



The Movement Toward Universal PreKindergarten: 1998-2008 in New York State<sup>1</sup>

Study conducted for the  
Rural Education Advisory Committee (REAC)

September 1, 2008

By

John W. Sipple, PhD

Lisa McCabe, PhD

Judith Ross-Bernstein

Hope Casto

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<sup>1</sup> The Rural Education Advisory Committee, receiving funding from the New York State Legislature obtained by the Legislative Commission on Rural Resources in 2007-2008, commissioned this study. We also offer special thanks to Joyce Main, Cornell University, and Darlene Tegza, NYSED, for their assistance.

**Abstract**

This purpose of this study is to analyze the take-up of state funded prekindergarten programs in the public schools across NYS, but with special emphasis on rural school districts. Using data from the State Education Department, we provide simple descriptive exploration and more complex multivariate analyses across the years 1998 to 2007. We find a rapid adoption of Pre-K programming by the larger, more urban school districts, though more tepid adoption by high need rural schools. We also find steady growth in the proportion of four year olds served in the more urban districts, though a relatively flat trajectory of change in the proportion of rural children served. Finally, important differences exist with regard to district sparsity and half- vs. full-day kindergarten.

### **Introduction**

This purpose of this study is to analyze the implementation of state funded prekindergarten programs in the public schools across NYS, but with special emphasis on rural school districts. Using data from the State Education Department, we provide simple descriptive exploration and more complex multivariate analyses across the years 1998 to 2008. In doing so, this study answers two main research questions:

- 1) How does the take-up rate of high need rural school districts differ from other high need school districts across the state of NY? What district and community characteristics help to explain the variation in take up rate?
- 2) How does the proportion of 4-year olds enrolled in Pre-K vary by school and community characteristics? Given the reduced capacity of rural communities to provide early care and education (Sipple, McCabe & Ross-Bernstein, 2007), do high need rural school districts serve a greater proportion of 4-year-olds than high need urban and suburban school districts?

### **Background**

#### **New York State's Universal Pre-Kindergarten Program**

In 1997, the New York State Legislature enacted universal prekindergarten for four-year-olds as part of a bill to improve education. Funding is administered by the State Education Department (SED) in the form of grants to local school districts. In its first year of operation, 1998-1999, total funding was \$67 million dollars and funds were allocated based on need and number of eligible 4 year olds. In its most recent year of implementation, 2007-2008, New York's program has undergone some significant changes. First, new funding in the amount of \$146 million, was added to the budget, bringing total funding to \$446 million. The additional funding made the program available, for the first time, to all districts in New York State with the exception of nine school districts (ineligible high school and special act districts.) Second, the UPK program was combined with New York's Targeted Pre-Kindergarten program (which was established in 1966

and provided funds for pre-kindergarten for low-income children) to create one pre-kindergarten program.

Funding levels for individual districts are based on the foundation formula for state education aid. This formula takes into account, among other things, student needs, wealth of district, and regional cost variations. Per pupil funding levels range from \$2,700 (the minimum any district will receive) to \$5,750.

In the early years of UPK implementation, districts were required to create a PreK Policy Advisory board to develop a plan for implementation. As of the 2007-2008 school year, this statute was eliminated. Districts are, however, required to contract with eligible community-based early childhood programs (e.g. Head Start, licensed child care centers, preschool special education programs [4410 schools], and family child care providers) to “collaborate a minimum of 10% of the grant to provide an instructional program for UPK students in eligible agencies (CBOs)” (NYSED, <http://www.emsc.nysed.gov/nyc/upk.html>).

Pre-kindergarten funding provides support for half-day programs (2 1/2 hours), five days per week, during the school year. Currently, teachers are not required to have a BA degree and be certified if there is a director with certification on site (although this is expected to change.) There is no specific curriculum mandated, but any curricula used must be aligned with K-12 standards.

While it may appear as if NYS is investing heavily in Pre-K, it is useful to compare the investment of NYS with other states. As shown in Table 1, in 2006-2007 New York State spent \$292,413,929 on its Pre-K programming - not including local contributions - averaging \$3454 per child enrolled. This places NYS 5<sup>th</sup> in the nation in total dollars spent behind Texas, New Jersey, Georgia, and California, and just ahead of Florida and Illinois (NIEER State Preschool Yearbook, 2008). In terms of per-pupil expenditures, NYS ranks 20<sup>th</sup> in the nation. NYS spent \$3454 per child enrolled in the 2006-2007 school year. New Jersey, Oregon, Connecticut, and Minnesota are

ranked 1-4 and all spend over \$7000 per enrolled child. NYS is within \$100 annual per-child expenditures of California, Kentucky, and Oklahoma.

**Table 1** - Selected States and Spending on Pre-K programming, 2007-2008.

State	Total State Pre-K Spending	State Pre-K Spending Per Child Enrolled
NJ	\$477466737	\$10,494 <sup>#</sup>
OR	\$27000000	\$7,853 <sup>%</sup>
PA	\$55648261	\$5519
WV	\$47338791	\$4441
GA	\$309579333	\$4111
MA	\$65816375	\$3681
NY	\$292413929	\$3454
CO	\$28965099	\$2047

Source: National Institute for Early Education Research, Rutgers, The State University of New Jersey.

<sup>#</sup> = Strongly influenced by Abbot Districts and the requisite high levels of state K-12 funding.

<sup>%</sup> = All state Pre-K funding is contributed to statewide Head Start Pre-K program.

### The Benefits of Pre-Kindergarten

The benefits of early education programs, and pre-kindergarten in particular, have long been debated. Some of the strongest evidence for sustained effects of early education program participation comes from longitudinal evaluations of high quality, center-based programs including the High/Scope Perry Preschool Program, Carolina Abecedarian Project, and the Chicago Child-Parent Centers. In these studies, which used rigorous evaluation methods, short-term impacts on cognitive outcomes during the elementary years are clear. In addition, long-term benefits include higher high school graduation rates, job earnings, and rates of home ownership, as well as lower rates of teenage pregnancy, arrests for a felony and incarceration in adolescence and adulthood, and lower rates of depressive symptoms (Brooks-Gunn, 2003; Campbell, Ramey, Pungello, Sparling,

& Miller-Johnson, 2002; Reynolds, Temple, Robertson, & Mann, 2001; Schweinhart, Montie, Xiang, Barnett, Belfield, & Nores, 2005; Schweinhart & Weikart, 1997). These effects are striking not only because they have endured over the lifetime of the children (in one study the children have been followed through age 40), but because of the substantial economic savings to the community that accompany these positive outcomes.

In recent years, evidence from evaluations of state pre-kindergarten programs demonstrate that children who have participated in such programs show better academic readiness skills (Lamy, Barnett, & Jung, 2005), as well as improved school attendance and performance, and reduced grade retention (Gilliam & Zigler, 2000). Oklahoma's Universal Pre-Kindergarten program especially shows promise. In a study that compared children with similar birthdates, but who were and were not eligible for participation due to strict birthdate cutoffs (i.e. they compared children who had birthdays just before and just after the September 1 cut off for participation), researchers found that children who participated in the pre-kindergarten program showed greater gains in early reading, writing and math skills than their similarly-aged peers without such program experience (Gormley, Phillips, & Gayer, 2008).

Research has shown that the largest benefits of pre-kindergarten participation accrue for the lowest income children (Brooks-Gunn, 2003). Because of this finding, proponents of targeted pre-kindergarten programs contend that targeted programs are more efficient and receive greater public support. In addition, because targeted programs serve smaller numbers of children, they can focus more on quality. These arguments, however, have been challenged recently by supporters of universal pre-kindergarten programs. Evidence suggests that although the gains are greater for lower income children, a clear cut off when gains are no longer apparent is difficult to identify. In fact, middle-income children (i.e. those with incomes in the second lowest 20%, middle 20% and second highest 20%) also have the potential to benefit from such programming (Barnett, Brown, & Shore, 2004). In addition, targeted programs must spend resources on

identifying and screening applicants for eligibility (a fact that is made more challenging for the oft documented mobility of low-income families), and often do not reach their intended recipients. Finally, quality may actually increase in universal systems as programs would be less stigmatized and would receive broader public support.

#### **Data & Methods**

The data for these analyses come from the New York State Education Department (NYSED). Some of the data are publicly available through the Chapter 655 and School Report card databases. Other data, requested and sent to us by the State Education Department, included the geographic size of each district (square miles) and Pre-K enrollment.

#### **Definitions of key variables used in this report:**

**N/RC** - Needs-to-Resource-Capacity Categories - A NYSED defined set of categories. The categories are a mix of geography and wealth (property and income wealth). The categories are as follows:

- NYC (not included in this study)
- Big Four - Buffalo, Rochester, Syracuse, Yonkers
- High Need Urban and Suburban Districts
- High Need Rural Districts
- Average Need Districts
- Low Need Districts

**FRPL** – Federal Free and Reduced Price Lunch program. This represents the proportion of students in each district eligible for FRPL.

**CWR** – Combined Wealth Ratio. This is a NYSED-defined index incorporating both property wealth and household income per pupil. A district with an average level of wealth in the state has a value of one, with numbers smaller than one representing increasingly poor school districts and larger than one representing increasingly wealthy school districts.

**AOE/TAPU** - Approved Operating Expenditures per Pupil Unit. This is a measure of average approved operating expenditures per pupil unit, excluding capital outlays and debt service.

**Sparsity** - A calculation of the square miles in a district divided by the the K-12 enrollment. While different measures of sparsity exist (square miles / total population), this measure is easily calculated and comparable across districts and years.

**Transportation** - From the Ch. 655 report, this is a calculation of the proportion of transportation-related district expenditures.

**NYS Share** - The proportion of district revenues received from the state; as distinct from the local or federal share of revenues.

**Pre-K Offer** – A binary variable indicating either that a school district has a state-supported Pre-K program in place or does not.

**Pre-Kindergarten Enrollment** - Our measure of Pre-K enrollment is derived from a data extract from the SED. For this study, Pre-K enrollment includes a BEDS day reporting of the enrollment of any child in any public Pre-K program. Hence, Pre-K enrollment includes children enrolled in UPK programs run in schools, in community-based organizations contracting with the school district, all experimental and targeted Pre-K programs in schools, and finally any supplemental Pre-K offerings.



The data for this study are from the 1998-1999 through 2007-2008 school years covering a period of 10 years. These are the first 10 years of the Universal Pre-K program and witnessed a tremendous growth in the participation by school districts. As context for this study, Table 2 displays the New York State K-12 public school enrollment trends by the N/RC categories. The data reveal decreasing enrollments in the Big Four, High Need Rural, and average need districts. The only category with a discernible increase in enrollment is the low need districts. Total enrollment in the Big Four districts dropped by just more than 10,000 students over the decade, the high need rural districts dropped by approximately 25,000 students, and the average need districts (the highest enrollment of any category) dropped by 40,000 students. Alternatively, the high need urban and suburban districts had steady enrollment over the decade while the low need districts have added about 30,000 students.

**Table 2** - K12 School Enrollment by N/RC categories, 1998/1999 thru 2007/2008.

	<b>Big Four*</b>	<b>High Need Urban &amp; Suburban</b>	<b>High Need Rural</b>	<b>Average Need</b>	<b>Low Need</b>
1998-1999	128914	215991	187571	865387	369482
1999-2000	129055	187680	185446	896476	379104
2000-2001	128642	188150	181320	896472	386615
2001-2002	128470	217358	177767	870393	393555
2002-2003	126859	217885	174428	868550	397268
2003-2004	125035	228735	174114	859525	396127
2004-2005	122757	226408	171459	852841	399664
2005-2006	120379	224670	168743	846472	401831
2006-2007	118340	220858	166086	838402	401260
2007-2008	117250	216986	162788	826864	400254

\*Big Four=Buffalo, Rochester, Syracuse, and Yonkers

Our analyses include both bi-variate and multi-variate examination of the data. First, we examine the proportion of districts with Pre-K enrollment by year, levels of needs-to-resource-capacity-categories (N/RC), FRPL, CWR, AOE/TAPU, Transportation (% of budget), NYS Share, and sparsity. Next, we model the multi-variate relationships using multi-level regression. This allows for an examination of the fixed effects of the demographic and fiscal variables and the independent effect of time (year-to-year) on the dependent variable.

We first present data on the proportion of school districts across the state that report enrollment in Pre-K. Simply put, all districts in any given year that report actual enrollments in Pre-K are considered to have a Pre-K program. It is important to note that this does not necessarily suggest that all districts we consider having Pre-K actually offer Pre-K in one of their schools. It is possible that a district, through collaboration with a community based provider of Pre-K, reports Pre-K enrollment but does not actually provide the program in their own school building. It is also important to note that Pre-K (offered in the building or out) may be Universal Pre-K, Targeted Pre-K, Experimental Pre-K, or a wholly locally-funded Pre-K program offered in their school(s). The state data on Pre-K enrollment is simply an annual BEDS reporting of the Pre-K enrollment without reference to the funding stream or specific regulation (e.g., targeted Pre-K vs. Universal Pre-K).

We then offer two multivariate analyses. First, we try to predict the presence of absence of Pre-K enrollment by regressing the Pre-K indicator (yes vs. no) on the set of independent variables. This is done using multi-level logistic regression with the level one variables being the demographic and fiscal measures for each district and level two being the passage of time across each individual district. Next we model the proportion of children enrolled in Pre-K by regressing the percent of enrollment on the set of demographic and fiscal variables.

A central element of this study is estimating the proportion of age-eligible children enrolled in Pre-K across the state. In essence, there is no such number available and so it must be

estimated. We estimate the percent enrolled three different ways and then use one for the remainder of this study. Table 3 displays the enrollment estimates calculated three different ways for all districts in the state (except New York City). This means that any district with Pre-K enrollment of zero will have an estimate of 0%. Alternatively, Table 4 displays the enrollment estimates, again calculated three ways, only for districts with Pre-K enrollments. This means that any district with enrollment of 0 in a given year is removed from the analysis.

In each table (3 & 4), column four reports the mean Pre-k participation rate calculated using Kindergarten enrollment. In any given year, the Pre-K enrollment figure (Year=0) is divided by the next year's kindergarten enrollment (full day plus half day; Year=1). The second method (column 5) is to divide the Pre-K enrollment figure by an average grade level enrollment calculated by dividing the K-6 enrollment by seven years). Similarly, the third method (column 6) divides the Pre-K enrollment by the K-12 enrollment total divided by 13 grade levels. As the reader can see in Tables 3 and 4, the estimates are very close to each other. We decided to use the K-6 enrollment calculation (column 5) because of this study's special attention to rural schools and the volatility in the size of single cohorts. While the single year estimate (kindergarten enrollment) may be more sensitive to the reported enrollment decline in some districts, we opted for the more stable estimate of averaging 7 grade levels.

**Table 3** - New York State School Enrollment: Total and Mean Pre-K Participation rates of ALL districts (except NYC)

YEAR	N Districts	Total K-12 Enrollment	Mean % Pre-K participation (KG Enrollment)	Mean % Pre-K participation (K-6 Enrollment/7)	Mean % Pre-K participation (K-12 Enrollment/13)
1998-1999	678	1767345	13	12	11
1999-2000	678	1777761	14	13	12
2000-2001	678	1781199	18	17	16
2001-2002	678	1787543	22	20	19
2002-2003	675	1784990	22	20	19

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YEAR	N Districts	Total K-12 Enrollment	Mean % Pre-K participation (KG Enrollment)	Mean % Pre-K participation (K-6 Enrollment/7)	Mean % Pre-K participation (K-12 Enrollment/13)
2003-2004	675	1783536	22	20	19
2004-2005	675	1773129	22	21	20
2005-2006	675	1762095	22	22	20
2006-2007	675	1744946	25	24	22
2007-2008	675	1724142	na	31	30

**Table 4** - New York State School Enrollment: Total and Mean Pre-K Participation rates of ONLY districts with Pre-K enrollments (except NYC)

YEAR	N Districts	Total K-12 Enrollment	Mean % Pre-K participation (KG Enrollment)	Mean % Pre-K participation (K-6 Enrollment/7)	Mean % Pre-K participation (K-12 Enrollment/13)
1998	210	800123	39	37	36
1999	230	847983	40	37	36
2000	279	951620	43	39	38
2001	308	989266	46	42	41
2002	305	986608	47	43	42
2003	306	990350	47	44	42
2004	305	962098	48	46	44
2005	315	976533	47	45	43
2006	330	995828	50	48	45
2007	417	1105623	na	50	48

**Findings**

We present our findings in three distinct sections. First, we present data over time (1998-2008) on the proportion of all school districts that offer state-funded Pre-K in their schools and separately the proportion of age-eligible children served by the school districts. Second, we estimate the fiscal and demographic characteristics that predict adoption of Pre-K programming and the proportion of children served. Finally, we offer preliminary analyses and thoughts on the

impact of Pre-K programming on later academic achievement as measured by elementary test scores.

**Pre-K Yes or No**

Table 5 displays the proportion of school districts with and without Pre-K enrollments broken out by N/RC category and year. Of the 678 school districts statewide (excluding New York City and districts without any elementary enrollment), 210 (30%) had students enrolled in Pre-K in the 1998-1999 school year. This increased rapidly by 2001-2002 to more than 300, and then plateaued until 2007-2008 when the number increased to 417 (62%). Of note is how each of the Big Four districts offered Pre-K in 1997-1998 school year and that 37 of the 43 (86%) High Need Urban and Suburban Districts offered Pre-K in 1997-1998. This has held steady until the 2007-2008 school year when all but two of the high need urban and suburban districts have Pre-K enrollment. Among all categories, there was a rapid increase in the first two years of the analysis and the last two years (see Figure 1). Not surprising, the low-need districts have the smallest proportion of districts with Pre-K enrollment.

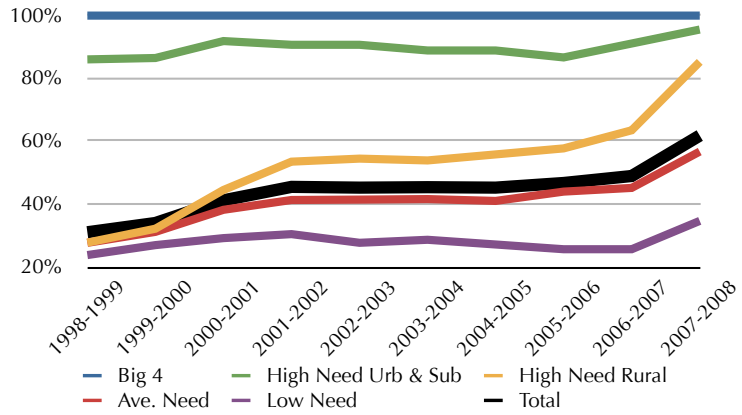
**Table 5** - Number of Districts with and without Pre-K

YEAR	Big Four*		High Need Urban/Suburban		High-Need Rural		Average Need		Low Need		All Districts	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
1998-1999	0	4	6	37	115	44	244	93	103	32	468	210
1999-2000	0	4	5	32	110	52	235	106	98	36	448	230
2000-2001	0	4	3	34	90	72	211	130	95	39	399	279
2001-2002	0	4	4	39	74	85	198	139	94	41	370	308
2002-2003	0	4	4	39	72	86	197	139	97	37	370	305
2003-2004	0	4	5	40	72	84	197	140	95	38	369	306
2004-2005	0	4	5	40	69	87	199	138	97	36	370	305
2005-2006	0	4	6	39	66	90	189	148	99	34	360	315
2006-2007	0	4	4	41	57	99	185	152	99	34	345	330
2007-2008	0	4	2	43	23	133	146	191	87	46	258	417

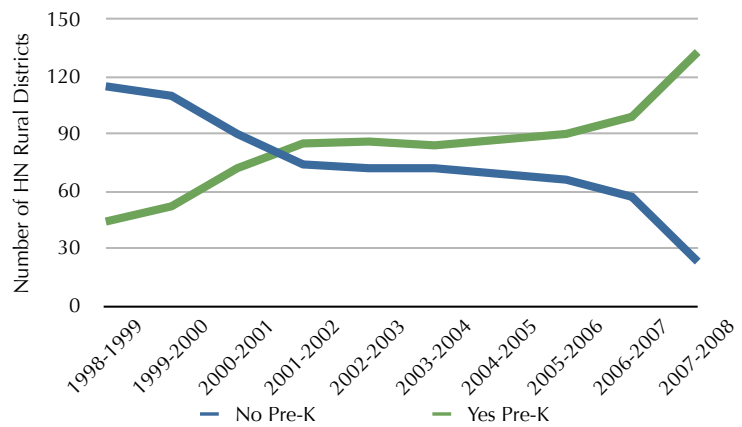
\*Big Four=Buffalo, Rochester, Syracuse, and Yonkers

With regard to the high need rural districts, only 44 of the 159 districts have students enrolled in Pre-K in 1998-1999. This has increased steadily over the decade including a significant jump in 2007-2008 to 133 of the 156 districts (see Figure 2).

**Figure 1** - Percentage of School Districts Offering Pre-K by N/RC Categories



**Figure 2** - Relative Number of High Need Rural School Districts Offering Pre-K



**Differences**

How different are the districts that adopted Pre-K from those who did not? Table 5 displays means for the two groups of districts across the five N/RC categories. Among all school districts in

the 1998-1999 school year, we find that those districts offering Pre-K serve higher proportions of children with FRPL status (38% to 27% respectively). This difference is statistically different (indicated by Bold type) and persists across all years in this study. Conversely, the districts offering Pre-K in 1998-1999 and 1999-2000 had greater community wealth (CWR of 1.4 vs. 1.1, and 1.3 vs. 1.1) and spent more per pupil during these two years (\$7671 vs. \$6765; \$7936 vs. \$7123). The differences, however, do not persist after the 1999-2000 school year.

Among the High Need districts, we see modest differences between those with and without Pre-K programs in the early years of the study. In the 1998-1999 school year, the proportion of poor students (FRPL) are slightly different; though not statistically different. The CWR also shows no statistical difference between the districts with and without Pre-K. In the 1999-2000 school year, however, both High need urban and suburban and high need rural districts with Pre-K serve greater proportions of poor children (64% vs. 53% and 49% vs. 45% in the rural areas). It also appears as if the districts with Pre-K tend to spend more per pupil than do the other districts. The high need urban and suburban districts spent about \$700 more per child in Pre-K districts in 1998-1999, while the high need rural districts with Pre-K spent, on average, \$350 more per child.

There appears to have been more significant differences in the average and low need districts. Average need districts who offered Pre-K served higher proportions of poor students, had greater levels of community wealth, and spent more than did the districts without Pre-K. While the spending differences held for three consecutive years, the proportion of poor students served held for the entire decade of the study. Similarly, the low need districts with Pre-K also served higher proportions of poor kids, had greater community wealth, and spend significantly more per pupil than did the districts without Pre-K.

In more recent years, the proportion of poor children (% FRPL) and the measure of community income and property wealth (combined wealth ratio), and per-pupil spending are statistically no different. (Is this for high need rural only?? But it looks like FRPL is sig in the 2 most

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recent years} This suggests, at least among the high need rural districts, that the the adoption cannot be attributable to common demographic characteristics and may only be explained by factors beyond the scope of this study.

**Table 6 - Fiscal and Demographic Averages by N/RC and Year**

Year		Big 4	HN Urb_Sub		HN_Rural		Ave Need		Low Need		All	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
1998-	FRPL	79%	58%	63%	48%	50%	26%	31%	5%	10%	27%	38%
1999	CWR	0.69	0.70	0.70	0.53	0.49	0.86	1.1	2.1	4.7	1.1	1.4
	AOE/TAPU	\$6550	<b>\$6126</b>	<b>\$6817</b>	\$5703	\$5865	<b>\$6316</b>	<b>\$7140</b>	<b>\$9051</b>	<b>\$12826</b>	<b>\$6765</b>	<b>\$7671</b>
1999-	FRPL	80%	53%	64%	45%	49%	25%	32%	5%	10%	26%	38%
2000	CWR	0.67	0.70	0.65	0.57	0.57	0.89	0.96	2.1	4.3	1.1	1.3
	AOE/TAPU	\$6990	\$6576	\$7041	<b>\$6162</b>	<b>\$6473</b>	<b>\$6606</b>	<b>\$7119</b>	<b>\$9472</b>	<b>\$13354</b>	<b>\$7123</b>	<b>\$7936</b>
2000-	FRPL	78%	57%	61%	45%	46%	24%	30%	5%	9%	25%	36%
2001	CWR	0.627	0.72	0.62	0.61	0.53	0.91	0.93	2.2	4.3	1.1	1.3
	AOE/TAPU	\$7337	\$6537	\$7332	\$6706	\$6565	<b>\$6940</b>	<b>\$7315</b>	<b>\$10010</b>	<b>\$13438</b>	\$7615	\$7980
	Tran.	5.6%	3.8%	4.3%	5.5%	5.5%	5.4%	5.2%	4.9%	4.8%	5.3%	5.1%
	NYS Share	63.0%	51.0%	57.9%	62.6%	66.7%	47.3%	47.5%	17.3%	15.7%	43.5%	49.5%
2001-	FRPL	78%	58%	61%	45%	46%	23%	29%	4%	7%	23%	35%
2002	CWR	0.62	0.72	0.65	0.55	0.52	0.92	0.92	2.1	4.4	1.2	1.2
	AOE/TAPU	\$7408	\$6940	\$7656	\$6844	\$6898	\$7462	\$7570	<b>\$10191</b>	<b>\$14341</b>	\$8026	\$8295
	Tran.	5.6%	3.3%	4.4%	5.5%	5.3%	5.6%	5.4%	4.8%	5.2%	5.3%	5.2%
	NYS Share	64.5%	53.1%	57.6%	65.4%	68.9%	47.9%	49.8%	21.4%	16.0%	44.7%	51.7%
2002-	FRPL	78%	57%	62%	45%	48%	24%	29%	5%	8%	23%	37%
2003	CWR	0.59	0.69	0.63	0.55	0.51	0.89	0.93	2.18	4.54	1.16	1.21
	AOE/TAPU	\$7492	\$7102	\$8038	\$7144	\$7226	\$7814	\$7934	<b>\$10889</b>	<b>\$15172</b>	\$8482	\$8620
	Tran.	5.5%	4.0%	4.2%	5.5%	5.1%	5.5%	5.4%	5.0%	5.1%	5.3%	5.2%
	NYS Share	64.6%	54.2%	59.6%	67.1%	69.9%	50.1%	51.2%	23.2%	18.0%	46.4%	53.6%
2003-	FRPL	80%	56%	60%	47%	49%	23%	30%	5%	10%	24%	38%
2004	CWR	0.55	0.78	0.62	0.51	0.47	0.85	0.86	2.16	4.90	1.12	1.22
	AOE/TAPU	\$7646	\$8000	\$8571	\$7441	\$7534	\$8329	\$8269	<b>\$11582</b>	<b>\$16645</b>	\$8988	\$9139
	Tran.	5.6%	3.4%	4.4%	5.3%	5.0%	5.4%	5.3%	5.0%	5.4%	5.2%	5.1%
	NYS Share	66.3%	49.8%	59.6%	69.2%	71.4%	51.4%	54.1%	24.3%	17.6%	47.9%	55.2%
2004-	FRPL	78%	59%	62%	48%	50%	24%	32%	5%	11%	24%	39%
2005	CWR	0.55	0.78	0.62	0.51	0.48	0.83	0.86	2.15	4.99	1.12	1.20
	AOE/TAPU	\$8299	\$9047	\$9275	\$8131	\$8145	\$8962	\$8994	<b>\$12615</b>	<b>\$18464</b>	\$9766	\$9897



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		Big 4	HN Urb_Sub		HN_Rural		Ave Need		Low Need		All	
	Tran.	5.5%	3.4%	4.4%	5.3%	5.3%	5.5%	5.5%	4.9%	5.2%	5.3%	5.3%
	NYS Share	67.3%	47.9%	57.8%	68.2%	70.2%	50.5%	52.0%	23.9%	16.9%	46.8%	54.0%
2005-	FRPL	76%	61%	61%	48%	50%	<b>25%</b>	<b>32%</b>	<b>5%</b>	<b>11%</b>	<b>24%</b>	<b>39%</b>
2006	CWR	0.56	0.73	0.63	0.50	0.48	0.82	0.88	<b>2.17</b>	<b>5.47</b>	1.13	1.23
	AOE/TAPU	\$8804	\$9340	\$9894	\$8656	\$8854	\$9510	\$9698	<b>\$13619</b>	<b>\$20147</b>	\$10481	\$10598
	Tran.	5.6%	3.6%	4.5%	5.4%	5.1%	5.5%	5.5%	4.9%	5.3%	5.3%	5.2%
	NYS Share	64.2%	50.7%	57.2%	67.2%	68.1%	49.5%	50.5%	22.8%	15.9%	45.4%	52.8%
2006-	FRPL	80%	61%	59%	<b>48%</b>	<b>52%</b>	<b>25%</b>	<b>32%</b>	<b>5%</b>	<b>11%</b>	<b>24%</b>	<b>40%</b>
2007	CWR	0.55	0.81	0.63	0.50	0.47	0.82	0.87	<b>2.14</b>	<b>5.94</b>	1.15	1.24
	AOE/TAPU	\$9284	\$10561	\$10403	\$9238	\$9383	\$10163	\$10271	<b>\$14094</b>	<b>\$22124</b>	\$11143	\$11230
2007-	FRPL	80%	53%	60%	<b>47%</b>	<b>51%</b>	<b>24%</b>	<b>31%</b>	<b>5%</b>	<b>10%</b>	<b>20%</b>	<b>39%</b>
2008	CWR	0.55	1.08	0.63	0.52	0.48	0.87	0.82	<b>2.12</b>	<b>4.99</b>	1.26	1.15
	AOE/TAPU	\$9284	\$11655	\$10360	\$9185	\$9355	\$10327	\$10123	<b>\$14069</b>	<b>\$20077</b>	\$11497	\$10993
<b>Bold Numbers</b> are statistically different (p≤.05) from each other within N/RC Category												

Notes: FRPL = Free and Reduced Price Lunch; CWR = Combined Wealth Ratio; AOE/TAPU = Approved Operating Expenditures per Pupil Unit

Not shown in Table 6 (see Appendix) is the degree to which the sparsity (the number of students per square mile) of districts varies by Pre-K participation. In the earliest years of the study, the sparsity of those districts with students enrolled in Pre-K was considerably less than the sparsity of those districts without any Pre-K enrollment. In other words, the districts with Pre-K enrollment had far more students per square mile than districts without any Pre-K enrollment. In more recent years, the relationship has flipped (see Figure 3). The districts with Pre-K enrollment are now serving more sparsely populated regions. Of import, however, is the relative levels of sparsity across the state. In 1998 the sparsity ranged from 252 pupils per square mile in districts with Pre-K enrollments to only 138 per square mile in the districts with no Pre-K enrollment. This is in stark contrast to the high need rural districts with dramatically less population per square mile and a different trend over time.

**Figure 3** - Sparsity of districts with and without Pre-K enrollment, 1998-2008

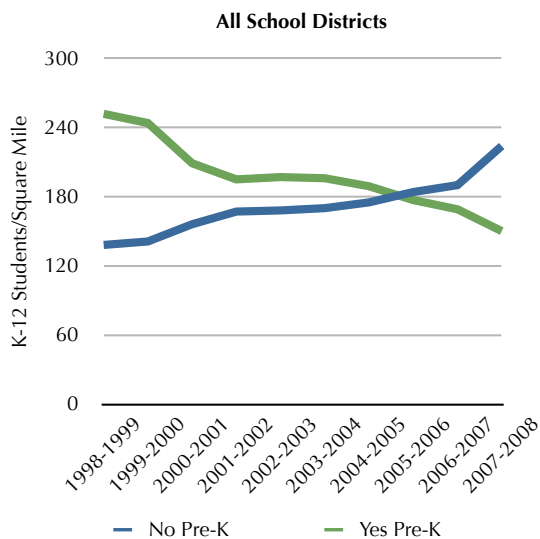
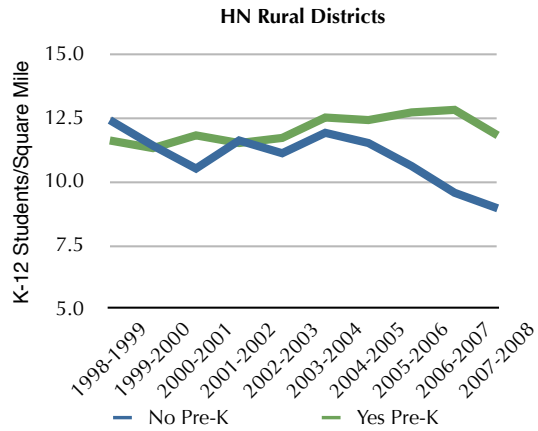


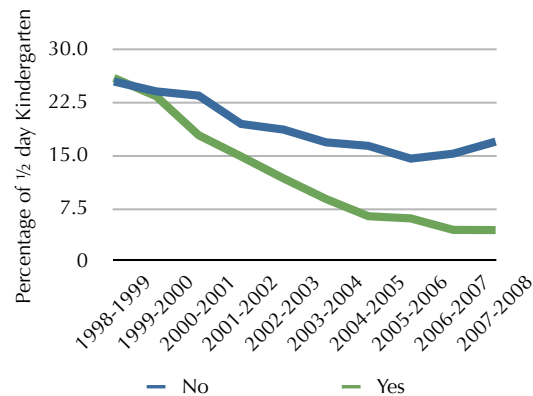
Figure 4 displays the relative sparsity among high need rural districts with Pre-K enrollment as compared with those without Pre-K enrollment. Here the absolute level of sparsity is much greater (only 12 pupils per square mile on average) and begins with nearly indistinguishable groupings between districts with Pre-K and those without. Not until 2006, is there a statistically significant difference between the two groups. Currently, and in contrast to the state as a whole, the high need rural districts with Pre-K are less sparse (11.8 pupils per square mile) than those without Pre-K (8.9 pupils per square mile).

**Figure 4** - Sparsity of High Need Rural districts with and without Pre-K enrollment, 1998-2008



Finally, we posited that districts with full day Kindergarten may be more likely to have Pre-K than those with ½ day Kindergarten. Figure 5 displays the trend over time and relationship between those districts with Pre-K and those without. Whereas in 1998, there is no difference between the groups, beginning in 2001 and persisting throughout, the districts with Pre-K enrollment have significantly lower rates of ½ day kindergarten enrollment. This suggests something important about the districts that have decided to move toward full-day kindergarten in the decision to add pre-K programming.

**Figure 5** - Percentage of ½ day Kindergarten Enrollment of all Kindergarten students by Pre-K enrollment and Year.



**Proportion of 4-Year-olds Served in Pre-K**

Next, we analyze the proportion of all 4-year-olds in the districts that have Pre-K. We can do this in two ways. First, we can only examine those districts that have Pre-K at any time while ignoring all other districts. This would result in an analysis of only districts with Pre-K enrollment. A second strategy would be to examine all districts by declaring enrollment in districts with no Pre-K enrollment as serving 0% of the age-eligible population.

Figure 6 displays the trends over time for the proportion of the age-eligible population served in Pre-K broken out by the N/RC categories. The Big Four districts are currently serving nearly 80% of the age cohort, up from just over 60% in 1998-1999. The high need urban and suburban districts increased participation from 30% in 1998-1999 to nearly 60% in the 2007-2008 school year. The high need rural districts follow a similar trend, but were serving only 13% in 1998-1999. As recent as the 2005-2006 school year, they served 30%, but in the last two years the participation rate jumped to 45% of all eligible children in the high need school districts.

Figure 6 - Percentage of 4 year olds in Pre-K by Year and N/RC - All districts

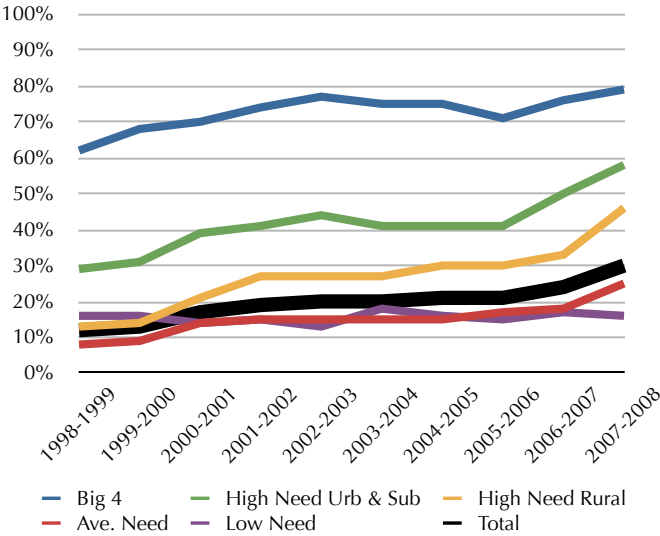
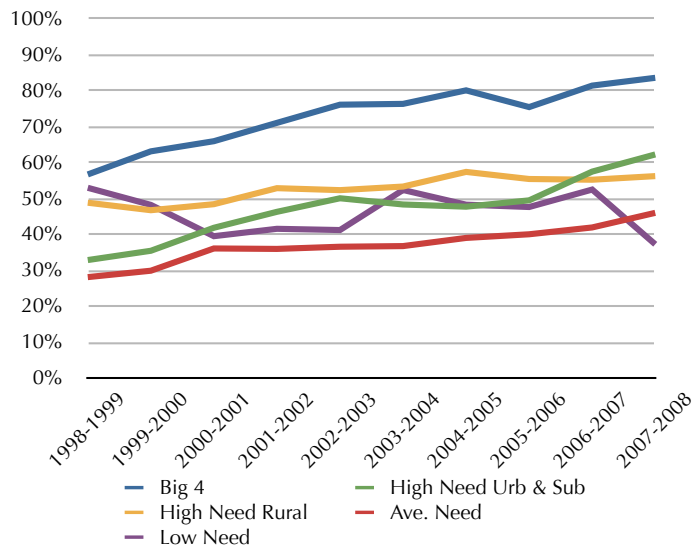


Figure 7 displays the trends in the Pre-K participation rates for only those districts with Pre-K enrollment. Among the districts that have students enrolled in Pre-K, the participation rates are naturally higher. Here, the high need rural districts serve nearly the same percentage of 4 year olds as do the high need urban and suburban districts (56% to 62%). Additionally, nearly half of the age-eligible children in the average need districts (46%) are served.

**Figure 7** - Percentage of 4 year olds in Pre-K by Year and N/RC - Among Districts with Pre-K Enrollment.



**Multivariate Time-Series Analyses - % of Children Enrolled in Pre-K**

Moving beyond the bi-variate relationships, we now analyze the data to determine the relative importance of each district and community characteristic above and beyond the effect of the others. We are also able to assess the degree to which the proportion of children in Pre-K programs changed above and beyond any change on the other demographic variables.

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Table 4a displays the regression results for the time-series mixed (random and fixed) effects model. Here we estimate the percentage of children in each district enrolled in Pre-K within the set of districts that offer Pre-K (districts with no Pre-K enrollment are eliminated from these analyses; analyses with all districts have similar findings and are included in the Appendix). The results suggest several interesting trends over the 10 years of data. First, each 10% increase in districts' FRPL rates are related to an increase of 2.6% in the rate of participation. Conversely, an increase of a decile of sparsity results in a decrease in the rate of participation by just more than two and a half percent (-2.6). Across the decade, we find an increase of more than 10%, or, on average, an increase of 1.3% per school year. Per pupil spending has a weaker relationship as an increase in spending of \$1000 per pupil results in just a .7% increase in participation. Similarly, increasing levels of community wealth (CWR) are not related to any change in participation rates.

Figure 4b represents the same model but with the addition of the Needs to Resource Capacity Categories. Once accounting for these categories, the effect of increasing FRPL or per pupil spending is only modestly decreased, and there is no change in the effect of community wealth or the overall annual rate of increase. Above and beyond the effect of these district and community characteristics, the average Big Four participation rates are 40 percentage points higher than the average high need rural district. All else being equal, there is no statistically significant difference in participation rates between the high need rural, the high need urban and suburban, the average need, or the low need districts.

Table 4a - Percentage of four year	Coef.	Std. Err.	P>z	[95% Conf. Interval]	
FRPL (10% units)	2.6	0.45	**	1.8	3.5
CWR (deciles)	0.5	0.38		-0.3	1.2
AOE/TAPU (\$1000 units)	0.7	0.16	**	0.4	1.0
Sparsity (deciles)	-2.6	0.36	**	-3.3	-1.9
YEAR	1.3	0.14	**	1.0	1.6
constant	35.4	3.42	**	28.7	42.1

Includes only districts with Pre-K Programs

Table 4b - Percentage of four year-olds served by districts in Pre-K program

Table 4a - Percentage of four year	Coef.	Std. Err.	P>z	[95% Conf.Interval]
FRPL (10% units)	2.3	0.48**		1.4 3.3
CWR (deciles)	0.5	0.40		-0.3 1.3
AOE/TAPU (\$1000 units)	0.6	0.16**		0.3 0.9
Sparsity (deciles)	-3.1	0.40**		-3.9 -2.3
YEAR	1.3	0.14**		1.1 1.6
Big Four	39.7	10.89**		18.4 61.1
HN Urban & Suburban	4.3	2.86		-1.3 9.9
Average Need	-1.7	1.90		-5.4 2.0
Low Need	3.5	3.77		-3.9 10.9
constant	39.0	3.52**		32.0 45.9

Includes only districts with Pre-K Programs

Notes: FRPL = Free and Reduced Price Lunch; CWR = Combined Wealth Ratio; AOE/TAPU = Approved Operating Expenditures per Pupil Unit

### Conclusions

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- Participation rates of 4-year-old children in New York State’s Pre-K program has increased from 12% to 31% in the last decade. In districts with Pre-K enrollment, 4-year-old participation rates range from 46% in average need districts to 56% and 62% in high need rural and high need urban/suburban districts, respectively.
- The proportion of districts with Pre-K enrollment (i.e. they operate a state-funded Pre-K program) has increased from 30% to 62% in the last decade, with a significant jump (from 49% to 62%) in the most recent two school years (2006-2007 and 2007-2008). The percentage of rural, high-need districts offering Pre-K has increased from 28% in the first year of the program to 85% in the 2007-2008 school year. Low-need districts are the least likely to offer Pre-K (only about 1/3 [35%] in the 2007-2008 school year).
- Looking across the first 10 years of Pre-K implementation, there are few consistent demographic differences between districts with Pre-K enrollment and those without. Districts are similar on characteristics such as community wealth and per-pupil spending. They do however differ on the



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proportion of low-income children (as measured by Free and Reduced Price Lunch [FRPL]-eligible students). Districts with Pre-K enrollments have a greater proportion of FRPL-eligible students when compared to those with no Pre-K.

- Over time, Pre-K programs have become more common in rural areas when looking across all districts. In the late 1990s districts with *no* Pre-K enrollment tended to serve more sparsely populated areas when compared to districts with Pre-K. In recent years, this relationship has flipped such that districts with *no* Pre-K now tend to be in more densely populated (more children per square mile) areas.
- Looking only at high-need rural areas, however, the early years suggest no difference in sparsity between those districts with and without Pre-K. By 2006, however, high need rural districts with Pre-K are more dense (11.8 pupils per square mile) than those without Pre-K (8.9 pupils per square mile).
- Districts with full-day kindergarten are more likely to have Pre-K enrollment than are districts with half-day kindergarten programs.
- When looking across a variety of community variables, four-year-old participation rates are higher when districts have higher proportions of low-income children, are more densely populated, and (to a lesser extent) spend more money per pupil. Community wealth, and Needs to Resource Capacity Categories (outside the 4 largest districts) are not related to 4-year-old participation rates. In the 4 largest school districts of Buffalo, Rochester, Syracuse, and Yonkers, 4-year-olds are 40% more likely to participate in Pre-K.

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**Appendix**

Average Pre-K Enrollments (three methods) by N/RC and Year

YEAR		Big Four	HN Urban Suburban	HN Rural	Ave. Need	Low Need	All
1998-	KG Enr	2696	405	86	183	205	194
1999	Ave Grade Enr (7)	2693	391	89	187	206	195
	Ave Grade Enr (13)	2479	386	91	198	211	201
1999-	KG Enr	2499	397	80	185	205	189
2000	Ave Grade Enr (7)	2675	397	86	193	208	196
	Ave Grade Enr (13)	2482	390	88	202	218	202
2000-	KG Enr	2257	388	77	181	207	185
2001	Ave Grade Enr (7)	2601	400	83	193	211	196
	Ave Grade Enr (13)	2474	391	86	202	222	202
2001-	KG Enr	2219	374	76	173	210	182
2002	Ave Grade Enr (7)	2560	391	83	186	218	195
	Ave Grade Enr (13)	2471	389	86	199	224	203
2002-	KG Enr	2164	366	76	174	209	182
2003	Ave Grade Enr (7)	2457	386	81	186	220	194
	Ave Grade Enr (13)	2440	390	85	199	228	203
2003-	KG Enr	2156	376	78	171	210	182
2004	Ave Grade Enr (7)	2313	386	81	181	219	192
	Ave Grade Enr (13)	2405	391	86	196	229	203
2004-	KG Enr	2107	376	78	171	208	182
2005	Ave Grade Enr (7)	2188	380	79	179	220	189
	Ave Grade Enr (13)	2361	387	85	195	231	202
2005-	KG Enr	2142	380	79	171	211	183
2006	Ave Grade Enr (7)	2138	374	78	176	219	187
	Ave Grade Enr (13)	2315	384	83	193	232	201
2006-	KG Enr	2107	376	78	168	202	179
2007	Ave Grade Enr (7)	2096	366	77	174	217	184
	Ave Grade Enr (13)	2276	378	82	191	232	199
2007-	KG Enr	2121	372	75	164	199	176
2008	Ave Grade Enr (7)	2096	366	77	174	217	184
	Ave Grade Enr (13)	2255	371	80	189	231	196

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Year		Big 4		HN Urb_Sub		HN_Rural		Ave Need		Low Need		All	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1998-	Sparsity	1041	314	515	12.4	11.6	<b>103</b>	<b>205</b>	352	319	<b>138</b>	<b>252</b>	
1999	n 1/2 KG	664	<b>68.7</b>	<b>176</b>	<b>3.53</b>	<b>0</b>	<b>66.8</b>	<b>122</b>	108	91.9	<b>60.4</b>	<b>112</b>	
	n Full G	2032	<b>69.8</b>	<b>272</b>	84.3	80.3	<b>84.5</b>	<b>146</b>	101	101	<b>87.8</b>	<b>184</b>	
1999-	Sparsity	1046	331	490	11.4	11.3	<b>102</b>	<b>210</b>	371	372	<b>141</b>	<b>244</b>	
2000	n 1/2 KG	570	<b>0</b>	<b>143</b>	<b>4.65</b>	<b>0</b>	<b>59</b>	<b>106</b>	109	97.3	<b>55.8</b>	<b>94.1</b>	
	n Full G	1929	<b>121</b>	<b>297</b>	74.6	81.2	<b>93.5</b>	<b>149</b>	92.9	117	<b>89</b>	<b>180</b>	
2000-	Sparsity	1046	476	471	10.5	11.8	<b>115</b>	<b>171</b>	377	382	<b>156</b>	<b>209</b>	
2001	n 1/2 KG	394	<b>0</b>	<b>119</b>	0.233	2.97	57.7	71.4	110	94.2	56.7	67.3	
	n Full G	1864	<b>103</b>	<b>294</b>	75.2	75.8	<b>91.6</b>	<b>162</b>	84.7	141	<b>86.3</b>	<b>178</b>	
2001-	Sparsity	1046	367	510	11.6	11.5	124	148	369	354	167	195	
2002	n 1/2 KG	0	<b>0</b>	<b>104</b>	0.203	2.52	53	52.4	79.6	91.4	48.6	49.6	
	n Full G	2219	<b>123</b>	<b>297</b>	75.4	74.4	<b>93.9</b>	<b>157</b>	118	146	<b>96.7</b>	<b>177</b>	
2002-	Sparsity	1034	363	508	11.1	11.7	124	150	367	385	168	197	
2003	n 1/2 KG	0	<b>0</b>	<b>81.7</b>	0.292	2.63	48.9	39.8	80	72.8	47.1	38.1	
	n Full G	2164	<b>120</b>	<b>309</b>	72	76	<b>99.8</b>	<b>169</b>	<b>114</b>	<b>177</b>	<b>98.3</b>	<b>188</b>	
2003-	Sparsity	1020	520	518	11.9	12.5	126	152	362	340	170	196	
2004	n 1/2 KG	0	<b>0</b>	<b>44.3</b>	0.278	2.81	45.3	37	<b>79.4</b>	<b>40.9</b>	44.7	28.6	
	n Full G	2156	<b>161</b>	<b>359</b>	74.7	77.3	<b>98.1</b>	<b>172</b>	<b>119</b>	<b>195</b>	<b>99.9</b>	<b>199</b>	
2004-	Sparsity	1002	522	512	11.5	12.4	131	144	364	341	175	189	
2005	n 1/2 KG	0	<b>0</b>	<b>34.3</b>	0.261	2.74	39.5	29	<b>77.7</b>	<b>30.8</b>	<b>41.7</b>	<b>22</b>	
	n Full G	2107	<b>156</b>	<b>369</b>	77.8	74.8	<b>107</b>	<b>176</b>	<b>119</b>	<b>207</b>	<b>105</b>	<b>201</b>	
2005-	Sparsity	985	567	497	10.6	12.7	131	140	377	311	184	177	
2006	n 1/2 KG	0	0	23.6	0.288	2.66	35.2	28.5	69	38.3	<b>37.5</b>	<b>21.2</b>	
	n Full G	2142	<b>194</b>	<b>385</b>	73.6	79.7	<b>113</b>	<b>170</b>	<b>129</b>	<b>209</b>	<b>112</b>	<b>200</b>	
2006-	Sparsity	967	675	483	<b>9.55</b>	<b>12.8</b>	133	135	379	304	190	169	
2007	n 1/2 KG	0	0	16.6	0.333	0	35.2	23.1	<b>65.3</b>	<b>29.6</b>	<b>37.7</b>	<b>15.7</b>	
	n Full G	2107	237	373	<b>64</b>	<b>85.4</b>	<b>106</b>	<b>176</b>	<b>126</b>	<b>203</b>	<b>106</b>	<b>200</b>	
2007-	Sparsity	955	718	480	<b>8.94</b>	<b>11.8</b>	151	118	390	300	<b>224</b>	<b>150</b>	
2008	n 1/2 KG	0	0	15.7	0	0	38.9	21.9	62.3	29.5	<b>43</b>	<b>14.9</b>	
	n Full G	2121	194	364	69.4	76.5	<b>104</b>	<b>159</b>	<b>133</b>	<b>175</b>	<b>111</b>	<b>174</b>	

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Table 5a - Percentage of four year-olds served by districts in Pre-K program					
	Coef.	Std. Err.	P>z	[95% Conf. Interval]	
FRPL (10% units)	2.4	0.31**		1.8	3.0
CWR (deciles)	0.4	0.26		-0.1	1.0
AOE/TAPU (\$1000 units)	-0.3	0.12**		-0.5	-0.1
Sparsity (deciles)	-1.4	0.30**		-2.0	-0.8
YEAR	1.8	0.09**		1.7	2.0
constant	19.8	2.64**		14.6	25.0
Table 5b - Percentage of four year-olds served by districts in Pre-K program					
	Coef.	Std. Err.	P>z	[95% Conf. Interval]	
FRPL (10% units)	2.1	0.31**		1.5	2.7
CWR (deciles)	0.5	0.27*		0.0	1.1
AOE/TAPU (\$1000 units)	-0.3	0.12**		-0.6	-0.1
Sparsity (deciles)	-1.6	0.31**		-2.2	-1.0
YEAR	1.8	0.09**		1.7	2.0
Big Four	49.4	11.77**		26.4	72.5
HN Urban & Suburban	0.3	2.10		-3.8	4.4
Average Need	-4.3	1.05**		-6.4	-2.2
Low Need	-0.8	1.71		-4.2	2.5
constant	23.1	2.68**		17.9	28.4
Includes all districts and designated districts with no Pre-K as having 0% in Pre-K					