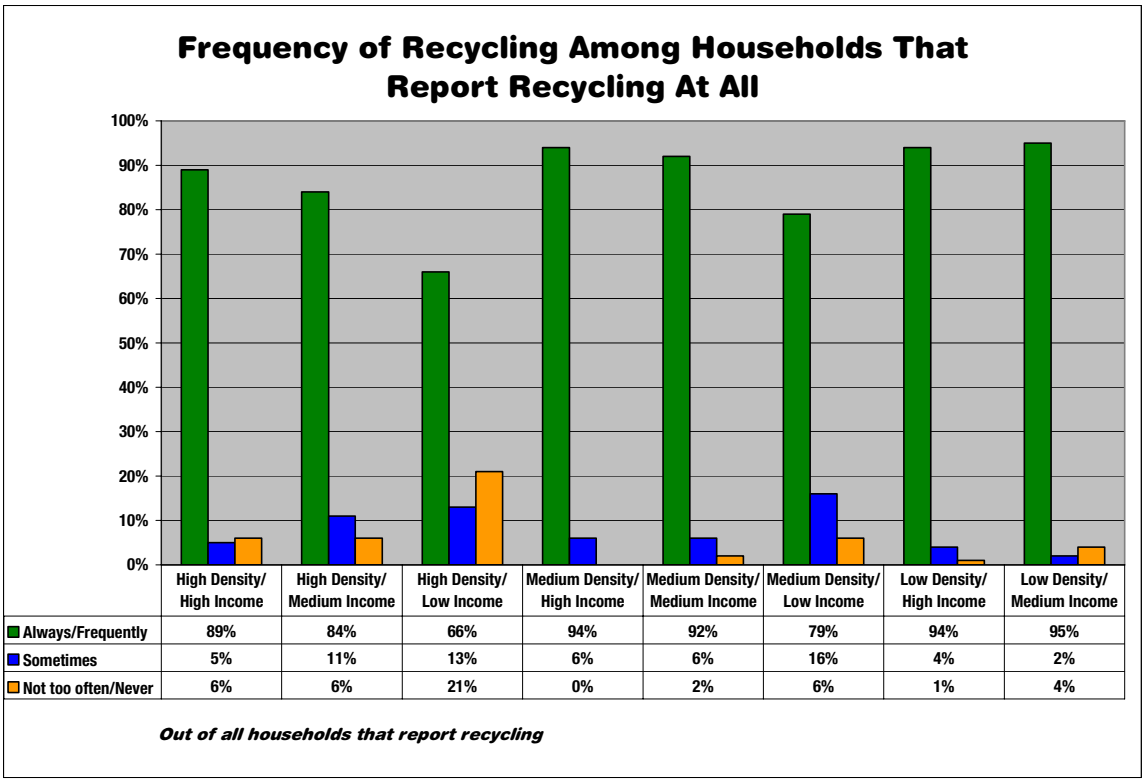
Chart 26



Frequency of Recycling – Another Measure Of Participation

Among respondents who do recycle, 66% and 79% High Density/Low Income and Medium Density/Low Income, respectively, reported "always" or "frequently" recycling. Respondents from other housing density/income groups reported that they recycle even more frequently, with 95% of Low Density/Medium Income respondents reporting "always" or "frequently" recycling [Chart 27].

Chart 27

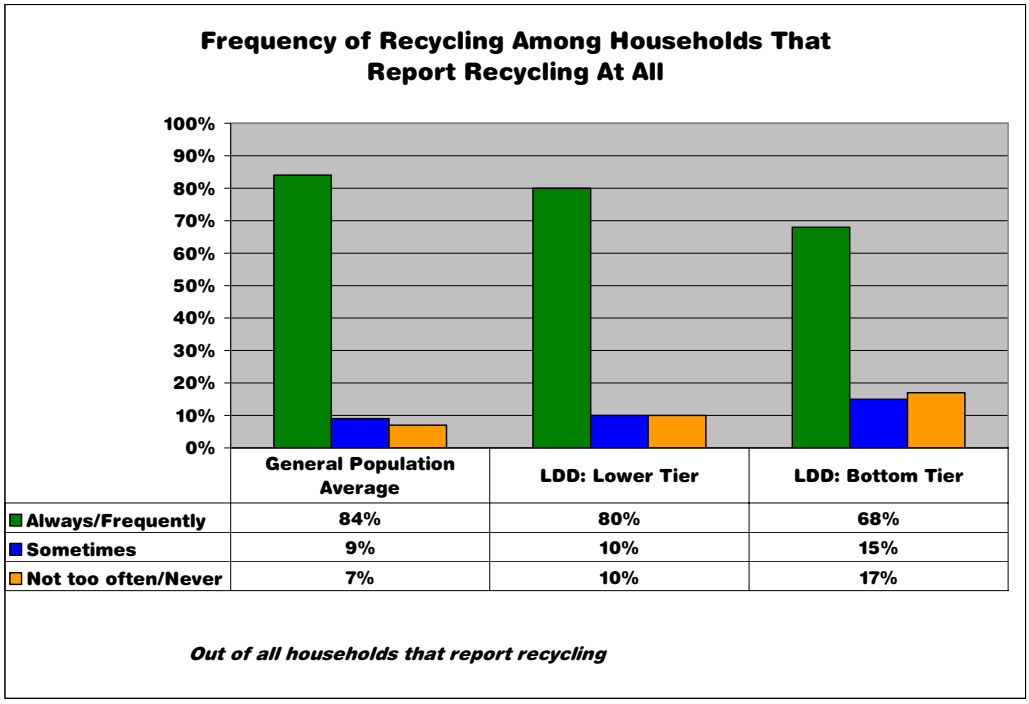


	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income	Low Density/ High Income	Low Density/ Medium Income
Always/Frequently	89%	84%	66%	94%	92%	79%	94%	95%
Sometimes	5%	11%	13%	6%	6%	16%	4%	2%
Not too often/Never	6%	6%	21%	0%	2%	6%	1%	4%

7% of the General Population Survey respondents confess to "never" recycling or recycling "not too often", and another 9% "only sometimes" recycling.

Among LDD respondents, the "always/frequently" totals are somewhat lower, with 68% of Bottom Tier respondents and 80% of Lower Tier respondents reporting "always" or "frequently" recycling. The "sometimes", "not too often", and "never" response categories are commensurately higher [Chart 28 next page].

Chart 28



Among apartment dwellers, however, there seems to be a less pronounced effect of income on recycling frequency, although on the whole, lower income residents reported recycling less frequently than Medium or High Income residents, in apartment buildings [Charts 29 and 30].

Chart 29

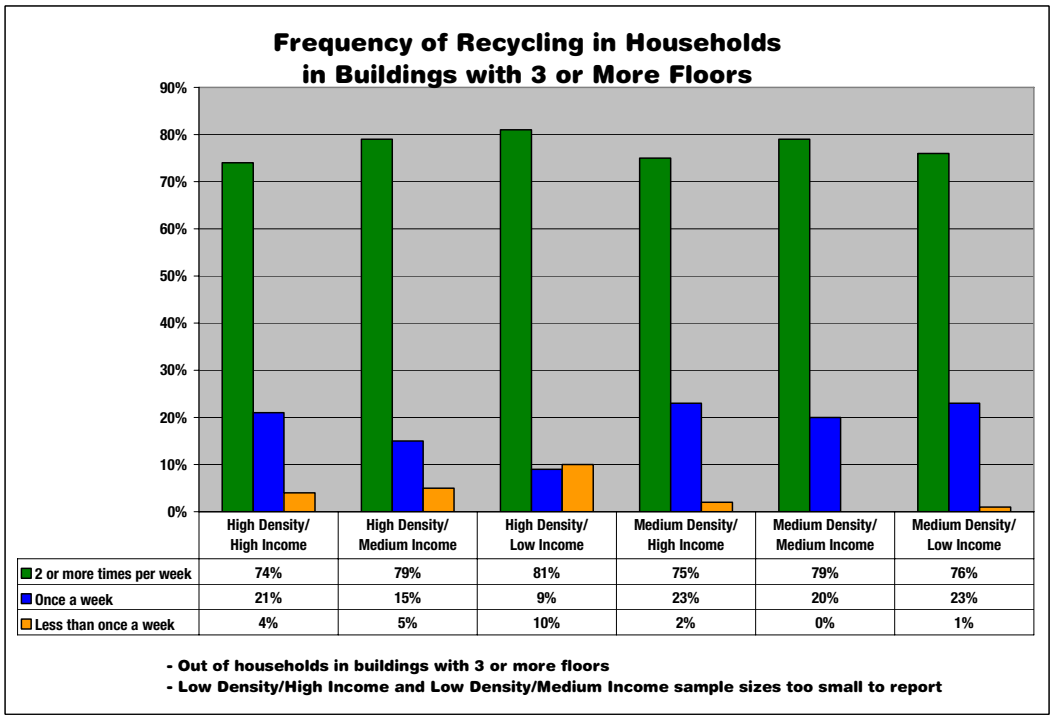
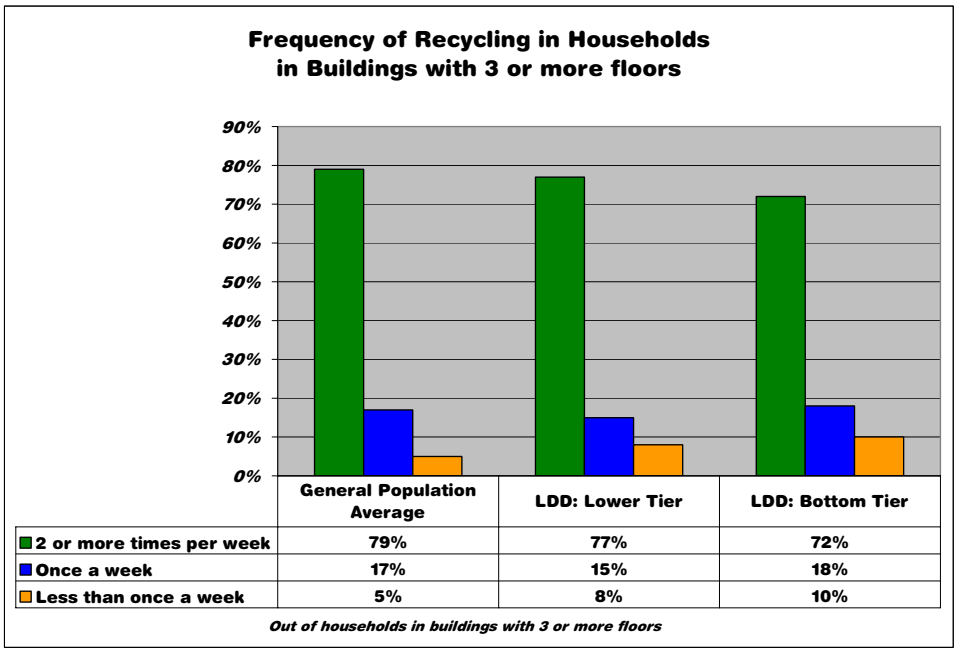


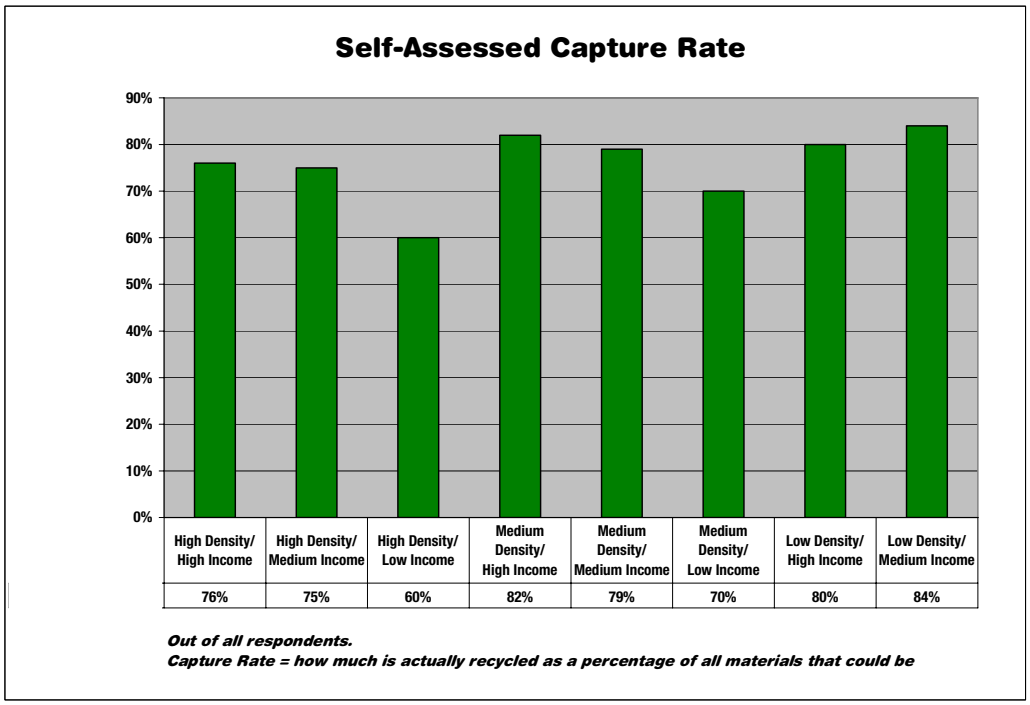
Chart 30



Survey Respondents Assess Their Own Recycling Behavior

Overall, lower income respondents reported that they recycle less thoroughly than their wealthier counterparts. When asked what percentage they recycled out of everything they could recycle, lower income groups reported a lower capture rate than did the general population [Chart 31].

Chart 31



CAUSES OF LOWER PARTICIAPTION UNCLEAR

While lower income had a clear, if not large, impact on participation, the explanation as to how and why income and recycling are related was not clear at all.

Education and Attitudes Not a Factor

In the recent history of the recycling program, various reasons have been advanced to explain the correlation between income and recycling rates. Some feel that residents of low income neighborhoods are particularly under-educated about recycling and/or lack motivation and interest in the practice. In this view, targeted outreach designed to inform such residents about the need to recycle, as well as how to recycle, would boost diversion rates.

On the whole, the 2005 market research results do not suggest that residents of low income neighborhoods are less educated or motivated to recycle than others. Although there is a small amount of variation among different subgroups surveyed, overall the results are consistent across income levels concerning confusion about the program, with less than a third having any questions about what or how to recycle.

When asked specifically about levels of certainty, the responses do show that lower income groups are slightly less certain about what is recyclable and how to organize recycling setouts, with those in the High Density/Low Income showing the least certainty (Charts 32-35). However, the charts also show that all High Density respondents in all income groups reported less certainty and more confusion than Medium and Low Density respondents about both what and how to recycle.

Chart 32

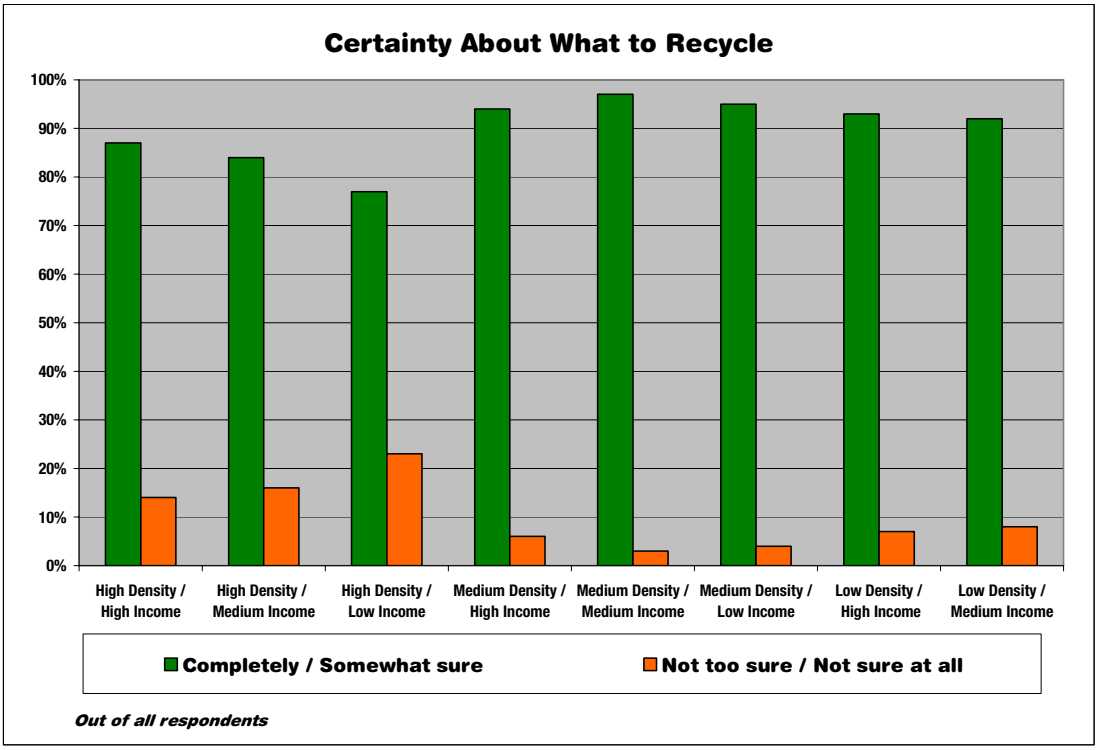


Chart 33

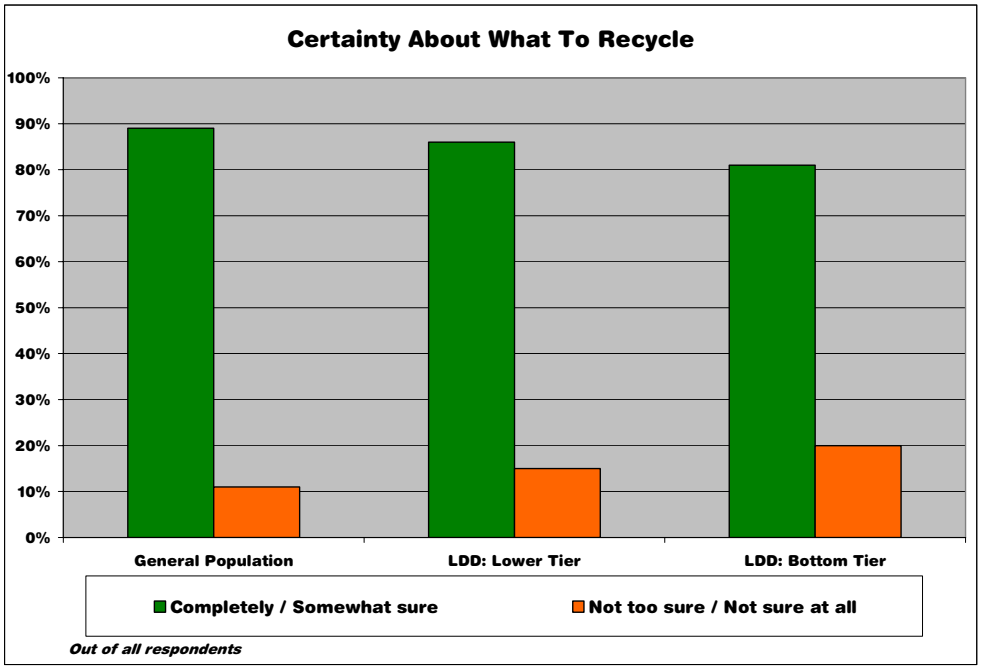


Chart 34

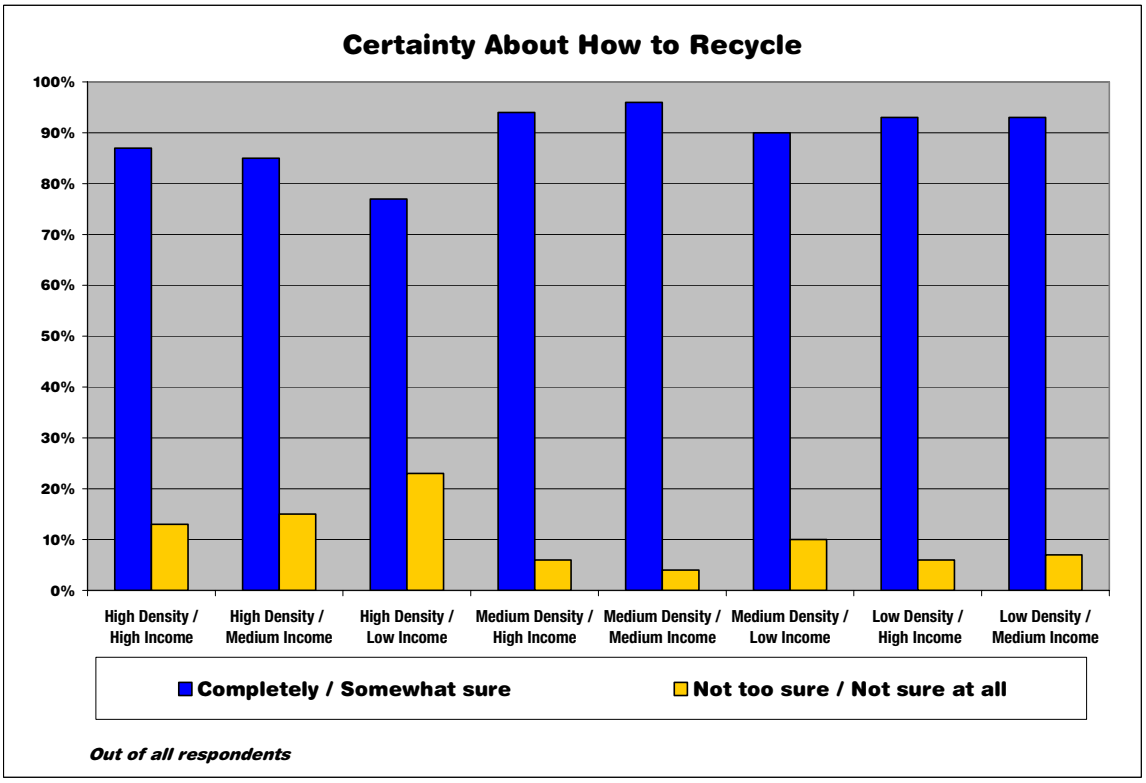
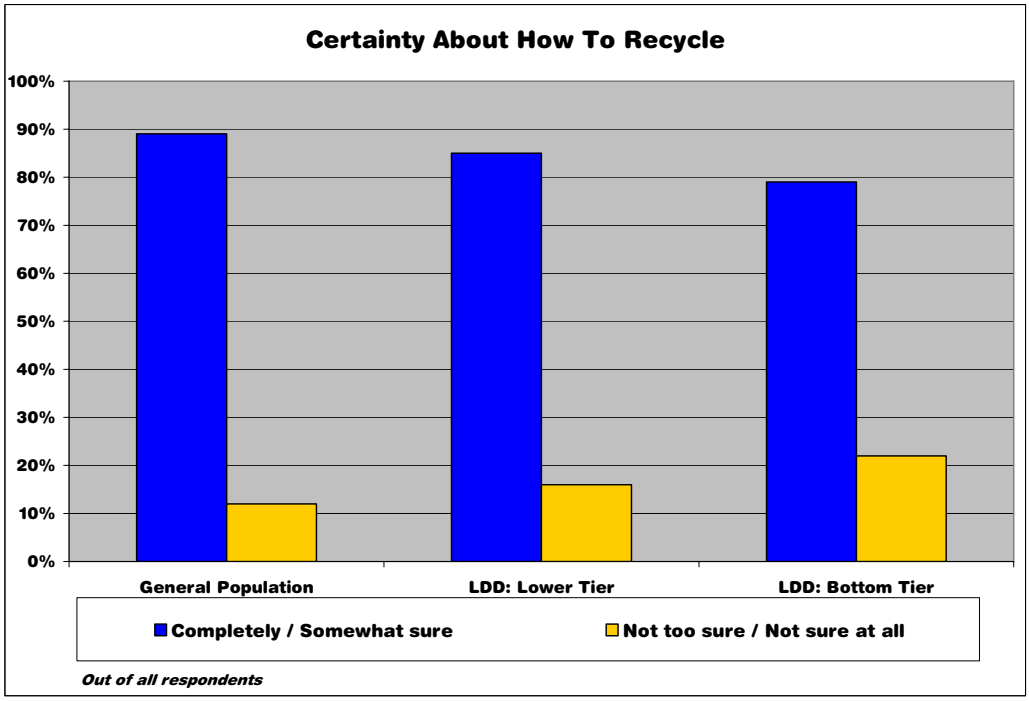
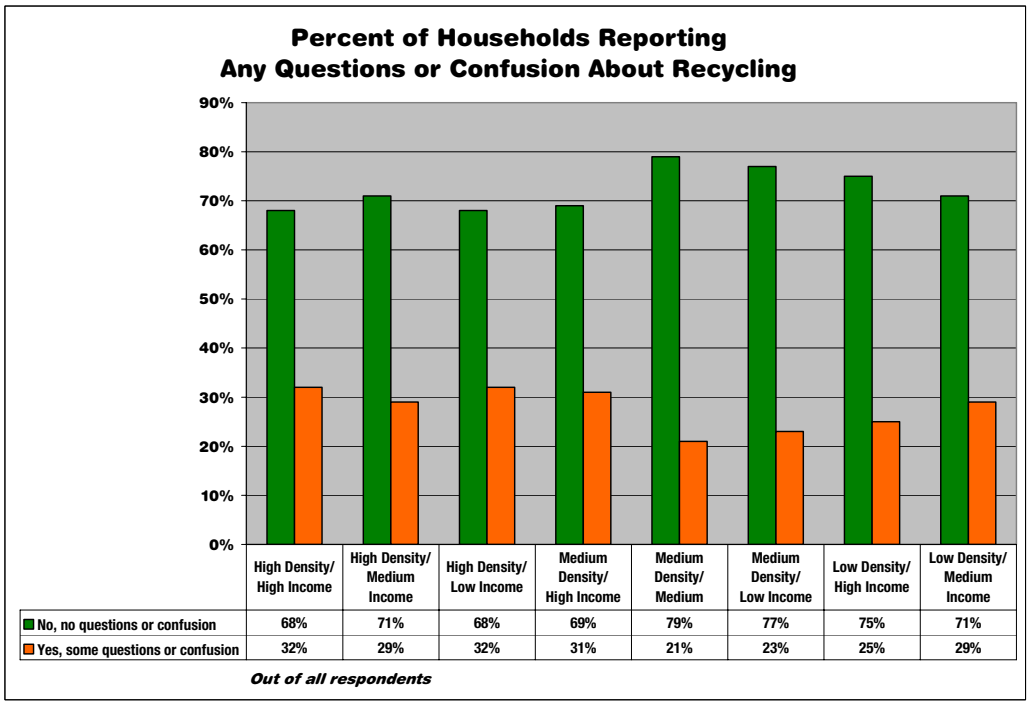


Chart 35



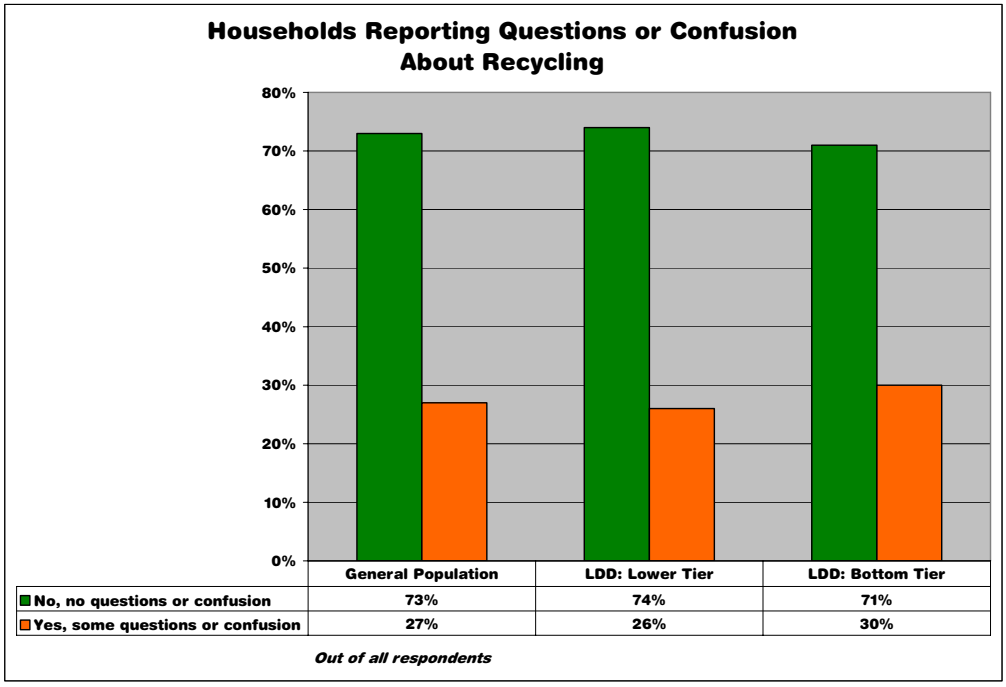
The differences in uncertainty about how to recycle by income strata are, however, small; across all income groups, the majority of residents feel certain about what and how to recycle. When asked specifically whether they had any questions or confusion about recycling at all, most respondents, regardless of income, respond "No" [Charts 36 and 37].

Chart 36



	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium	Medium Density/ Low Income	Low Density/ High Income	Low Density/ Medium Income
No, no questions or confusion	68%	71%	68%	69%	79%	77%	75%	71%
Yes, some questions or confusion	32%	29%	32%	31%	21%	23%	25%	29%

Chart 37

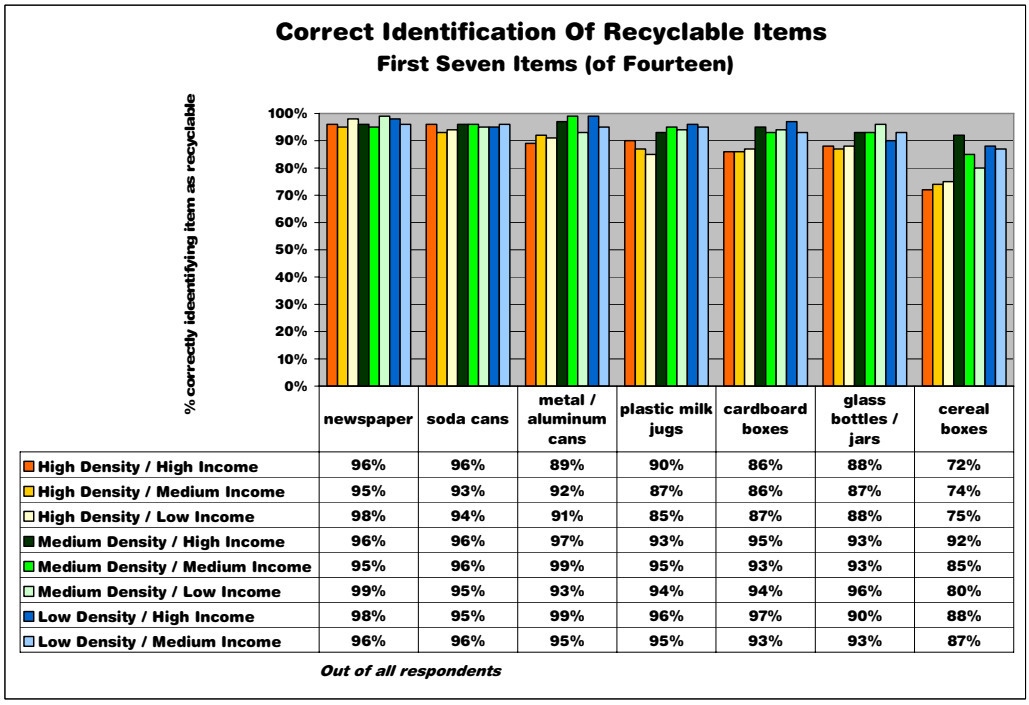


	General Population	LDD: Lower Tier	LDD: Bottom Tier
No, no questions or confusion	73%	74%	71%
Yes, some questions or confusion	27%	26%	30%

Out of all respondents

Another series of question in the survey measured the level of recycling education by asking for the correct identification of 14 household items as "recyclable" or "not recyclable" in NYC's curbside recycling program. Respondents' knowledge rates are remarkably similar across income groups [Charts 38 - 41].

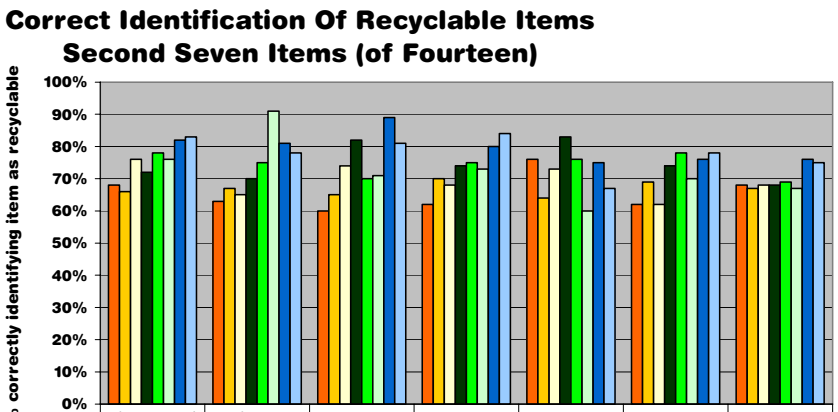
Chart 38



	newspaper	soda cans	metal / aluminum cans	plastic milk jugs	cardboard boxes	glass bottles / jars	cereal boxes
High Density / High Income	96%	96%	89%	90%	86%	88%	72%
High Density / Medium Income	95%	93%	92%	87%	86%	87%	74%
High Density / Low Income	98%	94%	91%	85%	87%	88%	75%
Medium Density / High Income	96%	96%	97%	93%	95%	93%	92%
Medium Density / Medium Income	95%	96%	99%	95%	93%	93%	85%
Medium Density / Low Income	99%	95%	93%	94%	94%	96%	80%
Low Density / High Income	98%	95%	99%	96%	97%	90%	88%
Low Density / Medium Income	96%	96%	95%	95%	93%	93%	87%

Out of all respondents

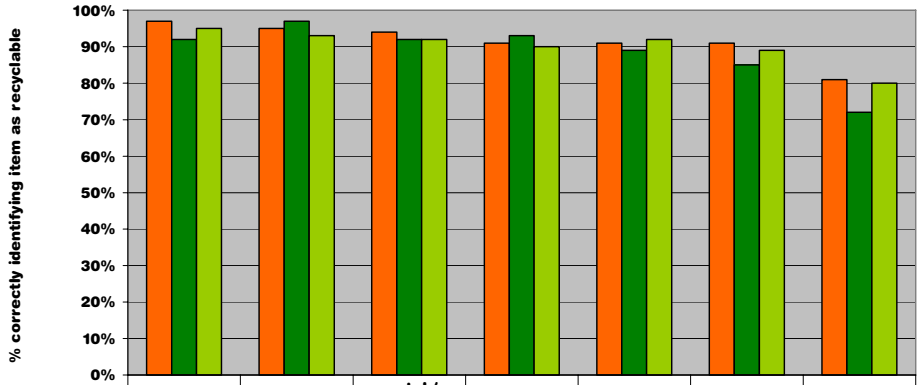
Chart 39



	shampoo / lotion bottles	bev. cartons / drink boxes	paperback books	pizza cartons	paper bags	aluminum foil	mixed paper
High Density / High Income	68%	63%	60%	62%	76%	62%	68%
High Density / Medium Income	66%	67%	65%	70%	64%	69%	67%
High Density / Low Income	76%	65%	74%	68%	73%	62%	68%
Medium Density / High Income	72%	70%	82%	74%	83%	74%	68%
Medium Density / Medium Income	78%	75%	70%	75%	76%	78%	69%
Medium Density / Low Income	76%	91%	71%	73%	60%	70%	67%
Low Density / High Income	82%	81%	89%	80%	75%	76%	76%
Low Density / Medium Income	83%	78%	81%	84%	67%	78%	75%

Out of all respondents

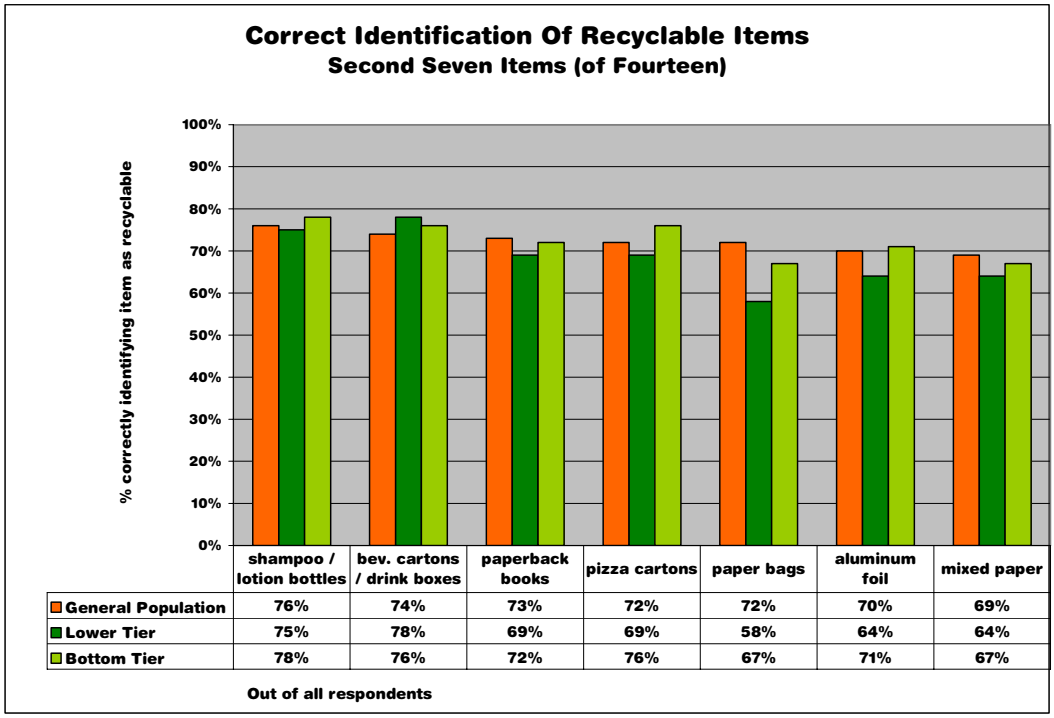
Chart 40



	newspaper	soda cans	metal / aluminum cans	plastic milk jugs	cardboard boxes	glass bottles and jars	cereal boxes
General Population	97%	95%	94%	91%	91%	91%	81%
Bottom Tier	92%	97%	92%	93%	89%	85%	72%
Lower Tier	95%	93%	92%	90%	92%	89%	80%

Out of all respondents

Chart 41



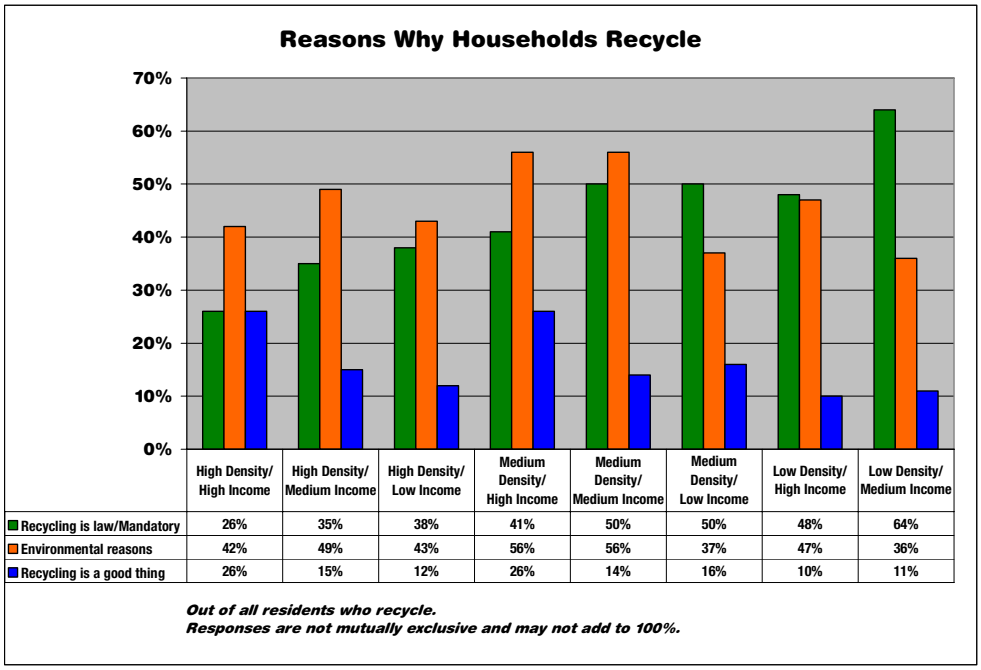
Recycling Motivators

Lower income residents not only show the same levels of education about recycling as the general population, they also share the same motivations to recycle.

Income does seem to have a small effect among Medium and Low Density groups in terms of listing environmental reasons as a motivation to recycle. Lower income residents in Medium and Low Density districts are less likely to say they comply for environmental reasons. This minor trend is borne out LDDs in comparison to the General Population [Charts 42 and 43 next page].

Percentages of respondents saying they recycle because it is the law are similar across density groups, although Low Density residents, regardless of income, are more likely to state that they recycle to comply with the law than Medium or High Density groups.

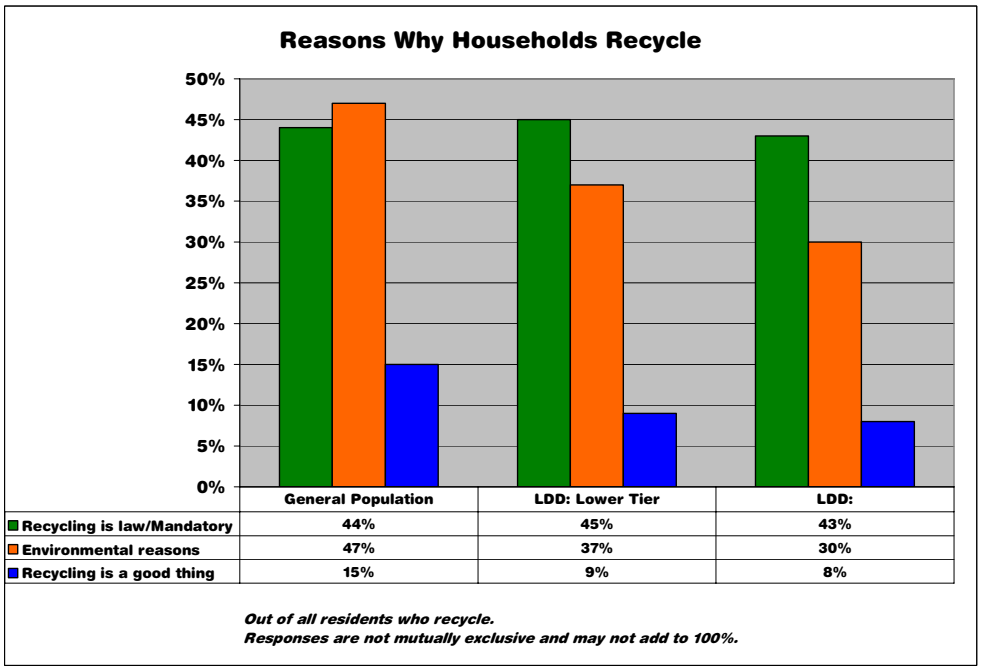
Chart 42



	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income	Low Density/ High Income	Low Density/ Medium Income
Recycling is law/Mandatory	26%	35%	38%	41%	50%	50%	48%	64%
Environmental reasons	42%	49%	43%	56%	56%	37%	47%	36%
Recycling is a good thing	26%	15%	12%	26%	14%	16%	10%	11%

Out of all residents who recycle.
Responses are not mutually exclusive and may not add to 100%.

Chart 43

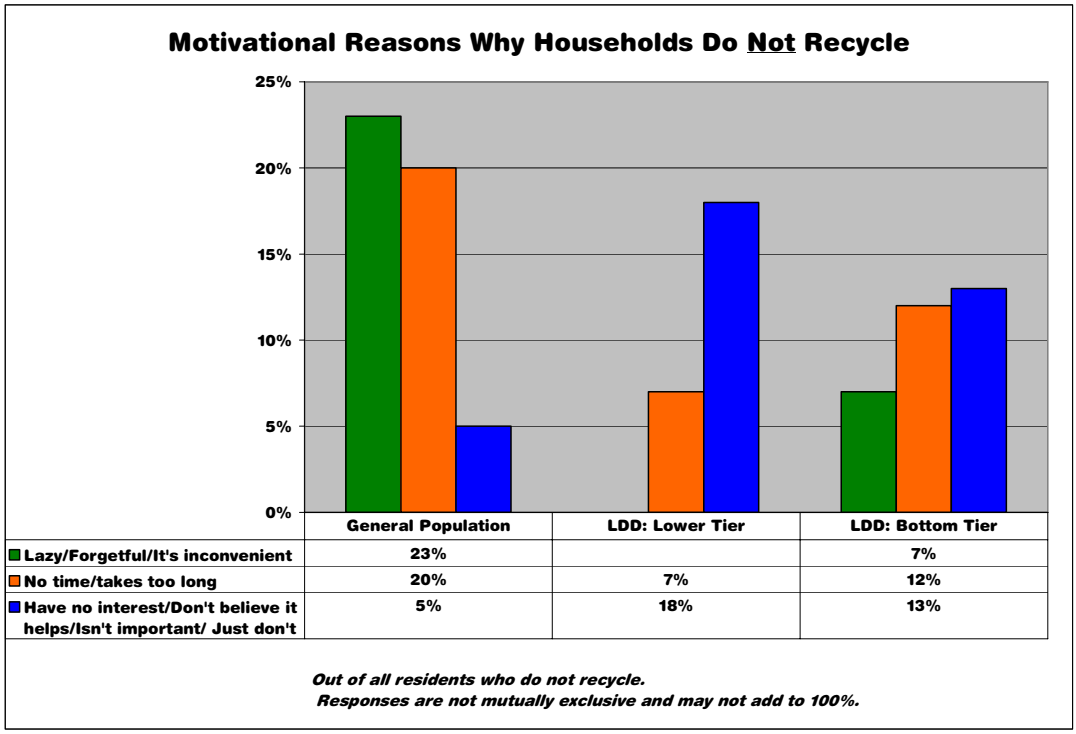


	General Population	LDD: Lower Tier	LDD:
Recycling is law/Mandatory	44%	45%	43%
Environmental reasons	47%	37%	30%
Recycling is a good thing	15%	9%	8%

Out of all residents who recycle.
Responses are not mutually exclusive and may not add to 100%.

Among the minority of households that admit to not recycling, there was more lack of interest expressed among residents of LDDs, while the General Population respondents offered more excuses such as being busy, lazy, or forgetful [Chart 44 next page].

Chart 44



Note: so few respondents in the General Population reported not recycling at all that results could not be broken out further by density/income group for this particular question.

Housing Conditions

Another theory as to why residents of lower income neighborhoods recycle less is that certain housing conditions reduce the ability and motivation to recycle. In lower income neighborhoods, it may be that building conditions discourage proper recycling. Superintendent services may be lacking; recycling areas may be dirty, unkempt, or dangerous; or there may be inadequate signage. Thus, regardless of an individual householder's motivation to recycle, the building's overall performance will be low.

The 2005 Survey explored the differences between such conditions in relation to income, revealing some trends that might explain lower participation in lower income areas.

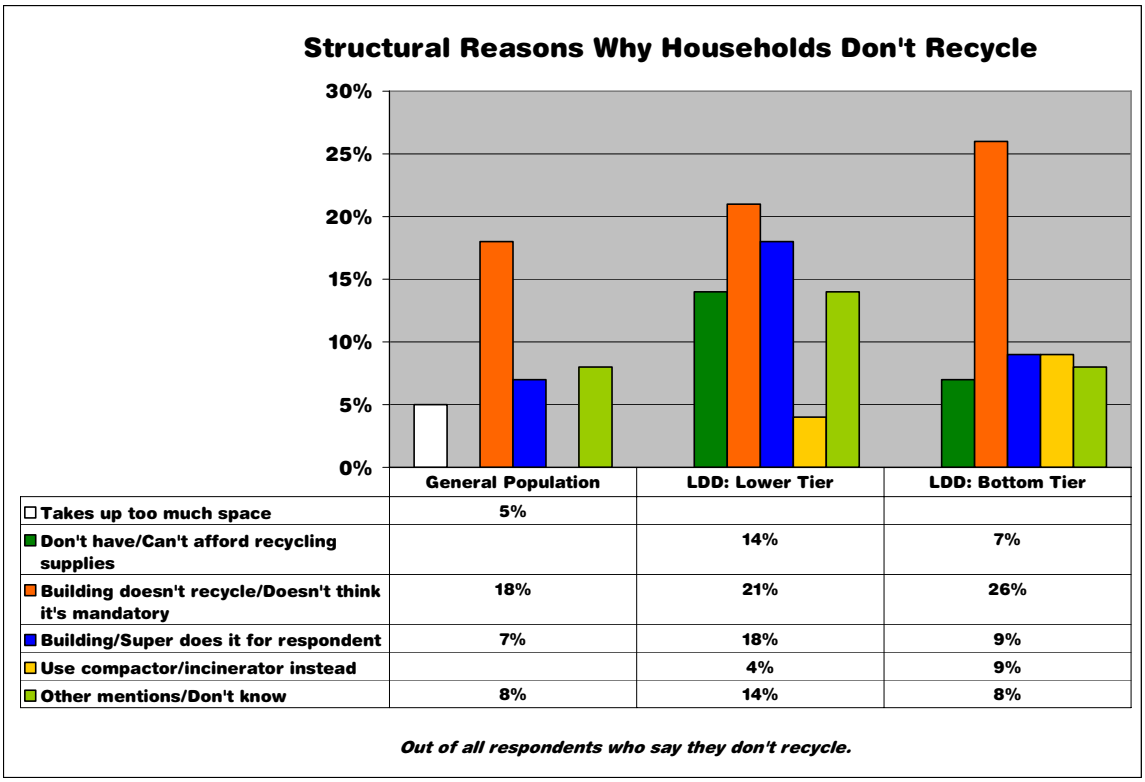
Note that the results presented below relate to the minority of respondents who reported not recycling at all. For this reason, sample sizes are small and there were not enough respondents in each density/income group to test differences among them.

Among respondents who don't recycle at all, those living in LDDs are less likely to have recycling services in their building, and more likely to report that they lack and can't afford recycling supplies. Respondents in LDDs erroneously believe that their building's use of a trash chute leading to a compactor (or formerly to an incinerator) precludes their building's ability to recycle [Chart 45 next page].

Among those who reported not recycling at all, adequate storage space in the apartment did not appear to be as significant a barrier to recycling for respondents living in LDDs as it was for

respondents in the General Population Survey. And the belief that their building is not required to recycle extends to respondents in the General Population Survey as well as the LDDs.

Chart 45



Note: so few respondents in the General Population reported not recycling at all that results could not be broken out by density and income groups.

Recycling Storage

When all respondents, regardless of the frequency of their recycling activities, were asked whether they have adequate storage space in their homes, Low Income respondents were somewhat more likely to report not having enough space at home to recycle than Medium or High Income respondents in the General Population. Similarly, a higher percentage of respondents in LDDs reported that they do not have adequate storage space within the home than the General Population respondents [Charts 46 and 47 next page].

Chart 46

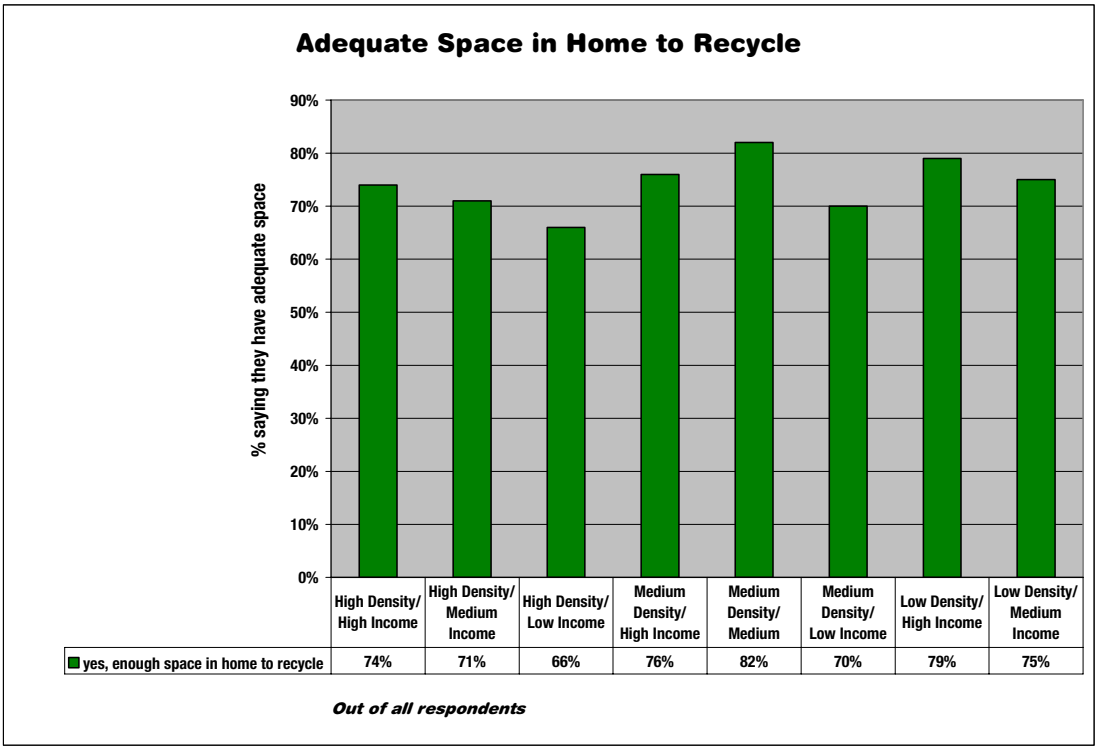
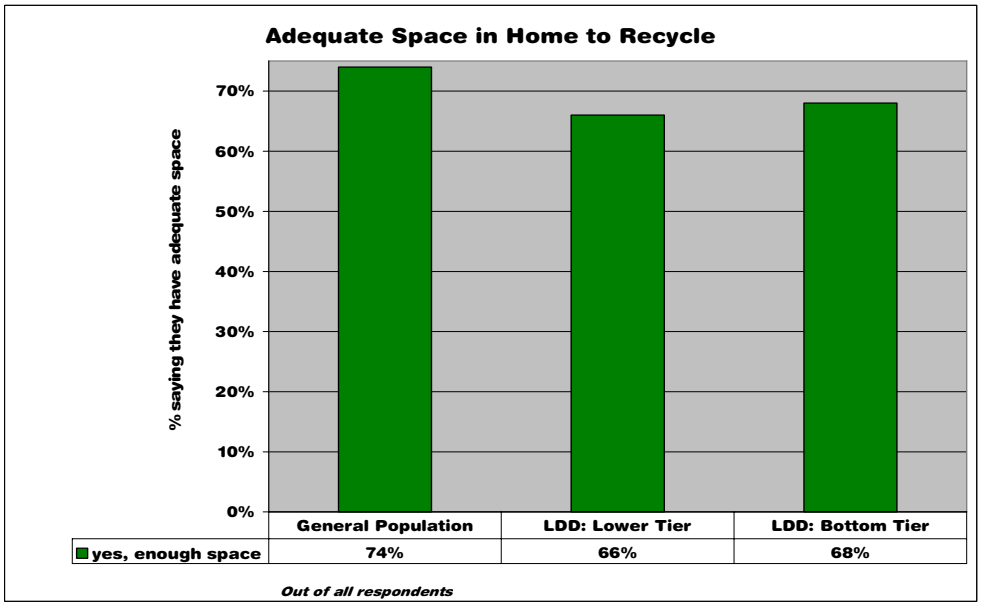
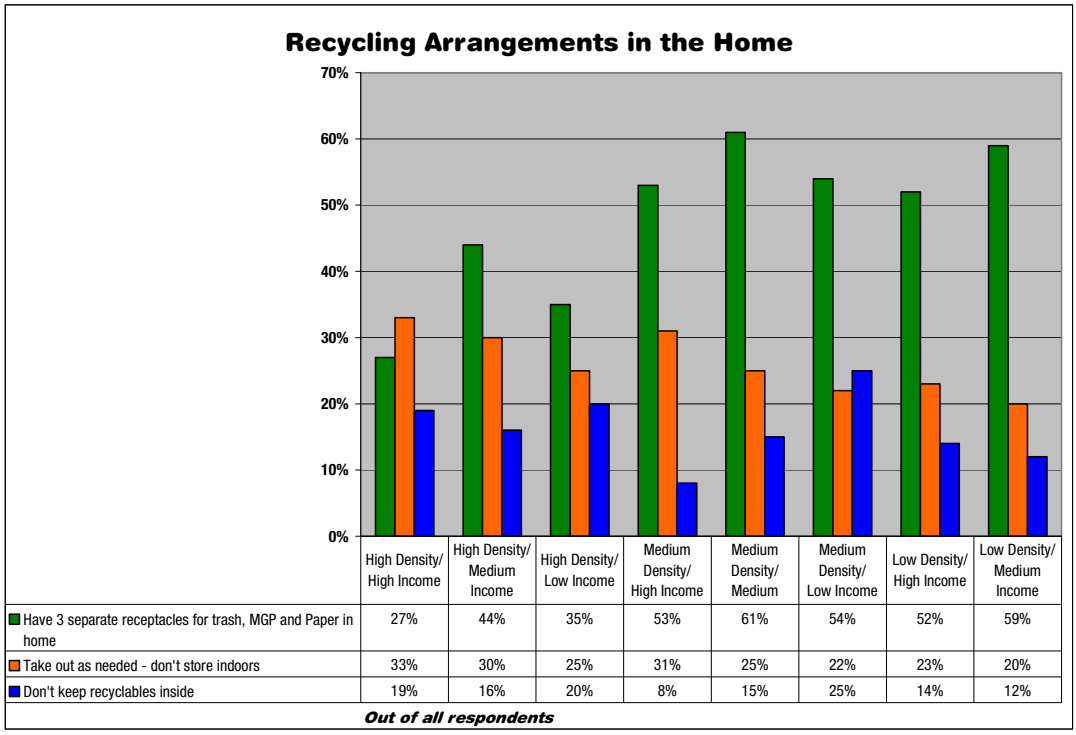


Chart 47



Among all respondents in the General Population Survey, those in High Density areas were less likely to store recyclables in separate or color-coded receptacles in the home than were respondents in Medium and Low Density areas [Chart 48 next page]. Moreover, among respondents in High and Medium Density areas, higher income respondents are somewhat more likely to store recyclables in their apartment and take them out as needed. Slightly more Low Income respondents stated that they don't accumulate recyclables in the home at all than Medium or High Income respondents.

Chart 48

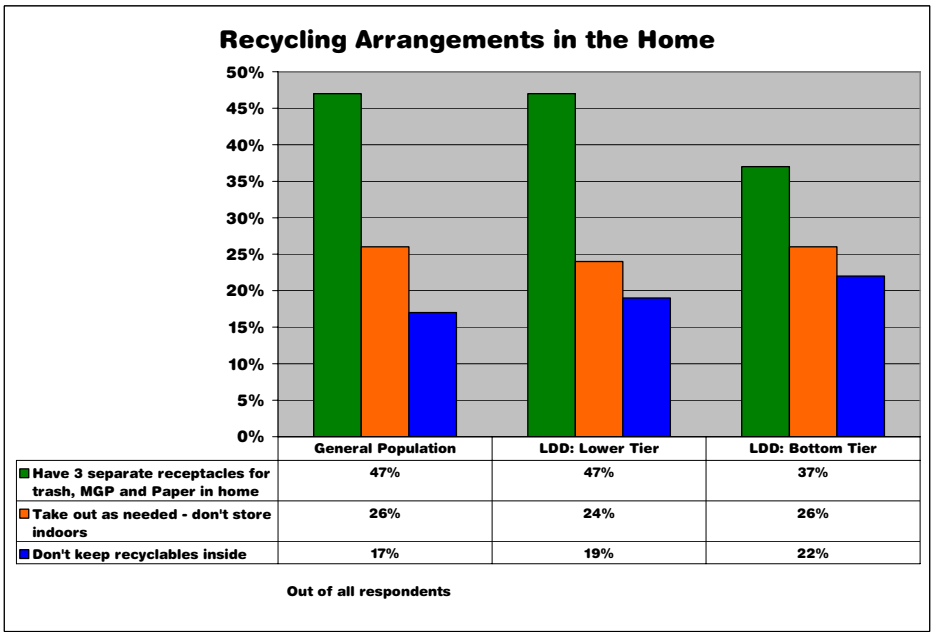


	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium	Medium Density/ Low Income	Low Density/ High Income	Low Density/ Medium Income
Have 3 separate receptacles for trash, MGP and Paper in home	27%	44%	35%	53%	61%	54%	52%	59%
Take out as needed - don't store indoors	33%	30%	25%	31%	25%	22%	23%	20%
Don't keep recyclables inside	19%	16%	20%	8%	15%	25%	14%	12%

Out of all respondents

Residents of the Bottom Tier LDDs are also less likely to have three separate receptacles inside the home than Lower Tier Low Diversion District respondents, or the General Population respondents. These differences suggest possible explanations for the positive correlation between income and recycling rates [Chart 49].

Chart 49

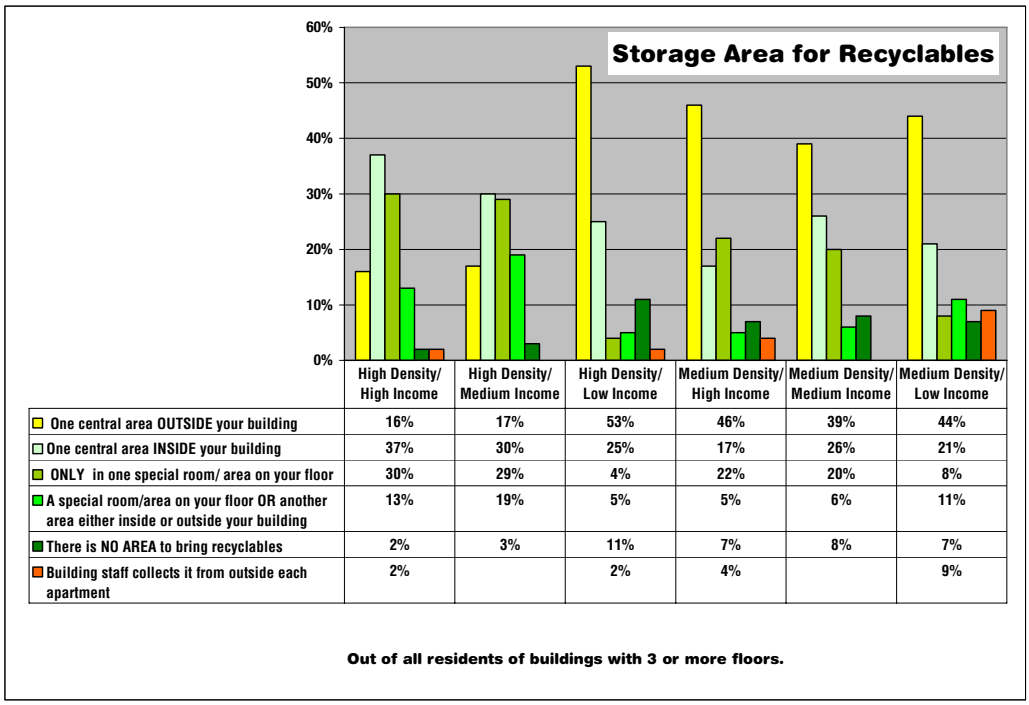


	General Population	LDD: Lower Tier	LDD: Bottom Tier
Have 3 separate receptacles for trash, MGP and Paper in home	47%	47%	37%
Take out as needed - don't store indoors	26%	24%	26%
Don't keep recyclables inside	17%	19%	22%

Out of all respondents

When asked about storage space for recyclables within the building, but outside the apartment, several trends appear. High and Medium Income building residents in High Density areas are far more likely than other groups in the General Population to have recycling arrangements set up inside their building (see Chart 50, various green bars); while residents of Medium Density areas are more likely to have outdoor recycling areas (yellow bars). It is particularly notable that in High Density settings, Low Income residents tend to have different recycling arrangements than buildings with Medium or High Income: Low Income residents are more likely to report either no area to recycle in their apartment buildings (orange bars), or an outdoor area (yellow bars).

Chart 50

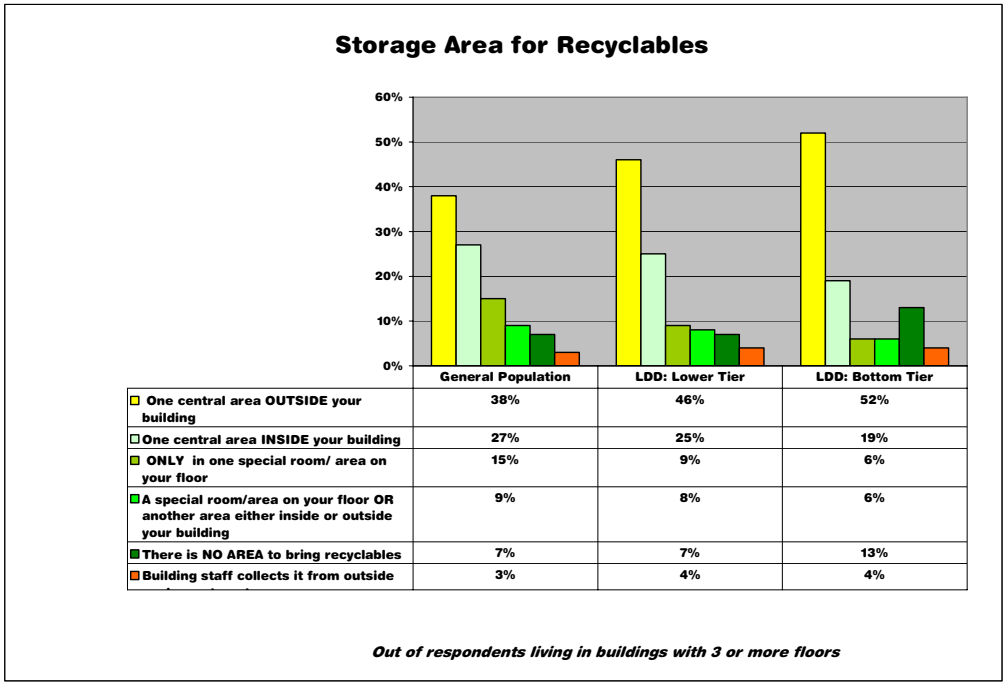


	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income
One central area OUTSIDE your building	16%	17%	53%	46%	39%	44%
One central area INSIDE your building	37%	30%	25%	17%	26%	21%
ONLY in one special room/ area on your floor	30%	29%	4%	22%	20%	8%
A special room/area on your floor OR another area either inside or outside your building	13%	19%	5%	5%	6%	11%
There is NO AREA to bring recyclables	2%	3%	11%	7%	8%	7%
Building staff collects it from outside each apartment	2%		2%	4%		9%

Out of all residents of buildings with 3 or more floors.

In addition, respondents from Low Diversion Districts are more likely to have to store recyclables outside the building rather than inside; and the Bottom Tier of LDDs are more likely to have no specific area in a building set up for recycling [Chart 51 next page, yellow and orange bars].

Chart 51



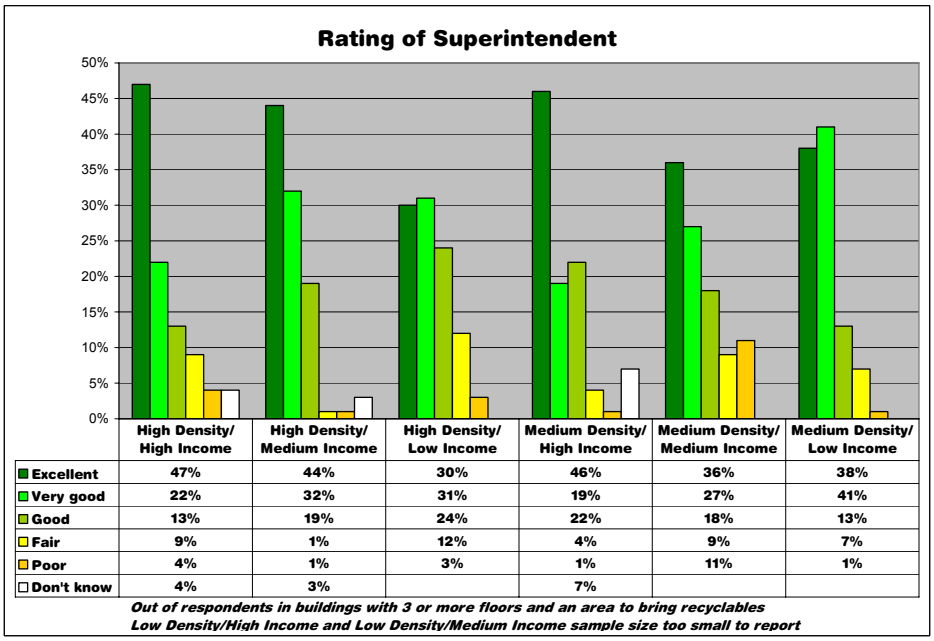
	General Population	LDD: Lower Tier	LDD: Bottom Tier
One central area OUTSIDE your building	38%	46%	52%
One central area INSIDE your building	27%	25%	19%
ONLY in one special room/ area on your floor	15%	9%	6%
A special room/area on your floor OR another area either inside or outside your building	9%	8%	6%
There is NO AREA to bring recyclables	7%	7%	13%
Building staff collects it from outside	3%	4%	4%

Out of respondents living in buildings with 3 or more floors

Superintendent's Role

When asked to rate their superintendent's job performance, lower income groups are less likely to describe the super as "excellent," while Medium Density/Medium Income respondents rated their supers as "poor" at a much higher rate than any other group [Chart 52].

Chart 52

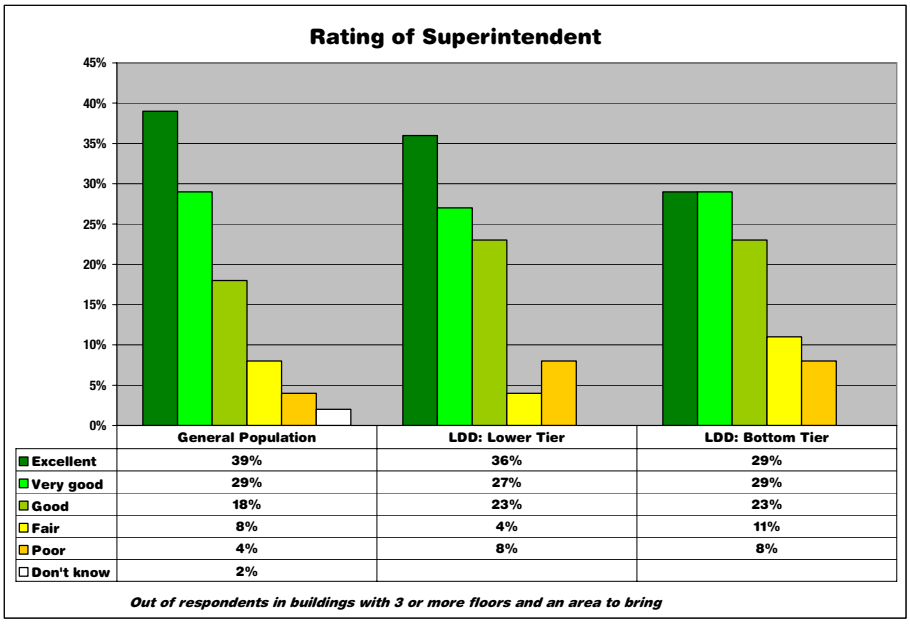


	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income
Excellent	47%	44%	30%	46%	36%	38%
Very good	22%	32%	31%	19%	27%	41%
Good	13%	19%	24%	22%	18%	13%
Fair	9%	1%	12%	4%	9%	7%
Poor	4%	1%	3%	1%	11%	1%
Don't know	4%	3%		7%		

Out of respondents in buildings with 3 or more floors and an area to bring recyclables
Low Density/High Income and Low Density/Medium Income sample size too small to report

These trends appear again when comparing LDD respondents to General Population respondents [Chart 53].

Chart 53

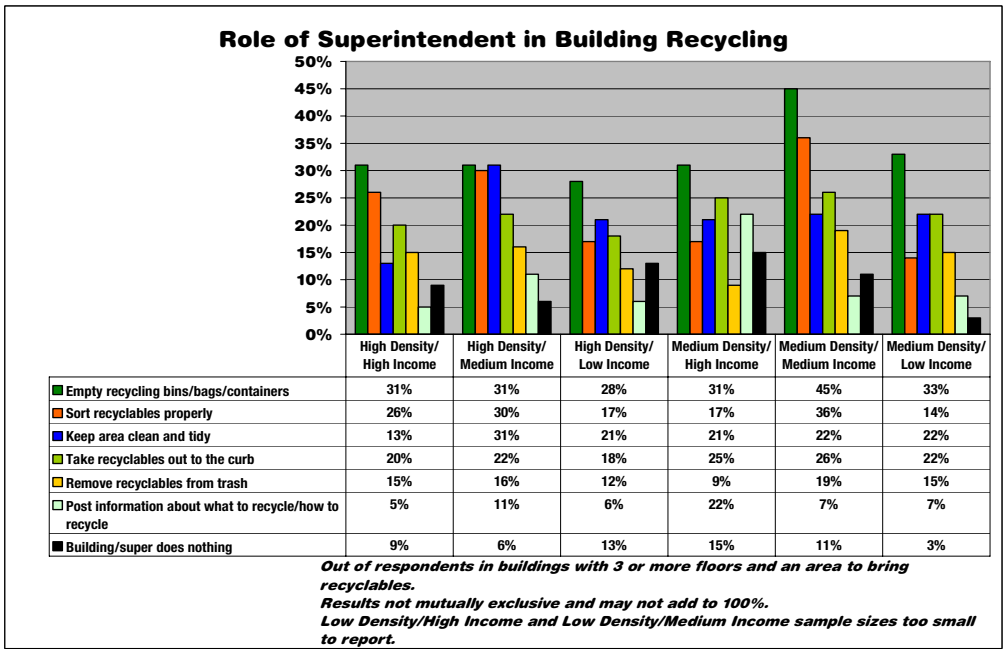


	General Population	LDD: Lower Tier	LDD: Bottom Tier
Excellent	39%	36%	29%
Very good	29%	27%	29%
Good	18%	23%	23%
Fair	8%	4%	11%
Poor	4%	8%	8%
Don't know	2%		

Out of respondents in buildings with 3 or more floors and an area to bring

Respondents in Medium Density/High Income areas are the most likely to report that the super is not involved at all in building recycling, while Medium Density/Low Income are the least likely to report no involvement by the super in the building's recycling efforts. Other trends by income are not distinct [Chart 54]. While notable, these findings do not conclusively identify what role superintendents play in the level of recycling within apartment buildings.

Chart 54



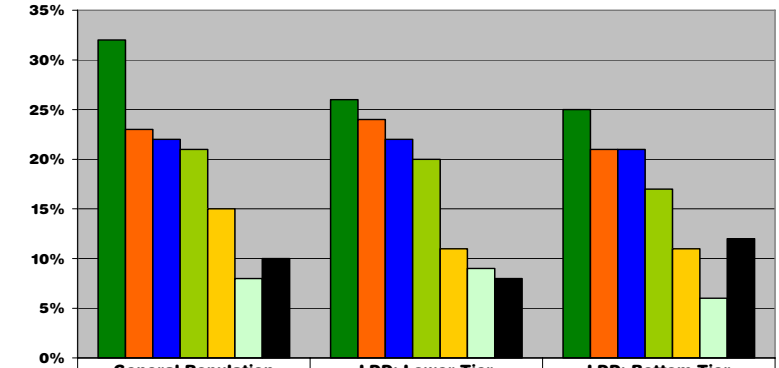
	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income
Empty recycling bins/bags/containers	31%	31%	28%	31%	45%	33%
Sort recyclables properly	26%	30%	17%	17%	36%	14%
Keep area clean and tidy	13%	31%	21%	21%	22%	22%
Take recyclables out to the curb	20%	22%	18%	25%	26%	22%
Remove recyclables from trash	15%	16%	12%	9%	19%	15%
Post information about what to recycle/how to recycle	5%	11%	6%	22%	7%	7%
Building/super does nothing	9%	6%	13%	15%	11%	3%

Out of respondents in buildings with 3 or more floors and an area to bring recyclables.
Results not mutually exclusive and may not add to 100%.
Low Density/High Income and Low Density/Medium Income sample sizes too small to report.

Among the General Population, nearly a third of respondents stated that their supers empty recycling bins, bags, or containers: over 20% stated that supers keep the recycling area clean and tidy and take recyclables out to the curb; and 8% reported that supers post information about what and how to recycle. Many respondents reported that it is the role of the superintendent to sort recyclables; remove trash from recycling bins and bags; and remove recyclables from trash bags [Chart 55]. *(Note: While this may be a service offered within the building, it is, in fact, each resident's responsibility to separate, prepare, and dispose of recyclables in the area and bins provided by the building.)* Among residents of LDDs, respondents report slightly less superintendent participation.

Chart 55

Role of Superintendent in Building Recycling

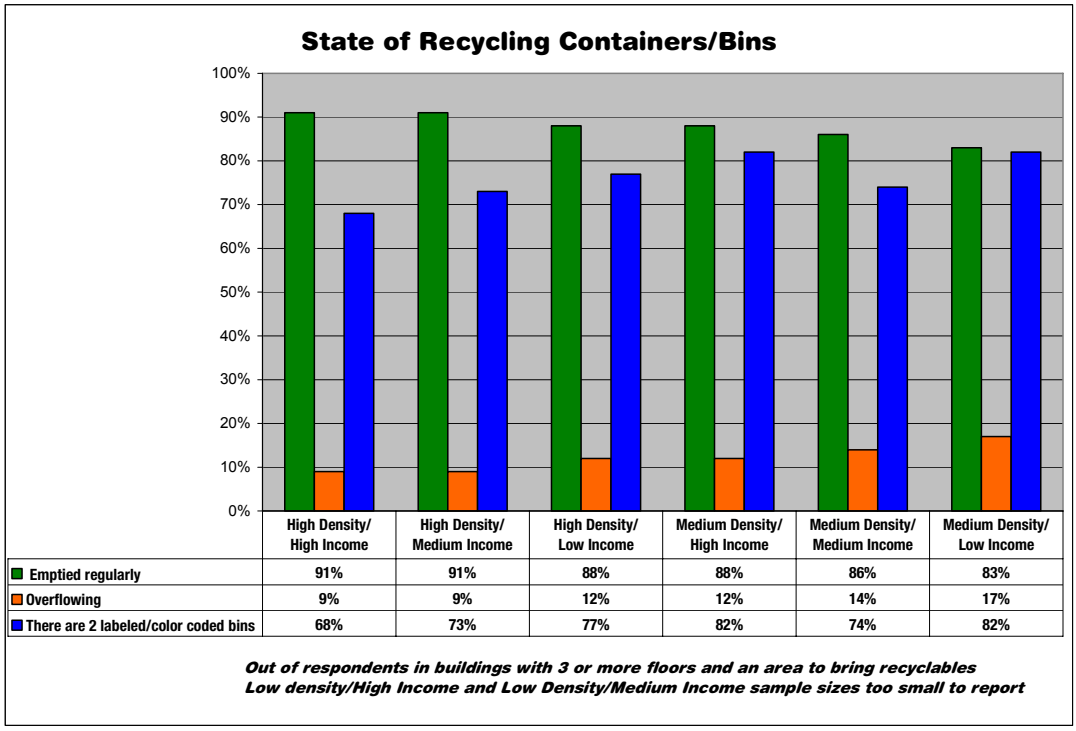


	General Population	LDD: Lower Tier	LDD: Bottom Tier
Empty recycling bins/bags/containers	32%	26%	25%
Sort recyclables properly	23%	24%	21%
Keep area clean and tidy	22%	22%	21%
Take recyclables out to the curb	21%	20%	17%
Remove recyclables from trash	15%	11%	11%
Post information about what to recycle/how to recycle	8%	9%	6%
Building/super does nothing	10%	8%	12%

Out of respondents in buildings with 3 or more floors and an area to bring recyclables. Results not mutually exclusive and may not add to 100%.

When asked about the particulars of the recycling area setup, it would appear that bins are properly set up more often in Low Income areas, although in such neighborhoods, these same bins may be emptied less regularly, and tend more to be overflowing [Chart 56 next page].

Chart 56

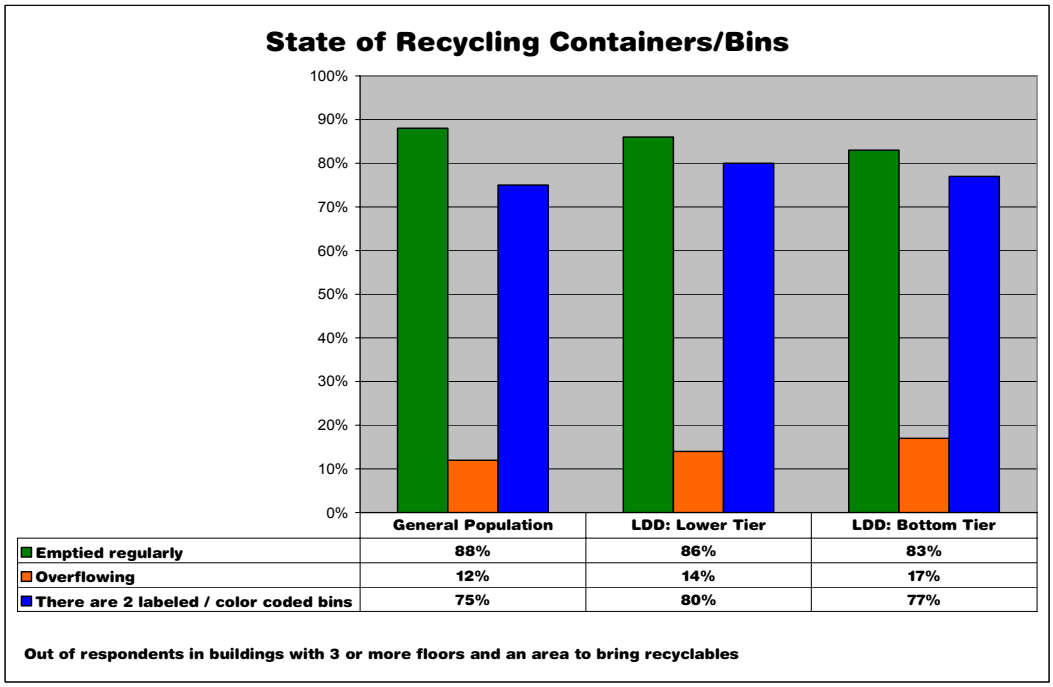


	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income
Emptied regularly	91%	91%	88%	88%	86%	83%
Overflowing	9%	9%	12%	12%	14%	17%
There are 2 labeled/color coded bins	68%	73%	77%	82%	74%	82%

Out of respondents in buildings with 3 or more floors and an area to bring recyclables
Low density/High Income and Low Density/Medium Income sample sizes too small to report

These small differences among groups are also found when comparing LDD residents to the General Population [Chart 57].

Chart 57

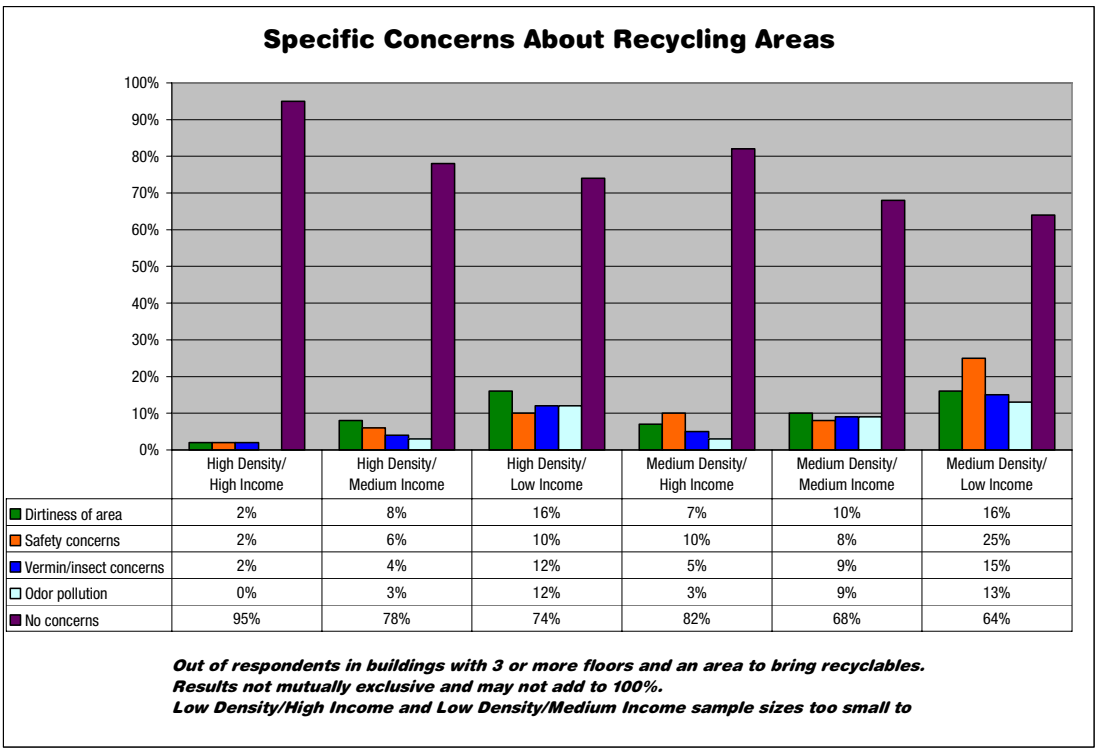


	General Population	LDD: Lower Tier	LDD: Bottom Tier
Emptied regularly	88%	86%	83%
Overflowing	12%	14%	17%
There are 2 labeled / color coded bins	75%	80%	77%

Out of respondents in buildings with 3 or more floors and an area to bring recyclables

Stronger trends emerge when building residents are asked whether they have concerns that would make them hesitant to bring recyclables to their recycling area. More Low Income district residents express such concerns, as do more LDD residents [Charts 58 and 59].

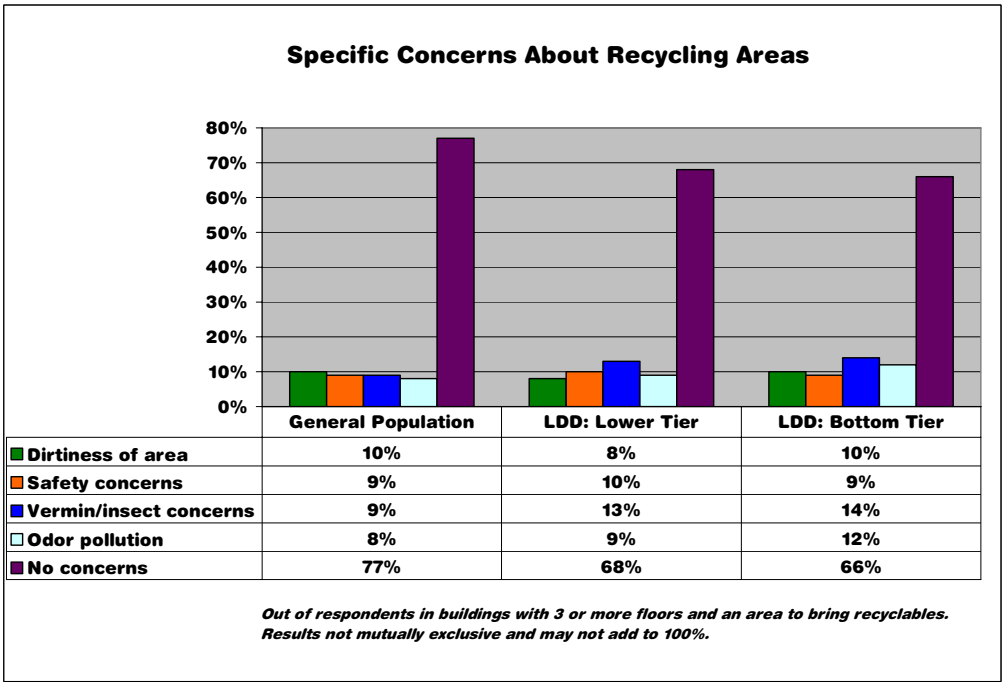
Chart 58



	High Density/ High Income	High Density/ Medium Income	High Density/ Low Income	Medium Density/ High Income	Medium Density/ Medium Income	Medium Density/ Low Income
Dirtiness of area	2%	8%	16%	7%	10%	16%
Safety concerns	2%	6%	10%	10%	8%	25%
Vermin/insect concerns	2%	4%	12%	5%	9%	15%
Odor pollution	0%	3%	12%	3%	9%	13%
No concerns	95%	78%	74%	82%	68%	64%

Out of respondents in buildings with 3 or more floors and an area to bring recyclables.
Results not mutually exclusive and may not add to 100%.
Low Density/High Income and Low Density/Medium Income sample sizes too small to

Chart 59



	General Population	LDD: Lower Tier	LDD: Bottom Tier
Dirtiness of area	**10%**	**8%**	**10%**
Safety concerns	**9%**	**10%**	**9%**
Vermin/insect concerns	**9%**	**13%**	**14%**
Odor pollution	**8%**	**9%**	**12%**
No concerns	**77%**	**68%**	**66%**

Out of respondents in buildings with 3 or more floors and an area to bring recyclables.
Results not mutually exclusive and may not add to 100%.

CONCLUSIONS

It should be noted that in most cases, differences in survey responses among density and income groups were relatively small, as were differences between General Population residents and Low Diversion District residents. Although there is some evidence to support the idea that structural differences explain why lower income areas recycle less than other areas, the evidence is not strong.[8] In addition, density plays a complex role in recycling rates, interacting with income in different ways that we have yet to fully understand.

It is likely that structural reasons play a role in the disparity in recycling rates seen among residents of different incomes, but these findings do not reveal precisely what aspects of structural inequities result in lower recycling rates among Low Income groups.

It does seem clear that differences in motivation or education among different demographic groups are not the driving force behind differences in the diversion rate.

[8] *In addition, the charts presented on the previous pages do not distinguish statistically significant from statistically non-significant differences. Such differences were not tested between the general population and low diversion groups; and only a few of the differences among density/income groups achieved were significant at a 5% risk level*

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