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School-Age Children in Rental Units in New Jersey: Results from a Survey of Developers and Property Managers

Morris A. Davis, Ph.D.
David Frame, Ph.D.
Ronald S. Ladell
Debra Tantleff

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Table of Contents

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Executive Summary

In this paper we provide new estimates of the number of school-age children associated with new developments of market-rate and affordable rental units in New Jersey. Given our knowledge of and relationships across the industry, we designed and conducted a large-scale survey completed by developers and property managers of multi-family rental buildings. Among other questions, we asked survey respondents to provide counts of market-rate and affordable units, children aged 5-17 ("school-age children"), and average household income.

Our data and analysis show that a one-size fits all approach is inappropriate for estimating the expected number of school-age children arising from a new development. Instead, we show the following variables are essential to accurately predict the number of school-age children arising from new development: (i) the distribution of the number of bedrooms, separately for affordable and market-rate units, (ii) the product type of the development – High-rise, Mid-rise or Low-rise[1] – and (iii) the expected household income of market-rate residents. With this information, the expected number of school-age children can be determined using the information in Table 1 below:[2]

Table 1: School-Age Children per 100 Units

	Affordable	Market Rate Units – Average HH Income						
		<$50K*		$50K - $100K*		>$100K*		
	All Units	High-rise or Mid-rise	Low-rise	High-rise or Mid-rise	Low-rise	High-rise	Mid-rise	Low-rise
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
studio or 1br	10.3	2.6	11.4	1.6	7.6	0.4	1.3	1.9
2br	72.1	43.6	126.4	13.4	56.7	2.2	8.9	28.2
3br and larger	108.9	100.0	137.9	17.6	63.0	4.3	23.9	61.8

* Values refer to the average household income of residents of market-rate units in the building.

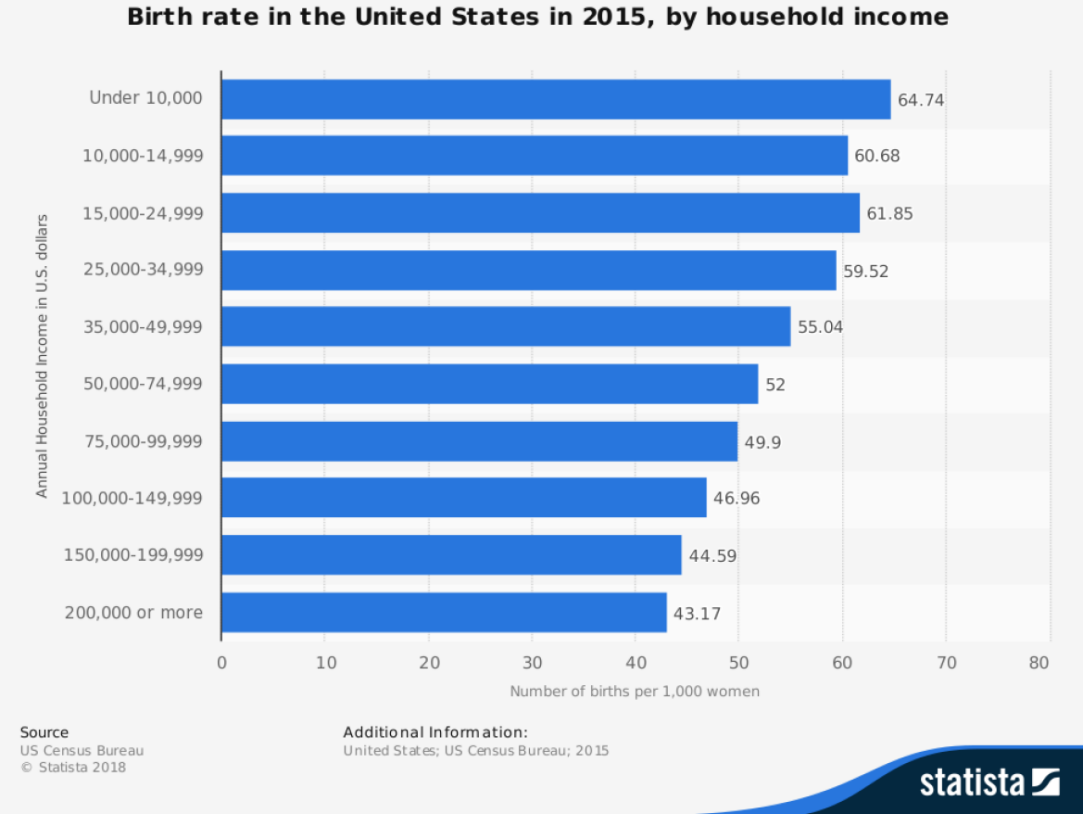
Each element of the table represents expected school-age children per 100 units for the specific characteristics listed.[3] The rows of Table 1 refer to number of bedrooms. The first column refers to school-age children for affordable units only. Columns (2) through (8) are estimates for market-rate residents. Columns (2) and (3) are for developments with average income of residents of less than $50 thousand per year, columns (4) and (5) are for developments with

[1] Low-rise is defined as a Townhome or a building with 1-3 floors, Mid-rise as 4-9 floors and High-rise as 10+ floors.
[2] The results in this data are computed using units built in any year. For the lowest-income category, columns 2 and 3, sample sizes are too small to compute this table using only data on units built after 2000. For the other income categories, columns 4-8, results are similar but not identical when we restrict the sample to units built after 2000.
[3] Our analysis covers all school-age children attending either public or private schools. Data from the 2015 (5-Year) American Community Survey as collected by the United States Census Bureau suggests 12 percent of all school-age children attend private schools in New Jersey.

average income of residents between $50 and $100 thousand per year and columns (6) through (8) are for developments with an average income of residents of over $100 thousand per year. This partition of income splits our sample roughly into thirds, although we demonstrate later the average income of the residents of more than 90% of the units built since 2000 is at least $100,000 per year. Due to sample-size limitations, we combine High-rise and Mid-rise developments when the average income of the market-rate residents is less than $100,000.

There are four fairly non-controversial results that are immediately apparent in Table 1. First, for any income level and building product type, the number of school-age children increases with the number of bedrooms. Second, for any given number of bedrooms and product type, the number of school-age children decreases as income increases. As can be seen in Figures 1 and 2 below, higher-income households have lower birthrates and are more likely to own (rather than rent) their homes. Third, holding income and number of bedrooms fixed, school-age children increases as the product type becomes less dense, i.e. there are more children in Low-rise than in High-rise developments. Finally, the results for affordable units and for market-units on buildings with average income less than $50,000 per year are quite similar, adding credibility to the accuracy of the survey as residents living in affordable units are, by definition, low income households.

Figure 1



We illustrate how to use the information in Table 1 with two examples. These examples highlight the possibility of large differences in the estimated number of school-age children associated with different types of developments and residents.

Example 1 – High income, High-rise
A 200 unit High-rise project with average income of residents of market-rate units of $125,000:

- 30 affordable units (15%): 6 one bedroom, 17 two bedroom, 7 three bedroom
- 170 market rate units: 85 one bedroom, 76 two bedroom, 9 three bedroom

The expected number of school-children is **23**, calculated as follows:

- Affordable units (use estimates in column 1): Expect 20.5 children
  - 6 one bedroom x (10.3 / 100) = 0.6
  - 17 two bedroom x (72.1 / 100) = 12.3
  - 7 three bedroom x (108.9 / 100) = 7.6
- Market units (use estimates in column 6): expect 2.4 children
  - 85 studio and one bedroom x (0.4 / 100) = 0.3
  - 76 two bedroom x (2.2 / 100) = 1.7
  - 9 three bedroom x (4.3 / 100) = 0.4

Given the building type, the income of the market-rate residents, and the distribution of bedrooms, the affordable units in this building are associated with **68.3 children per 100 units**, computed as 100*(20.5/30), and the market-rate units are associated with **1.4 children per 100 units**, computed as 100*(2.4/170).

Example 2 – Middle-income, Low-rise
A 200 unit Low-rise project with average income of residents of market-rate units of $75,000. Assume the number of units and the distribution of bedrooms is the same as with example 1

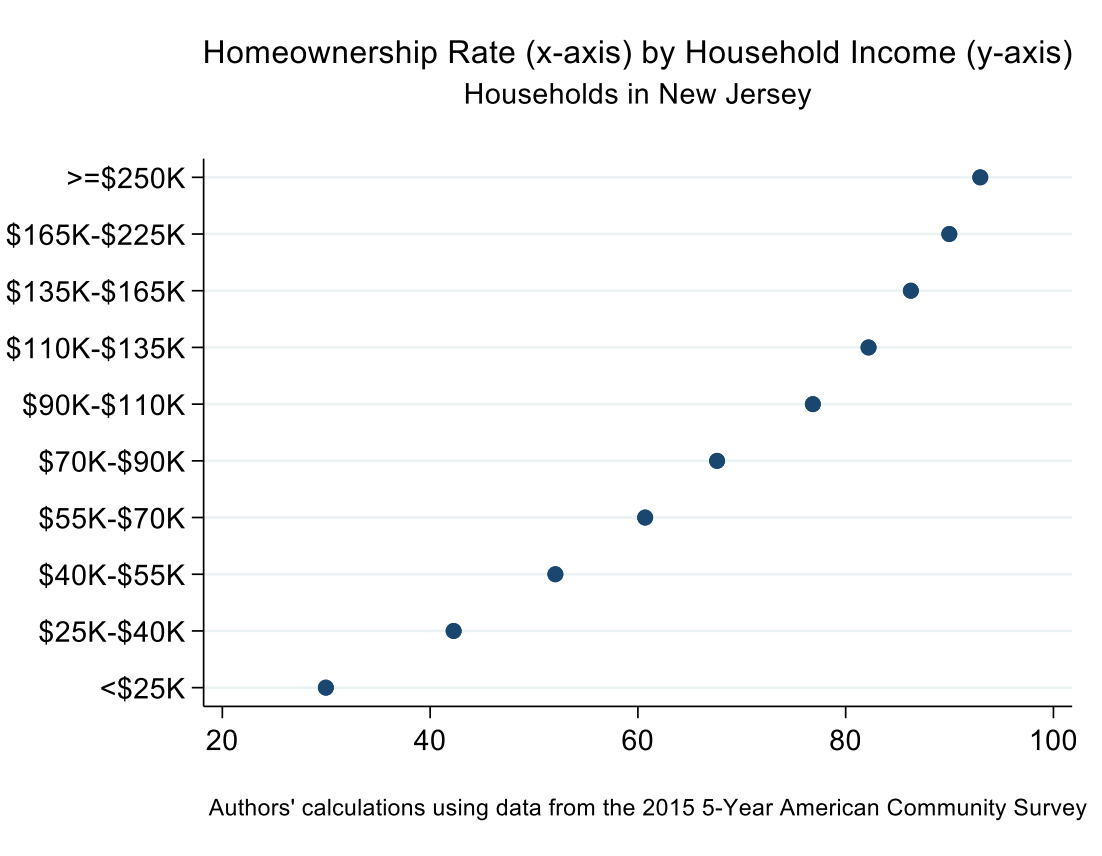
- 30 affordable units (15%): 6 one bedroom, 17 two bedroom, 7 three bedroom
- 170 market rate units: 85 one bedroom, 76 two bedroom, 9 three bedroom

The expected number of school-children is **75**, calculated as follows:

- Affordable units (use estimates in column 1): Expect 20.5 children, same as Example 1
  - 6 one bedroom x (10.3 / 100) = 0.6
  - 17 two bedroom x (72.1 / 100) = 12.3
  - 7 three bedroom x (108.9 / 100) = 7.6
- Market units (use estimates in column 5): expect 55.2 children
  - 85 studio and one bedroom x (7.6 / 100) = 6.5
  - 76 two bedroom x (56.7 / 100) = 43.0
  - 9 three bedroom x (63.0 / 100) = 5.7

Comparing examples 1 and 2 highlights the importance of controlling for product type, number of bedrooms, and income of market-rate residents when determining the expected number of school-age children. The market-rate units in example 2 are associated with **32.5 children per 100 units** (computed as 100* 55.2/170), a 23 times increase in the incidence of school-age children residing in market-rate units relative to the estimate provided in example 1.

Figure 2



Survey Design, Data Collection and Data Cleaning

Appendix A shows the exact 13-question survey that we distributed. The survey was designed to be short and to the point to encourage as many respondents as possible. The first 5 questions cover address, building characteristics, year built and condo/rental status; questions 6 and 7 cover rents, units and occupancy for market-rate units; question 8 covers affordable units and occupancy; question 9 covers building amenities; questions 10 and 11 cover school age children and questions 12 and 13 cover income of residents. Questions 11 and 13 were designed to be "backup" questions in the event the respondents could not answer 10 and 12. We did not use questions 11 and 13 as in almost every case respondents that answered questions 11 and 13 also answered 10 and 12.

The first surveys were distributed in October, 2016 and data collection continued until about January, 2018.[4] Most respondents completed the form by hand and sent to us a scan of the results; a few respondents submitted Excel spreadsheets containing the information. Many of the developers we contacted were eager to participate but some (we do not have records of the exact number) did not respond to our requests for information as they either did not want to share the information with us for competitive reasons, or they did not collect the information. We promised all developers and survey respondents that the data collected would not be shared or posted.

The raw survey responses needed "cleaning" before we could begin analysis. In some instances regarding the number of occupied and vacant units, questions 7 and 8, we received responses of "no record" or "unknown," or in some responses, the individual rows were crossed out. In these cases, and in cases when the rows were left blank, we assume a value of 0 units. For question 10, the school-age children question, many rows were left blank or crossed out. If the survey respondent entered at least one number for school-age children in question 10, including 0, we assume all the other non-numeric entries for this question including blank responses are 0 and keep the survey in our working sample. ***If the survey respondent failed to enter at least one numeric value for question 10, we exclude the survey from the working sample***.[5] In the case of question 12 (household income), we assume these data are missing when the response is blank or if the respondent wrote "unknown" and ultimately do not use these surveys when computing school-age children for market-rate units.

A summary of our sample exclusions and coverage is given in Table 2a. We collected 265 surveys in total. Two surveys were discarded because they were from age-restricted developments (55+ or 62+). One survey was discarded because it was completed in 2018 and many of the units were vacant. Four surveys were discarded because they were listed as condo

[4] We received a few additional surveys in April, 2018.

[5] We repeat this step separately for market-rate and affordable units in the same survey. In other words, the same survey might have useable information for market-rate units and none for affordable, and vice-versa.

or condo and rental developments. Seven more surveys were discarded as they list no vacant or occupied units at all. The remaining 251 surveys cover more than 40,000 market-rate units and more than 4,000 affordable units. We refine our sample by eliminating surveys without information about children[6] (row 2) or income for households residing in market-rate units (row 3), yielding 32,200 market rate units from 143 surveys and 1,968 affordable units from 42 surveys. Rows 4 and 5 list our sample sizes of units built before or after 2000, respectively.

Table 2A: Survey Responses and Sample Sizes

Sample		Market Units	Surveys	Affordable Units	Surveys	Total Surveys
Total units	(1)	42,425	222	4,111	79	251*
Units w/ info on children	(2)	33,140	157	1,968	42	168
(2) + info on income**	(3)	32,200	143	1,968	42	157
(3) for units built < 2000	(4)	21,138	92	677	13	94
(3) for units built >= 2000	(5)	11,062	51	1,291	29	63

* Some surveys cover both market-rate and affordable units.

** Filter for availability of income data only applied to market-rate units.

Table 2B: Statistics on Units per Survey

		Market				Affordable			
Product Type		# Surveys	Avg. Units	Std. Dev.	Range	# Surveys	Avg. Units	Std. Dev.	Range
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High-rise	(1)	11	721	1,238	140-4433	1	140	X	X
Mid-rise	(2)	30	203	119	6-504	12	36	20	8-63
Low-rise	(3)	102	178	210	2-1492	29	48	40	3-173

Table 2B shows statistics concerning the number of units each survey represents separately for High-rise (column 1), Mid-rise (column 2) and Low-rise units (column 3). The first four columns show the statistics for market-rate units: The number of surveys, the average number of units per survey, the standard deviation of the number of units per survey (a measure of spread), and the lowest and highest number per survey, respectively. Columns 5-8 show the same statistics for the affordable units in the sample. Generally speaking, as density declines each survey covers fewer units, but we have more surveys. Our measures of spread, columns 3-4 and 7-8 show that our surveys cover a wide variety of apartment and community sizes.

[6] These are the surveys for which question 10 was left entirely blank, i.e. the respondent failed to enter at least one numeric value (including 0) for question 10.

We compare our estimates of the universe of rental units that we derive from data from the U.S. Census Bureau in Appendix B. Appendix Table B1 shows our sample for units built in any year (row 3 of Table 2) and Table B2 restricts the analysis to units built after 2000 (row 5 of table 2). Overall, our sample includes 3.5% of all rental units in New Jersey (Table B1). We have more representation of units built after 2000, as our overall coverage rate for these units is 10.9% relative to the total built as estimated using data from the Census (Table B2). Table B2 shows that our sample includes data for more than 15 percent of the rental units built since 2000 in Bergen, Hudson, Mercer, Monmouth and Morris counties and more than 9 percent of the units built in Hunterdon, Passaic, Somerset and Warren counties. We believe our sample sizes are sufficiently large and representative to provide informative and robust results.

Analysis

Table 3 below reports the values of school age children per 100 units for the entire sample (rows 1 and 2), units built before 2000 (3 and 4) and units built on or after 2000 (5 and 6). The odd rows report values for market-rate units and the even rows report values for affordable units. The first column reports children per 100 units and the last two columns report total children and total units. Children per 100 units is computed simply as 100 times children divided by units. A few observations from this table are worth mentioning. First about two thirds of affordable units in our sample were built after 2000 (826 out of 1,238) whereas only one third of market-rate units were built after 2000 (11,062 out of 32,200). Second, the number of school-age children per 100 affordable units is significantly higher than the number of school-age children per 100 market units, regardless of the time period. Third, the number of children per 100 market rate units for units built after 2000, 9.8, is much lower than for units built before 2000, 25.9.

Table 3: School-Age Children per 100 Units

			Children per 100 units	Total Children	Total Units
Built Any Year	(1)	Market	20.4	6,561	32,200
	(2)	Affordable	62.9	1,238	1,968
Built Before 2000	(3)	Market	25.9	5,477	21,138
	(4)	Affordable	60.9	412	677
Built After 2000	(5)	Market	9.8	1,084	11,062
	(6)	Affordable	64.0	826	1,291

We argue that older and newer market-rate units differ by product type, the composition of the number of bedrooms, and the income of market-rate residents and these differences account for the variation in the number of school-age children per 100 units shown in Table 3. The first three rows of Table 4 show the distribution of market-rate units by type of unit: studio and one bedroom (row 1), two bedroom (row 2) or three bedrooms or more (row 3). These rows show that the older units tend to have more studio and one bedrooms and fewer two bedrooms, and all else equal this should imply that the older units should have fewer children. But all else is not equal: The distribution of income and the types of buildings are very different and these variables matter. Rows 4-6 show the percentages of market-rate units occupied by households earning less than $50 thousand per year (row 4), between $50 and $100 thousand per year (row 5), and more than $100 thousand per year (row 6). Residents of market-rate units built after 2000 have much higher incomes than residents of units built before 2000 and as Table 1 demonstrates, for any given number of bedrooms, higher-income residents living in market-rate rentals tend to have fewer children than lower-income residents (reflecting the

relationship between birthrates and household income shown earlier in Figure 1). Finally, rows 7-9 show that more than 70 percent of the units built before 2000 in our sample are Low-rise units, but 70 percent of the units built after 2000 are either mid- or hi-rise units. Table 1 shows that residents of Low-rise units have more children.

Table 4: Distribution of Market-Rate Units by Year Built

		Built Before 2000		Built After 2000	
		# Units	Percent	# Units	Percent
studio + 1br	(1)	13,016	61.6	5,570	50.4
2br	(2)	7,080	33.5	4,956	44.8
3br and larger	(3)	1,042	4.9	536	4.8
<$50K	(4)	5,339	25.3	121	1.1
$50K - $100K	(5)	9,946	47.1	861	7.8
>$100K	(6)	5,853	27.7	10,080	91.1
High-rise	(7)	5,373	25.4	2,561	23.2
Mid-rise	(8)	896	4.2	5,184	46.9
Low-rise	(9)	14,869	70.3	3,317	30.0

Table 1 reports results using data from our entire sample, which implicitly assumes there are no intrinsic differences in children per unit between buildings built earlier than or after the year 2000 once we control for product type, number of bedrooms and incomes of market-rate residents. Table 5 shows the results from a formal statistical test of this assumption for affordable units built before and after 2000. Row 1 shows the results for studio and one bedroom apartments, row 2 for two bedroom apartments and row 3 for three bedroom and larger apartments. Column 1 shows estimates from the full sample, column 2 shows results for the older units, column 3 shows results for the newer units and the last column shows the result of the statistical test of the equality of the estimates in columns 2 and 3. A "No" means that, after running a proper statistical test, we cannot reject that the estimates are the same; a "Yes" means that we reject that the estimates are the same.[7] The last column of Table 5 shows that we cannot reject that the estimates of children per 100 units are equal for any bedroom type. Even though the exact before- and after-2000 estimates of school-age children differ, there is enough uncertainty around each estimate that once we formally account for this uncertainty a statistical test cannot reject the equality of the estimates.[8]

[7] The "null hypothesis" is that there are no differences in school-age children between different types of units and we test if that hypothesis can be rejected. Except when noted, our rejection criteria is a 5% probability level. At that level, 5% of the time we will reject that the estimates are the same when in fact they are identical.

[8] We have also confirmed that for affordable units we cannot reject the equality of the estimates of school-age children per 100 units across product types at either a 5% or 10% probability level (not shown).

Table 5: School-Age Children per 100 Units, Affordable Units by Year Built

		Full Sample	Built Before 2000	Built After 2000	Reject at 5%?*
		(1)	(2)	(3)	(4)
studio + 1br	(1)	10.3	13.6	6.9	No
2br	(2)	72.1	96.0	61.5	No**
3br and larger	(3)	108.9	106.8	109.5	No

* This marks whether we can reject the null hypothesis of the equality of the "Before 2000" and "After 2000" estimates at a 5% probability level using an F-test that explicitly accounts for sampling uncertainty.
** We can reject at a 10% probability level but not at 5%.

Table 6: School-Age Children per 100 Units, Market-Rate Units by Building Product Type

Income	Bedrooms		Full Sample**	High-rise +Mid-rise	High-rise	Mid-rise	Low-rise	Reject at 5%?*
			(1)	(2)	(3)	(4)	(5)	(6)
<$50K	studio + 1br	(1)	11.0	2.6			11.4	Yes
	2br	(2)	120.0	43.6			126.4	Yes
	3br and larger	(3)	135.7	100.0***			137.9	X
$50K - $100K	studio + 1br	(4)	6.8	1.6			7.6	Yes
	2br	(5)	49.3	13.4			56.7	Yes
	3br and larger	(6)	55.1	17.6			63.0	Yes
>$100K	studio + 1br	(7)	1.0		0.4	1.3	1.9	Yes
	2br	(8)	12.2		2.2	8.9	28.2	Yes
	3br and larger	(9)	26.5		4.3	23.9	61.8	Yes

* This marks whether we can reject the null hypothesis of the equality of the "High-rise", "Mid-rise" and "Low-rise" estimates at a 5% probability level using an F-test that explicitly accounts for sampling uncertainty.
** Note that we exclude 205 units without a reported product type and 53 units with a report for product type as "Townhome, Mid-rise").
*** This estimate is from exactly one survey; we ignore the outcome of the statistical test for this row.

Table 6 provides some perspective for why we emphasize product type as an important determinant of school-age children. This table shows tests of the equality of school-age coefficients for market-rate units for various product types after controlling for income and number of bedrooms. Results for income less than $50 thousand are shown in rows 1-3; rows 4-6 show results for incomes from $50 to $100 thousand; and rows 7-9 show results for incomes greater than 100 thousand. Column 1 shows estimates of school-age children when all product types are combined and columns 2-5 show results when split by product type. When we study incomes less than $100 thousand, due to small sample sizes we combine High-rise and

Mid-rise units (column 2) and compare that to Low-rise units (column 5); when we study incomes of $100 thousand or more, we have enough data to separately compare High-rise, Mid-rise and Low-rise units (columns 3-5). Column 6 shows the results of a formal statistical test for the equality of the reported estimates in columns 2-5. Whenever we reject the equality of the estimates of the rate of school-age children, we mark the results using red text. Column 6 shows that in almost all cases we can reject the assumption that the number of school-age children is independent of product type after controlling for income and number of bedrooms. Simply put, there are more children in low-rise buildings than in mid-or high-rise buildings, even after controlling for income and number of bedrooms, and this explains why Table 1 includes product type as a factor.

Unfortunately, it is very difficult to "drill down" further to see if other factors matter once we control for product type, income and number of bedrooms as we lack sufficient observations to run robust statistical tests. That said, we investigate, as best as possible, whether (a) living within one-half mile of a transit stop or (b) locating in areas with good schools affects estimates of school-age children for market-rate units. Our results for transit are in Tables 7 and 8 and our results for schools are in Tables 8 and 9.

In Table 7, we control for income and number of bedrooms, temporarily ignoring product type, to see if there is any obvious relationship between distance to a transit hub and number of children. Column 1 shows estimates of school-age children for the entire sample. Columns 2 and 3 show estimates of school-age children per 100 market-rate units when the sample is split into units outside one-half mile of a transit hub (column 2) and within one-half mile (column 3). Column 4 shows the result of a statistical procedure that tests the equality of the estimates in columns 2 and 3. The cells highlighted in red show the bedroom-income combinations where we cannot rule out that proximity to a TOD is correlated with differences in the number of children. Row 2 indicates that lower-income renters living proximate to a TOD tend to have **more** school-age children and rows 8-9 show that higher-income renters living close to a TOD tend to have **less** school-age children.

In Table 8, we try to investigate further by controlling for product type, but studying only 2 bedroom market-rate units due to small sample sizes for one- and three- bedroom units. We combine mid- and hi-rise units for all income categories to increase sample sizes. Rows 1-2 report results for incomes less than $50 thousand, rows 3-4 are for incomes between $50 and $100 thousand and rows 5-6 are for incomes more than $100 thousand. Each row represents the results of a different product type for 2-bedroom units holding income fixed. The results of Table 8 support those of Table 7. Focusing on row 2 of Table 8: column 3 shows that lower-income households renting 2-bedroom units in Low-rise buildings tend to have more children when located within 0.5 miles of a transit stop (147.4 per hundred units) than when located farther away (40.6 children per hundred units, shown in column 1). Row 5 shows that the exact opposite is true for high-income renters living in mid- or hi-rise buildings; these renters tend to

have fewer children when located near a transit hub. This latter result is not significant at the 5% probability level, but is significant at the 10% level which is why we use blue text color.

Table 7: School-Age Children per 100 Units, Market-Rate Units by TOD

Income	Bedrooms		Full Sample	Outside TOD	Inside TOD	Reject at 5%*?
			(1)	(2)	(3)	(4)
<$50K	studio + 1br	(1)	11.0	5.8	13.2	No
	2br	(2)	120.0	41.6	138.8	Yes
	3br and larger	(3)	135.7	85.9	300.0**	X
$50K - $100K	studio + 1br	(4)	6.8	7.0	6.8	No
	2br	(5)	49.3	60.7	37.8	No
	3br and larger	(6)	55.1	56.9	51.5	No
>$100K	studio + 1br	(7)	1.0	0.9	1.0	No
	2br	(8)	12.2	24.4	7.1	Yes
	3br and larger	(9)	26.5	56.1	16.3	Yes

* This marks whether we can reject the null hypothesis of the equality of the "Outside TOD" and "Inside TOD" estimates at a 5% probability level using an F-test that explicitly accounts for sampling uncertainty.
** This estimate is from exactly one survey; we ignore the outcome of the statistical test for this row.

Table 8: School-Age Children per 100 Units, 2-Bedroom Market-Rate Units by TOD

Income	Product Type		Outside TOD	Inside TOD	Reject at 5%?*
			(1)	(2)	(3)
<$50K	Hi- and Mid-Rise	(1)	56.5**	41.3	X
	Low-rise	(2)	40.6	147.4	Yes
$50K - $100K	Hi- and Mid-Rise	(3)	17.1**	13.2	X
	Low-rise	(4)	61.6	50.0	No
>$100K	Hi- and Mid-Rise	(5)	16.0	3.7	No***
	Low-rise	(6)	28.8	27.2	No

* This marks whether we can reject the null hypothesis of the equality of the "Outside TOD" and "Inside TOD" estimates at a 5% probability level using an F-test that explicitly accounts for sampling uncertainty.
** This estimate is from exactly one survey; we ignore the outcome of the statistical test for this row.
*** We can reject at a 10% probability level but not at 5%.

Tables 9 and 10 have the same layout as Tables 7 and 8, but show results based on a measure of the quality of the local school system. For each building in our sample, we look up the school scores (from 1-10, with 10 the best) for the public elementary, middle and high school as assigned by *greatschools.org*.[9] We average the 3 scores and split our sample based on whether the average is less than or greater than 7. As before, when we can reject the equality of the estimates of school-age children per 100 units at a 5% probability level, we highlight the estimates using red text; if we can only reject equality at a 10% probability, we use blue text. We find the results for schools are essentially the opposite of those of transit. Lower-income renters living in an area with good schools have fewer children (rows 2 and 5, Table 9) and high-income renters living in an area with good schools have more (rows 8 and 9, Table 9).

Similar to Table 8, Table 10 expands on the results of Table 9 by focusing only on 2 bedroom units, which enables us to control for both income and product type. Rows 2 and 4 of Table 10 confirm that households earning less than $100 thousand and living in Low-rise apartments tend to have *fewer* children if they live in an areas with good public schools. Rows 5 and 6 of Table 10 suggests that once we control for product type, the presence of good public schools does not impact the incidence of school-age children for high-income renters.[10]

Summing up, we believe that school-quality and proximity to a TOD might both be important in determining school-age children, and the effects of each might vary by income, but hesitate to alter the baseline estimates we report in Table 1 due to mixed results and small sample sizes.

[9] The rankings are available at https://www.greatschools.org/new-jersey/. This web site does not assign every address to a local public elementary or middle school. In these cases, we use judgment as to the relevant public school.

[10] One way to reconcile the results of rows 8 and 9 of table 9 (showing that public schools impact school-age children for high-income renters) with the results of rows 5 and 6 of Table 10 (showing that good public schools do not impact school-age children) involves a story of sorting: high-income renters in areas with good public schools tend to reside in Low-rise buildings and high-income renters in areas with worse public schools tend to reside in Mid- and High-rise buildings.

Table 9: School-Age Children per 100 Units, Market-Rate Units by Avg. School Quality

Income	Bedrooms		Full Sample	School < 7	School >= 7	Reject at 5%?*
			(1)	(2)	(3)	(4)
<$50K	studio + 1br	(1)	11.0	11.2	X	X
	2br	(2)	120.0	120.7	44.4	Yes
	3br and larger	(3)	135.7	135.7	X	X
$50K - $100K	studio + 1br	(4)	6.8	7.3	4.0	No
	2br	(5)	49.3	52.4	25.8	No**
	3br and larger	(6)	55.1	53.9	400.0***	X
>$100K	studio + 1br	(7)	1.0	1.0	1.4	No
	2br	(8)	12.2	9.5	23.9	No**
	3br and larger	(9)	26.5	17.6	65.0	Yes

* This marks whether we can reject the null hypothesis of the equality of the "School < 7" and "School >= 7" estimates at a 5% probability level using an F-test that explicitly accounts for sampling uncertainty.
** We would reject at a 10% probability level.
*** This estimate is from exactly one survey; we ignore the outcome of the statistical test for this row.

Table 10: School-Age Children per 100 Units, 2-Bedroom Market-Rate Units by Avg. School Quality

Income	Product Type		School < 7	School >= 7	Reject at 5%?*
			(1)	(2)	(3)
<$50K	Hi- and Mid-Rise	(1)	43.6	X	X
	Low-rise	(2)	127.2	44.4	Yes
$50K - $100K	Hi- and Mid-Rise	(3)	12.2	22.5***	X
	Low-rise	(4)	60.8	26.5	No**
>$100K	Hi- and Mid-Rise	(5)	5.7	2.6	No
	Low-rise	(6)	25.9	30.8	No

* This marks whether we can reject the null hypothesis of the equality of the "School < 7" and "School >= 7" estimates at a 5% probability level using an F-test that explicitly accounts for sampling uncertainty.
** We would reject at a 10% probability level.
*** This estimate is from exactly one survey; we ignore the outcome of the statistical test for this row.

Conclusions

Based on the results of a large survey of builders, developers and property managers and using non-controversial methods we construct a "matrix" in Table 1 to enable developers and other interested parties to estimate the expected number of school-age children generated by new rental development. We compute school-age children for affordable units by number of bedrooms; and for market-rate units we compute school-age children by number of bedrooms, product type (Low-rise, Mid-rise and High-rise), and by average household income of the residents. We show that school-age children increases with the number of bedrooms; decreases with household income; and decreases with the density of the product type. We demonstrate using two examples that a "one size fits all" approach for determining the number of school-age children is inappropriate, as the variation induced by all these factors can be large. In each example, we consider a new 200-unit development with the same distribution of bedroom types and with a 15% affordable set-aside. The first development is a High-rise project catering to high-income households, leading to 23 school-age children. The second development is a Low-rise project catering to mid-income households, leading to 75 school-age children – an increase of nearly a factor of 3. We also study the impact of location near a transit hub on school-age children, as well as the impact of location associated with a highly-regarded public school system. Our results about transit and schools are suggestive, but not conclusive and further study and research on these topics is needed.

Appendix A

Questions on Building Characteristics

1. Name of Community and Street and City Address
   _____

   _____

2. Development type (check any that apply):
   - TOD (less than 0.5 mile away from transit stop)
   - Mixed Use (at least 2 uses)

3. Product type:
   - Townhome (A multilevel unit with interior stairs, but not a loft)
   - Lowrise 1-3 stories
   - Midrise 4-9 stories
   - Highrise 10 or more stories

4. When was the Year Built/Completed _____

5. Is the community a condominium or a rental? _____

6. **Market rate rents:** Base rent range (net of any other fees or concessions, if applicable); *Skip if this is a condominium community*

	Monthly Base Rent Range
Studio	_____
1BD	_____
2BD	_____
3BD	_____
4BD	_____

7. **Market rate units and population:** Total units and population (according to lease documents)

	Total Vacant Units	Total Occupied Units	Total Current Residents
Studio	_____	_____	_____
1BD	_____	_____	_____
2BD	_____	_____	_____
3BD	_____	_____	_____
4BD	_____	_____	_____
Total Units and Residents (sum rows)	_____	_____	_____

8. **Affordable units and population :** total units and population (according to lease documents)

Affordable units are deed restricted as to the amount someone can pay for the unit (condominium) or amount of rent that can be charged (rental)

	Total Vacant Units	Total Occupied Units	Total Current Residents
Studio	_____	_____	_____
1BD	_____	_____	_____
2BD	_____	_____	_____
3BD	_____	_____	_____
4BD	_____	_____	_____
Total Units and Residents (sum rows)	_____	_____	_____

9. Does your community offer the following amenities

	Yes	No
○ Pool	____	_____
○ Fitness Center	____	_____
○ Kids play area	____	_____
○ On-site leasing/management	____	_____
○ Shuttle to transit	____	_____

Questions on School Age Children

Answer question 10 if known, otherwise answer question 11

10. **Total school age children (ages 5-17)** by unit type.

	Market Units	Affordable Units
○ Studio	_____	_____
○ 1BD	_____	_____
○ 2BD	_____	_____
○ 3BD	_____	_____
○ 4BD	_____	_____

11. Answer the following about **school age children (ages 5-17)**
The sum of these 4 rows should be 100% for Market Units and 100% for Affordable Units

	Market Units	Affordable Units
○ Percent of units with **no** school age children	_____	_____
○ Percent of units with **1** school age child	_____	_____
○ Percent of units with **2** school age children	_____	_____
○ Percent of units with **3+** school age children	_____	_____

Questions on Demographics – Market Rate Units Only

12. What is average household income per unit? _____

13. Can you estimate the percent of households earning the following (totals should sum to 100)
The sum of these 6 rows should be 100%

- ○ Less than $50K per year _____
- ○ Between $50K - $100K per year _____
- ○ Between $100K - $150K per year _____
- ○ Between $150K - $200K per year _____
- ○ Between $200K - $250K per year _____
- ○ More than $250K per year _____

Appendix B

Table B1: Survey Coverage, Units Built in Any Year

	Market	Affordable	Total	Census*	% of Census
Atlantic	838	0	838	5,042	16.6%
Bergen	3,055	92	3,147	103,937	3.0%
Burlington	2,296	162	2,458	30,811	8.0%
Camden	2,933	0	2,933	52,543	5.6%
Cape May	0	0	0	1,324	0.0%
Cumberland	0	0	0	2,175	0.0%
Essex	1,759	173	1,932	145,284	1.3%
Gloucester	0	0	0	13,205	0.0%
Hudson	9,709	176	9,885	164,992	6.0%
Hunterdon	145	12	157	5,048	3.1%
Mercer	1,733	439	2,172	40,777	5.3%
Middlesex	2,307	81	2,388	90,822	2.6%
Monmouth	1,589	110	1,699	45,893	3.7%
Morris	2,902	37	2,939	37,753	7.8%
Ocean	346	174	520	26,736	1.9%
Passaic	626	193	819	68,463	1.2%
Salem	0	0	0	43,689	0.0%
Somerset	450	98	548	23,749	2.3%
Sussex	0	0	0	5,726	0.0%
Union	1,372	149	1,521	68,840	2.1%
Warren	140	72	212	8,863	2.4%
TOTAL	32,200	1,968	34,168	985,672	3.5%

* Census data derived from the 2015 American Community Survey. Units refer to non-group-quarter rentals in town-homes or multi-family buildings.

Table B2: Survey Coverage, Units Built Since 2000

	Market	Affordable	Total	Census	% of Census
Atlantic	0	0	0	653	0.0%
Bergen	1,785	92	1,877	10,101	18.6%
Burlington	0	100	100	5,099	2.0%
Camden	0	0	0	5,103	0.0%
Cape May	0	0	0	99	0.0%
Cumberland	0	0	0	106	0.0%
Essex	625	64	689	15,381	4.5%
Gloucester	0	0	0	1,961	0.0%
Hudson	4,772	176	4,948	23,030	21.5%
Hunterdon	81	12	93	704	13.2%
Mercer	770	227	997	4,350	22.9%
Middlesex	47	61	108	11,087	1.0%
Monmouth	803	110	913	5,771	15.8%
Morris	1,191	34	1,225	4,271	28.7%
Ocean	0	47	47	6,058	0.8%
Passaic	165	189	354	3,772	9.4%
Salem	0	0	0	3,922	0.0%
Somerset	294	98	392	3,370	11.6%
Sussex	0	0	0	570	0.0%
Union	529	9	538	7,472	7.2%
Warren	0	72	72	768	9.4%
TOTAL	11,062	1,291	12,353	113,648	10.9%

* Census data derived from the 2015 American Community Survey. Units refer to non-group-quarter rentals in town-homes or multi-family buildings.

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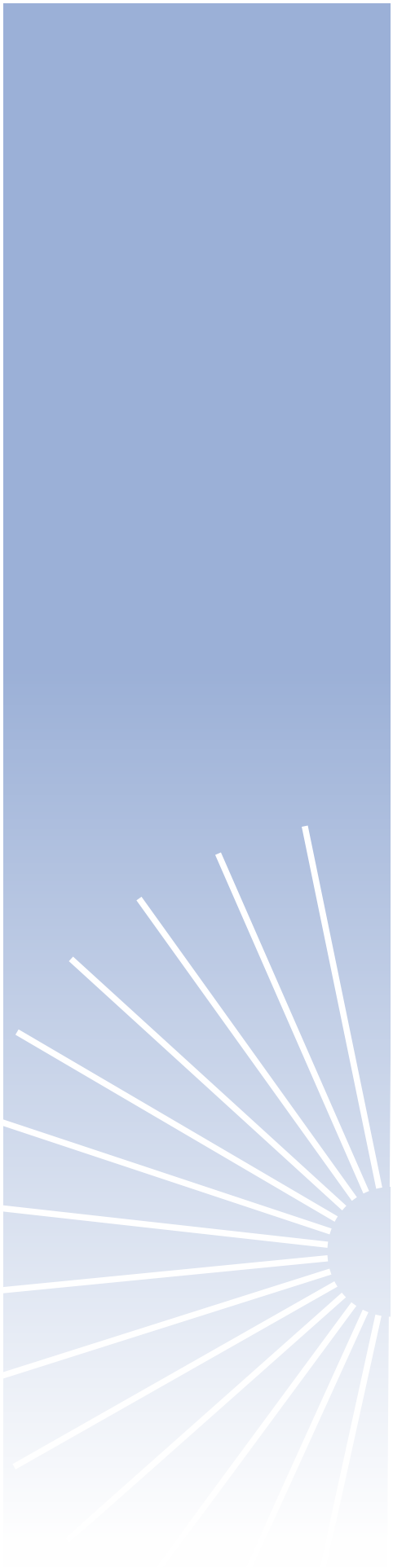
For more information, please contact:

Lorri Layton
Director of Marketing
& Outreach
lorri.layton@rutgers.edu
973-353-2813



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