Boston Area Research Initiative

An Evaluation of Equity in the Boston Public Schools' Home-Based Assignment Policy

July 2018

The Boston Area Research Initiative

The Boston Area Research Initiative (BARI) is an interuniversity partnership that pursues original urban research on the cutting edge of both science and public policy, with an emphasis on the opportunities created by novel digital (i.e., "big") data. BARI is a leader in the national movement toward data-intensive, cross-sector partnerships that generate new knowledge that can be translated into benefits for local communities. BARI specializes in the utilization of administrative records, internet-generated content, and other modern data to better understand the city and to support and improve urban policy and practice. We also strive to support a thriving local civic data ecosystem wherein researchers, policymakers, and practitioners can collaborate on similar efforts. BARI is jointly based at Northeastern and Harvard Universities and is led by Co-Directors Daniel T. O'Brien (School of Public Policy and Urban Affairs, Northeastern University), Robert J. Sampson (Dept. of Sociology, Harvard University), and Christopher Winship (Dept. of Sociology, Harvard University).

The Team for this Report

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Executive Summary

Boston Public Schools (BPS), like many other urban districts, serves a city that is de fact residentially segregated along racial and socioeconomic lines. As such, it has utilized school choice and assignment policies as one way to reduce racial and economic segregation and the extent to which public education reproduces social inequities between groups. Such policies empower parents to select schools they believe are the best ones for their children, whether these schools are nearby or outside of their neighborhood. Further, by providing greater schooling options across the city, such policies not only provide parents with fewer resources living in communities with low performing schools greater access to high quality schools; they also provide incentives for parents who have the means to leave the district to stay. In turn, school choice has the potential to not only enhance equity but also to diversify the population of the district and of any given school. However, such policies often have the less desirable consequence of forcing many students to travel long distances each morning and evening.

Partially in response to the strains that long travel distances have placed on both families and the district, BPS adopted a new "home-based assignment system" (HBAP) in school year 2014-2015. HBAP replaced the previous approach of dividing the city in three zones (3Z) with a geographically-driven algorithm that generated individualized "choice baskets" centered on each student's home address that ensured access to high quality schools. As such, it was a bold attempt to reorganize school choice and assignment to provide students with increased access to good schools, close to home, especially for those students with the lowest level of access.

Four years after the full implementation for the kindergarten and 6th grades, the Boston Area Research Initiative (BARI) worked with BPS to evaluate HBAP and its impacts on the district, with a particular eye toward the goals of increasing equitable access to high quality schools and decreasing the distance students travel to school (i.e., good schools, close to home). To what extent did HBAP achieve its goals of access to high quality schools close to home? Did it either mitigate or exacerbate inequities in access and assignment to quality schools across neighborhoods, racial and socioeconomic groups, and students in general education, English Language Learner, and Special Education programs? Did the focus on local access help communities to build "neighborhood schools"? Did it unintentionally increase racial or economic segregation of Boston's students? The full report addresses each of these questions. Below are the main findings and conclusions.

Findings

Geography largely determines access to quality. The overarching lesson of the evaluation is that **it is impossible for a choice and assignment system to provide access to "good schools close to home" when the geographic distribution of quality schools is itself inequitable.** Neighborhoods in the southern core of the city (from South Boston across to Roxbury and down through Mattapan and Dorchester), which are predominantly inhabited by Black and disadvantaged students, have very few Tier 1 schools nearby. Consequently, they had fewer such schools in their choice baskets, had greater competition for seats in those schools, were less likely to attend them, and had to travel longer distances to school when they did attend them. When the analysis expands the definition of high quality schools to include both Tier 1 and Tier 2 schools, these disparities were less striking for kindergarten, but remained strong for 6th grade.

There is a need for an algorithm that defines access to quality in terms of competition for seats, rather than numbers of schools. HBAP builds choice baskets with universal minimum access to quality schools by guaranteeing that they have at least a certain number of Tier 1, Tier 2, and Tier 3 schools. Analyses based on numbers of schools, access to seats, and competition for seats revealed that **variations in the number of students living in different parts of the city created large disparities in competition for seats. These disparities disproportionately lowered practical access for Black students, and, to a lesser extent, Latino students.** It is important to note that these disparities existed before HBAP. However, HBAP did nothing to eliminate them.

Implementation of HBAP was incomplete. At the time of this evaluation, the implementation of HBAP was incomplete in two ways. First, it was rolled out sequentially across grades, starting with kindergarten and 6th grade in 2014-2015. This then progressed to include 1st grade and 7th grade in 2015-2016, and so on. This seemed a logical approach given that most new school assignments occur in kindergarten and 6th grade. However, it means that HBAP's impact on school composition was not fully realized and thus could not be fully evaluated, for this reason the evaluation was conducted only on kindergarten and 6th grade. Second, and more notable, **the implementation for 6th grade constructed choice baskets based on quality assessments of schools with kindergartens (regardless of whether that school had a 6th grade), then adding pathway schools and removing any school that did not have 6th grades.** This resulted in 6th grade choice baskets that had fewer than the number of Tier 1 schools that are nearest to the students' home address than the policy stipulated. These were unfortunately concentrated in a small number of neighborhoods whose nearest Tier 1 schools do not offer 6th grade, meaning that these families did not have access to the high quality schools that were promised by the policy.

HBAP shortened commutes. HBAP achieved one of its main goals in that **students traveled shorter distances and times to get to and from schools.** This was particularly true for elementary school students. The gains were most noteworthy

for the lower frequency of long trips; for example, the longest 25% of commutes among kindergarteners (i.e., above the 75th percentile) were reduced by a half-mile and over 2.5 min. in each direction.

HBAP diminished integration across the city without creating neighborhood schools. **HBAP did not succeed in its goal of helping neighborhoods to concentrate their students at fewer, more local schools (i.e., creating neighborhood schools). Nonetheless, it showed signs of lowering racial and geographic integration across the district.** The average neighborhood sent its students to the same number of schools under 3Z and HBAP. However, for students in predominantly minority neighborhoods, they were more likely to be dispersed across more schools under both 3Z and HBAP. In comparison, Asian and White students became increasingly concentrated at a small number of schools that were more likely to be of high quality. The consequence is that students are more likely to attend schools whose student bodies reflect lower geographic and racial diversity. These results were not alarming in their magnitude, but they do reflect a potentially troubling trend.

Conclusions

Many of the inequities uncovered across neighborhoods and racial groups arose from geographic patterns that existed before HBAP, meaning the policy did not create them, nor did it do anything to ameliorate them. There are ways that the policy could be improved—including accounting for levels of competition for seats across neighborhoods. However, school assignment policies alone will not solve the greater challenge facing BPS, which is the uneven distribution of high quality schools across Boston. If families want their children to attend schools closer to home, as prior research indicates, then the more effective policy solution is to establish a greater number of high quality schools that are more equitably dispersed throughout the city.

HBAP, which focused on increasing the likelihood that students attend schools close to home, had very real consequences for school diversity. For both kindergarten and 6th grade there was evidence of diminishing geographic and racial integration across the district. This was a foreseeable outcome given the basic premise of HBAP and the context of a racially and economically segregated city. However, it is an issue that the district as a whole might want to revisit.

An Evaluation of Equity in the Boston Public Schools' Home-Based Assignment Policy

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Note to the Reader: Reading this Report

This report evaluates the consequences of the Boston Public Schools' Home-Based Assignment Policy for equity in terms of access and assignment to quality schools. It also examines any effects on school composition. This makes for a rather lengthy and detailed series of analyses. We have sought to make it as accessible as possible to as wide an audience as possible while also utilizing advanced statistical techniques that ensure a rigorous evaluation. In order to strike this balance we have made a number of decisions regarding the organization of the report that it will be useful for the reader to understand.

- The report is separated into eight chapters, each one attending to a different aspect of the evaluation. These chapters are largely self-encapsulated, and a reader looking for a particular piece of information can access it directly from the appropriate chapter without having to read the rest of the report.
- We provide non-technical introductions and summaries for each chapter and, in many cases, for the sections within chapters. This is so readers not interested in the detailed statistical analyses can easily absorb the main findings. Likewise, Chapter 1 is an introduction to the purpose and background of the evaluation and Chapter 8 is an overarching summary of the findings.
- The Appendices contain the most technical material on methodology. They also contain full tables that present analytic results in greater detail than would be appropriate for the main text.
- Though we have designed the report to enable readers to move through the report freely as they seek out the information most relevant to them, **we encourage all to read Chapter 2's summary of the methodology and terms used in the report**. This is important because Chapter 2 describes all analytic decisions, which form the basis for interpretation of the results. We understand that statistically-driven reports often lead readers to ask questions about, "What does that mean?" or "Why did they do it that way?" or "Why didn't they ask this question?" We hope that Chapter 2 will answer many of these questions without forcing readers to dig through the technical Appendices.

Chapter 1: Background on School Choice and Boston Public Schools

Demographic gaps in achievement are pernicious and have been a pressing concern since the Brown v. Board of Education decision and the revelations of the Coleman (1966) report on the consequences of racial segregation. Across the nation, African-American and Latino youth are much more likely to attend schools that have fewer resources, less-experienced teachers, fewer advanced courses, and fewer guidance counselors than are Euro-American youth (Hill and Torres 2010; Hill 2011; Reardon and Bischoff 2011). These disparities are reinforced by deepening residential segregation across race and class (Ayscue and Orfield 2015; Orfield and Frankenberg 2013), which manifests in homogeneous school populations (Hill and Torres 2010; Walsemann, Bell, and Maitra 2011).

Like other urban districts serving diverse populations, Boston Public Schools must navigate the tension between residential segregation along racial and economic lines and realizing the benefits of diverse schools. To address these issues and increase both equity and integration in schools, urban districts such as Boston Public Schools have implemented a range of policy solutions. One common policy approach is to provide parents with choice in the school assignment process. By decoupling school assignment from residential neighborhoods, such policies have the potential to create geographically (and, presumably, racially and socioeconomically) diverse schools. School choice and assignment policies are designed to increase equity and access to high quality schools through parental empowerment (Hill, Jeffries, and Murray 2018).

When families have access to a wide variety of schools falling both within and beyond their neighborhood of residence, they can choose schools that match their interests and needs. As such, families living in neighborhoods with low performing schools have a means for opting out of those schools in favor of better schools outside of their neighborhood. A second goal related to decoupling residential neighborhood and school assignments for many school choice policies is to improve integration within schools. Indeed, early choice programs in the United States often focused on creating magnet schools and controlled choice policies that were designed to attract families from diverse neighborhoods (Hill, Jeffries, & Murray, 2018). Via these two goals, school choice policies are designed to give families the freedom to leave neighborhood schools that are underperforming and instead choose schools that match parents' preferences and interests, in turn increasing incentives for families to stay in urban public-school districts.

School choice models have a long history and are largely based on an assumption that market pressures through competition among schools would increase the availability of high quality schools as parents "vote with their feet" (Friedman 1955; Chubb and Moe 1990). In open market conditions, schools that

are not up to standard will not be selected by families, leading these schools to either close or improve; meanwhile, high quality schools will expand in the face of increased demand. However, significant constraints on the system, including wide variability in the quality of schools and the requirement that all students must be enrolled in school has ultimately created competition among parents, rather than schools—as there are fewer schools and seats to meet the demands. These policies also assume that parents want to have choices, are able to effectively make decisions, and, possibly most tenuously, that parents will make choices that result in increased equity and diversity (Hill, Jeffries, Murray, 2018).

1.1. School Choice in Boston and the Adoption of HBAP

Boston Public Schools has historically struggled with the implementation of policies that can counteract its historically racially-segregated residential landscape. This segregation was the stimulus for forced bussing policies instituted in the 1970s. These policies were both unpopular and ineffective and were replaced by Controlled School Choice plans that gave families additional options and the autonomy to submit preferences regarding the school to which their children were assigned. Until 2014, the school choice plan divided the city into three zones—east, west, and north (3-Zone Plan or 3Z). Families living in each zone could choose schools within their zone, any school in another zone, as long as it was within a mile of their home address, and any citywide school. As with all school choice policies, if more families select the school than there are seats, then a lottery system is employed with priorities granted for certain situations, such as schools within a "walk zone" and schools that a sibling already attends.

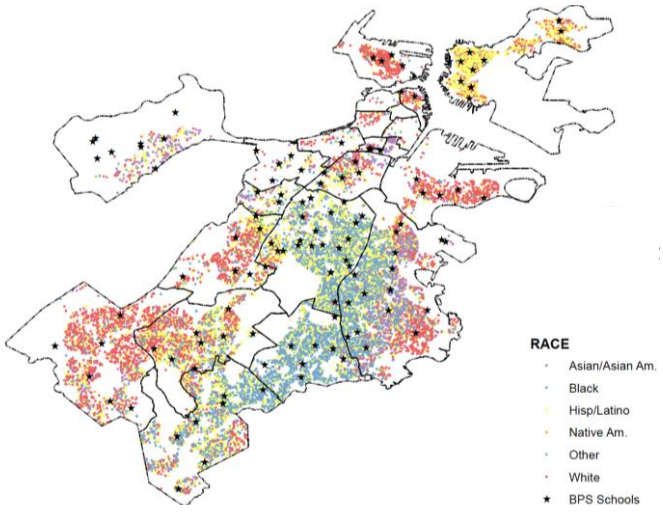

Figure 1-1. A dot map representing the geographic distribution of BPS students of different races (all students, 2011-2017).

School choice policies in Boston have played an important role in increasing access to high quality schools for some disadvantaged students and families. As can be seen in Figure 1-1, the city remains largely segregated along racial and socioeconomic lines and there is clearly a value in policies that can diversify the population of any given school.

They have the downside, however, of forcing many students to travel long distances—as much as 10 miles!—each morning and evening. After 20 years, the costs of transporting students across the city—both human time costs and dollars, along with the continued racial segregation of the schools—prompted Boston Public Schools to revisit their school choice assignment system. The premise of the new assignment system was to give families "good schools, close to home" and to reinvigorate neighborhood schools. Indeed, research shows that parents consistently show a preference for schools close to home, but their willingness to trade location for academic achievement varies based on context and, presumably, the availability of free public transportation (Fuller and Elmore 1996; Glazerman 1998; Goyette 2008; Hastings, Kane, and Staiger 2005).

In 2012, Boston Public Schools initiated a highly public process to reengineer its school choice and assignment system, with the goal of providing parents with equitable access to good schools that are close to home. In theory, this would decrease travel distances while also safeguarding against the inequities that are inherent in a residentially-segregated city. This included a collaboration with researchers at MIT to model competing scenarios using existing data to compare how well various school assignment systems would accomplish this goal. In March 2013, the School Committee approved the adoption of the Home Based Assignment Plan (HBAP).

HBAP, generated by MIT researchers, was a bold and clever attempt to provide parents with increased access to good schools, close to home. Central to HBAP is the effort to create universal minimum access to quality education based on MCAS Tiers that rank each school's proficiency and academic growth. Under the HBAP system, each family receives at least six MCAS Tiered schools in their baskets, based on their locations relative to their home address. These six MCAS Tiered schools include: the two closest Tier 1 (i.e., deemed highest quality) schools; the four nearest schools that are either Tier 1 or 2 (i.e., high quality); the six nearest schools that are in Tiers 1, 2 or 3. These are joined by any schools within one mile of the family's home; option schools (e.g., ELC; EEC, AWC); City Wide Schools; any schools that a sibling attends; and overlays for Special Education and English Language Learner Programs.

1.2. The Evaluation of HBAP

Four years after the adoption of HBAP, it is now possible to evaluate the extent to which it was successful in achieving the goal of increasing access to high quality schools and reducing the distances students must travel to schools. This is particularly important given its innovative nature, making it an unproven solution. In conducting our evaluation, BARI divides the HBAP system into five stages, each

with its own dynamic of engagement with families. These stages are: (1) Choice baskets; (2) Shopping period; (3) Submission of choices; (4) Assignment; and (5) Enrollment. Inequities can arise at any of these stages, and they may be generated by the system itself or by its interaction with actions and decisions made by families. For example, the choice baskets themselves might be inequitable in some way (Stage 1), or, after receiving their choice baskets, parents might engage the school choice system with different levels of knowledge or priorities (Stage 2). Even with the same knowledge and desire for high quality schools, additional factors create disparities in the ability of families from different racial backgrounds to actualize these preferences. In turn, they end up submitting choices of differing academic quality (Stage 3; Bell 2009). Further, while they policy has algorithms to assign students to schools equitably based on a lottery and established priorities (Stage 4), families may vary in their decisions to enroll their students in the assigned schools (Stage 5).

Even though inequities can arise at any of the five stages of HBAP, this evaluation focuses on Stages 1 and 4. This is because Stages 1 and 4 are fully under the management of BPS via the HBAP system and permit the most concrete assessment of its impacts on equity as it pertains to access to quality schools, assignment, and attending schools closer to home. While doing so, it also considers the extent to which HBAP maintains diversity within schools.

This report begins with a summary of the pertinent methodological considerations and decisions that are essential for readers to know in order to understand the evaluation (*note*: a complete methodological report can be found in the Appendices). This is followed by chapters that address each of the essential questions of the evaluation.

Chapter 2: Guide to General Methodology, Interpreting Analyses, and Glossary

This chapter summarizes the methodological techniques used in this evaluation. This summary is intended to enable the reader to understand and interpret the results and is thus not a full technical description, which is instead available in the Appendices. It is recommended that all readers use this chapter as a useful reference for navigating the numerous analyses in Chapters 3-7, as it provides background on the following: data sources; the cross-group comparisons used to evaluate equity; techniques for measuring distance and school quality; and neighborhood definitions. There is also a short glossary of abbreviated terms.

2.1. Data Sources

Boston Public Schools provided datasets that included students' choice baskets, submitted choices, and enrollment for all grades for the three years since the implementation of HBAP (from 2014-2015 through 2016-2017) and the last three years of 3Z (from 2011-2012 through 2013-2014). BPS followed a staggered plan in implementing HBAP. They began with kindergarten (and pre-k) and 6th in 2014-2015, and then progressed longitudinally (e.g., 2015-2016 added grades 1 and 7) in each subsequent year (see Chapter 3 for more on implementation process). Therefore, the main analysis of the effect of HBAP is conducted exclusively for kindergarten (i.e., K2; not pre-k grades given their low enrollment, though see Chapter 6 for a comparison) and 6th grade, as those are the grades for which there are three years of data and therefore the best context for ascertaining the effects of HBAP on access, assignment, and school composition. Throughout, these analyses include all records with complete information on the relevant variables.

Student addresses were provided in students' records were geocoded using BARI's custom geographical infrastructure (O'Brien and Gomory 2017), which coordinates all known addresses in the city (as defined by the City of Boston's Street and Address Management System) with census geographies and higher-level administrative geographies (e.g., Boston Planning & Development Authority's planning districts). Students whose address could not be mapped were excluded.

2.2. Comparing HBAP and 3Z

There are two ways to compare the HBAP and 3Z policies. First, the "counterfactual approach" compares HBAP to what would have happened under the 3Z policy. This is the best approach for assessing equitable access because the choice baskets under each policy can be definitively modeled in a given year. Thus, equitable

access was analyzed for students only in the years since HBAP was introduced, comparing their actual HBAP choice baskets with their simulated 3Z choice baskets. Analyzing equitable access in this manner controls for demographic changes in neighborhoods or the opening or closing of schools between the two time periods.

The counterfactual approach is not feasible for the question of equitable assignment. Assignment depends not only on access, but the choices that families submit and the competition they encounter through the lottery. Families' choices and thus the process of assignment cannot be simulated counterfactually. To assess equitable assignment, assignments under HBAP were directly compared to those made under 3Z. Similarly, because school composition is a direct result of school assignment, schools and neighborhoods under HBAP were compared directly to those under 3Z.

2.3. Equity for Whom? Defining Cross-Group Comparisons

Evaluating equity requires the examination of variations across a population, most typically concentrating on differences between particular groups. HBAP is a fundamentally geographic system in that choice baskets, and thus access, is inherently dependent on an individual's home address. In turn, access interacts with the lottery system to determine assignment. For this reason, the foundation of the evaluation of equity is geographical, comparing access and assignment across neighborhoods (see Section 2.4 for how neighborhoods are defined).

Of course, equity across demographic groups is the true issue of interest in such an evaluation, as captured by the history of school choice provided in Chapter 1. In all cases, additional analyses further quantified how any geographic disparities translate into demographic inequities. For analyses of access it was only possible to do so across race. This is because the students have not yet enrolled in BPS and have not necessarily shared all information necessary for other demographic measures.[1] Analyses of assignment leveraged a fuller set of data to expand to comparisons to poverty status, English Language Learner (ELL) status and Special Education (SPED) status.

[1] Some will note that it would be possible to link data from enrollment databases with choice baskets to fill in this information for those who eventually enrolled in BPS. This is true, but could skew analysis in meaningful ways. Students that did enroll in BPS are more likely to come from populations with fewer resources to attend private schools. Further, those with the resources to leave the district would be more likely to do so if they have poor access. Thus, if the analysis of access loses the higher-resource families with the lowest level of access, our evaluation will conclude that these groups have even greater access than they actually do.

The district uses six categories for race: Asian, Black, Latino, Native American, Other, and White. Our primary analyses do not discuss Native American and Other as they are too few to permit robust comparison, but the tables in the Appendices do include them. ELL students are categorized into Current, Former, and Never. Our analyses compare Current to the other two. Poverty was defined using historical thresholds for free-or-reduced-price lunch (even after BPS began providing free lunch for all students). Special Education students were classified as any student enrolled in a special education program, including ELL students enrolled in such programs.

Last, after discussions with BPS and an examination of the data, a decision was made not to divide ELL students by language group. This was for two reasons. First, only two first languages were spoken by more than 3% of the district's students—English (55%) and Spanish (27%)—making it impossible to conduct robust statistical comparisons across groups. It would be feasible to compare Spanish-speakers to English-speakers, but it turns out that the geographic distribution of Spanish-speakers is statistically identical to the geographic distribution of students who identify as Latino.[2] In turn, their patterns of access and assignment would be exactly the same. For this reason, any reader particularly interested in the access and assignment of Spanish-speakers relative to other students should attend to the analyses of equity across races, which compares Latino students to Asian, Black, and White students.

2.3. Defining Neighborhoods

Neighborhood analyses were based on the traditional definitions provided by the 16 planning districts of the Boston Planning & Development Agency. These have sufficient historical and social meaning to be understood as the basis for analysis. Analysis across 16 neighborhoods, however, can make for an unwieldy set of comparisons that are vulnerable to spurious interpretations, especially when some have rather low numbers of students. In order to overcome these limitations, all geographic analyses were conducted in two stages. First, to aid in interpretation, a four-part classification of neighborhoods as general "regions" was used: *downtown* neighborhoods, which are densely settled, including Central, Back Bay/Beacon Hill, Fenway-Kenmore, South End, and South Boston; *southern urban core*, which are mostly majority-minority and often disadvantaged, including Mattapan, North and South Dorchester, and Roxbury; *southwestern semiurban areas*, which are less

[2] 60% of Latino students speak Spanish as a first-language, and 99% of Spanish-speaking students identify as Latino. Counts of Spanish-speaking and Latino students across census blocks, the smallest geographic unit of analysis, were $r = .96$, and for census block groups, the next smallest geographic unit of analysis, were $r = .999$.

densely settled and often somewhat more affluent, including Hyde Park, Jamaica Plain, Roslindale, and West Roxbury; and *the "wings"*, which are geographically-removed from the rest of the city and tend to have specialized policies for access to local schools, including Allston-Brighton, Charlestown, and East Boston.

The four groupings are largely similar in their geographic structure, meaning the neighborhoods therein will have similar experiences for the operation of HBAP. This makes for a much more efficient communication of the analysis of equity across neighborhoods. That said, there will be deviations from these broader patterns and there are those who will want to understand them. For this reason, analyses were conducted across the 16 neighborhoods. The text of each chapter highlights any neighborhoods that stood out as distinct from the tendencies of their grouping. The results for all neighborhoods are also available in the detailed tables in the Appendices.

2.4. Defining Distance

BPS' choice and assignment system is one of many policies that defines the distance between two points "as the crow flies," also known as Euclidean distance. This is a loose proxy of the effort required to commute to and from school. It does not account for the real distance that must be traveled through the street grid, and the amount of time that this travel takes, given speed limits, street signals, traffic, etc. To partially account for this and provide a better estimate of travel effort, distance was accounted for in two ways. First, the traditional Euclidean distance was estimated. Second, two online sources (Open Street Map and Google Maps) were used to estimate travel times during rush hour (using APIs; see Appendix B for more detail). Whereas the former is comparable to other work and examines distance as defined for the generation of choice baskets, the latter provides a better approximation of the impacts of geographic distance between home and school on families, and, thereby, a better estimate of inequities among demographic or geographic groups. While it does not account for circuitous bus routes, it is more accurate than Euclidean distance.

Further, to examine the relationship between access and distance, the choice baskets were divided into schools closer than 1.5 miles to home and those further away. One-and-a-half miles was chosen because it a reasonable distance and one that is a bit broader than the assumption of "walk zone" utilized by both policies. This is crucial because both policies provide access to all schools within 1 mile of a person's home. Consequently, if "near to home" were defined as a radius of 1 mile or less, there would by definition be no differences between the policies.

2.5. School Quality

Understanding that definitions of school quality vary in the minds of families and in the scientific literatures, the analysis here uses the ranking systems employed by BPS. Under 3Z, BPS relied on DESE Tier rankings, which are based solely on MCAS scores. To capture a broader assessment of quality, BPS created a Tier ranking system, based on the most recent scores on MCAS scores as well as historical trajectory. These Tiers were the ones used to inform the generation of choice baskets under HBAP.

Because school quality was assessed differently under 3Z and HBAP, they are not directly comparable. As a result, initial attempts to compare quality across the two policies produced inconsistent results that appear to be associated with differences in the *assessment* of quality, rather than true differences in school quality. Therefore, all subsequent analyses of equitable access to quality schools between the two policies apply BPS tier rankings in 2014-2015 to schools in 2013-2014. This is the best approach because school quality across two school years is relatively stable.

"High quality" was operationalized in two ways: (1) schools in Tier 1 only and (2) combining Tier 1 and Tier 2. This is for two reasons. First, the HBAP policy ensures access to quality schools using each of these definitions. Second, in the minds of BPS, Tier 2 schools are still good schools. Relatedly, the low number of Tier 1 schools can exaggerate inequities in access that are often dampened when quality is considered more broadly as the combination of Tier 1 and Tier 2 schools. It is important, then, to consider equity in both ways.

2.6. Glossary

The following terms are abbreviated throughout the report:

- *3Z* – 3-Zone Policy
- *BARI* – Boston Area Research Initiative
- *BPS* – Boston Public Schools
- *ELL* – English Language Learner
- *HBAP* – Home-Based Assignment Policy
- *SPED* – Special Education

Chapter 3: Do Boston Public Schools Students have Greater Access to High Quality Schools?

The evaluation of HBAP begins with the question of equitable access to high quality schools across geographic and demographic groups. This entailed an analysis of the contents of choice baskets under HBAP and how the distribution of these contents differed from those that would have been provided by 3Z. The fundamental promise of HBAP was to improve access to high quality schools and reduce the distances students must travel to schools. A primary mechanism for this was to provide *universal minimum access* to high quality schools, with each student receiving a choice basket including the two nearest Tier 1 schools, the 4 nearest Tier 1 or Tier 2 schools, and the 6 nearest Tier 1, 2, or 3 schools, as well as any other school within 1 mile of their home.

Universal minimum access should not be mistaken for completely equal access, however, as some students might receive more high quality schools in their choice baskets due to greater proximity to such schools. The goal of HBAP was to ensure that all students had access to high quality schools and that this access was distributed more evenly across geographic and demographic groups than it was under 3Z. Further, in theory, providing *access* to a minimum number of quality schools would create sufficient likelihood of being *assigned* to one of them. It would also limit the amount of variability in choice baskets, making access largely equitable.

Equitable access under HBAP was assessed in a general sense as well as how these reflected either shifts in choice baskets between 3Z and HBAP or simply revealed persistent disparities. Because students with choice baskets were not necessarily enrolled in BPS, data on poverty status, ELL status, and SPED status were not available for comparison of those groups (see Chapter 2). The assessment that follows examined three measures of access: (1) the number of schools of different quality levels in each basket; (2) the number of seats within schools, to account for differential school size; (3) the amount of competition for seats in choice baskets, measured as the number of "seat shares" to which an individual is likely to have access, calculated as the ratio of seats in the choice basket over the number of other students who have those same seats in their choice baskets. This last measure was only analyzed for HBAP because of the difficulty of generalizing it across policies.[3]

[3] Seat shares were first calculated at the school level as the number of seats available divided by the number of choice baskets that the school appears in. This is approximately the likelihood of each student receiving a seat in the school if all students who have it in their choice basket chose it as their first choice. These seat shares are summed across all schools in a student's choice basket (or the appropriate subset, e.g., Tier 1 schools) to get total seat shares. This is a somewhat indirect measure in that it does not account for interdependence in competition across schools. This makes

In this chapter, the entirety of choice baskets is examined. In Chapter 4, the question of "good schools, close to home" is address by examining schools within 1.5 miles of a student's home address. First, though, the implementation of HBAP is described, which is necessary to give full context to the results that follow. Complete methodology and tables are available in Appendix A.

3.1. Implementation of HBAP

Understanding how HBAP was implemented is essential to organizing and interpreting its evaluation. First, all high schools are citywide schools, and thus the policy was only intended to effect elementary and middle school students. Within those age groups, HBAP was implemented in stages by BPS beginning in the 2014-2015 school year. As can be seen in Table 3-1 below, implementation began with kindergarten grades (including pre-kindergarten grades K0 and K1) and 6th grade. Additional grades were added progressively each year. For example, in 2015-2016, 1st and 7th grades were incorporated, and in 2016-2017, 2nd and 8th grades, and so on. Indeed, it has not been fully implemented for all grades at the time of this evaluation.

Table 3-1. Implementation of HBAP by School Year.

School Year	On Grades	Off Grades
2014/2015	Kindergarten and 6th	1st through 5th, 7th, and 8th
2015/2016	Kindergarten, 1st, 6th, and 7th	2nd through 5th and 8th
2016/2017	Kindergarten, 1st, 2nd, 6th through 8th	3rd through 5th
2017/2018	Kindergarten, 1st through 3rd, 6th through 8th	4th and 5th
2018/2019	Kindergarten, 1st - 4th, 6th - 8th	5th
2019/2020	All	None

it particularly difficult to compare this measure across policies because there is more overlap in choice baskets between everyone in the same zone under 3Z than there is between many individuals who happen to have the same nearest Tier 1. Thus, this measure was only used to compare equity across groups within HBAP.

The implementation of HBAP for kindergarten students was exactly as described previously, with students receiving the nearest two Tier 1 schools, four Tier 1 or Tier 2 schools, and 6 Tier 1, Tier 2, or Tier 3 schools, plus the other types of schools as proscribed by the policy. Grade 6 was implemented somewhat differently. Rather than basing the composition of choice baskets on schools with 6th grade available, the algorithms from kindergarten were used. That is to say, choice baskets for 6th grade students started out with the two nearest Tier 1 schools *with a kindergarten*, the 4 nearest Tier 1 or Tier 2 schools *with a kindergarten*, and the 6 nearest Tier 1, 2, or 3 schools *with a kindergarten*, as well as any other school within 1 mile of their home *with a kindergarten*, rather than assessing schools based on 6th grade. Choice baskets then received pathway middle schools that are matched to a student's current elementary school of enrollment.[4] Finally, any school without a 6th grade option was removed. By this mechanism, it is possible that some choice baskets did not reach minimum access, as defined by policy (e.g., 2 closest Tier 1 schools). The impact of this on equitable access was evaluated.

3.2. Access among Kindergarteners

Across the board, students entering kindergarten had fewer schools and seats in their choice baskets under HBAP at all Tier levels. This was by design, as HBAP sought to provide options concentrated around a family's home address. The assumption was that this would diminish access to numbers of schools evenly, thereby holding actual competition for desirable seats constant. Total number of schools and seats in the average basket decreased by just over half (50% and 52%, respectively), from 30 schools with 1,293 seats to 15 schools with 619 seats. These drops were somewhat higher for Tier 1 schools and seats (60% and 62%, respectively), from 6.5 schools with 260 seats to 2.5 schools with 100 seats. However, when Tier 1 and Tier 2 were combined, the decline in schools and seats was more consistent at about one half (50% and 53%, respectively), from 13 schools with 540 seats to 6.5 schools with 254 seats. Likewise, the average school was included in about half as many choice baskets under HBAP (dropping from 1,162 choice baskets on average to 443 choice baskets). This arrangement means that both access and competition are more localized under the new policy.

Choice baskets under HBAP did not vary much in their size, and featured variation similar to 3Z. The smallest 25% of baskets had 14 schools or fewer and

[4] Each elementary school has a single pathway middle school to which all of its students are given access except in the case of elementary schools in East Boston, which also have Edwards Middle School in Charlestown as a second pathway school to ensure additional access in a nearby neighborhood.

533 seats or fewer and the largest 25% had 17 schools or more and 700 seats or more.[5] The number of Tier 1 and Tier 1 or Tier 2 schools in each basket were also largely even across students. Over 50% of students had the minimum two Tier 1 schools and the 75th percentile and up had three or more. Those baskets in the lowest 25th percentile in terms of size had, on average, six Tier 1 or Tier 2 schools, two more than the minimum, indicating that most students live sufficiently close to enough high quality schools to have them fill out their basket. Baskets at the median and 75th percentile in terms of size had only one more Tier 1 or Tier 2 school, on average, amounting to seven total, further indicating an even distribution of access.

An analysis of the number of seats yielded similar results, although the low number of Tier 1 schools translated to very few accessible seats in some cases. Choice baskets in the bottom 25% in terms of size had 60 or fewer Tier 1 seats in their basket whereas the top 25% in terms of size had more than double, with at least 131 seats. Interestingly, when Tier 2 schools are added to the definition of high quality, the disparities between the 25th and 75th percentiles were less marked, ranging from 221 to 288 seats; though the absolute difference was the same in these two comparisons (~60 seats), the relative difference was more muted (~25% larger baskets on the upper end vs. ~100% larger baskets).

3.2.1. Differences across Neighborhoods.

Differences in numbers of schools and seats: The decline in the number of schools in choice baskets differed modestly across neighborhoods regions, with the only notable case being wing neighborhoods, whose choice baskets saw a proportionally smaller reduction (42% vs. 50%-53% for the other neighborhood regions). This variation was even more modest for seats (all neighborhoods types saw reductions of 48%-53%). Importantly, the neighborhoods that saw the greatest proportional reductions were in the southern urban core, but they had had access to the most schools and seats under 3Z and maintained this distinction under HBAP (15.35 schools and 693 seats vs. 13.4-15 schools and 546-598 seats for the other neighborhood regions; see Appendix A, Tables A-1 and A-2 for full results).

Most of these variations by neighborhood region were consistent. For example, most southern urban core neighborhoods had relatively large choice baskets under both 3Z and HBAP, despite a proportionally larger reduction in their size. Wing neighborhoods, however, told a somewhat distinctive story. East Boston

[5] Using a variant of the coefficient of variation = *interquartile range/median*. The coefficient of variation under 3Z was .30 and under HBAP was .28.

had the smallest drop in total schools represented in their choice baskets, giving it the second largest choice baskets under HBAP after Roxbury (means of 16.60 and 15.91, respectively). However, despite the larger number of schools in their baskets, East Boston students tended to have fewer *seats* (average of 533 seats, or exactly the 25th percentile for all students). This illustrates a particular dynamic for these geographically isolated neighborhoods in that the number of seats in their choice basket is subject to the handful of schools in and around the neighborhood. For comparison, Allston-Brighton also appeared to have access to rather small schools, resulting in choice baskets with fewer seats (516) on average, but Charleston had access to larger schools, resulting in access to more seats (629). See Appendix A, Tables A-4 and A-5 for full results

Differences in distribution of high quality schools. As noted, access to high quality schools was defined in two ways, first as access to Tier 1 schools only, and then as access to the combination of Tier 1 and Tier 2 schools. The first analysis revealed stark inequities in access to Tier 1 schools across neighborhoods, which is inevitable given the small number of Tier 1 schools in the city. This is apparent in the map of schools with kindergartens, their Tier designation, and the number of seats in Figure 3-1. Simply put, some neighborhoods do not contain any Tier 1 schools and may not have any close by. However, there was greater equity when high quality is assessed by combining Tier 1 and Tier 2 schools. See Appendix A, Tables A-1 and A-2 for full results.

Neighborhoods in the southern urban core had the fewest Tier 1 schools and seats on average (avg.: 2.09 options and 71 seats per student; ranging from 1.93 schools for South Dorchester to 2.22 in Roxbury and from 65 seats in North Dorchester to 73 seats in South Dorchester), and Downtown neighborhoods had the largest average number of Tier 1 schools and seats (3.33 and 140, respectively). The number of Tier 1 options available to residents of semiurban neighborhoods and wing neighborhoods fell between the extremes of downtown and southern core

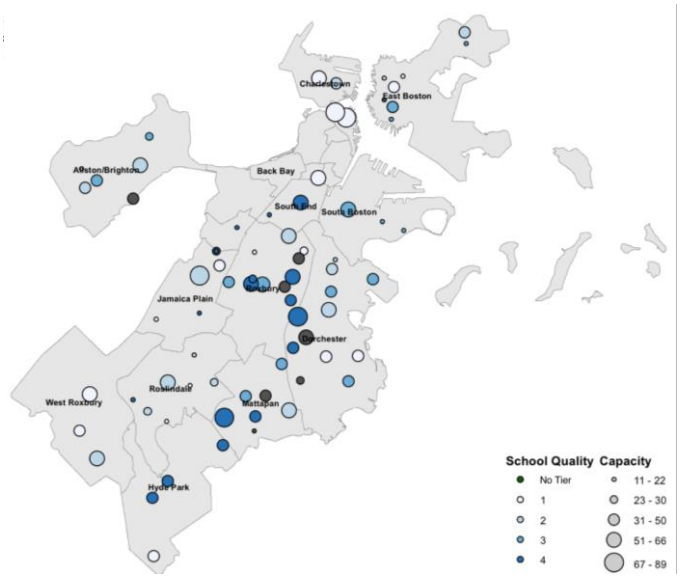

Figure 3-1. The location, Tier level, and capacity of all kindergartens in Boston (2014-2015).

neighborhoods, with an average of 2.93 schools and 110 seats and 2.99 schools and 126 seats, respectively. However, these regions were less uniform in their access. For example, Charlestown had the greatest access to Tier 1 schools in the city, with an average of 4.79 schools and 281 seats in their choice basket, and Allston-Brighton students had exactly two Tier 1 options with 42 seats. Similarly, the average Roslindale and West Roxbury choice basket had above average access with 3.16 schools and 130 seats and 3.33 schools and 137 seats, respectively, but Jamaica Plain had limited access with 2.14 schools and 60 seats. These differences capture the consequences of an uneven distribution of a scarce number of Tier 1 schools and seats. See Appendix A, Tables A-4 and A-5 for full results

Greater equity was seen when Tier 1 and Tier 2 schools were combined. The four neighborhood regions varied far less around a much higher baseline of access, ranging from an average of 6.39 Tier 1 and 2 schools in families' baskets in wing neighborhoods to an average of 6.91 Tier 1 and 2 schools in families' basket in southwestern semiurban neighborhoods. The number of seats ranged from 232 in wing neighborhoods to 264 in Downtown neighborhoods. When zooming in to the neighborhood level, the variation remained rather limited. Again, Allston-Brighton stood out as being geographically isolated from high quality schools with only 5.6 top-tier schools with 191 seats in the average choice basket, as were South Boston and Mattapan (6.1 schools and 240 seats and 6.15 schools and 253 seats, respectively). For Roslindale, the analysis of seats and schools yielded different results—families' choice baskets had a higher average of top-tier schools (6.9), but a smaller average number of seats (238), indicating smaller schools.

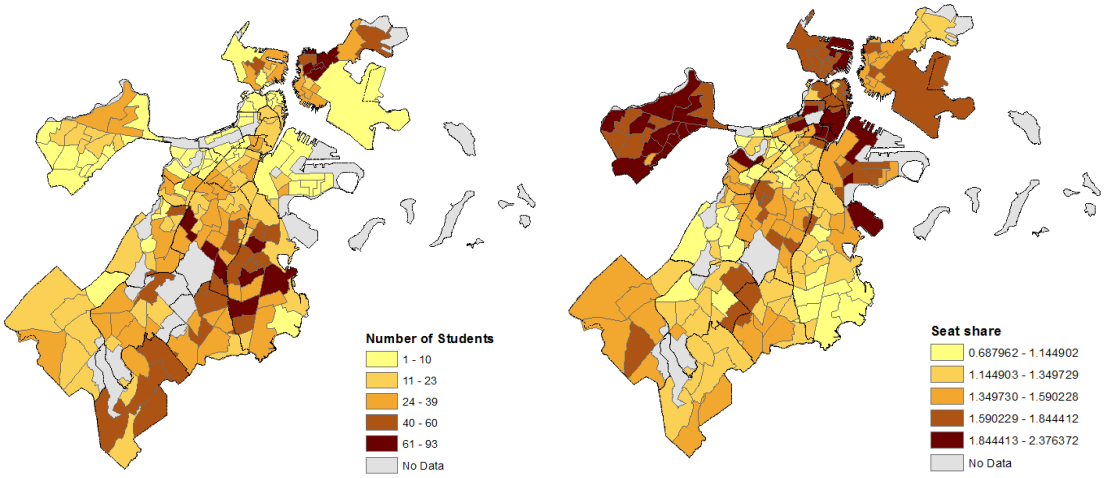

Figure 3-2. The number of kindergarten students living in each census tract in 2014-2015 (left panel) and the consequences for competition for seats, as quantified by the average number seat shares in kindergarten choice baskets (right panel).

Competition for seats. Numbers of schools and seats in choice baskets do not account for how many *other* students might also vie for those schools and seats. As can be seen in the map in Figure 3-2, certain parts of the city—particularly those with a greater Black or Latino population—have more students living there, and thus likely experience greater competition in the school choice lottery. To account for this, equity was analyzed in terms of competition for seats, or seat shares, (see Appendix A, Table A-3 for full results). Wing neighborhoods had the greatest average seat shares (i.e., lowest competition; 1.67 seat shares), followed by downtown neighborhoods (1.48 seat shares), then southern core and semiurban neighborhoods (1.32 and 1.31 seat shares, respectively). While the wing neighborhoods, especially Allston-Brighton, had fewer seats in their choice baskets, there were fewer students competing for these seats, resulting in greater access. All three wing neighborhoods had above-average access, or less competition, in terms of total seat shares. While there isn't wide variation in competition, students in southern neighborhoods like Hyde Park (1.28), Jamaica Plain (1.26), South Dorchester (1.15) had the lowest seat shares, as did South End (1.20), which was a bit more unexpected, but probably due to a higher density of students. See Appendix A, Table 3-6 for full results.

Looking at access to high quality schools, however, revealed greater disparities. Residents in the southern urban core had the lowest access to Tier 1 schools, with 0.14 seat shares (vs. a district average of 0.32). That is, students in these neighborhoods have between 1/3rd and 1/4th the true access to Tier 1 schools as Downtown and wing neighborhoods (0.48 and 0.49 seat shares, respectively; semiurban neighborhoods sit in between with 0.37 seat shares). Further, these disparities do not diminish when high quality is defined as access to Tier 1 and 2 schools. Southern core neighborhoods continued to have the lowest access by a considerable margin (0.50 seat shares; all others at 0.72 or above). Importantly, these disparities were present under 3Z and simply continued under HBAP (for example, these same neighborhoods had 0.48 seat shares for Tier 1 and Tier 2 schools under 3Z vs. 0.60 – 0.68 for the other neighborhood regions).

The geographic isolation of wing neighborhoods gave them the highest practical access to top-tier schools at 0.87 seat shares. Charlestown had the greatest such access, with more seats and lower competition for them (1.15 seat shares for Tier 1 and 1.32 seat shares for Tier 1 and 2 schools). East Boston and Allston-Brighton had lower access to Tier 1, but above average access when Tier 1 and Tier 2 were combined (0.76 and 0.74 seat shares, respectively). Interestingly, Central Boston has proximity to more Tier 1 schools and seats with few students competing for those seats. Consequently, students living there had greater access to and less competition for high quality schools (0.96 seat shares for Tier 1 and 1.25 seat shares for Tier 1 and Tier 2). In contrast, all southern urban core

neighborhoods had low access to Tier 1 and combined Tier 1 and Tier 2 schools. Additionally, South Boston had similarly low access (0.27 seat shares at Tier 1 schools and 0.49 seat shares at Tier 1 and Tier 2 schools). The South End also had below-average access to Tier 1 and Tier 2 schools (0.57 seat shares), though not to Tier 1 schools (0.36 seat shares).

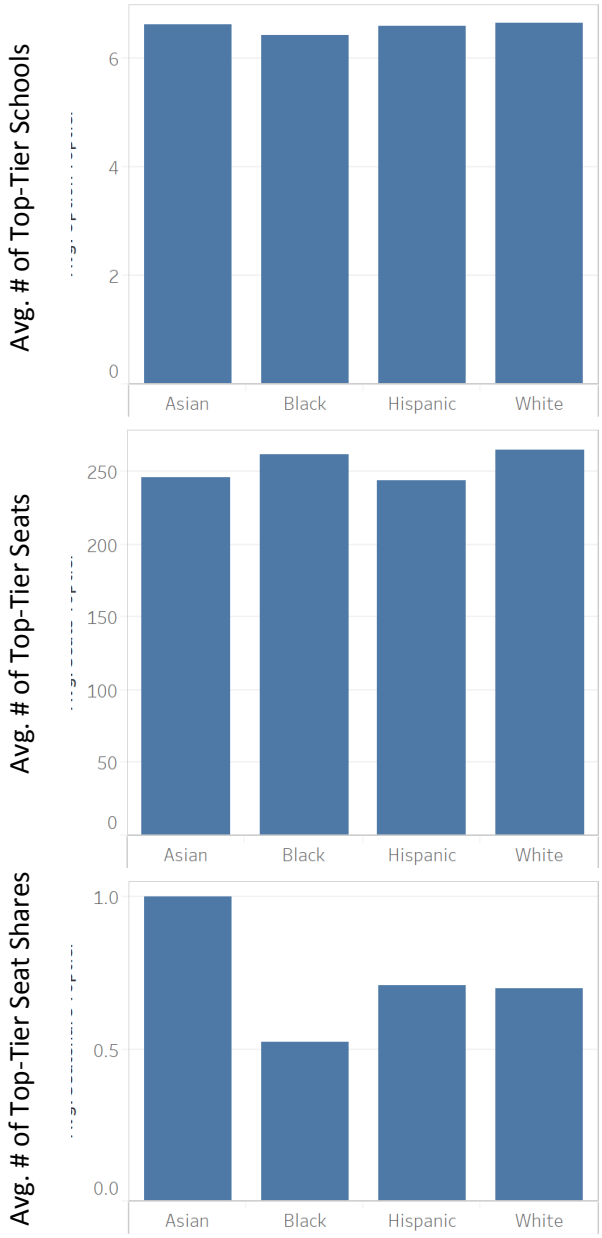

Figure 3-3. The average number of schools, seats, and seat shares at Tier 1 and Tier 2 schools in choice baskets under HBAP for each race for kindergarten.

3.2.2. Differences by Race, Poverty and Program

Differences in numbers of schools and seats. Because of the uneven distribution of racial groups across Boston neighborhoods, geographic disparities in access had consequences for racial equity. As might be expected, declines in the size of choice baskets were similar across racial groups, but revealed existing disparities in access (see Figure 3-3). The only exceptions were that Latino students lost a somewhat higher number of Tier 1 seats (68%) and White students lost fewer (57%). This also means that HBAP did not improve upon existing inequities in access. Black students had the fewest Tier 1 schools and seats in their baskets under both HBAP and 3Z. Under HBAP, they had about 10% fewer schools and seats in their baskets than the average student (2.39 schools and 88 seats compared to district averages of 2.69 schools and 100 seats), whereas White students had about 20% *more* Tier 1 schools and seats in their baskets than the average student (2.98 schools and 127 seats). Also, very few White students had low levels of access. The lowest 25th percentile of White students had an average of 75 seats

in their baskets, compared to 60 or fewer for the three other main racial groups. At the high end of the range of access, Black students had a "low ceiling". The 75th percentile choice basket for Black students' baskets contained an average of 96 seats, or 4 seats fewer than the *average* (i.e., 50th percentile) level of access for the district as a whole. At the same time, the 75th percentiles for White and Asian students were 169 and 152 seats, respectively. See Appendix A, Tables A-7 and A-8 for full results.

Differences in access to high quality schools were much smaller when access to Tier 1 and Tier 2 schools were combined. White students still had the greatest access with an average of 265 seats in top-tier schools. Black students had access to the fewest top tier schools, but the disparity was negligible (6.43 schools vs. a district average of 6.55) and this did not translate into fewer seats (262 seats vs. a district average of 254). Instead, Latino and Asian students had the fewest seats (244 and 246 seats, respectively). Though these disparities were far less notable, they were driven in part by the lowest-access Asian and Latino students (25th percentile was 206 and 212 seats, respectively; 25th percentile for Black and White students were 231 and 232, respectively).

Competition for seats. As with the geographic analysis, there were stark disparities in competition for seats across race (see Figure 3-3). Asian students had the greatest practical access to schools with 1.72 seat shares. Further, their Tier 1 seat shares were greater than White students by a factor of a third (0.54 vs. 0.40), greater than Latino students by about 2/3rds (0.31 seat shares) and nearly triple that of Black students (0.19 seat shares). This additional access was largely driven by those residing in Chinatown, which is the predominant source of students in the Central neighborhood and also sees limited competition for local schools. For the combination of Tier 1 and Tier 2 schools, Asian students still had dramatically greater access (0.99 seat shares), particularly compared to Black students (0.51 seat shares). See Appendix A, Table A-9 for full results.

The deficit in access experienced by Black students is likely unsurprising given the findings pertaining to the southern core neighborhoods above, but it remains instructive. Even though the neighborhoods where Black students live are nearby to a number of Tier 2 schools, the elevated level of competition for those seats resulting from a greater density of students lowers their practical access. This disparity was across the board, as the 25th percentile Black students had access far below the same percentile in other racial groups (0.27 vs. 0.35 – 0.42 for other major races) and the 75th percentile of access lagged considerably as well (0.61 vs. 0.84 – 1.47 for other major races).

3.3. Access for 6th Grade

HBAP was implemented for 6th grade in a way that was vulnerable to providing less than the minimum level of access promised by the policy (e.g., access to the two closest Tier 1 schools). In addition, there are fewer middle schools in the city in general. As a result, the size of the average choice basket remained almost *perfectly stable* across the two policies, dropping from 14.25 schools to 13.48 schools and increasing slightly from 783 to 816 seats. Any losses, however, were concentrated in Tier 1 seats and schools, with the average choice basket dropping in size from 2.56 schools with 145 seats to 1.39 schools with 101 seats (drops of 46% and 30%, respectively). This likely reflects the fact that, for many neighborhoods, the nearest Tier 1 schools identified through the algorithm based on kindergartens were schools without 6th grade, meaning they did not actually contribute to access. The drop in the average access to Tier 1 and Tier 2 schools combined was less dramatic, and almost entirely explained by the decrease in Tier 1 schools (from 6.52 schools with 376 seats to 5.20 schools with 330 schools). Differences in the range of access to Tier 1 were quite large, with the bottom 25% of students receiving 10 or fewer Tier 1 seats in their basket and the top 25% percent receiving 141 or more. Analyses that combined Tier 1 and Tier 2 yielded greater equity (25th percentile = 283 and 75th percentile = 391), though this range from the bottom to the top is still notably greater than the same measure for kindergarten.

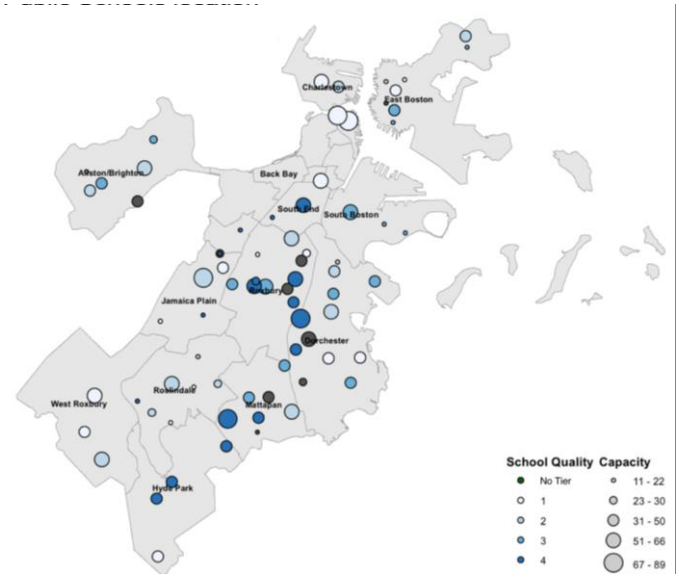

Figure 3-4. The location, Tier level, and capacity of all 6th grades in Boston (2016-2017).

3.3.1. Differences across Neighborhoods

Differences in numbers of schools and seats. Southern urban core and downtown neighborhoods had far larger choice baskets than other neighborhoods (6.79 schools and 382 seats and 5.08 schools and 327 seats, respectively; semiurban neighborhoods had 3.45 schools and 176 seats and wing neighborhoods had 3.03 schools and 185 seats). Though total size of choice baskets was largely even geographically, these results obscure disparities in

access to high quality schools. Though these disparities again reflected the distribution of quality schools across the city (see map in Figure 3-4), they could not be easily generalized by neighborhood regions. The wing neighborhoods had particularly high access to Tier 1 as a whole (1.77 schools and 125 seats vs. district-wide averages of 1.39 schools and 101 seats) as a whole, but this was driven entirely by Charlestown (3.19 schools and 196 seats) and was not especially true for East Boston or Allston-Brighton. That said, the elevated access in downtown neighborhoods to Tier 1 and Tier 2 options was true across neighborhoods (all neighborhoods with 6.06 schools and 345 seats or greater, more than the average for all other neighborhood regions). See Appendix A, Tables A-10, A-11, A-13, and A-14 for full results.

On the other end of the spectrum, several neighborhoods had highly limited access to Tier 1 schools. The average of choice baskets in Jamaica Plain, Roslindale, and Roxbury was *less than one Tier 1 school*. As can be seen in the map in Figure 3-4, this seems to be in part because the Tier 1 schools are located elsewhere in the city *and*, based on a cross-reference with Figure 3-1, because the nearest Tier 1 schools with kindergartens (which was the basis for the implementation of HBAP for 6th grade, as well) were in Roslindale and do not actually serve 6th grade, and thus conferred no actual access. Because a choice basket cannot contain a fraction of a school, this means that a sizable number of students—over a third in Roxbury and over half in Jamaica Plain and Roslindale—had *zero* Tier 1 schools with 6th grades in their choice baskets. This is critical because, while the average number of seats (i.e., 40, 60, and 52, respectively) for these neighborhoods was still low, those statistics do not fully represent the complete lack of access to Tier 1 schools for many students living there.

Combining Tier 1 and Tier 2 schools partially reduced the disparities, but not as much as they did for kindergarten students. Central and Charlestown had the greatest access for Tier 1 and Tier 2 schools (7.04 schools and 434 seats and 6.50 schools and 448 seats, respectively), followed by Allston-Brighton (7.03 schools and 365 seats) and Jamaica Plain (and 6.62 schools and 365 seats, respectively. East Boston, Hyde Park, Roslindale, North Dorchester, and Mattapan had the least access to Tier 1 and Tier 2 schools combined, all with fewer than 5 schools and 310 seats on average. These disparities seem to reflect the lack of quality schools with 6th grades in certain parts of the city, especially East Boston and south-central Boston.

Competition for Seats. As with kindergarteners, there was a greater amount of competition for seats in southern core neighborhoods (see Figure 3-5). Seat shares for students in these neighborhoods were smaller than other parts of the city (1.48 total seat shares vs. 1.80 – 2.00 for all other regions). This disparity was even more consequential for high quality schools, with students in these neighborhoods

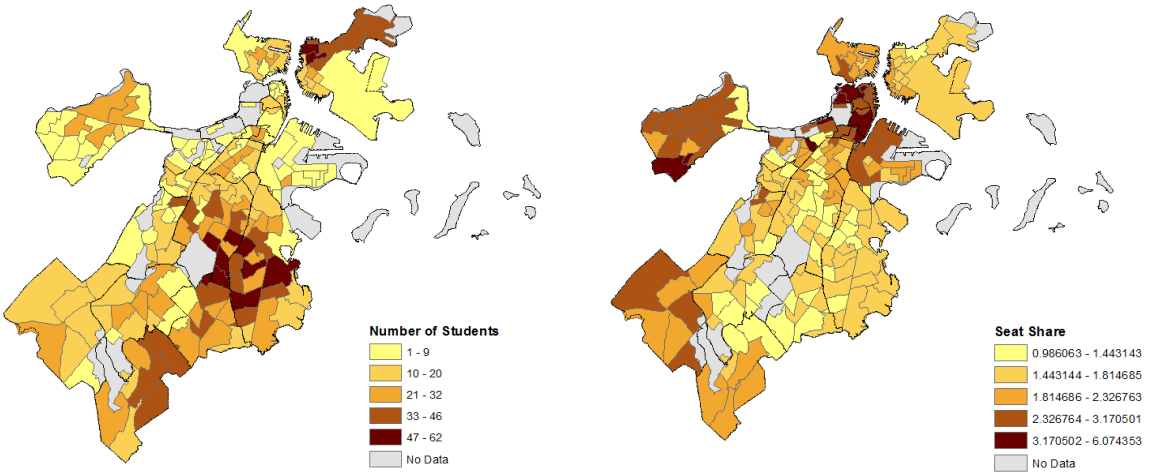

Figure 3-5. The number of 6th grade students living in each census tract in 2014-2015 (left panel) and the consequences for competition for seats, as quantified by the average number seat shares in 6th grade choice baskets (right panel).

having markedly fewer seat shares for Tier 1 and Tier 1 or 2 schools than the rest of the city (0.22 seat shares in Tier 1 schools vs. 0.39-0.47 for other regions; 0.54 seat shares in Tier 1 or Tier 2 schools vs. 1.07-1.13 for other regions). Drilling down to the neighborhood level, these disparities were true for all southern urban core neighborhoods. In addition, Jamaica Plain also saw highest competition (i.e., lower access) for Tier 1 schools with 6th grade (0.11 seat shares in Tier 1 schools), but its access to high quality schools as defined by Tier 1 and Tier 2 schools only partially ameliorated this deficit (0.79 seat shares in Tier 1 or Tier 2 schools). See Appendix A, Tables A-12 and A-15 for full results.

The wing neighborhoods were variable in their competition, depending on the schools therein or nearby. Allston-Brighton residents had high competition for Tier 1 seats (0.24 seat shares in Tier 1 schools), although they had significantly less competition for high quality seats when Tier 1 or Tier 2 schools are combined (1.53 seat shares in Tier 1 or Tier 2 schools). East Boston residents had highest competition across the board (0.43 seat shares in Tier 1 schools; 0.85 seat shares in Tier 1 and Tier 2 schools) whereas Charlestown residents had lowest competition (1.02 seat shares in Tier 1 schools; 1.64 seat shares in Tier 1 and Tier 2 schools). Separately, Central had the lowest competition for seats (i.e., greatest access) in the city, largely due to the number of high quality schools in that region and the low number of students living there (1.14 seat shares in Tier 1 schools; 1.91 seat shares in Tier 1 and Tier 2 schools).

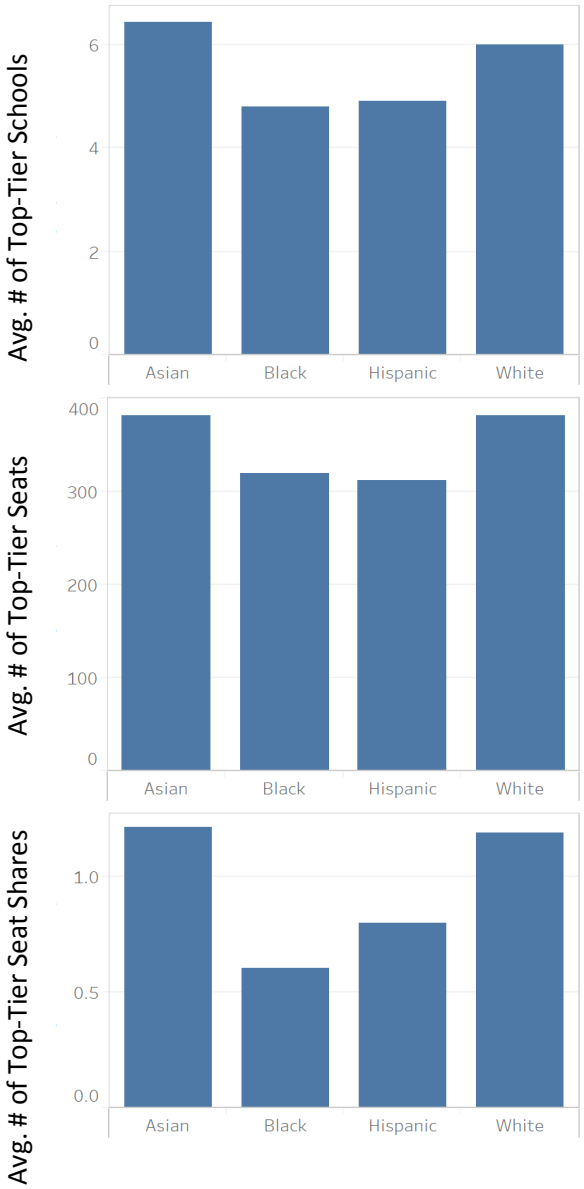

Figure 3-6. The average number of schools, seats, and seatshares at Tier 1 and Tier 2 schools in choice baskets under HBAP for each race for 6th grade.

3.3.2. Differences by Race, Poverty and Program

Differences in distribution of high quality schools. Though the geographic analysis did not find especially large differences between neighborhoods in the total size of choice baskets, there were some disparities across races (see Figure 3-5). Whereas Asian and White students had the largest choice baskets (15.46 schools and 886 seats and 14.58 schools and 865 seats), Black and Latino students had markedly smaller ones (13.08 schools and 825 seats and 12.93 schools and 776 seats, respectively). Much of this manifested in lower access to high quality schools. On average, Black students had 1.18 Tier 1 schools with 90 seats in their baskets, and 4.81 Tier 1 or Tier 2 schools with 319 seats in their baskets, and Latino students had 1.28 Tier 1 schools with 99 seats in their baskets, and 4.99 Tier 1 or Tier 2 schools with 312 seats in their baskets. This was low relative to White students, who had, on average, 1.73 Tier 1 schools with 122 seats in their baskets, and 6.02 Tier 1 or Tier 2 schools with 382 seats in their baskets; and to Asian students, who had 2.06 Tier 1 schools with 134 seats in their baskets, and 6.45 Tier 1 or Tier 2 schools with 381 seats in their baskets. See Appendix A, Tables A-16 and A-17 for full results.

Competition for seats. Racial disparities in access to quality schools for 6th grade were even starker when examining competition for seats (see Figure 3-6). Due to

higher competition for seats, Black students had less than half the practical access of Asian and White students (0.23 seat shares at Tier 1 schools and .60 seat shares at Tier 1 and Tier 2 schools vs. 0.51 seat shares at Tier 1 schools and 1.19 seat shares at Tier 1 and Tier 2 schools for White students and 0.59 seat shares at Tier 1 schools and 1.21 seat shares at Tier 1 and Tier 2 schools for Asian students). Latino students had just barely more access than their Black peers (0.29 seat shares at Tier 1 schools and 0.79 seat shares at Tier 1 and Tier 2 schools). A closer look at the distribution reveals even more alarming trends—27% of Black students had *zero* seat shares at Tier 1 schools. This was also true for 21% of Latino students, 17% of White students, and 6% of Asian students. Additionally, the bottom 25% of Black students had 0.24 seat shares or fewer at Tier 1 or Tier 2 schools, compared to 0.59 and 0.57 or fewer Tier 1 seat shares for the 25th percentile of White and Asian students, respectively (25th percentile for Latino students = 0.38). Looking at the high end of the range of access, the Black population appears to be uniformly disadvantaged. The 75th percentile of choice baskets among Black students contained only 0.26 seat shares at Tier 1 schools and 0.77 seat shares at Tier 1 or Tier 2 schools, both of which are considerably lower than *average access* for White and Asian students. Latino students also had low ceilings, though slightly less extreme (75th percentile = 0.47 for Tier 1 schools; 75th percentile = 0.98 for Tier 1 and Tier 2 schools). See Appendix A, Table A-18 for full results.

Summary

The analysis of choice baskets suggests that HBAP was unsuccessful in creating equitable access to high quality schools. There were concerns in the BPS community that HBAP's use of number of schools as the metric for equality rather than seats would accidentally create inequities. On occasion in this analysis, there were moderate differences in interpretation depending on whether schools or seats were used as the metric of access, but this was a modest issue, primarily isolated to the unique sets of schools available to students living in wing neighborhoods. There were two other weaknesses in HBAP's original formulation, however, that emerged:

1) Universal minimum access still leads to inequities based on the nearness of high quality schools. This is especially apparent for Tier 1 schools, which tend to be nearer to neighborhoods where White and Asian students live than to where Black and Latino students live. The disparities are lessened for the combination of Tier 1 or Tier 2 as the inclusion of more schools leads to a more even distribution. This geographic inequality is mapped in Figures 3-1 (for kindergarten) and 3-4 (for 6th grade). Going further, this

reveals a major limitation to HBAP's goals in that it is impossible for a choice system to provide "quality schools close to home" if high quality schools are clustered in some neighborhoods and absent in others.

2) There is differential competition for seats based on the number of students who have each school in their choice basket. Black and Latino students not only have fewer high quality seats in their baskets, they compete for them with more of their peers. This is due to the combination of less access to high quality schools and because Black and Latino students tend to live in parts of the city with a greater density of BPS students, as shown in Figures 3-2 and 3-5.

Unfortunately, these two issues—fewer high quality schools and more students competing for them—come together in the very neighborhoods where the most vulnerable and historically disadvantaged populations live. This creates deep and pernicious context for the emergence of inequities in assignment.

Of additional concern are the consequences of the particular implementation of HBAP for 6th grade. The decision to base the 6th grade algorithm on schools with kindergartens and to then fill in the appropriate pathway schools clearly impacted some neighborhoods more than others. Specifically, if a neighborhood's nearest Tier 1 or Tier 2 schools did not offer 6th grade, this equated to the loss of access promised by the policy. Indeed, neighborhoods with great elementary schools (without 6th grade), were particularly penalized by this implementation procedure. Although this evaluation did not simulate what choice baskets would have been if implemented based exclusively on schools offering 6th grade, it seems apparent that this decision drives disparities in access to high quality schools and undermines the ability of BPS to provide access as promised in the HBAP policy.

Chapter 4: Do Students Have Access to High Quality Schools Closer to Home?

A primary goal of HBAP was to have students attend schools closer to home. However, in guaranteeing universal minimum access to quality schools, the closest high quality schools may or may not be near students' home. To expand on the evaluation of equitable access presented in Chapter 3, Chapter 4 more specifically examines the subset of schools in choice baskets that were within a 1.5 mile radius of the student's home. As in Chapter 3, this evaluation focuses on counts of schools, counts of seats, and competition for seats (i.e., "seat shares," that accounts for the number of other students that might be vying for the same seats). Full tables are reported in Appendix A.

4.1. Local Access among Kindergarteners

Because HBAP was designed to create choice baskets that increase access to schools close to families' homes, choice baskets under HBAP for students entering kindergarten contained a higher proportion of schools (61% vs. 41%) and seats (63% vs. 42%) that were within 1.5 miles of the student's home. In other words, despite a ~50% decrease in schools and seats, there was only a ~25% drop in schools and seats within 1.5 miles of the student's home. Thus, HBAP did effectively concentrate choice baskets on areas nearby the home.

4.1.1. Differences across Neighborhoods

Differences in schools and seats. Because the majority of options in kindergarten choice baskets were within 1.5 miles of the student's home, differences across neighborhoods in access to schools "close to home" largely resembled the results presented in Chapter 3. The focus on areas nearby the home, however, further exaggerated the impact of the geographic distribution of high quality schools, previously captured in Figure 3-1. Southern urban core neighborhoods had the lowest access to Tier 1 schools within a 1.5 mile radius (1.59 schools with 54 seats) and downtown neighborhoods stood out as having the highest access (2.72 schools with 116 seats), with semiurban and wing neighborhoods falling in between (2.00 schools with 77 seats and 2.02 schools with 91 seats). See Appendix A, Tables A-1 and A-2 for full results.

Zooming in to specific neighborhoods, Allston-Brighton had particularly low local access to Tier 1 schools (0.75 schools with 9 seats), indicating that 25% of students in the neighborhood had zero Tier 1 schools within 1.5 miles of their home. Similar proportions of students from South Boston and Mattapan also had no Tier 1 schools within 1.5 miles of their homes. On the other end of the spectrum,

Charlestown and Central had the greatest access to Tier 1 schools (3.50 schools with 212 seats and 3.05 schools with 178 seats). See Appendix A, Tables A-4 and A-5 for full results.

When combining across Tier 1 and Tier 2, disparities in access within a 1.5 mile radius diminished (all four neighborhood regions ranged from 3.67-4.26 schools and 142-176 seats). South Boston and Mattapan, as well as Hyde Park, still stood out as having the least access to high quality schools within 1.5 miles of home (2.10 – 3.01 schools and 77 – 121 seats), and Jamaica Plain, Roslindale, and Roxbury had the greatest access (>5 schools and >194 seats each).

Competition for seats. Neighborhoods in the southern urban core had the highest competition and thus lowest practical access to high to quality schools within a 1.5 mile radius, reflecting elevated competition for seats (0.09 seat shares in Tier 1 schools vs. 0.40 seat shares in downtown neighborhoods and 0.36 in wing neighborhoods; 0.37 seat shares in Tier 1 and Tier 2 schools vs. 0.50 seat shares in downtown neighborhoods and 0.57 seat shares in wing neighborhoods). Southwestern semiurban neighborhoods also lagged behind in their seat shares for Tier 1 schools (0.24 seat shares), but less so for Tier and Tier 2 schools combined (0.47 seat shares). See Appendix A, Table A-3 for full results.

Some neighborhoods had particularly low access to Tier 1 schools within 1.5 miles, with no such schools within their borders nor adjacent neighborhoods. These included Allston-Brighton, Hyde Park, Jamaica Plain, Mattapan, North Dorchester, Roxbury, and South Dorchester (all with 0.04 – 0.15 seat shares), very few students in these neighborhoods had any Tier 1 schools within 1.5 miles of their homes. The results were more promising when Tier 1 and Tier 2 were combined, although Hyde Park and Mattapan remained below average (0.23 and 0.30 seat shares, respectively vs. districtwide average of 0.45). Charlestown and Central has greater access to both Tier 1 and Tier 1 or Tier 2 schools (0.91 Tier 1 seat shares and 1.04 Tier or Tier 2 seat shares and 0.85 Tier 1 seat shares and 0.90 Tier or Tier 2 seat shares, respectively). See Appendix A, Table A-6 for full results.

4.1.2. Differences by Race, Poverty and Program

Disparities in access within 1.5 miles across races closely mirrored the results of overall access and the findings from the geographic analysis of local access to schools, as seen in Figure 4-1. Black students had the fewest Tier 1 schools and seats within 1.5 miles of home in their baskets (1.73 schools and 63 seats), Latino students had the second fewest (1.91 schools and 72 seats), and White and Asian students had the greatest access (2.15 schools and 95 seats and 2.05 schools and

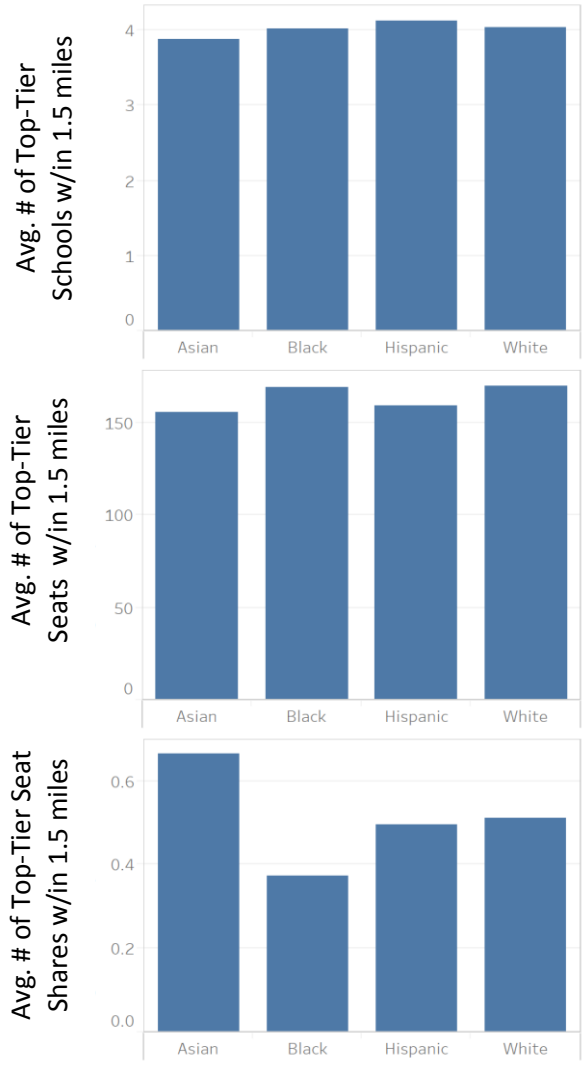

Figure 4-1. The average number of schools, seats, and seatshares at Tier 1 and Tier 2 schools within 1.5 miles of home in choice baskets under HBAP for each race for kindergarten.

82 seats, respectively). When Tier 1 and Tier 2 were combined, these differences were diminished, though not eliminated. Because Black students are overrepresented in neighborhoods with more students, as previously illustrated in Figure 3-2, they saw more competition for this lower number of schools and seats, giving them the lowest practical access to Tier 1 schools and to combined Tier 1 and Tier 2 schools within 1.5 miles of their homes (0.13 seat shares and 0.35 seat shares, respectively). Asian students had the greatest access to schools within a 1.5 mile radius (0.37 seat shares and 0.65 seat shares, respectively), followed by White students (0.31 seat shares and 0.50 seat shares, respectively), and Latino students (0.22 seat shares and 0.47 seat shares, respectively). Examining the range of access to high quality schools within a 1.5 mile radius, Black students suffered from not only a low floor (25th percentile = 0.04 seat shares for Tier 1 and 0.18 seat shares for Tier 1 and Tier 2) but also a very low ceiling in terms of access. The Black students with the highest access had less access than the average individual in each of the other three major races (75th percentile = 0.18 seat shares for Tier 1 and 0.44 seat shares for Tier 1 and Tier 2). See Appendix A, Tables A-7 through A-9 for full results.

On the whole, while HBAP succeeded in reducing the geographic spread of the schools in each family's choice basket, this highlighted inequities across neighborhood and race in the access to high quality schools close to home. These outcomes derive less from HBAP itself, however, and more from the fact that some neighborhoods do not have high quality neighborhood schools. Further, because of

the residential racial segregation in Boston and the high concentration of school-age children in neighborhood that have fewer high quality schools, this translates into significant racial disparities in the realization of the implicit goal of Boston school children attending neighborhood schools that are of high quality.

4.2. Local Access for 6th Grade

Achieving equitable access to schools close to home for 6th grade is more challenging because of the small number of middle schools in the city. In fact, among choice baskets, the average proportion of schools within 1.5 miles of a student's home went slightly *down* under HBAP (41% to 37% for schools and 39% to 35% for seats). There was notable variation in this access, as more than 25% of students had zero Tier 1 schools within 1.5 miles of their home, though the issue was less dramatic when considering Tier 1 and Tier 2 schools together (25th percentile = 40 seats).

4.2.1. Differences across Neighborhoods

Neighborhoods in the southern urban core and the southwestern semiurban areas had the lowest access to Tier 1 schools within 1.5 miles (0.42 schools with 34 seats and 0.61 schools with 34 seats, respectively). Wing neighborhoods and downtown neighborhoods had greater Tier 1 access within 1.5 miles (0.97 schools with 52 seats and 1.16 schools with 58 seats). Making this comparison even sharper, 66% of residents of southern urban core neighborhoods and 55% of residents of semiurban neighborhoods had zero Tier 1 schools within 1.5 miles in their choice baskets, whereas the same was true for 37% of students in wing neighborhoods and 32% of students in downtown neighborhoods. Combining Tier 1 and Tier 2 schools made little difference, with students living in downtown neighborhoods still receiving about double the access of students living in other parts of the city (3.00 schools with 212 seats vs. 1.77-2.00 schools and 80-120 seats for the other neighborhood regions). Across all neighborhood regions, there were ~15% of students with no top-tier seats within 1.5 miles in their choice basket, except for downtown neighborhoods (9% of students with no such seats). Again, these results reflected the geographic distribution of schools presented previously in Figure 3-4. See Appendix A, Tables A-10 and A-11 for full results.

In terms of competition for seats, the greater density of students in the southern urban core resulted in these neighborhoods having the lowest amount of practical access (0.11 seat shares for Tier 1 schools and 0.22 seat shares for Tier 1 and Tier 2 schools). In contrast, the other three neighborhood regions have largely even levels of seat competition (0.23-0.29 seat shares for Tier 1 schools and 0.54-

0.67 seat shares for Tier 1 and Tier 2 schools). See Appendix A, Table A-12 for full results.

Looking at individual neighborhoods, Jamaica Plain, North Dorchester, and Roxbury (all with an average of 10 or fewer Tier 1 seats) had limited access to high quality schools within a 1.5 mile radius. None, however, rivaled Mattapan. *No student living in Mattapan had a Tier 1 school within 1.5 miles of their home in their choice basket.* Jamaica Plain also had very little access to Tier 1 schools within 1.5 miles, with only 10% of students receiving any such schools in their basket. This extreme disparity remained for Mattapan when Tier 1 and Tier 2 schools were combined. The average Mattapan student had 26 high quality seats in his or her choice basket, but 35% of students had zero high quality seats. Similarly, 31% of students living in Hyde Park had no high quality seats within 1.5 miles in their choice basket, either. Students living in Roxbury also had a limited number of Tier 1 and Tier 2 schools in their baskets (80 seats on average). Charlestown and Central had the highest number of Tier 1 and of Tier 1 and Tier 2 schools in their baskets (both with >135 Tier 1 seats and >250 Tier 1 and Tier 2 seats). This is because of the geographic distribution of schools. See Appendix A, Tables A-13 and A-14 for full results.

Seat shares by neighborhood largely replicated the previous analyses. Mattapan had by definition zero seat shares for Tier 1 and only 0.08 (i.e., near zero) for combined Tier 1 or Tier 2. Other predominantly minority neighborhoods were universally low (e.g., Roxbury and North Dorchester each had <0.10 seat shares at Tier 1 schools and <0.21 seat shares at Tier 1 and Tier 2 schools). Additionally, Allston-Brighton, Jamaica Plain, and Fenway/Kenmore had considerably below-average seat shares for Tier 1 schools (all <0.15 seat shares). South Boston and South Dorchester also had below-average seat shares for Tier 1 and Tier 2 schools (0.34 and 0.32 seat shares, respectively). In addition to Central and Charlestown, West Roxbury, Back Bay/Beacon Hill, and Allston-Brighton had the highest practical access to high quality schools (>0.70 seat shares for Tier 1 and Tier 2 schools). See Appendix A, Table A-15 for full results.

4.2.2. Differences by Race, Poverty and Program

As a consequence of the geographic variations, Black and Latino students had lower access to Tier 1 schools within 1.5 miles of their homes and to combined Tier 1 and Tier 2 schools within 1.5 miles of their homes (both with fewer than 0.60 schools and 31 seats on average for Tier 1 schools within a 1.5 radius of home and fewer than 1.90 schools and 100 seats on average for Tier 1 and Tier 2 schools) when compared to White and Asian students (both with greater than 1.11

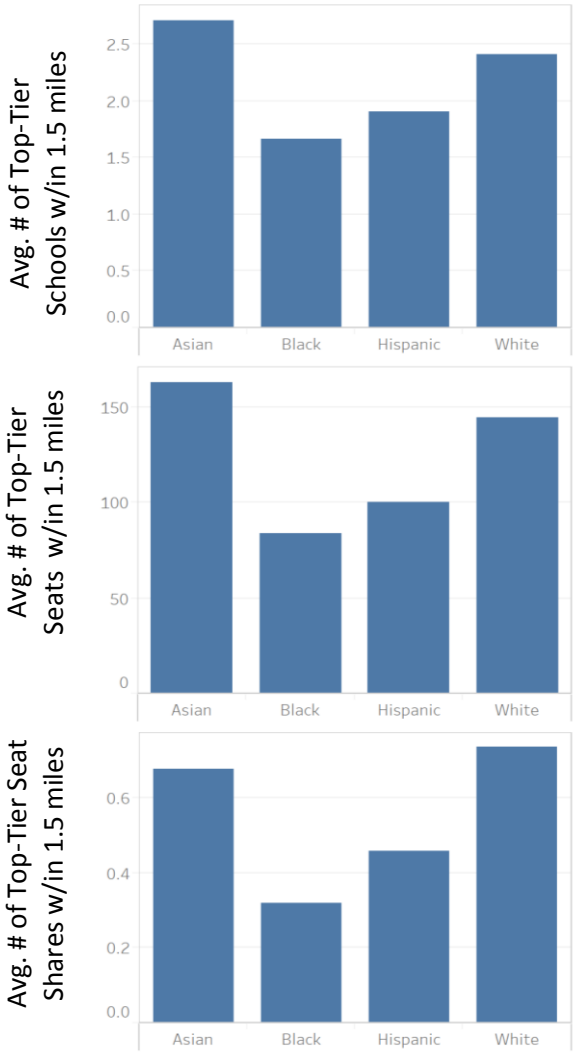

Figure 4-2. The average number of schools, seats, and seat shares at Tier 1 and Tier 2 schools within 1.5 miles of home in choice baskets under HBAP for each race for 6th grade.

and 65 seats on average for Tier 1 schools and greater than 2.40 schools and 144 seats on average for Tier 1 and Tier 2 schools). These differences are illustrated in Figure 4-2; also see Appendix A, Tables A-16 and A-17 for full results.

These racial disparities are exacerbated by differences in competition between regions of the city with more students, creating even more disparities in terms of seat shares. Black and Latino students had 0.11 and 0.14 seat shares at Tier 1 schools, respectively, and 0.25 and 0.40 seat shares at Tier 1 and Tier 2 schools; Asian and White students had 0.36 and 0.37 seat shares at Tier 1 schools, respectively, and 0.64 and 0.68 seat shares at Tier 1 and Tier 2 schools. This was driven by the fact that 65% of Black students and 56% of Latino students had no Tier 1 schools within 1.5 miles of home in their choice baskets, and 22% of Black students and 13% of Latino students had no Tier 1 or Tier 2 schools within 1.5 miles of home in their choice baskets. The same values were under 35% (Tier 1) and 8% (Tier 1 and Tier 2) for White and Asian students. See Appendix A, Table A-18 for full results.

In summary, HBAP did not reach its goal of increasing access to good schools, close to home for 6th graders. Indeed, the number of high quality schools in a 1.5 mile radius declined. The neighborhood and racial disparities in access to high quality schools close to home (1.5 mile radius) were even more marked than in kindergarten. There are many neighborhoods and racial groups that have nearly zero access to high quality schools with 6th grades in proximity of their homes. Communities as disparate as Mattapan and Jamaica Plain were similar in their near

lack of access to high quality 6th grade schools within and near to their communities. This low level of access is due in part to the small number of schools with 6th grade and their uneven geographic distribution. That said, it is difficult to know if this is entirely due to HBAP or is exacerbated by its incomplete implementation.

4.3. Summary

In order to more closely examine the question of access to "good schools, close to home," this chapter examined exclusively the schools that students received in their choice baskets that fell within 1.5 miles of their homes. Overall, the results for kindergarteners were nearly identical to those presented in Chapter 3 for the entire contents of choice baskets. This was because the majority of options in choice baskets were within 1.5 miles of home. In short, neighborhoods with more Black and Latino students tended to have somewhat fewer high quality schools and seats in their baskets within 1.5 miles of their homes, and had to compete with more of their peers for these seats.

For 6th grade, the results were similar, at least in terms of which neighborhoods and racial groups had the greatest and lowest access. The raw numbers, however, were more striking. Because of the lower number of middle schools in the city, equitable access to high quality close to home was very difficult to realize (at least, using our threshold of 1.5 miles). Quite a few neighborhoods had very few (if any) high quality schools close by, especially Mattapan, and this translated into poor access for Black and Latino students. This low access was, again, exacerbated by greater competition for seats in these neighborhoods as well as the unexpected implementation of HBAP for 6th grade students (see Chapter 3).

Based on these analyses, "good schools close to home" does not mean schools will be equally close. Further, in practice, the nearest, high quality school may not be "close to home" at all.

Chapter 5: Are Students Equitably Assigned to High Quality Schools Close to Home?

Equitable access to high quality schools through choice baskets is only one side of a school choice and assignment system. Whether students are equitably assigned to high quality schools is another. That is, choice baskets describe what access each family has, but they do not entirely determine equity in assignment. Families have to submit their choices, those choices go through the lottery, and then assignments made. It is at this point that the true nature of HBAP's effectiveness is visible: to what extent are students assigned to, and thus attending, higher quality schools closer to home? Enrollment data sets were used to examine this question in three parts. First, to what extent are students attending schools closer to home? This is based on analyses of Euclidean distance ("as the crow flies") and estimated time traveled to schools (using Google Maps, see Section 2.3 and Appendix B for more on methodology). Second, the quality of the schools students attended was analyzed. Third, combining these two questions, this chapter assesses the extent to which students were attending "quality schools, close to home." Using the full set of demographic and programmatic information associated with enrollment data sets (which were absent for choice baskets), these outcomes were compared across neighborhoods, race, poverty status, English Language Learner (ELL) status, and Special Education (SPED) status. Full methodology and results are available in Appendix B.

5.1. Distance to School

On the whole, students attended schools closer to home that required shorter commutes under HBAP compared to under 3Z. This difference was more apparent for kindergarten students than 6th graders, likely because there are more elementary schools. Kindergartners attended school an average of 1/4th of a mile closer to home (from 1.4 miles to 1.15 miles), with a one-way commute about 1.5 min. shorter (from 10.3 min. to 9 min.). The effects for 6th graders were more modest, however, with students only attending schools ~100m closer to home (from 1.8 to 1.7 miles) with ~20 sec. reduction in commute (from just above to just below 12.5 min.). The shorter commutes appear to be driven largely by a reduction in the longest commutes. Across the range of distances, those who traveled the furthest (i.e., top 75th percentile) saw the biggest gains: commutes for Kindergarteners, in the top quartile for distance decreased by nearly a half-mile (from 1.95 miles to 1.45 miles) and over 2.5 min. one-way (from 13.9 min. to 11.1 min.); for 6th graders, distances declined by 1/4th of a mile (from 2.55 miles to 2.3 miles) and ~45 sec. (from 18 min. to 17.25 min.) for the top quartile for distance.

Changes in median travel time were less notable. See Appendix B, Tables B-1 and B-2 for full results.

5.1.1. Differences among Kindergarteners

Differences across Neighborhoods. For kindergarteners, some neighborhoods saw a greater decrease in travel times to school than others. Wing neighborhoods saw the greatest reductions in both travel distance and time (22% and 15%, respectively), giving them the shortest commutes on average (~1 mile and 8 min.). These likely reflected students from these neighborhoods becoming more likely to attend schools within them rather than traveling elsewhere. Travel reductions were rather even across other neighborhood regions (17-18% for distance and 11-15% for time). There were sizable differences in distance traveled in the end, with southern urban core and southwestern semiurban neighborhoods traveling 1.25-1.5 miles and downtown neighborhoods traveling about a mile. However, because of different traffic patterns in these different parts of the city, students in all three neighborhood regions averaged about 9 min. of travel one way. Whereas all three neighborhoods had a considerable number of students commuting some of the longest distances (75th percentile for all ≈ 14 min.), the longest commutes under HBAP were concentrated among students living in downtown neighborhoods (median = 12 min. vs. 10-11 min. for the other neighborhood regions). One strange outlier neighborhood in all of this was South Boston, which saw a 2% *increase* in travel distances and a 4% increase in travel times; that said, their travel times remained on the low side (under 9 min. one way). See Appendix B, Tables B-3 and B-4 for full results.

Differences by Race, Poverty and Program. In general, kindergarteners across races, socioeconomic classes, neighborhoods, and programmatic assignments saw shortened travel times under HBAP, with benefits most notable for the longest travel times. However, there were differences in those benefits across racial and socioeconomic groups, which mirrored the neighborhood differences. Black students traveled a half-mile further than Asian and White students (1.25 miles and 9.5 min. vs. just over 1 mile and 8.5 min.) with Latino students falling in the middle. Students in poverty similarly traveled about 1/4th of a mile and 1 min. further than their more affluent classmates. Special Education students tended to travel further to school (1.83 miles and 12.5 min. vs. 1.09 miles and 8.8 min. for general education students), though this makes sense given that only certain schools provide the appropriate services. ELL students traveled distances and

times similar to general education students (1.11 miles and 8.7 min. on average under HBAP).[6] See Appendix B, Tables B-6 through B-9 for full results.

5.1.2. Differences among 6th Graders

Differences across Neighborhoods. The changes in travel distance by neighborhood for 6th graders were inconsistent, and in some cases contradictory. For nearly all neighborhoods, the percentage change was limited, though Central Boston saw the greatest reductions (23%), followed by South Boston (18%). The latter finding was odd being that South Boston kindergarteners saw the only increase in commutes. No other neighborhood saw a reduction of more than 10%. The effects on travel times were even less noteworthy, with no neighborhood dropping more than 12% and most less than 7%.[7] See Appendix B, Tables B-3 and B-5 for full results.

Differences by Race, Poverty, and Program. For 6th graders, only Asian students saw any real reduction in travel distance to school (16%; no other racial group saw more than a 7% drop). Across race, Black students traveled further to school than their classmates (1.9 miles and 13.6 min. vs. the average of 1.7 miles and 12.4 min.), Asian and White students had the shortest commutes (both ~1.3 miles and ~10.5 min. on average), and Latino students fell at the midpoint between these extremes. The disparities in distance across poverty status were less prominent, but the two groups still differed in travel time by ~1 min. The disparities between special education students and general education students were stark for 6th graders (2.6 miles and 17 min. vs. 1.7 miles and 11.7 min.). See Appendix B, Tables B-6 through B-9 for full results.

Taken together, families saw modest gains in travel times and distances between 3Z and HBAP. There was more consistency in improvements for kindergarten, compared to 6th grade. These small general improvements were largest due to reducing the longest commutes, rather than a general improvement across the board. For 6th grade, there were disparities in travel distance with

[6] ANOVAs were used to test the overall level of inequity for race, socioeconomic status, neighborhoods, and programmatic assignments both before and after the implementation of HBAP, and then compared them to establish whether equity increased or decreased. Though the large sample sizes made any analysis significant, the level of inequity was largely negligible for demographic and programmatic characteristics (measured as the proportion of variance associated with group differences; R^2 =.001 - .01), though unsurprisingly neighborhoods did have more differences in travel distance (R^2 = .04), though not time. Likewise, equity did shift both up and down depending on the categorization scheme, but these values too provided little meaningful insight.

[7] Students in the Back Bay/Beacon Hill neighborhood saw a 25% *increase* in travel times, but this is probably a result of a very small number of cases, making statistical interpretation highly unreliable (13 under 3Z and 22 under HBAP).

Blacks traveling farther than other racial groups and special education students traveling the farthest.

5.2. Assignment and Quality

BPS defines school quality by dividing schools into four Tiers based on current and historical MCAS scores and trajectories. This system was adopted in 2014-2015, concurrent with the introduction of HBAP. Here equity in the assignment of students to quality schools was analyzed in two stages. First, assignments under HBAP were examined. This was followed by an examination of differences in assignments between HBAP and 3Z, in an effort to establish what impact, if any, HBAP had.

As described in Section 2.4, BPS used a different ranking metric provided by DESE under 3Z; thus, comparing across time *and* across rating systems turned out to provide uninterpretable results. For this reason, the comparison between the two policies applied BPS tier rankings (2014-2015) to schools in the last year of 3Z (2013-2014), assuming that schools largely maintained the same actual quality between those two consecutive school years. Seats were mostly evenly distributed across Tiers for each of these school years.[8]

5.2.1. Assignments under HBAP

Differences among kindergarteners. Under HBAP, there are considerable disparities in assignments to schools in the different Tiers based on neighborhoods, as shown in Figure 5-1 (also see Appendix B, Figure B-1). These differences largely reflected the distribution of quality schools and competition for those schools observed in Chapters 3 and 4. Whereas 44% of students living in downtown neighborhoods attended Tier 1 schools and 54% attended Tier 1 and Tier 2 schools, only 10% of students living in the southern urban core attended Tier 1 schools and 34% attended Tier 1 and Tier 2 schools. Wing and semiurban neighborhoods did not have the same advantages as downtown neighborhoods in assignment to Tier 1 schools (32% and 29%, respectively), but they actually had more students attending Tier 1 and Tier 2 schools (58% and 62%, respectively). In contrast, students living in the southern urban core were far more likely to attend Tier 4

[8] Under HBAP, 23% of kindergarteners attended a Tier 1 school, 24% attended a Tier 2 school (47% total in top-tier schools), 16% attended a Tier 3 school, and 27% attended a Tier 4 school (others attended ELC and unranked schools). These same proportions were 22%, 25%, 16%, and 25% for 3Z. For 6th graders under HBAP, 22% attended Tier 1 schools, 29% Tier 2, 30% Tier 3, and 13% Tier 4; the same numbers were 20%, 32%, 35%, and 7% for 3Z.

schools (34% of students vs. 3% in wing neighborhoods, 22% in downtown neighborhoods, and 27% in southwestern semiurban neighborhoods).

Just as the results across neighborhood regions aligned with the patterns of access described in Chapters 3 and 4, the results for specific neighborhoods did as well (see Appendix B, Table B-24 for full results). That said, some of the findings were striking. *More than 80% of students residing in Back Bay/Beacon Hill, Central, and Charlestown attended Tier 1 schools*. Put another way, these three neighborhoods accounted for 22% of the city's Tier 1 assignments while only containing 6% of its students. West Roxbury and Roslindale also had favorable assignments, with 80% and 69% of their students attending Tier 1 or Tier 2 schools. On the other end of the spectrum, Mattapan only sent 26% of its students to Tier 1 or Tier 2 schools (5% to Tier 1) and South Boston only sent 20% of its students to Tier 1 or Tier 2 schools (13% to Tier 1).

These geographic disparities were then reflected in the racial and socioeconomic distribution of quality assignments. As illustrated in Figure 5-2 (also see Appendix B, Figure B-2 for more detail), White and Asian students were far more likely to attend Tier 1 schools (44% and 43%, respectively) than Black and Latino students (12% and 18%, respectively). The same was true for Tier 1

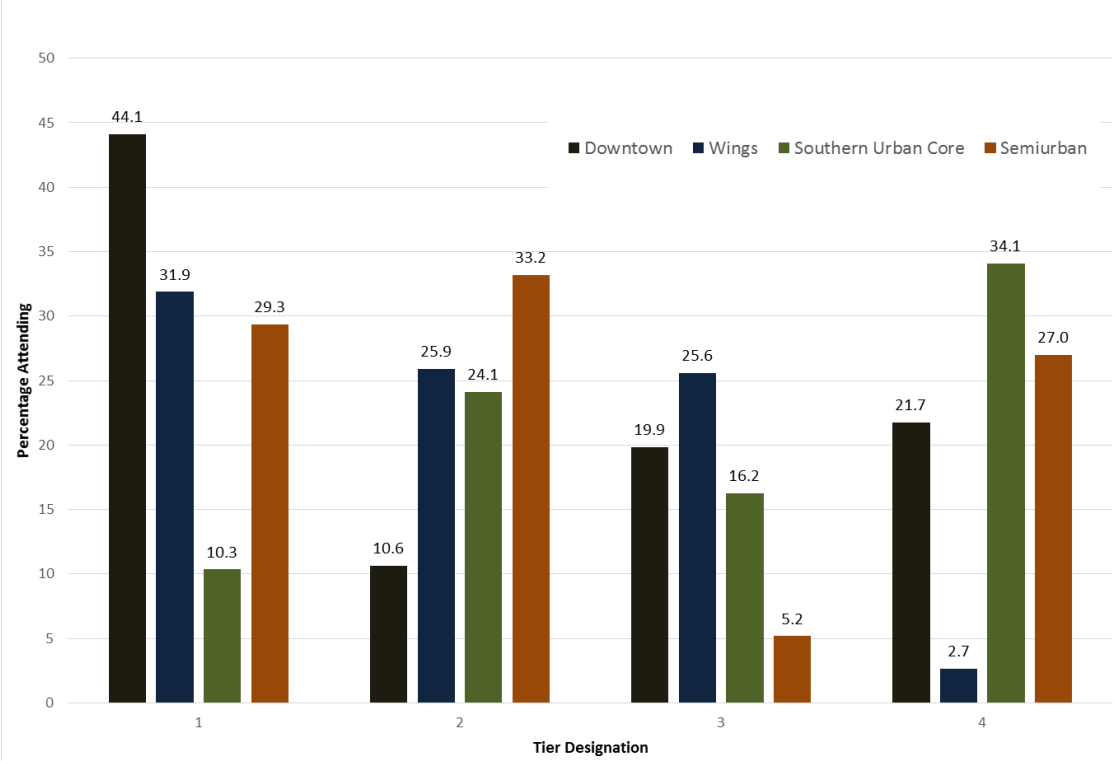

Figure 5-1. The distribution of kindergarten students to schools of each Tier level by neighborhood region.

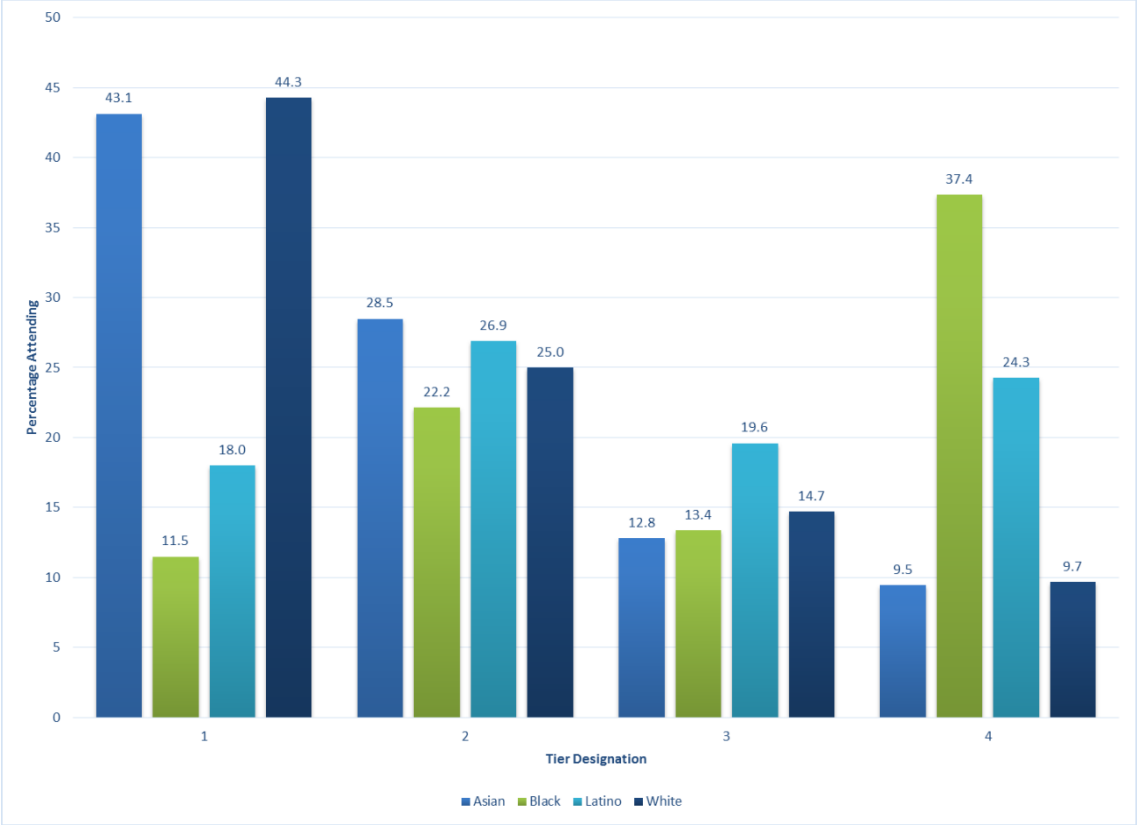

Figure 5-2. The distribution of kindergarten students to schools of each Tier level by neighborhood region.

and Tier 2 schools (White = 69%; Asian = 72%; Black = 34%; Latino = 45%). Thus, although noted in Chapter 3 and, to a lesser extent, in Chapter 4 that combining Tier 1 and Tier 2 schools mitigated some of the apparent disparities in access to quality schools, there are still inequities in the schools that students end up attending. This might be accounted for by the elevated competition for seats that Black and Latino students face. Meanwhile, 37% of Black students and 24% of Latino students attended Tier 4 schools and only 10% of White and Asian students did. Paralleling these results, 41% of students in poverty attended Tier 1 schools compared to 57% of those not in poverty. This is unsurprising given the correlation between minority race and poverty, but the nature of this result is less extreme than that for race. This reflects the fact that the inequities here are first and foremost geographic, and that racial segregation is moderately more prominent than socioeconomic segregation in Boston. See Appendix B, Figure B-3 for additional detail.

The differences between programs in assignment were negligible. ELL students were about equally likely to attend high quality schools (21% at Tier 1 schools vs. 22% for General Education students) and less likely to attend Tier 4

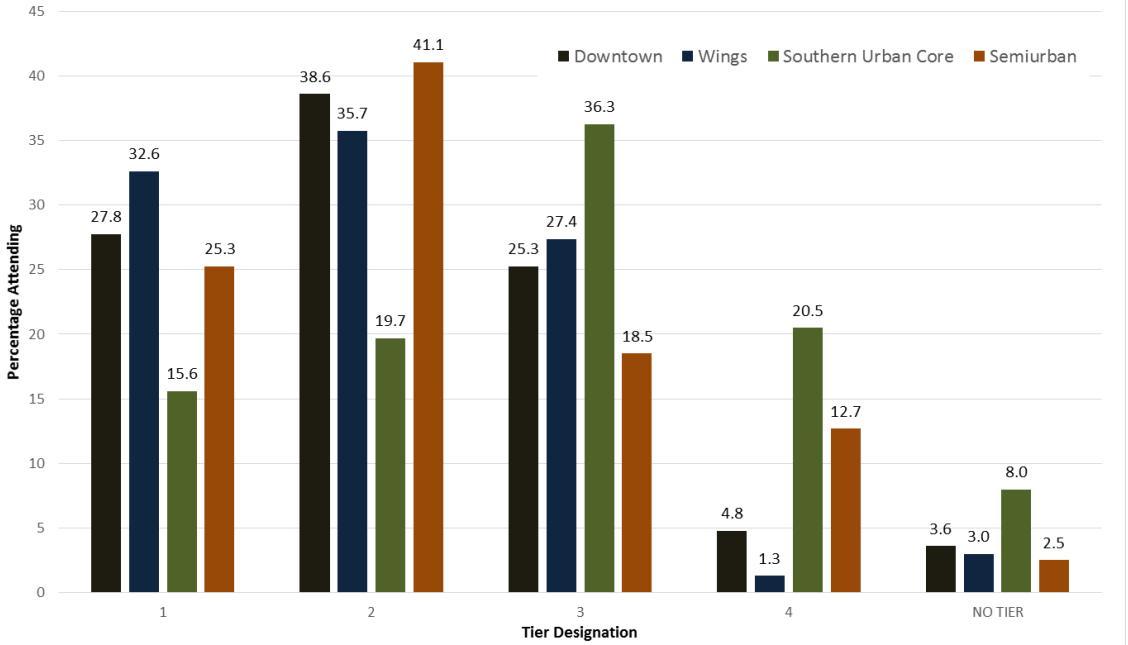

Figure 5-3. The distribution of 6th grade students to schools of each Tier level by neighborhood region.

schools (20% vs. 28%). Special Education students were also well-represented at high quality schools (25% at Tier 1) and underrepresented at Tier 4 schools (10%). See Appendix B, Figures B-4 through B-5 for full results.

Overall, there are vast inequities across geographic region and racial background in the assignment of kindergarteners to high quality schools. Black students in particular, especially those living in the southern urban core, are significantly more likely to be disadvantaged by the HBAP. They are extremely unlikely to attend high quality schools relative to students from other neighborhoods.

Differences among 6th graders. The disparities in assignment to high quality schools were similar to those seen for kindergarteners, but even more straightforward and striking (see Figure 5-3; also see Appendix B, Figure B-6). Simply put, students living in the southern urban core were far less likely than any of the other neighborhood regions to attend Tier 1 schools (16% vs. 25%-33% for the other regions) or Tier 1 or Tier 2 schools (36% vs. 66%-68% for the other regions), and far more likely to attend Tier 4 schools (21% vs. 1%-5% for the other regions). These results were largely consistent for specific neighborhoods. Again, assignment to Tier 1 and Tier 2 schools was greatest in Back Bay/Beacon Hill (91%), Central (94%), Charleston (86%), and West Roxbury (88%), and universally lowest across the southern urban core. Assignments to Tier 4 schools

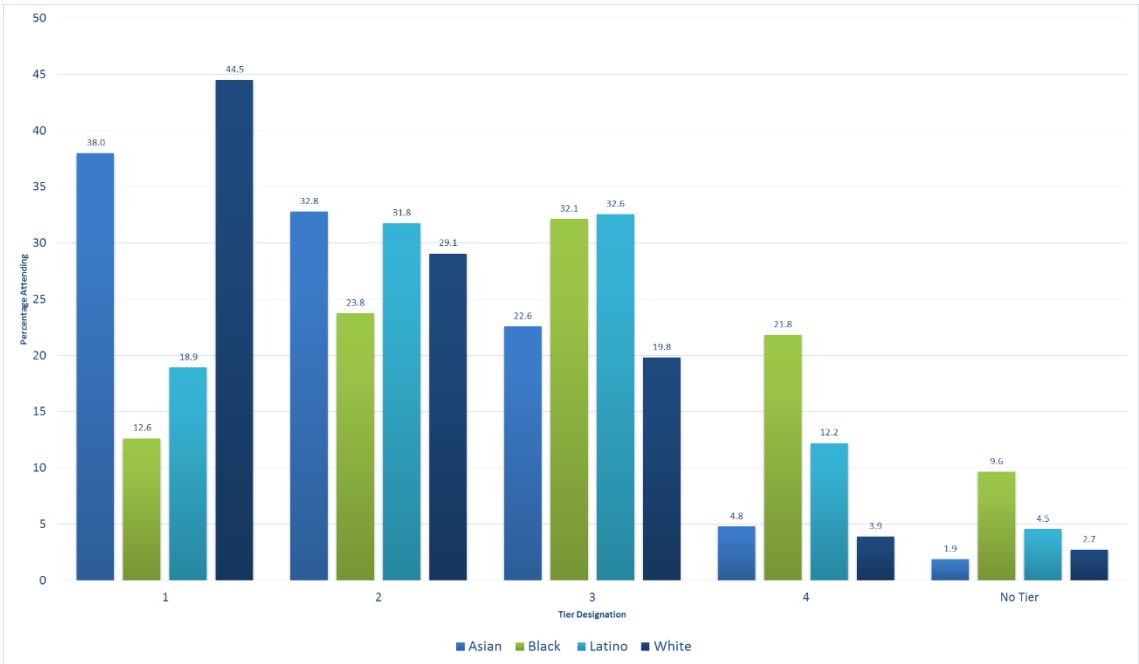

Figure 5-4. The distribution of 6th grade students to schools of each Tier level by race.

were greatest in Jamaica Plain (20% of students), Mattapan (27%), and Roxbury (26%). See Appendix B, Table B-25 for full results.

These geographic disparities translated into racial inequities in the same way they did for kindergarteners. As shown in Figure 5-4 (also see Appendix B, Figure B-7 for more detail), White and Asian students were overrepresented at Tier 1 schools (38% and 45%, respectively) and at Tier 1 and Tier 2 schools (71% and 74%, respectively) relative to Black and Latino students (13% and 19% at Tier 1 schools, respectively, and 36% and 50% at Tier 1 and Tier 2 schools, respectively). Again, Black students were disproportionately assigned to Tier 4 schools (22% vs. 4% for White students, 5% for Asian students, and 12% for Latino students). This also meant that students living in poverty were less likely to attend Tier 1 schools (19% vs. 34%) and Tier 1 or Tier 2 schools (49% vs. 64%), though not especially more likely to attend Tier 4 schools (6% vs. 5%; see Appendix B, Figure B-8 for more detail).

Distinct from kindergarteners, there were differences in assignments to quality schools by program. For ELL, 13% attended Tier 1 schools (vs. 21% of non-ELL students) and 47% attended Tier 1 or Tier 2 schools (vs. 51% of non-ELL students). General Education students were also more likely to attend Tier 1 and, to a lesser extent, Tier 1 or Tier 2 schools (22% and 52%, respectively) than SPED students (14% and 68% for AWC students; 9% and 43% for SPED ELL; and 18% and 41% for SPED). See Appendix B, Figures B-9 through B-10 for full results.

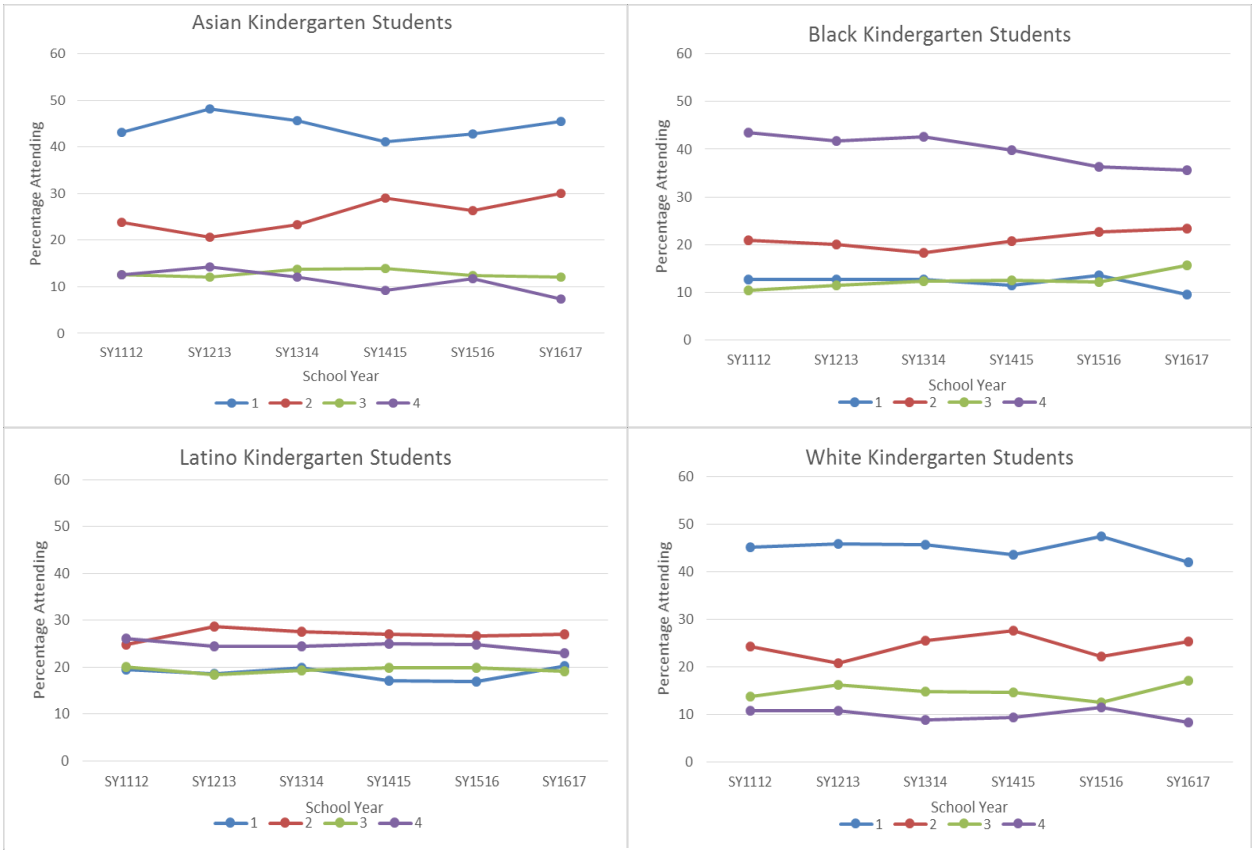

Figure 5-5. Proportion of kindergarten students of each major racial group attending schools of each Tier level across school years.

5.2.2. Changes in Assignment under HBAP

The disparities in school quality across groups are not a consequence of HBAP, but of a legacy of the uneven distribution of quality schools across Boston's neighborhoods. Across all comparisons described for kindergarteners and 6th graders in Section 5.2.1—neighborhood regions, individual neighborhoods, race, poverty status, and program status—there were no shifts in assignment to any given Tier that was greater than 5 percentage points. There are some changes in the distribution of racial groups across Tiers under HBAP for 6th grade, with the proportion of Black and Hispanic students in Tier 4 schools bumping up from 13% to 22% and 5% to 12%, respectively. This may be due to the geographic constriction of choice baskets, the increased competition for high quality seats, and potentially fewer options to access schools outside the district when assigned a lower tier school. If students are not assigned their top tier, high quality schools, they must be assigned to another school in their choice basket. For Black families, these schools are likely to be Tier 4. There is a particularly notable jump in the

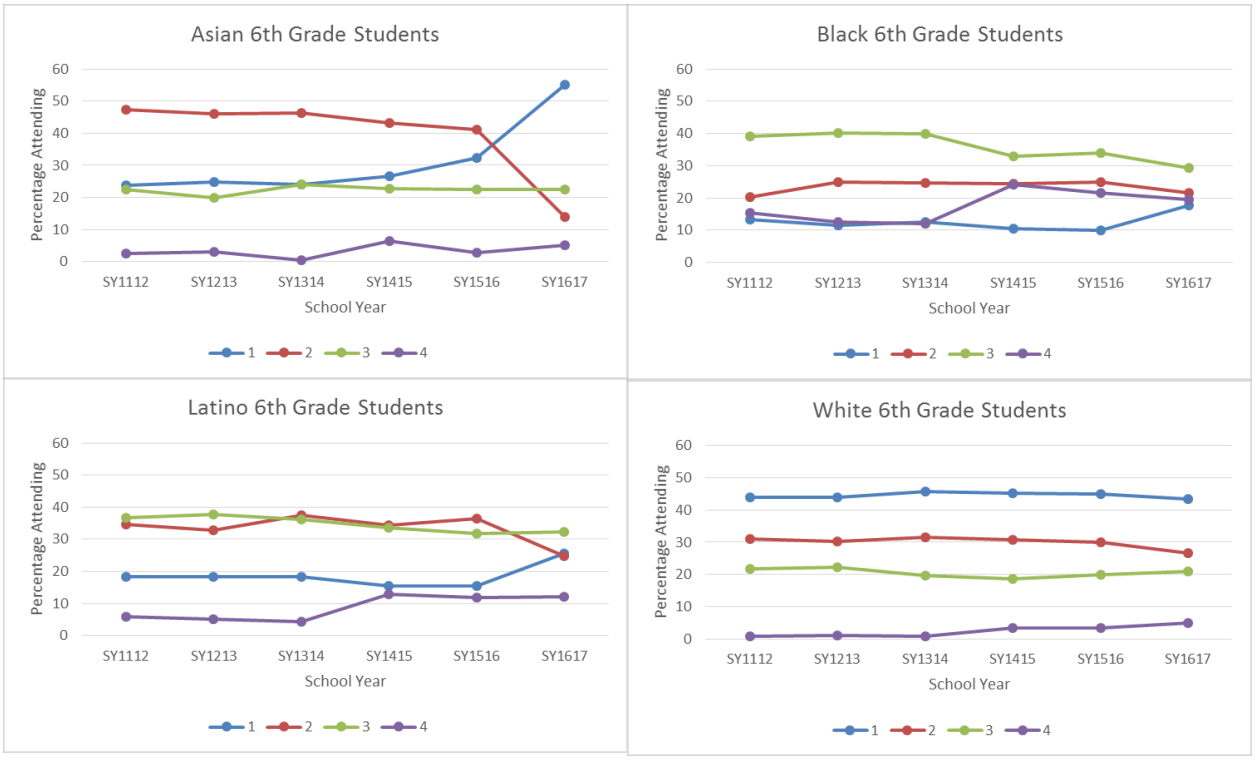

Figure 5-6. Proportion of 6th grade students of each major racial group attending schools of each Tier level across school years.

number of Asian students attending Tier 1 schools between 2015-2016 and 2016-2017, but this appears to be because Quincy Upper School, whose student body is greater than 45% Asian across years, was re-designated from Tier 2 to Tier 1 that year.

The lack of change in distribution across quality schools reflects strong stability in the schools that particular neighborhoods and demographic groups attended between 3Z and HBAP. It also echoes the lesson from Chapters 3 and 4 that HBAP neither created geographic and demographic inequities in BPS, nor did it counteract them. One might ask how it is possible for students to be attending schools closer to home and not sizably alter the distribution of quality. This could arise because most of the reduction in travel distance and times occurred in the upper 25% of the distribution, rather than across the board. Only a subset of that 25% were then redistributed to more local schools, and only a third of those would be likely to attend a school of a different Tier. This equates to no more than a 7-8% change in any direction.

5.3. Are Students Attending "Good Schools Close to Home"?

It is one thing to attend school closer to home under HBAP, or to attend higher quality schools (of which there is no evidence for any group under HBAP), but neither guarantees that students, on average, are attending better schools closer to home, the central premise of HBAP. To examine this question, comparisons were made across of school years 2013-2014 and 2014-2015 using the BPS Tier rankings from 2014-2015. This narrow timespan ensures that findings can be attributed to changes in travel distances arising from different assignments, not to the redistribution of schools to different Tier levels.

5.3.1. Are Kindergartners Attending "Good Schools Close to Home"?

Kindergarteners traveled shorter distances and times to schools of all tiers under HBAP (reduction in distance of 10%-20% across Tiers and in time of 7%-16%). These benefits of HBAP varied across neighborhoods and populations in ways that recalled the unbalanced distribution of high quality schools across Boston. See Appendix B, Tables B-1 and B-2 for full results.

Differences across Neighborhoods. Neighborhoods in downtown and the southern urban core saw the greatest reduction in travel distance and times to Tier 1 schools and wing neighborhoods saw the greatest reduction in travel distance and times to Tier 2 schools. These differential effects of the policy change had limited tangible impact on the differences in travel time across the city. To wit, semiurban and southern core neighborhoods respectively had the shortest and longest travel distances and times for Tier 1 schools under both 3Z and HBAP (see Appendix B, Tables B-10 and B-11 for full results).

The geographic distribution of commutes to school across Tiers again highlighted that certain neighborhoods are well-served by high quality schools and others are not. The average Tier 1 attendee living in Allston-Brighton, Jamaica Plain, Mattapan, North Dorchester, Roxbury, and South Boston traveled 2 miles or more (for Mattapan and South Boston it was >2.5 miles on average), compared to a district-wide average of 1 mile. Travel times for these students were also elevated under HBAP (although there was a 1 minute improvement compared 3Z). Particularly for Mattapan, students attending Tier 1 schools traveled an average of

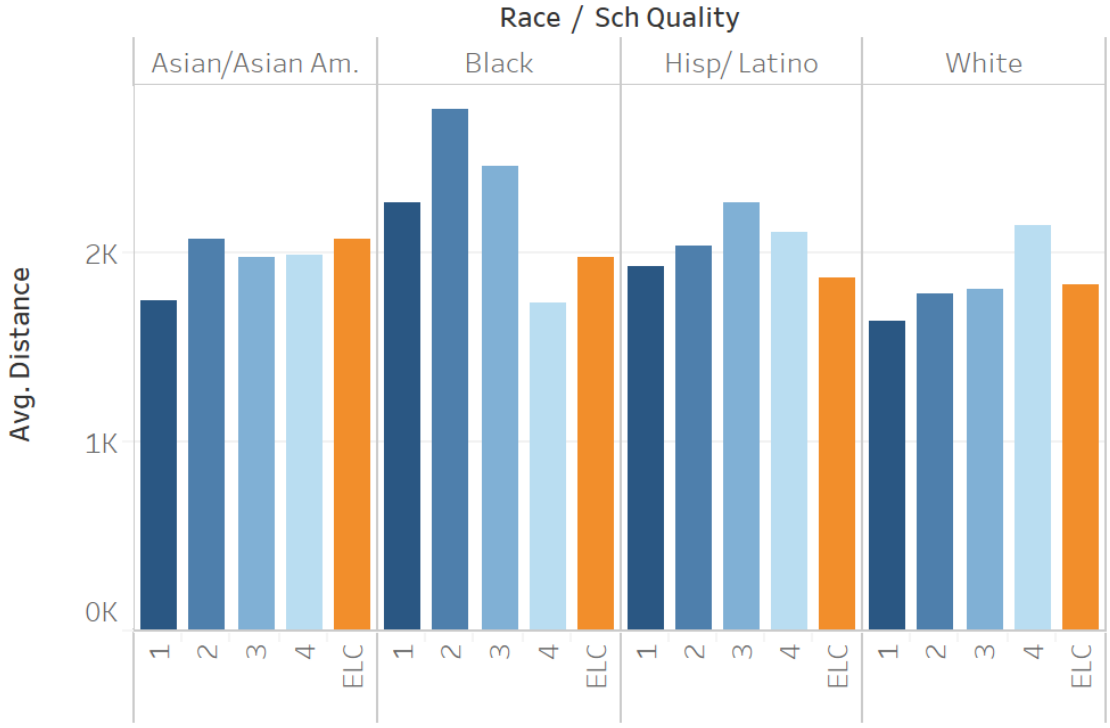

Figure 5-7. Distance traveled to school depending on the Tier level of the school for each race, for kindergartners under HBAP.

15.5 min. each way under HBAP. As seen in Chapters 3 and 4, these are the neighborhoods that have the least geographic proximity to Tier 1 schools. Consistent with these findings, students from the more geographically isolated neighborhoods—Allston-Brighton, Charlestown, East Boston, and South Boston—had higher travel distances and even more exaggerated travel times when attending Tiers not present within the neighborhood. See Appendix B, Tables B-12 and B-14 for full results.

Differences by Race, Poverty and Program. Given the geographic disparities in distance traveled to schools of different quality, it is unsurprising to observe similar disparities across races (see Figure 5-7). White, Asian, and Latino students had shorter commutes to Tier 1 schools under both 3Z and HBAP (just less than 1 mile and 8 min. for White students and 1.2 miles and 9 min. for both Latino and Asian students) than Black students (1.33 miles and 9.5 min.). Black students had the shortest commutes to Tier 4 schools (1 mile and 8 min. vs. 1.4 miles and 10.25 min. for White students at the other end of the spectrum). It important to note that racial groups that are farthest away from schools with a particular Tier designation are less likely to attend a school in that Tier. Thus, two elements of inequity are captured here: Black students are less likely to attend high quality schools (see

Section 5.2.2), and when they do attend them they have longer commutes. See Appendix B, Tables B-16 through B-19 for full results.

SPED students had marked declines in travel distance and time under HBAP, particularly for Tier 2 and Tier 3 schools (14% for distance and 16% for time for Tier 2 and 12% and 14% for Tier 3), but the reductions were less notable for Tier 1 schools (4% for distance and 2% for time). They still traveled further to school than General Education or ELL students at all Tier levels (by .5-1.25 miles and 2-5.5 min., depending on the Tier). On the other hand, the greatest decline in travel times for ELL students was when attending Tier 1 schools (21% in distance and 18% in time vs. 16% and 12% for ELL students in general). This resulted in ELL students having similar travel distances and times to General Education students across the board (less than a ¼-mile difference and 1 min. difference across Tiers). See Appendix B, Tables B-20 through B-23 for full results.

5.3.2. Are 6th Graders Attending "Good Schools Close to Home"?

The results for 6th grade differed from those for kindergarten in that travel times were not as heavily reduced, as seen above. In fact, travel to schools in Tiers 1-3 all decreased (4%-8%), but travel to schools in Tier 4 *increased* by 28%. Despite this seeming lack of change, disparities across neighborhoods, demographic groups and programs remain and are described in turn. See Appendix B, Tables B-1 and B-2 for full results.

Differences across Neighborhoods. 6th grade students from downtown and semiurban neighborhoods saw a drop in their travel distance and time to Tier 1 schools (14% and 33% for travel distance, respectively, and 15% and 33% for travel time). In fact, semiurban neighborhoods went from having the longest average commute to Tier 1 schools at ~13 min. to the shortest at ~9 min. Those living in the southern core and wing neighborhoods, however, saw a modest increase in travel distance and time (6% each for travel distance and 0.5% and 8% for travel time, respectively). Wing neighborhoods had the longest commutes to Tier 1 schools under HBAP at 14 min. For Tier 2 schools, downtown neighborhoods again saw a decline in travel distance and time (10% and 11%), though the decline for wing neighborhoods was dramatic (52% and 43%), going from an average one-way commute of ~18 min. to ~10 min. There was a modest increase in travel distance and time for the southern core and the southwestern semiurban neighborhoods (11% and 8% for distance, respectively, and 15% and 10% for time). The upshot was that those living in downtown and wing neighborhoods averaged 10-11 min. for commutes to Tier 2 schools, those living in

southwestern semiurban neighborhoods traveled ~13.5 min. to Tier 2 schools, and students from southern core neighborhoods traveled just over 17 min. to Tier 2 schools. See Appendix B, Tables B-10 and B-11 for full results.

The differences between neighborhood regions largely generalized to the specific neighborhoods, though there were some exceptions and notable cases. The modest increases in travel to Tier 1 schools in southern core neighborhoods were predominantly driven by Roxbury, which saw a 17% increase in distance and a 14% increase in time to attend Tier 1 schools. The increases in distance traveled to Tier 2 schools was more consistently distributed across the southern core. See Appendix B, Tables B-13 and B-15 for full results.

Differences by Race, Poverty and Program. The differences in travel distance and time by neighborhood again manifested in disparities across racial groups. Black students still traveled the furthest distance on average to attend a Tier 1 school, with an average distance of nearly 2 miles, and Asian and White students traveled the shortest distances, with an average distance of just under 1.2 miles. In terms of time, Black students had an average commute of 12.5 min. and Asian and White students averaged 8-9 min. Interestingly, Latino students had a shorter distance of commute than Black students (avg. = 1.75 miles), but a *longer* time of commute (avg. = 13.5 min.). Distinctive from kindergarten, Asian students traveled the shortest distances and times to Tier 4 schools (~1.2 miles and ~8.5 min.), though they were still underrepresented there. Black students were still a close second, traveling on average 1.33 miles and 9.5 min. to attend Tier 4 schools. Latino and White students traveled somewhat longer distances and times to attend such schools. As would be expected from these results across race, students in poverty had longer commutes to Tier 1 and Tier 2 schools, though these disparities were less extreme than for race (both ~1/3rd of a mile and 3 min. for Tier 1 and 1.5 min. for Tier 2). See Appendix B, Tables B-16 through B-19.

Similar to kindergarten, SPED students in Grade 6 traveled a further distance to schools of all Tiers (difference of .5-1.5 miles and 3-6.5 min., across Tiers). Like General Education students, they saw limited reductions in travel distances and times and even an increase in travel distances and times to attend Tier 4 schools (14% for distance and 16% for time). ELL students in 6th grade had a distinctive split in their travel times. They traveled almost exactly the same distance and time to Tier 2 and 3 schools as General Education schools, but considerably further and longer to Tier 1 (difference of 1/4th mile and 3 minutes) and Tier 4 schools (difference of 1/2-mile and 3 minutes). See Appendix B, Tables B-20 through B-23 for full results.

Summary

HBAP has been successful in assigning kindergarten students to schools closer to home, with the greatest impact coming from lowering the longest travel times and distances. These benefits were equitably distributed across groups and neighborhoods. The impact for 6th graders was less marked, probably in part because of the lower number of schools serving 6th grade and the fact that schools with 6th grades did not populate the choice baskets on an algorithm that yielded the closest high quality schools with 6th grade. Therefore, there was greater difficulty in reducing travel times. That said, they were still present for some.

The goal of "quality schools, close to home," however, was more elusive. Simply put, quality schools are unevenly distributed across Boston, and some neighborhoods have few, if any, high quality schools nearby. In some cases, these neighborhoods that do not have high quality schools are the ones with a greater density of students—raising the level of competition for scarce seats. Students in these neighborhoods were thus less likely to attend high quality schools as students in all neighborhoods attended schools closer to home. It is important to note that, while HBAP is clearly responsible for lowering travel distances and times, it did not *cause* students from these neighborhoods to attend schools of lower quality as they were already underrepresented in them. Instead, it removed the furthest options in the 3Z choice baskets, reducing the likelihood of assignments that would require long-distance commutes.

The main demographic consequence of these geographic disparities was racial disparities. Asian and White students were overrepresented in Tier 1 schools and Black students were overrepresented in Tier 4 schools. As seen in Chapter 4, many Black students live in the neighborhoods that *do not have* quality schools near enough to their homes for HBAP to make them practically available, especially for 6th graders. Thus, the problem lays in the geographic distribution of quality schools and of students across Boston, and the ability of HBAP as designed to deal with these imbalances.

Chapter 6: Equity in the Lottery Process: Additional Considerations

As described in Chapter 2, there are five stages to the HBAP system: (1) Choice baskets; (2) Shopping period; (3) Submission of choices; (4) Assignment; and (5) Enrollment. This evaluation has focused specifically on Stages 1 and 4, evaluating the former through the contents of choice baskets and the latter through the final enrollments of students. Such analyses are unable to take fully into consideration the numerous processes that occur in between access and assignment, however, and the different pathways by which people arrive there. A full assessment of how families engage in the shopping period and determine their preferred schools is beyond the scope of this evaluation, but this chapter addresses three nuances of HBAP that are likely to interact with family decisions to in turn have consequences for equity. These are: the effect of entering at different rounds of assignment; the likelihood with which families receive their top choices; administrative assignment of students who did not receive a submitted choice; and the entry of students into BPS at either pre-kindergarten or kindergarten. Importantly, rounds not only the stated focus of the first of these four topics, but also play a major role in the second and third, making them a recurring theme of this chapter. For all analyses in this chapter, see Appendix C for methodology.

6.1. Entry at Different Rounds

The BPS assignment lottery occurs across multiple rounds. The first round is timed so that parents have assignments in hand before deposits are due for private and parochial schools in the spring, so that parents can make informed decisions about where to send their children the following fall. The majority of students enter the lottery during this first round (81% under both 3Z and HBAP for kindergarteners, and 88-89% for 6th graders). This was not consistent across racial groups for kindergarteners. Only 64% and 70% of Black and Latino kindergarteners, respectively, entered during the first round under HBAP, whereas 82% and 85% of Asian and White students did so, respectively. These disparities were less pronounced for 6th graders, with 86% and 89% of Black and Latino students entering in the first round, respectively, and 93% and 92% of Asian and White students doing the same, respectively. This is likely because most 6th graders are already in the system and thus are aware of the need to enter the lottery for the following year, whereas more kindergarten parents are going to be unfamiliar with the process.

As might be expected, kindergarten students entering at later rounds are less likely to be assigned to Tier 1 and Tier 2 schools and increasingly likely to be assigned to Tier 4 schools. This is illustrated in Figure 6-1. This is because many of

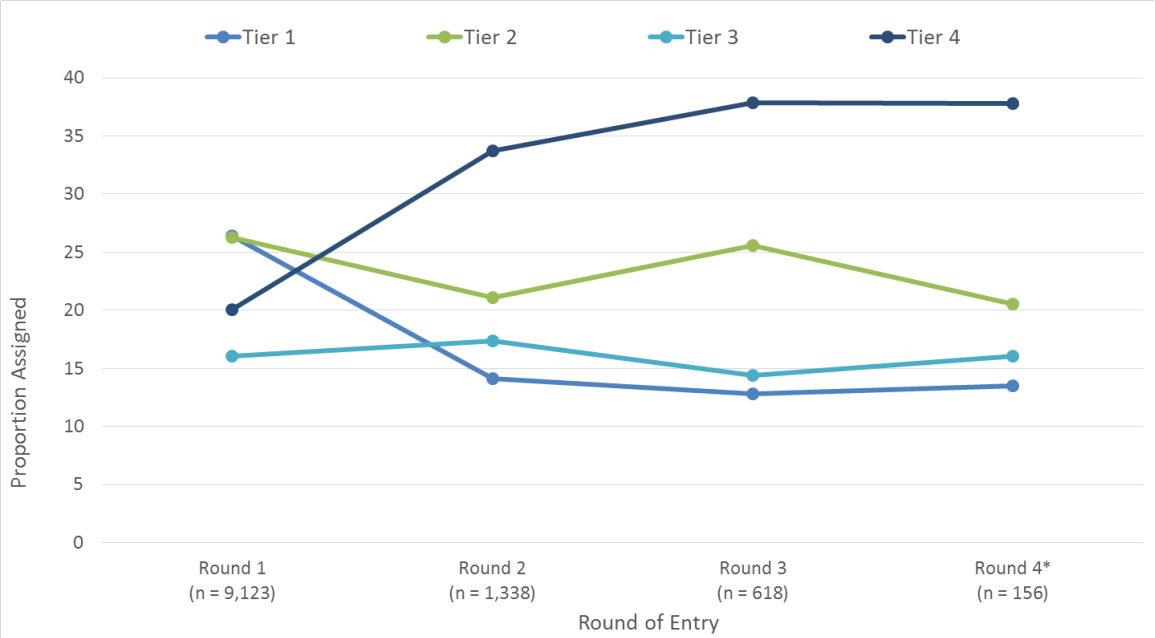

Figure 6-1. Proportion of kindergarten students entering in each round of the lottery being assigned to schools in each Tier. (*Note*: Round 4 is no longer used for kindergarten.)

the most desirable seats are taken in the first round. In round 1, 26% of students are assigned to Tier 1 schools and 53% of students are assigned to Tier 1 or Tier 2 schools. These proportions drop to 14% and 35% by round 2, but stay stable for the remainder of the rounds. On the other hand, assignment to Tier 4 schools increases steadily from 20% in round 1 to 34% in round 2 to 38% in rounds 3 and 4.

Similar to kindergarten, 53% of 6th graders entering in the first round were assigned to a Tier 1 or Tier 2 school. This proportion dropped more gradually, to 42% in round 2 and 32% in round 3. Tier 4 assignments also followed a more graduated pattern, starting at 14% in round 1, *dropping* to 10% in round 2, and then increasing to 22% in round 3. It should be noted, though, that very few students enter at round 3 or after (fewer than 1% of any race). This all suggests that entry at different points in the process has demonstrable consequences for equity among kindergartners, but is not as great a concern for 6th graders. This could be because most 6th graders are already in the system and are aware of the need to enter the lottery for the next year, whereas many families entering kindergarten may be unfamiliar with the process and its timing.

6.2. Receiving one's First Choice

One assumption often made with school choice systems is that all families will desire the Tier 1 school nearest their home. This is not necessarily the case as they may prefer another school because it is closer to home, because friends and relatives already go there, because of facilities or programs it offers, or because of some other feature that matters to them. With this in mind, another way to evaluate the equitability of a school choice and assignment system is to look at what proportion of families receive their top choice, and how this proportion varies across groups.

The proportion of students receiving their first choice in the lottery increased modestly from 3Z to HBAP for kindergarteners, from 72% to 74%. Though this effect was rather small, it was consistent across races (increases of 0.5% for White students, 2% for Black students, 3% for Latino students, and 5% for Asian students). For 6th graders, the increase was a bit more marked, going from 70% to 78%. Likewise, the gains across races were more varied, with White students gaining by 2%, Asian students by 5%, Latino students by 6%, and Black students by 12%.

As illustrated in Figures 6-2 and 6-3, however, these advances reflected and maintained disparities that previously existed under HBAP. Black students were notably less likely to receive their first choice under HBAP (70% for kindergarten

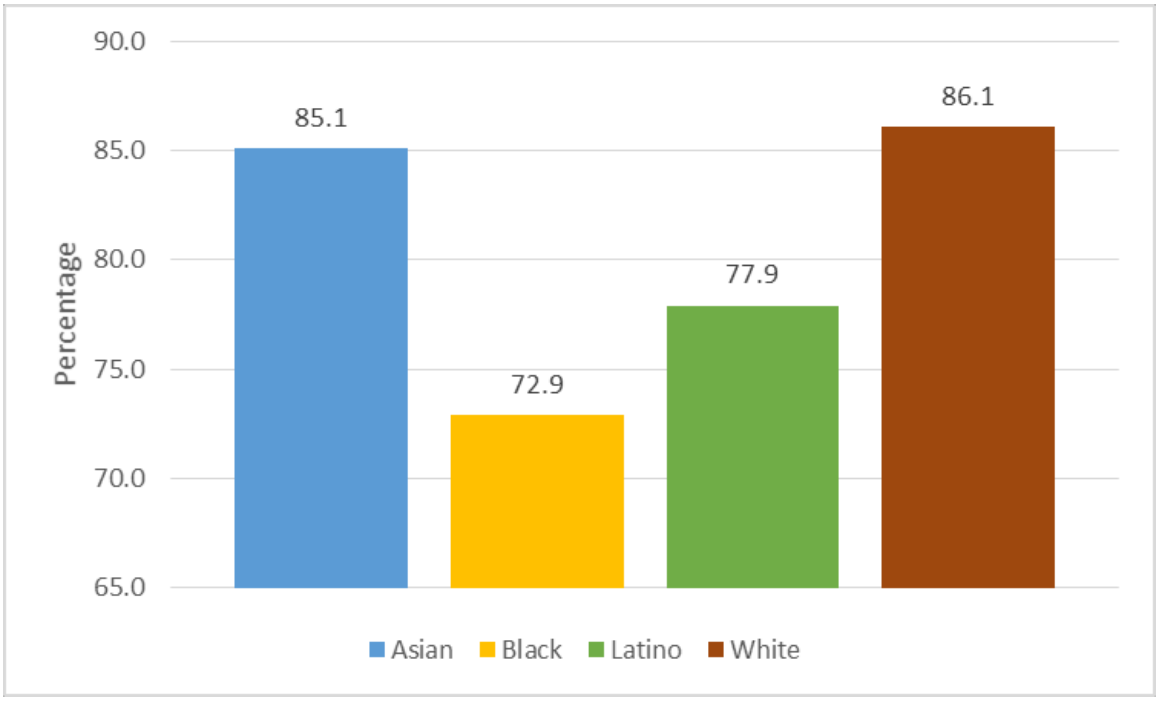

Figure 6-2. Proportion of kindergarten students receiving their first choice in the lottery under HBAP, by race.

and 73% for 6th grade) than White and Asian students (81% and 82% for kindergarten, respectively, and 86% and 85% for 6th grade, respectively). Latino students sat midway between these two extremes (74% for kindergarten and 78% 6th grade).

There are two possible explanations for the racial differences in receiving one's top choice. Based on the analysis in Chapters 3-5, it could be that elevated competition for seats for Black students and Latino students makes them less likely to receive the one they most want, especially if that school is also desirable to others. Second, it might be that entry at later rounds of the lottery, which is more common in Black and Latino families, can lower a student's chance of receiving a desired school. In turns out that it is a mixture of the two. Students entering in round 1 have an 89% chance of receiving their top choice, but a less than 70% chance of receiving their top choice in every round thereafter. If this information is taken in conjunction with the proportion of students of each racial group entering the lottery in each round, there are still disparities.[9] By this method, only 70% of Black students received their top choice, compared to an expected 74%. All other races either match or just slightly outperform their expected likelihood of receiving their top choice. This would suggest that a lower

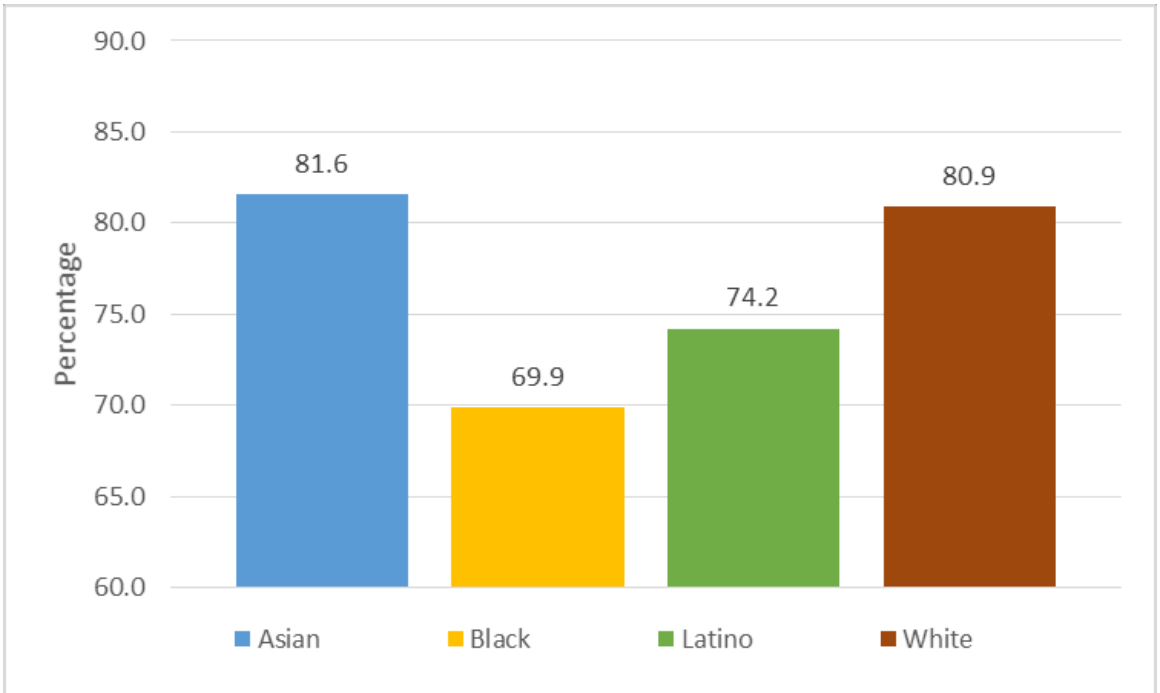

Figure 6-3. Proportion of 6th grade students receiving their first choice in the lottery under HBAP, by race.

[9] By multiplying the proportion entering in a given round by the likelihood of receiving a top choice when entering in that round and then summing these values, the expected proportion of each racial group receiving their top choice can be estimated.

proportion of Black students receive their top choice in part because they are more likely to enter the lottery at later rounds, but also because of the elevated competition they face for desirable seats.

6.3. Administrative Assignment

Students who do not receive one of the choices they submitted to the lottery are assigned administratively to the nearest school with available seats.[10] Under 3Z, 2.7% of kindergarten students were administratively assigned, and this increased to 4.8% under HBAP. For 6th grade, administrative assignment was far less common under 3Z and HBAP, in part because a substantial proportion of students continues in the same school or follows a proscribed feeder pattern. This was especially true under HBAP as administrative assignments decreased from 3.4% under 3Z to 0.5%. Given the limited number of administrative assignments for 6th graders under HBAP they appear to be of negligible importance for equity. This analysis concentrates on variations among kindergarten students.

Under both policies, administrative assignments were more likely to occur for kindergarten students entering the lottery after round 1. This was true for 1 in 7

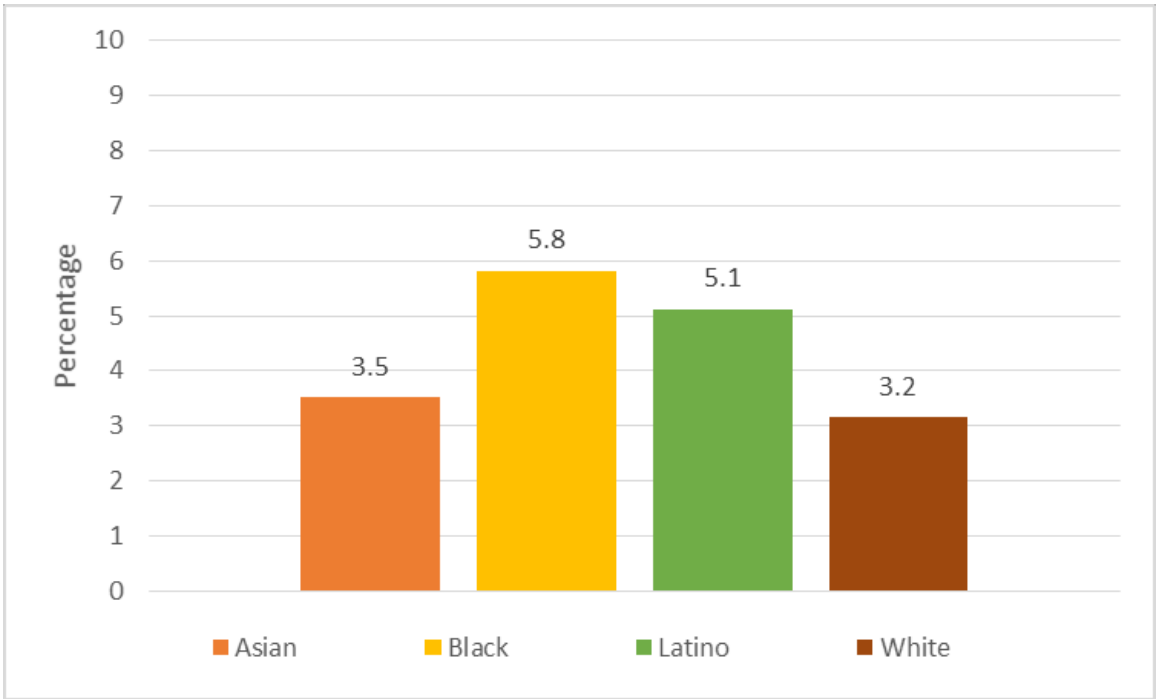

Figure 6-4. Proportion of kindergarten students of each major racial group administratively assigned under HBAP.

[10] Under 3Z, this included individuals who submitted no choices, which is no longer possible since the implementation of HBAP

students (14.2%) entering after round 1 for HBAP and 1 in 10 students (9%) under 3Z. Administrative assignments tend to bias toward lower quality (and presumably less popular) schools. Students who were administratively assigned were most likely to attend Tier 4 schools under both policies, but this was even truer under HBAP (47% vs. 39% under 3Z).

Figure 6-4 compares administrative assignments under HBAP across races and finds that Black and Latino students were more likely to be administratively assigned than White and Asian students. 5.8% and 5.1% of Black and Latino students were administratively assigned, compared to 3.5% and 3.2% of White and Asian students. A smaller gap was present for poverty status (5% vs. 4.5% for those not in poverty). Special programs, given the way they are accessed and assigned, were less likely to be administrative assigned than General Education students (ELL = 3%, SPED = 1.5%).

Focusing on the differences across races, these disparities were largely attributable to the fact that Black and Latino students were more likely to enter after the first round than White and Asian students (see Section 6.1). Even when accounting for round of entry, however, White students were administratively assigned at a dramatically lower rate than other groups entering in the same round. Entering in Round 2, for example, the likelihoods are: Asian = 14.8%, Black = 16.2%, Latino = 17%, and White = 2.8%. Entering in Round 3: Asian = 12%, Black = 13.4%, Latino = 12.4%, and White = 8.3%.[11]

This result appears to have been explained by geography. Students living in wing neighborhoods were highly unlikely to be administratively assigned (2% vs. 6% for all other regions), two of which (Charlestown and Allston-Brighton) are predominantly White. This makes sense being that students from these neighborhoods have priority in the assignment process to be assigned to local schools. They may also be more likely to indicate these schools in their choices. For these two reasons they are unlikely to be administratively assigned, and, in turn depress the total proportion of White students that are administratively assigned.

[11] Entering in Round 4, the numbers are too low to be meaningfully compared.

6.4. The Effect of Pre-Kindergarten on Competition for Kindergarten Seats

With the availability of pre-kindergarten (K1) programs at BPS schools, students may enter the enrollment system at different ages. Further, those who attend a district school for pre-kindergarten are guaranteed a seat in that same school for kindergarten (K2). This raises the possibility that those entering in pre-k may face less competition for high quality seats, which in turn raises their likelihood of attending more desirable elementary schools while also increasing the competition for seats in high quality schools for those entering the lottery at K2.

To assess the impact of pre-k entry into schools, those already present in the system before kindergarten were compared to those who entered at kindergarten. Those entering at age 3 (also known as K0) were not distinguished from those entering at K1 because K0 represents a very small percentage of students (<5% each year). Further, they are predominantly special education students (~70%), which is one of the stated functions of K0, making them a distinct population. In any case, they too are almost always present for pre-k and thus, for the question here are appropriately grouped with others arriving in that year.

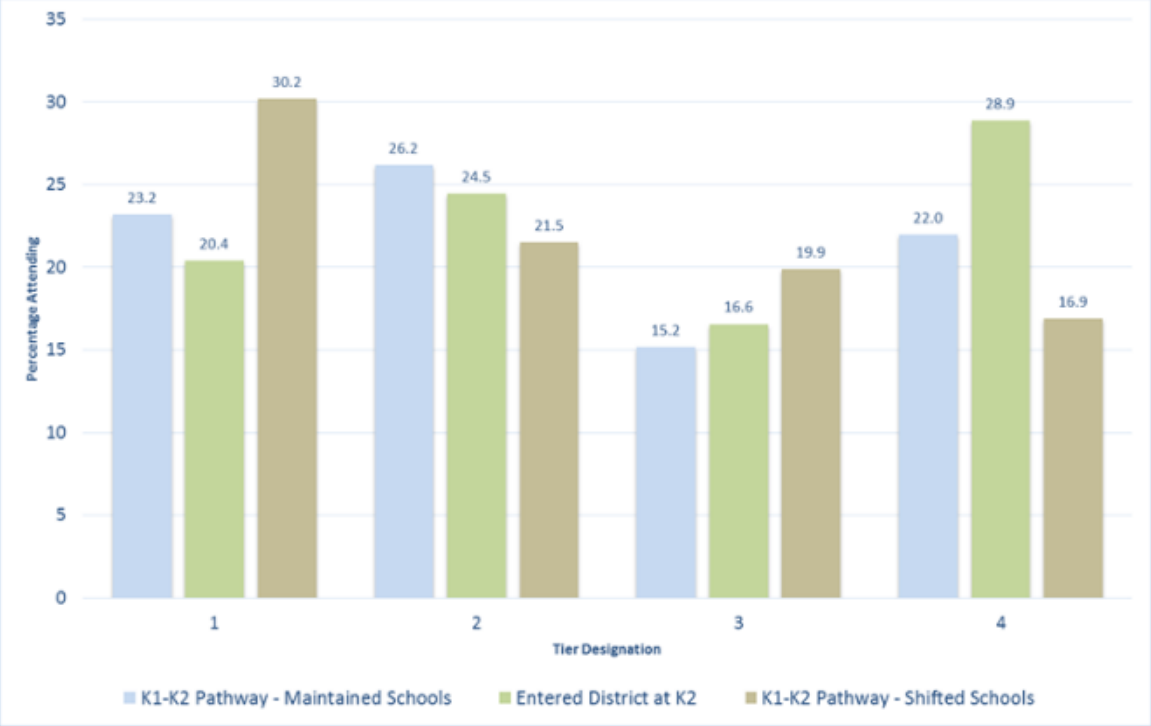

Figure 6-5. Proportion of kindergarten students attending each Tier level, depending on whether they entered the district in kindergarten (K2) or previously (K1-K2 Pathway).

Over the three years of HBAP, exactly 50% of kindergarten students were in the system the previous year. Those entering the system during pre-kindergarten were somewhat more likely to attend Tier 1 schools than those entering at kindergarten (24% vs. 20%) and considerably less likely to attend Tier 4 schools (21% vs. 29%). *Why* this is the case, however, is not entirely clear. One could make the argument that it is because those entering in pre-kindergarten experience less competition for more available seats and thus are more likely to receive high quality schools. Providing additional insight, Figure 6-5 further divides students who entered in pre-kindergarten by whether they remained at the same school for kindergarten or entered the lottery and switched schools. This latter group, which constitute about 1/10th of pre-kindergarten students (or 5-6% of all students), were the most likely to attend Tier 1 schools (30.2%) and least likely to attend Tier 4 (17%). Even separating these students out, those who attended pre-k in the district and stayed at the same school were more likely to attend Tier 1 and less likely to attend Tier 4 schools than those entering in kindergarten.

It is possible that there are demographic differences between those entering at each time point, and that the disparities seen here arise from the differential access and competition that these groups experience, regardless of the age at which they enter the school system. This seems unlikely as racial groups are approximately equally likely to enter at pre-kindergarten, with the only exception being that White students are especially likely to take advantage of this opportunity (59.5% vs. 45-49% for other races). The combination of such limited differences with uneven access across groups is unlikely to create the resultant disparities. Thus, the lower likelihood of students entering in kindergarten to be assigned to high quality schools is likely attributable to the greater competition for seats at this later time point.

Meanwhile, it would seem that the additional advantages of those who reenter the lottery after pre-kindergarten is a result of strategy. Such families would likely only reenter the lottery in order to attend a higher quality school, provided that was the feature of a school that mattered most to them. Thus, they would be expected to be assigned to higher quality schools more often than their peers that stayed put. With an extra year of experience they might also have greater knowledge of the system and be aware of high quality schools with more seats available or that have less competition for seats. Given these multiple possible interpretations, the impact of the pre-kindergarten pathway on access and competition requires additional study.

6.5. Summary

This chapter has examined four details of the lottery process that are relevant to a full understanding of equity in the system: the impacts of entering after the first round of assignment; the likelihood of a family receiving their top choice; administrative assignment when a student receives none of his or her selected schools; and the option to enter the system at kindergarten or pre-kindergarten. Notably, a major theme across the first three of these topics is the role of rounds in determining assignments.

The four separate analyses each revealed disparities in outcomes, but they vary in their interpretation. Some cannot be attributed to HBAP. First, students entering in later rounds were indeed less likely to receive a top tier school and more likely to be assigned to a Tier 4 school. These students were also less likely to be assigned to their top choice. This is not necessarily a concern pertaining to HBAP, however, but of the long-standing decision to maintain rounds as a way to accommodate families that are considering options outside the district. Second, students attending a district school for pre-k were more likely to be assigned to high quality schools, arising in part from less competition for seats at this earlier time.

More troubling for HBAP, however, was that a relatively low number of minority families receiving their top choice, and this was not entirely a result of round of entry. Close examination revealed the Black students were less likely to receive their top choice even when accounting for the fact that they more often enter the lottery at round 2 or later. Based on the findings in Chapters 3-5, this would seem to result from the elevated competition for seats that they experience. Likewise, Black and Latino students were more likely to be administratively assigned. Interestingly, this appears to be because they are more likely to enter the lottery at later rounds and not because of elevated competition for seats. Conversely, a lack of competition specifically for students living in wing neighborhoods insulated them from administrative assignment relative to the rest of the city. In sum, the results of this chapter are mixed for HBAP specifically, but do reveal other policies regarding school choice and assignment that can generate or exacerbate inequities.

Chapter 7: HBAP's Impacts on School Composition

To this point, the evaluation has focused on HBAP's impacts on the access and assignments of individual families, and the equitability of these impacts across geographic and demographic groups and those enrolled in different BPS programs. The goals and potential pitfalls of HBAP also pertain to the overall organization of the district and how its students are distributed across schools. Namely, it can have districtwide consequences for the manner in which schools integrate students of diverse backgrounds. A stated goal of HBAP at the time of implementation was to aspire to "neighborhood schools" where most or all of the students living in a given community could attend school together. In theory this would create stronger schools and stronger communities through stronger connections between home and schools. It could also, however, diminish geographic and racial integration, which is always a possibility in a city with significant residential segregation.

Here, this analysis and evaluation of HBAP concludes by asking two questions. First, to what extent was HBAP successful in creating neighborhood schools? Because there are no strict boundaries on attendance to any school, nor was that the intention, this question is defined more formally as the extent to which the students from a given neighborhood (estimated with census tracts) are concentrated at a smaller number of schools, and the extent to which schools connect and integrate multiple neighborhoods. To answer this latter question, the analysis leveraged cutting-edge techniques from network science to assess geographic connectivity across the city (see Box on Illustration of Methodology in this chapter and Appendix D for further detail). Second, did HBAP maintain racial diversity within schools? If indeed HBAP was successful in the pursuit of neighborhood schools and, in turn, lowered geographic integration, there will be the associated possibility that it also lowered racial integration.

7.1. The Goal of "Neighborhood Schools"

The goal of neighborhood schools is essentially a two-sided geographic question. On the one hand, do neighborhoods send their students to a smaller number of schools? The potential flipside of this, however, is that schools become less geographically diverse. These questions were addressed through two complementary methodologies. First, diversity indices were calculated to formally measure how concentrated each neighborhood's students are at a small number of schools (or, conversely, how dispersed they are across many schools). When these indices are greater, they indicate that a neighborhoods students are more dispersed over more schools, and when they are lower they are sending their

students to fewer schools in a more concentrated fashion. A similar approach was used to quantify the diversity of neighborhoods attending each school.[12]

Second, techniques from network science were leveraged to assess the connections created between neighborhoods and schools by students and their assignments (see Appendix D and the box on Illustration of Methodology for more detail).[13] Put in simple terms, schools convene students from multiple neighborhoods and thus connect these communities and their populations to each other. Consequently, a city with a highly integrated school district will be more strongly connected across geography than one where schools are geographically segregated. This analysis allowed for a closer assessment of how much HBAP has separated schools by neighborhoods. All descriptive statistics and correlation matrices for measures of diversity and centrality are reported in Appendix D, Tables D-1 through D-5.

7.1.1. Do Neighborhoods Send their Students to Fewer Schools?

HBAP did little to move toward the ideal of "neighborhood schools." There was a marginal tendency for neighborhoods to send their kindergarteners to a smaller number of schools, but no such change for Grade 6.[14] On average, neighborhoods sent their resident kindergarteners to 11 schools under 3Z and to 10 schools under HBAP. For 6th graders, the average neighborhood sent students to 8 schools under 3Z and to 9 schools under HBAP.

Census indicators were used to closely examine which communities were more or less dispersed across schools (drawing from the U.S. Census' American Community Survey, estimates for 2012-2016 to be consistent across analyses). Students living in census tracts with greater White and Asian populations were more concentrated at a smaller set of schools (i.e., were less disperse across schools). In contrast, those living in census tracts with more Black and Latino students were less concentrated, and thus scattered across a greater number of schools. The implication is that neighborhoods that are predominantly White or Asian come closer to the ideal of the neighborhood school, whereas neighborhoods that are predominantly Black or Latino are dispersed to more schools. These relationships were strong for both kindergarten and Grade 6 for all school years

[12] Using Herfindahl (H) indices to measure diversity: $H = 1 - \sum_i p_i^2$ where p_i is the proportion of students attending school *i*. *H* then reflects the likelihood that two students selected from the neighborhood at random attend different schools, with higher scores indicating more dispersion. The same is done for schools with *i* reflecting neighborhoods whose students attend that school.
[13] Connectivity for the whole district and for individual schools and neighborhoods is measured using eigenvector centrality (EV). See Appendix D for more on calculation.
[14] For kindergarten, ΔH = -.008, p = .06, and for Grade 6, ΔH = .008, p = *ns*, using Wilcoxon non-parametric rank tests.

(using rank-order, non-parametric correlations, i.e., Kendall's τ; % White: τ's = -.56 - -.50; % Black: τ's = .48 - .59; % Asian: τ's = -.22 - -.29; % Latino: τ's = .30 - .35; all *p*-values < .001). Higher concentration of schools was associated with higher median income and lower percentage in poverty, though as with the analyses of access and assignment, these results were modest relative to the correlations with race.

Though racial disparities in the creation of neighborhoods schools were present under both 3Z and HBAP, there was some evidence that HBAP may have exacerbated the situation. For 6th graders, neighborhoods with a higher proportion Black became more dispersed under HBAP and neighborhoods with a higher proportion Asian became more concentrated under HBAP.[15] Changes in concentration were uncorrelated with percentage White or Latino in a census tract. There were no fully significant correlations for kindergarten students, but neighborhoods with greater Black populations saw a moderate drop in the concentration of their students at fewer schools.[16]

7.1.2. Is BPS Less Geographically Integrated?

Although HBAP did not lead to the substantial concentration of the typical neighborhood's students at a smaller number of schools, it did seem to lower the geographic integration of the city's student population. Schools and tracts were both generally less connected to other schools and tracts under HBAP.[17] This was particularly visible for kindergarten, for which the average school drew from a less diverse set of census tracts.[18] Note, however, that this does not necessarily mean that the district was *less racially integrated*, which is addressed in the next section, though it does raise the possibility that this is the case given the uneven distribution of races across the city's geography. There was no correlation between this geographic diversity and a school's Tier level.

Under HBAP some schools and tracts became more interconnected than others.[19] This may have occurred because of the different geographic logics of 3Z and HBAP. Under 3Z, students from across each Zone were likely to mix at every school in the Zone, creating a more even range of integration. HBAP, however,

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[15] ΔH correlated positively with % Black, τ = .11, *p* < .05, and negatively with % Asian, τ = -.11, *p* < .05.
[16] ΔH correlated negatively with % Black, τ = -.10, *p* = .06.
[17] Using Eigenvector centrality (EV). For kindergarten schools, ΔEV = -.12, *p* < .001, and for 6th grade, ΔEV = -.06, *p* < .001, using Wilcoxon rank tests. For kindergarten tracts, ΔEV = -.31, *p* < .001, and for 6th grade, ΔEV = -.13, *p* < .001, using Wilcoxon rank tests.
[18] ΔH = -.01, *p* < .001.
[19] For example, the most central EVs were as much as 18 times the mean under HBAP, whereas no EV was more than 9 times the mean under 3Z. This pattern was true across grades.

heavily reduced the number of students in each neighborhood attending certain schools. Thus, schools became somewhat more regionally concentrated. In contrast, some schools and tracts that are located on the border between two regions of the city whose choice baskets otherwise were largely separated from each other. These schools and tracts in turn "connected" groups that would otherwise be unlikely to be integrated under HBAP. This is especially true for schools in East Boston that attract students from other Boston neighborhoods, and the one East Boston census tract that sends a handful of students to schools in Dorchester, South End, and other southern neighborhoods.

7.2. Did HBAP Maintain Diversity within Schools?

If BPS is less geographically integrated under HBAP, it raises the possibility that it is also less racially integrated. This question was examined by analyzing two measures for all schools: First *diversity* was defined as the mixture of multiple races in a school.[20] Diversity, though, does not guarantee integration across all races—it could, for example, reflect the integration of only two of the main four races that constitute BPS's student population. For this reason a second measure was developed—racial *representativeness*, or the extent to which each school's population deviates from the population of the district as a whole.[21]

Schools maintained a similar level of racial diversity under HBAP for both kindergarten and 6th grade[22], but diversity was lowest at lower quality schools under both policies. That is to say, lower quality schools had greater concentrations of a single race. Nonetheless, the racial integration—meaning the representativeness of schools on the whole—*decreased* moderately for kindergarteners under HBAP. In other words, the average kindergartner attended a school that was less similar in its racial composition to the composition of the district as a whole.[23] This is illustrated by the fact that 74% of BPS students under

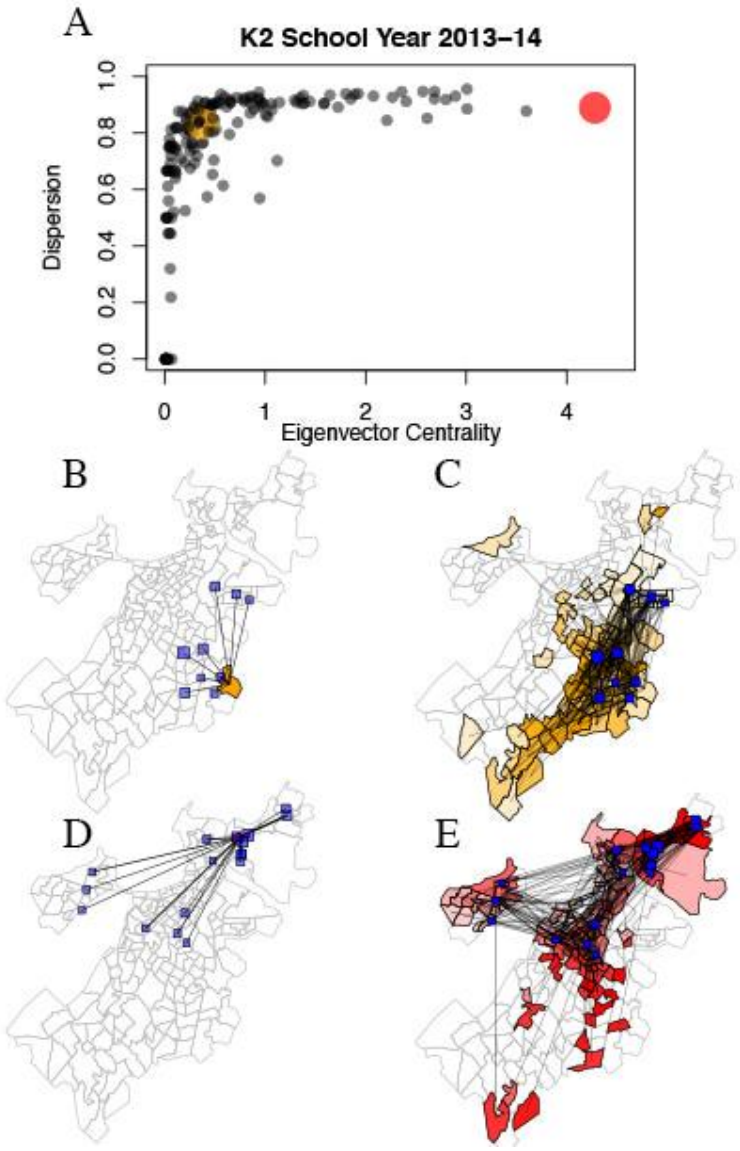
[20] Using Herfindahl (H) indices to measure diversity: $H = 1 - \sum_i p_i^2$ where p_i is the proportion of students of race *i*. *H* then reflects the likelihood that two students from a neighborhood selected at random are of different races, with higher scores indicating more diversity.

[21] A Pythagorean distance was calculated from the expected racial composition of a school if races were perfectly evenly distributed across the district (i.e., $d = \sqrt{\sum(p_i(school) - p_i(BPS))^2}$ where p_i is the proportion of race *i*). These measures are limited to the four main races, and thus they were rescaled to reflect 100% of the population (2.5% of both kindergarten and 6th grade students are not classified in one of these four groups). For kindergarten, the racial composition used as a baseline was: 8% Asian, 34% Black, 41% Latino, and 16% White. For 6th grade, the racial composition used as baseline was: 10% Asian, 30% Black, 49% Latino, and 12% White.

[22] For kindergarten, ΔH = .009, p = *ns*, and for Grade 6, ΔH = .007, p = *ns*, where a negative change indicates a drop in diversity, tested with Wilcoxon non-parametric rank tests.

[23] For kindergarten, Δd = .03, $p < .05$, and for Grade 6, ΔH = .007, p = *ns*, where a positive change indicates a drop in integration, tested with Wilcoxon non-parametric rank test.

Box: Illustration of Network Methodology



This figure illustrates the relationship between a census tract's centrality and its geographic dispersion (or concentration) across schools. Panel A shows that the two measures are largely distinct as their correlation are modestly positive but highly nonlinear. To illustrate further, we take two census tracts that have approximately the same level of dispersion across schools, but one with a median centrality (large orange dot; in South Dorchester) and the other with the highest centrality in the city (large red dot; in East Boston). Panel B shows that the South Dorchester neighborhood sends its students to nine schools (blue squares). Panel C shows the seventy other census tracts that send students to these schools (shaded, with darker yellow reflecting higher centrality), capturing the geographic network of classmates of the students living in the focal neighborhood.

Panel D and E represent the same information for the East Boston neighborhood. Its students attend more schools (17), but, more importantly, 95 other census tracts also send students to these schools (darker red reflecting higher centrality). The greater number of tracts sharing schools with the East Boston neighborhood makes it more connected to the rest of the city and thus more central. This is enhanced by the fact that these other neighborhoods are themselves more central, meaning they can further integrate the students from the East Boston neighborhood into the city, though this is a secondary consideration. In all of this, the schools themselves act as the conduits for connectivity across neighborhoods, and thus have their own varying levels of centrality reflecting the extent to which they do this.

HBAP were Black or Latino, but that the average Black or Latino student attended a school that was 81% Black or Latino. This difference of 7% between expected and actual proportion was greater than under 3Z (5%). There was no change to this effect for Grade 6.[24]

Finally, the extent to which a school's diversity or representativeness was associated with its quality was examined. Whereas the representativeness measures were not correlated with Tier level, the diversity indices were.[25] Tier 3 and Tier 4 schools had less diverse student populations for both kindergarten and 6th grade, which was due to the overrepresentation of Black students at Tier 4 schools. These findings reflect an unevenness in integration: whereas high quality schools successfully draw from a large range of races, low quality schools do not. This may be due to the greater access to resources that enable families to leave the district when their students are assigned to lower Tier school. These associations were present in 3Z and not improved upon under HBAP.

7.3. Summary

HBAP carried with it the potential for positive and negative impacts on school composition. On the one hand, it might increase the potential for schools to act as gathering places for individual neighborhoods, strengthening bonds within the community, at the school, and between home and school. On the other, in doing so it might limit the geographic and, in turn, racial diversity of individual schools, thereby undermining one of the basic goals of school choice. HBAP appears to have done little to achieve the former, desired outcome while modestly moving towards the latter, unwanted one.

HBAP led to students attending schools closer to home, but did not actually move closer to the ideal of "neighborhood schools," and might even have moved away from it for kindergarteners. This appears to be an unintended consequence of the system's design and the creation of choice baskets centered on a family's home. Under 3Z, almost all students in the same zone—some living miles away from each other—had identical choice baskets, the only deviations being for those

[24] Δd = .-01, p = *ns*, where a positive change indicates a drop in integration, tested with Wilcoxon non-parametric rank test.

[25] Because of the potential for Tiers to shift and the different ranking systems, only school years 2013-2014 and 2014-2015 were analyzed. For both measures, the correlations are universally negative (using Kappa coefficients), though not always significant. Only one was significant for representativeness, and 3 of 4 were significant for diversity (representativeness: 2013-2014, kindergarten: κ = -.20, p < .05; 2013-2014, 6th grade: κ = -.10, p = *ns*; 2014-2015, kindergarten: κ = -.10, p = *ns*; 2014-2015, 6th grade: κ = -.13, p = *ns*; diversity: 2013-2014, kindergarten: κ = -.13, p = *ns*; 2013-2014, 6th grade: κ = -.19, p < .05; 2014-2015, kindergarten: κ = -.25, p = .05; 2014-2015, 6th grade: κ = -.20, p = .10).

living near the borders between zones. Under HBAP, students living even in the same census tract could have different choice baskets based on localized differences in which schools are closest to them. For example, a student living on the eastern edge of a census tract may receive a Tier 1 school that is further to the east whereas there may be another Tier 1 school to the west that is nearer to students living on the other side of the tract. As a result, HBAP may actually lower the possibility of students living in the same neighborhood attending the same school or small set of schools. This effect is most visible for minority neighborhoods.

By assigning students more often to schools closer to home, though, HBAP does appear to have lowered geographic integration of students across the city. This may have also led to lower racial integration for kindergarteners. Of particular note, lower quality schools were less racially integrated under both HBAP and 3Z, though HBAP does not appear to have contributed to this situation. This may be understood however as a natural outcome of school choice. When families do select schools further away from home, they do so because they offer higher quality education. They are unlikely to select low quality schools far away, and thus low quality schools will reflect the local population more than they integrate the district's population as a whole.

Chapter 8: General Summary

HBAP sought to provide each family with a smaller, more manageable set of school options that was guaranteed to contain a minimum number of the high quality schools nearest to their home. This was intended to accomplish three goals. First, the universal minimum number of high quality schools was supposed to create equitable access across demographic backgrounds and neighborhood of residence. Second, this equitable access to local schools would then translate into assignments that allow students from across demographic and geographic groups to attend high quality schools close to home. Third, it would effectively balance the desire for "neighborhood schools" that theoretically strengthen local communities with the need to maintain geographic and demographic diversity.

This evaluation found that HBAP was unsuccessful in achieving each of its three main goals. That said, it largely maintained status quo, inheriting but not counteracting inequities that existed under the previous system, 3Z. Rather than an indictment of HBAP itself, the results indicate that its bold, creative approach was not able to generate equity as much as hoped. Within this overarching assessment, there were three main lessons to be learned regarding HBAP and other school choice systems that might help pave the path forward: (1) the geographic distribution of quality schools can undermine even the best school choice and assignment system; (2) definitions of minimum access need to take into account potential competition for seats; and (3) full implementation is essential. These are discussed in turn.

8.1. The Consequential Geography of School Quality

At numerous times in this report when discussing disparities in access or assignment to high quality schools, it was necessary to note that the results simply reflected the geographic distribution of school quality. Simply put, it is impossible for a choice system to provide "quality schools, close to home" if there are no quality schools nearby in the first place. The idea of creating a universal minimum level of access is a thoughtful way to solve this problem—at least for access, if not access close to home. Even if it leaves some inequities in place, as seen particularly for Tier 1 schools, when there are greater numbers of quality seats, these issues can begin to even themselves out, as can be seen when the definition of quality is expanded to Tier 1 and Tier 2. In sum, as long as the baseline level of access is high enough, everyone should have a sufficient opportunity to be assigned to a high quality school.

Establishing a minimum level of access, however, requires the inclusion of schools that are further away for families living in some neighborhoods. For

example, the Tier 1 schools in the choice baskets of families living in Mattapan are quite far away. This pits equitable access and assignment against an even more powerful force: that people tend to gravitate toward schools near their homes (Bell 2009). This is driven not only by a comfort with and preference for "the known" or one's own space, but the basic logistics of child rearing: How will my child get to school each morning? After school, if I'm not home from work, where is he/she going? Who is available to help me make all these pieces fit together? These sorts of questions often dominate parents' thought processes and may undermine efforts to encourage students to voluntarily transport around the city in hopes of attending higher quality schools or to expose them to greater geographic or racial diversity.

8.2. Quantity of Seats vs. Competition for Seats

Universal minimum access is a thoughtful approach, but for it to be effective it needs to be defined appropriately. The choice baskets under HBAP were constructed based on the nearest schools at particular Tier levels. Some have criticized this, saying that the use of seats would have been more effective in creating equity because the use of schools is vulnerable to variations in schools' sizes. Though the logic of this critique is entirely sound, the use of schools or seats turned out to have been mostly inconsequential for actual questions of equity. A completely different issue arose through the analysis, however. There is an uneven distribution of students across the city, thereby creating differential competition for seats. To illustrate, Black and Latino students tend to live in neighborhoods with a greater density of BPS students. As a result, the schools in their choice baskets, especially the high quality schools guaranteed by HBAP, fall in a larger number of *other students'* choice baskets. Consequently, they experience more competition for seats at desirable schools. Accounting for competition in the algorithm for universal minimum access would be a bit more complicated than simply tallying the nearest set of schools, but would certainly be possible and would give BPS better purchase on their goal of offer equitable access to high quality schools.

8.3. Implementation

HBAP was implemented incompletely in two ways. First, it was rolled out incrementally, starting with kindergarten and 6th grade in 2014-2015, and progressing one grade per year from there. This means the impacts of HBAP, good or bad, were not fully observable for all grades. Whereas implementing a new policy in stages has advantages for scaling up and managing unintended or

unforeseen issues, the full impact of the policy on school composition and equity may not have been fully borne out. It could be argued that, as HBAP was an experiment whose consequences were unclear, this was a prudent approach.

Second, the implementation of HBAP for 6th grade was probably different from what its designers envisioned. Instead of running the choice basket algorithm on all schools offering 6th grade, BPS ran it for all schools offering *kindergarten*, and then removed any schools not offering 6th grade and adding pathway schools. This led many 6th graders to receive choice baskets containing fewer than the promised number of high quality schools. More importantly, these unexpected reductions in choice basket contents were distributed unevenly across the city. Most strikingly, the two Tier 1 schools offering kindergarten that are nearest to students in Roslindale, Jamaica Plain, and Roxbury do not offer 6th grade. Consequentially, the students living there received *zero* Tier 1 schools in their final baskets. These sorts of disparities were completely foreseeable, and, luckily, equally fixable.

8.4. Conclusions: The Limitations of School Choice Systems in Creating Equity

The three concerns noted here—the geographic distribution of quality schools, the need to base access on potential competition for seats, and the proper implementation of the system—are not independent, but coincide in certain neighborhoods. Unfortunately, this happened particularly in the neighborhoods that are home to the city's most vulnerable and disadvantaged populations. Black and Latino students tended to have fewer high quality seats in their baskets, owing to the uneven geographic distribution of high quality schools. They also lived nearby more of their peers, meaning they were competing for those fewer seats with a greater number of potential classmates. These two factors together meant that Black and Latino students faced far greater competition for seats in high quality schools, with a number of downstream consequences. They were less likely to attend high quality schools. They were more likely to attend Tier 4 schools. They were less likely to receive their preferred schools and to be administratively assigned. Further, the students from these neighborhoods were more likely to be dispersed over multiple schools, hindering their ability to create shared community ties. These issues were compounded for 6th grade in that certain disadvantaged, predominately minority neighborhoods were the very places most hurt by the partial implementation of the choice basket algorithm.

Two of the three issues we have identified have solutions that lie within the purview of the school choice system. It is straightforward to implement the choice basket algorithm properly for 6th grade. It would require some attention, but it is feasible to rewrite the algorithms to take account of competition when defining

minimum access. What a school choice system cannot fix, however, is the uneven distribution of school quality across the city. This is the false promise of universal minimum access. It is impossible for a choice system to provide "quality schools close to home" if there are no quality schools nearby some homes in the first place. By changing the structure of assignment through policies related to school assignment, districts, like BPS, create the *opportunity* for integration, but it is more difficult to equitably enable families to take advantage of those opportunities.

The tension between equitable opportunity and equitable outcomes (i.e., access and assignment, respectively) has been seen countless times in thoughtful reforms intending to raise up populations that have long been segregated and oppressed. As with the school choice approach, they often encourage these populations to seek opportunities outside of their neighborhoods. For example, William Julius Wilson (1987) recounts this as an unforeseen effect of civil rights legislation in the 1960's in his landmark book on *The Truly Disadvantaged*. He demonstrates that Black individuals with the skills and positioning to take advantage of these reforms were able to climb the socioeconomic ladder and "join" mainstream society, whereas the many less fortunate could not. The consequence of this is that those who were left behind now live in communities that lack their former most talented members, greatly diminishing the overall capacity for collective thriving.

In the case of HBAP and BPS, this is evidenced in the concentration of Black students from southern urban core neighborhoods attending Tier 4 schools. Distinct from Wilson's story about civil rights legislation, it is not as obvious that the Black families that are able to accommodate their children traveling long distances to higher quality schools are necessarily more talented than their neighbors, although that is a possibility. Nonetheless, they were able to avail themselves of these opportunities whereas many of their neighbors could not. The latter in turn often ended up at low quality schools close to their homes, perpetuating a cycle of lack of opportunity coupled with a limited capacity for action. Rather than giving such populations the opportunity to attend higher quality schools outside their neighborhoods, a stronger and more effective course of action toward equity would be to improve the quality of the lowest performing schools such that there are indeed "high quality schools, close to home" for all residents.

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Appendices

Appendix A. Equitable Access

A.1. Data Preparation and Methodology

A.1.1. Data Sets

Data for the analysis of equitable access included variables derived from the BPS Choice Basket dataset, the BPS Historical Capacity dataset, and BPS School-level Profile dataset across school years 2014-2015 through 2016-2017. BPS was not able to provide address information in the Choice Basket dataset for school years 2011-2012 through 2013-2014 and thus data preparation pursued the simulation of a counterfactual using cases from the HBAP school years only.

The BPS Choice Basket dataset represents school and program options provided to families within lottery rounds within school years within students. Of note, and addressed below, program options were occasionally nested within schools such that a family may be provided two separate programs from the same school; however, by and large, program options provided to families were limited to one program per school. The BPS Historical Capacity dataset represents seats available per program option within a grade within a school per school year: for all analyses only program options for kindergarten or 6th grade were considered. Finally, the BPS School-level Profile dataset provided information for each school year within a school.

A.1.2. Data Preparation

Data preparation for the Choice Basket dataset included (a) recoding missing and 'Round 0' into a Round 5 value, (b) collapsing the 30+ program codes into a 5-category program code variable, (c) reducing (i.e. aggregating) the dataset to the first round that a student appears in the dataset, (d) examining rate of missingness across key variables (e.g. program code, 4-digit school code), and (e) identifying cases for which the same program code was offered at the same school in the same school year. The Choice Basket dataset was aggregated to the student-level to indicate whether a student was ever provided any ELL program option, any Hybrid program option, any SPED program option, any Dual Language program option, and/or any Advanced Work Class (AWC) program option among choices (hereafter referred to as Program Category flags) as well as to capture the student address for geocoding. The student-level dataset was then geocoded using BARI's custom geographical infrastructure, which coordinates all known addresses in the city (as defined by the City of Boston's Street and Address Management System) with census geographies and higher-level administrative geographies (e.g., Boston Planning & Development Authority's planning districts). Students whose address

could not be mapped were excluded. Program Category flag variables and a flag to designate a case as part of the final analytic sample were reincorporated into the program option-level Choice Basket dataset and the dataset was trimmed to choice baskets of the final analytic sample only. Data preparation for the Historical Capacity dataset included (a) collapsing the program codes into a 5-category program code variable, (b) checking for duplicate programs within schools within school years, and (c) creating the necessary linking variables to represent the program option within a school within a school year as a unique identifier for the 2 grades. Data preparation for the School-level Profile dataset included (a) creating the school quality variable for the appropriate school year and (b) creating the necessary linking variables to represent the school and school year as a unique identifier.

The true HBAP analytic sample (i.e. uniquely geocoded students school years across 2014-2015 through 2016-2017) was then used to create the counterfactual sample for each school year. First, program codes of the all the options provided to the true HBAP sample were used. A student-level flag was created for each program code that was offered to a student in the original data. For example, if a student had a 'TLE' program option (an option within the Dual Language category), a student-level flag for *TLE* was coded as 1. This was computed across all 30+ program codes for kindergarten and 6th grade. Taking the program code flags, the Program Category flags, and student address, the counterfactual sample was then generated through a simulation of the 3Z algorithm through which students were assigned (a) all schools within their 3Z school zone (i.e. North, East, and West) and (b) all additional schools within 1 mile of their homes. Of note, this simulation included all schools regardless of school type or grades served, which was corrected for later in the simulation process. A final program category flag for General Education Only students was created to represent a case that presented no ELL, Hybrid, or Dual Language program category flags. The counterfactual sample was then split up into separate sub-datasets based on program category eligibility: thus, for kindergarteners there were sub-datasets for ELL-eligible, Hybrid-eligible, Dual Language-eligible, and General Education Only and for 6th graders, there was an additional sub-dataset for AWC-eligible students.

In a parallel process using the Historical Capacity datasets, a wide-format school-level dataset was created for each school year that indicated (a) a flag for every viable program option within that school year, (b) the associated capacity of that program option (i.e. seats available), and (c) the total number of options being offered at that school. In an initial wave of matching, the wide-format dataset was incorporated into the counterfactual choice basket sub-datasets by a many-to-one match for each year and grade such that if the 3Z simulation captured school '1234'

for a student and that school was in the historical capacity dataset of a given school year, the information for all program options offered by that school for that school year was integrated into the student's choice basket. This initial round of matching allowed for the removal of irrelevant schools (e.g. high schools) that were added during the wide sweep of 3Z simulation. The next wave of matching was specific to each sub-dataset. Here, information about the number of seats for each specific program option was retained only if both the student and school had the program code flag: for example, in the Dual Language sub-dataset for 6th graders, if a student had the student-level TLE flag and school '1234' had a viable TLE program option, then that TLE program option was preserved for counterfactual choice basket. If there was not a matching program option at the school, the seat information for the general education program option was preserved.[26] This was repeated across all relevant codes within each Program Category sub-dataset. The sub-datasets were then combined and program options that were duplicates within school and school year were removed.[27]

A.1.3. Measures

Measures of interest were computed across both the true HBAP sample and the 3Z simulated counterfactual sample. *Seat* information was incorporated for the HBAP sample from the affiliated school year Historical Capacity dataset. Seat information for the counterfactual is reviewed above. Next, the choice basket dataset was aggregated on the school program code within school year to incorporate the number of times an option was *Offered* in the HBAP and the counterfactual samples. Next, for each option in a choice basket, a *Seat Share* was calculated by dividing the *Seats* available in the lottery that year by the number of times it was *Offered*. Next, school quality information was incorporated from the School-Level Profile dataset and the Seats, Offered, and Seat Share variable were calculated only for Tier 1 options and then only for the top 2 tiers. The complete Choice Basket dataset of a given student was then used to create aggregate variables, including the sum of seat shares within a student, the sum of Tier 1 seat shares within a student, the sum of the top tier seat shares within a student, the number of overall options a family is provided, the number of Tier 1 options a family is provided, and the number of top tier options a family is provided. Total sample and sub-sample

[26] It is important to note that using this process meant that there were no cases in which a student had an ineligible (i.e. non-existent) program option listed in the choice basket, whereas in the true HBAP data there were numerous instances in which an ineligible or non-existent program option was provided in the choice basket

[27] For the AWC sub-dataset, the process of preserving information was slightly different. Students who are AWC eligible are provided both the AWC option at the school as well as the general education option at the school.

frequencies were analyzed across the aggregated dataset generally and in consideration of distance measurements.

A.2. Detailed Tables

The following tables compare the contents of the average choice basket across neighborhood regions (see Section 2.5 for categorization), individual neighborhoods, and races, split by kindergarten (Tables A-1 through A-9) and 6th grade (Tables A-10 through A-18). Contents are described in terms of numbers of schools, seats, and seat shares (based on potential competition for seats; see Chapter 3 and Section A.1 for more detail), and they also provide the same information for the subset of schools within 1.5 miles of the student's home. The tables show the shifts in contents of choice baskets from 3Z (based on a simulation of student choice baskets during the school years of HBAP, see Section 2.2) to HBAP. The contents of these tables are discussed in greater detail in Chapter 3 (all contents of choice basket) and Chapter 4 (schools within 1.5 miles of home).

Table A-1. Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood region.

	Downtown		Semiurban		Southern Core		Wings		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	29	14	28	13	32	15	26	15	30	15
25 Percentile	27	14	26	13	28	14	26	14	26	14
75 Percentile	32	16	29	14	36	17	26	17	32	17
Tier1 - Mean	8	3	6	3	5	2	9	3	7	3
25 Percentile	6	3	7	2	3	2	9	2	4	2
75 Percentile	10	4	7	3	8	2	9	3	9	3
Top Tier - Mean	14	7	14	7	12	6	15	6	13	7
25 Percentile	12	6	14	7	8	6	15	6	9	6
75 Percentile	16	7	15	8	17	7	15	7	15	7
W/in 1.5mi - All tiers - Mean	10	8	9	7	17	12	7	7	12	9
25 Percentile	7	6	5	4	13	10	6	5	8	6
75 Percentile	12	10	11	9	20	14	10	9	17	12
Tier1 - Mean	3	3	2	2	2	2	3	2	2	2
25 Percentile	3	2	1	1	1	1	1	1	1	1
75 Percentile	4	4	3	3	2	2	4	3	3	3
Toptier - Mean	4	4	5	4	5	4	4	4	5	4
25 Percentile	4	3	3	2	4	4	3	3	4	3
75 Percentile	5	5	7	6	7	5	6	5	6	5
Number of Records	1,051	1,062	2,260	2,268	4,203	4,227	1,990	1,991	9,504	9,548

Table A-2. Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood region.

	Downtown		Semiurban		Southern Core		Wings		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1,218	598	1,187	561	1,479	693	1,058	546	1,293	619
25 Percentile	1,087	551	1,078	493	1,337	618	1,013	474	1,098	533
75 Percentile	1,387	655	1,292	633	1,631	787	1,098	641	1,471	700
Tier1 - Mean	337	140	239	110	196	71	380	126	260	100
25 Percentile	273	113	225	73	114	58	361	72	135	60
75 Percentile	403	165	269	139	292	76	397	148	373	131
Toptier - Mean	585	264	546	258	492	261	609	232	540	254
25 Percentile	546	239	521	231	362	231	576	191	392	221
75 Percentile	656	288	600	285	686	298	634	267	634	288
W/in 1.5mi - All tiers - Mean	440	335	367	283	791	546	290	233	546	393
25 Percentile	321	269	235	191	640	444	223	189	317	238
75 Percentile	537	420	476	376	960	649	381	293	789	534
Tier1 - Mean	126	116	89	77	63	54	134	91	91	75
25 Percentile	89	83	38	38	39	39	20	12	39	38
75 Percentile	141	141	139	117	76	75	231	112	135	96
Toptier - Mean	191	167	185	161	220	176	189	142	202	164
25 Percentile	169	149	132	110	177	154	102	100	158	133
75 Percentile	225	207	245	213	266	211	270	166	255	211
Number of Records	1,051	1,062	2,260	2,268	4,203	4,227	1,990	1,991	9,504	9,548

Table A-3. Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood region.

	Downtown		Semiurban		Southern Core		Wings		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.21	1.48	1.21	1.31	1.28	1.32	1.04	1.67	1.20	1.41
25 Percentile	0.71	0.89	0.68	0.83	0.78	0.73	0.65	1.12	0.70	0.83
75 Percentile	1.27	1.88	1.41	1.68	1.58	1.74	1.16	2.17	1.42	1.83
Tier1 - Mean	0.41	0.48	0.26	0.37	0.20	0.14	0.40	0.49	0.28	0.31
25 Percentile	0.24	0.17	0.17	0.19	0.07	0.07	0.24	0.24	0.15	0.08
75 Percentile	0.45	0.69	0.35	0.47	0.24	0.19	0.43	0.68	0.40	0.35
Toptier - Mean	0.68	0.72	0.60	0.73	0.48	0.50	0.65	0.85	0.57	0.65
25 Percentile	0.39	0.29	0.39	0.40	0.20	0.25	0.39	0.50	0.35	0.32
75 Percentile	0.72	0.80	0.82	1.00	0.47	0.60	0.72	1.07	0.72	0.79
W/in 1.5mi - All tiers - Mean	0.45	0.98	0.37	0.80	0.65	1.09	0.33	1.01	0.49	0.99
25 Percentile	0.24	0.57	0.18	0.48	0.39	0.61	0.19	0.62	0.26	0.58
75 Percentile	0.46	1.27	0.45	1.12	0.83	1.47	0.42	1.30	0.59	1.34
Tier1 - Mean	0.20	0.40	0.10	0.24	0.06	0.09	0.14	0.36	0.10	0.22
25 Percentile	0.07	0.16	0.03	0.09	0.02	0.04	0.02	0.10	0.03	0.05
75 Percentile	0.16	0.63	0.12	0.31	0.09	0.11	0.21	0.53	0.12	0.25
Toptier - Mean	0.24	0.50	0.20	0.47	0.20	0.37	0.23	0.57	0.21	0.45
25 Percentile	0.10	0.24	0.12	0.27	0.11	0.18	0.12	0.30	0.11	0.22
75 Percentile	0.22	0.64	0.27	0.64	0.24	0.44	0.28	0.73	0.25	0.58
Number of Records	1,051	1,062	2,260	2,268	4,203	4,227	1,990	1,991	9,504	9,548

Table A-4. Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood.

	Allston/Bri..		Back Bay/ Beacon..		Central		Charlestown		East Boston		Fenway/Ke..		Hyde Park		Jamaica Plain	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	26	14	26	13	26	14	26	14	26	16	32	14	29	13	29	15
25 Percentile	25	14	26	13	26	13	26	14	26	16	29	14	27	13	26	14
75 Percentile	27	15	27	14	27	15	26	14	26	17	35	16	30	14	31	16
Tier1 - Mean	8	2	9	4	9	4	9	5	9	3	10	3	4	3	8	2
25 Percentile	8	2	9	4	9	3	9	5	9	3	10	3	3	3	7	2
75 Percentile	9	2	9	5	9	4	9	5	9	3	10	4	5	3	7	2
Top Tier - Mean	14	6	15	6	14	6	15	7	15	7	17	7	10	7	16	7
25 Percentile	13	6	15	6	15	6	15	7	15	6	16	7	8	6	15	7
75 Percentile	15	6	15	6	15	8	15	8	15	7	18	8	11	7	16	8
W/in 1.5mi - All tiers - Mean	5	5	6	6	7	6	7	6	8	8	12	8	6	5	14	11
25 Percentile	4	4	5	5	5	5	5	5	9	8	8	6	3	3	12	10
75 Percentile	6	6	6	6	9	7	9	7	10	9	17	12	10	7	17	12
Tier1 - Mean	1	1	3	3	4	3	4	3	3	2	3	3	2	1	2	2
25 Percentile	1	1	2	2	3	3	3	3	2	2	2	2	1	1	1	1
75 Percentile	1	1	4	4	4	4	4	4	4	3	3	3	2	2	2	2
Toptier - Mean	3	2	4	4	4	4	5	5	5	4	4	4	2	2	6	5
25 Percentile	2	2	3	3	3	3	4	4	5	4	3	3	1	1	5	5
75 Percentile	3	3	5	5	4	4	6	5	6	5	6	6	3	3	7	6
Number of Records	466	466	53	53	229	231	343	343	1,181	1,182	101	101	569	573	538	540

Table A-4 (cont.). Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood.

	Mattapan		North Dorchester		Roslindale		Roxbury		South Boston		South Dorchester		South End		West Roxbury		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	29	15	35	15	27	13	36	17	31	16	30	14	28	14	26	13	30	15
25 Percentile	28	15	33	15	26	13	33	15	29	15	27	14	27	14	25	13	26	14
75 Percentile	30	17	37	17	28	14	39	19	33	17	31	15	31	15	27	13	32	17
Tier1 - Mean	4	2	5	2	7	3	8	2	5	2	3	2	9	4	7	3	7	3
25 Percentile	3	2	4	2	7	3	7	2	4	2	3	2	9	3	7	3	4	2
75 Percentile	4	2	5	2	7	4	9	3	6	3	3	2	10	4	7	4	9	3
Top Tier - Mean	9	6	11	6	15	7	17	7	11	6	8	6	15	7	15	7	13	7
25 Percentile	8	6	9	6	15	7	16	6	9	6	8	6	15	6	15	7	9	6
75 Percentile	10	7	11	7	15	7	19	8	12	7	8	7	17	7	15	7	15	7
W/in 1.5mi - All tiers - Mean	13	10	17	12	10	7	21	14	10	8	14	10	11	8	5	5	12	9
25 Percentile	11	9	14	11	9	6	19	12	8	6	12	10	9	8	4	3	8	6
75 Percentile	14	12	20	13	11	9	22	17	13	11	17	12	14	10	6	6	17	12
Tier1 - Mean	1	1	2	1	4	3	2	2	2	2	2	2	3	3	2	2	2	2
25 Percentile	1	0	1	1	3	3	2	1	1	0	2	2	3	3	2	2	1	1
75 Percentile	1	1	3	2	4	3	3	2	3	2	2	2	4	4	3	2	3	3
Toptier - Mean	3	3	5	4	7	5	7	5	4	3	5	4	5	4	4	4	5	4
25 Percentile	3	2	4	4	6	5	6	5	2	1	5	4	4	4	3	3	4	3
75 Percentile	4	4	6	5	8	6	8	6	5	4	6	5	6	5	5	5	6	5
Number of Records	798	814	488	488	618	620	1,603	1,608	239	248	1,314	1,317	429	429	535	535	9,504	9,548

Table A-5. Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood.

	Allston/Brig..		Back Bay/Beacon ..		Central		Charlestown		East Boston		Fenway/Ken..		Hyde Park		Jamaica Plain	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1,056	516	1,079	605	1,076	581	1,061	629	1,058	533	1,266	582	1,329	536	1,212	612
25 Percentile	1,043	486	1,028	574	1,056	511	998	601	1,011	457	1,108	548	1,201	468	1,092	564
75 Percentile	1,098	605	1,120	632	1,138	638	1,098	669	1,098	641	1,428	629	1,401	607	1,346	676
Tier1 - Mean	366	42	389	210	376	200	385	281	384	113	409	110	152	111	294	60
25 Percentile	361	31	361	147	361	165	361	275	372	83	403	77	114	96	262	42
75 Percentile	373	55	398	231	397	259	397	295	397	132	420	135	171	139	269	66
Toptier - Mean	577	191	625	276	605	290	622	346	617	214	682	276	414	241	635	282
25 Percentile	567	166	617	253	617	272	617	349	617	174	639	248	340	216	587	263
75 Percentile	617	221	634	309	634	317	634	354	634	250	722	311	467	261	654	322
W/in 1.5mi - All tiers - Mean	188	174	305	289	355	286	323	285	321	241	497	346	285	208	588	423
25 Percentile	163	135	290	255	269	228	256	238	296	217	314	269	148	140	500	365
75 Percentile	223	223	336	320	441	367	400	337	406	293	727	460	401	272	710	490
Tier1 - Mean	9	9	167	167	204	178	219	212	159	87	79	78	51	50	50	42
25 Percentile	11	11	105	105	159	151	201	201	95	73	47	47	36	36	22	22
75 Percentile	11	11	231	231	259	254	237	237	232	96	105	105	58	58	66	64
Toptier - Mean	84	75	195	197	231	201	259	250	211	136	174	160	82	77	225	199
25 Percentile	58	54	137	159	165	156	234	234	166	111	140	118	38	38	191	175
75 Percentile	102	100	259	259	259	259	275	271	286	161	212	207	137	126	251	233
Number of Records	466	466	53	53	229	231	343	343	1,181	1,182	101	101	569	573	538	540

Table A-5 (cont.). Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood.

	Mattapan		North Dorchester		Roslindale		Roxbury		South Boston		South Dorchester		South End		West Roxbury		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1,343	666	1,642	663	1,136	555	1,556	756	1,480	636	1,408	642	1,153	588	1,070	544	1,293	619
25 Percentile	1,219	597	1,501	641	1,076	480	1,435	659	1,387	597	1,234	568	1,102	557	980	493	1,098	533
75 Percentile	1,445	761	1,805	726	1,222	633	1,721	872	1,625	707	1,534	722	1,288	653	1,113	596	1,471	700
Tier1 - Mean	138	80	198	65	257	130	288	66	186	95	117	73	378	130	256	137	260	100
25 Percentile	113	60	143	55	262	117	262	52	144	88	113	75	383	113	262	102	135	60
75 Percentile	158	83	166	69	269	154	338	77	227	113	114	76	419	141	269	169	373	131
Toptier - Mean	390	253	482	258	570	238	660	264	462	240	353	263	616	260	568	273	540	254
25 Percentile	343	222	395	237	524	212	625	230	395	221	321	239	625	247	524	261	392	221
75 Percentile	423	301	485	288	600	260	760	298	521	267	379	310	683	280	600	287	634	288
W/in 1.5mi - All tiers - Mean	616	452	805	535	376	295	949	643	440	331	699	489	488	368	221	208	546	393
25 Percentile	516	398	694	474	316	235	877	523	328	221	561	403	381	333	176	175	317	238
75 Percentile	708	552	933	627	433	366	1,028	779	537	438	846	582	616	455	277	242	789	534
Tier1 - Mean	33	32	64	49	151	120	66	55	71	62	76	68	121	116	97	90	91	75
25 Percentile	22	22	30	30	137	101	52	39	30	0	75	59	113	113	58	58	39	38
75 Percentile	39	39	105	69	183	139	90	66	113	89	76	76	135	135	103	103	135	96
Toptier - Mean	145	135	216	172	250	197	256	194	155	121	224	181	194	174	180	168	202	164
25 Percentile	119	105	186	150	213	177	221	167	94	59	188	158	185	171	132	125	158	133
75 Percentile	163	163	250	208	277	217	293	222	203	178	249	211	225	201	221	212	255	211
Number of Records	798	814	488	488	618	620	1,603	1,608	239	248	1,314	1,317	429	429	535	535	9,504	9,548

Table A-6. Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood.

	Allston/Bright..		Back Bay/Beacon Hill		Central		Charlestown		East Boston		Fenway/Kenm..		Hyde Park		Jamaica Plain	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.09	1.96	0.91	1.47	1.48	1.87	1.00	1.76	1.03	1.52	1.34	1.24	1.23	1.28	1.49	1.26
25 Percentile	0.67	1.27	0.66	0.86	0.68	1.18	0.65	1.12	0.65	0.96	0.87	0.69	0.68	0.85	0.68	0.71
75 Percentile	1.21	2.46	1.12	1.97	1.21	2.40	1.16	2.33	1.16	1.86	1.62	1.44	1.39	1.67	1.44	1.65
Tier1 - Mean	0.39	0.22	0.34	0.76	0.75	0.96	0.40	1.15	0.40	0.41	0.41	0.30	0.15	0.35	0.37	0.20
25 Percentile	0.23	0.09	0.24	0.32	0.24	0.71	0.24	0.79	0.24	0.28	0.26	0.08	0.07	0.20	0.17	0.06
75 Percentile	0.43	0.24	0.43	1.07	0.43	1.24	0.43	1.56	0.45	0.57	0.47	0.41	0.17	0.44	0.41	0.20
Toptier - Mean	0.64	0.73	0.56	0.89	1.07	1.25	0.63	1.32	0.66	0.76	0.76	0.64	0.41	0.70	0.79	0.64
25 Percentile	0.35	0.42	0.39	0.38	0.39	0.77	0.39	0.84	0.39	0.51	0.45	0.30	0.20	0.45	0.39	0.36
75 Percentile	0.72	1.06	0.72	1.27	0.72	1.59	0.72	1.69	0.72	0.92	0.95	0.73	0.40	0.93	0.88	0.79
W/in 1.5mi - All tiers - Mean	0.23	1.04	0.25	0.82	0.69	1.18	0.34	1.14	0.37	0.95	0.48	0.77	0.24	0.61	0.63	1.00
25 Percentile	0.14	0.78	0.18	0.40	0.21	0.94	0.25	0.85	0.23	0.59	0.27	0.47	0.14	0.34	0.34	0.62
75 Percentile	0.25	1.48	0.33	1.24	0.39	1.58	0.45	1.45	0.49	1.24	0.71	1.01	0.31	0.77	0.67	1.38
Tier1 - Mean	0.01	0.06	0.15	0.60	0.54	0.85	0.22	0.91	0.18	0.32	0.08	0.21	0.05	0.15	0.09	0.11
25 Percentile	0.01	0.00	0.08	0.18	0.16	0.64	0.15	0.68	0.08	0.21	0.04	0.05	0.02	0.04	0.01	0.02
75 Percentile	0.01	0.10	0.23	0.96	0.19	1.21	0.26	1.18	0.23	0.41	0.09	0.20	0.05	0.20	0.09	0.19
Toptier - Mean	0.13	0.32	0.17	0.67	0.56	0.90	0.27	1.04	0.25	0.53	0.17	0.38	0.08	0.23	0.26	0.47
25 Percentile	0.07	0.12	0.10	0.24	0.16	0.71	0.18	0.73	0.15	0.32	0.09	0.21	0.02	0.07	0.14	0.29
75 Percentile	0.13	0.55	0.28	1.16	0.25	1.24	0.34	1.30	0.28	0.62	0.21	0.52	0.11	0.31	0.29	0.62
Number of Records	466	466	53	53	229	231	343	343	1,181	1,182	101	101	569	573	538	540

Table A-6 (cont.). Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for kindergarten students, by neighborhood.

	Mattapan		North Dorchester		Roslindale		Roxbury		South Boston		South Dorchester		South End		West Roxbury		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.10	1.35	1.31	1.34	1.07	1.24	1.50	1.45	1.16	1.68	1.11	1.15	1.10	1.20	1.05	1.46	1.20	1.41
25 Percentile	0.69	0.86	0.85	0.61	0.70	0.77	0.89	0.85	0.79	0.98	0.69	0.65	0.73	0.76	0.65	0.89	0.70	0.83
75 Percentile	1.41	1.73	1.64	1.87	1.46	1.55	1.81	1.90	1.58	2.34	1.40	1.57	1.25	1.43	1.37	2.00	1.42	1.83
Tier1 - Mean	0.14	0.14	0.19	0.10	0.26	0.38	0.31	0.14	0.18	0.27	0.12	0.14	0.36	0.36	0.27	0.57	0.28	0.31
25 Percentile	0.06	0.08	0.07	0.05	0.17	0.20	0.19	0.04	0.09	0.13	0.06	0.08	0.26	0.18	0.17	0.27	0.15	0.08
75 Percentile	0.17	0.17	0.24	0.13	0.35	0.47	0.43	0.18	0.24	0.27	0.15	0.21	0.45	0.41	0.38	0.79	0.40	0.35
Toptier - Mean	0.34	0.48	0.41	0.48	0.60	0.67	0.73	0.50	0.38	0.49	0.29	0.50	0.63	0.57	0.62	0.95	0.57	0.65
25 Percentile	0.19	0.27	0.22	0.22	0.39	0.34	0.43	0.25	0.24	0.25	0.19	0.27	0.41	0.29	0.39	0.53	0.35	0.32
75 Percentile	0.42	0.53	0.44	0.61	0.82	0.84	0.95	0.62	0.49	0.55	0.37	0.61	0.74	0.65	0.88	1.34	0.72	0.79
W/in 1.5mi - All tiers - Mean	0.50	1.04	0.59	1.12	0.36	0.84	0.83	1.22	0.35	1.15	0.55	0.94	0.40	0.84	0.24	0.74	0.49	0.99
25 Percentile	0.35	0.69	0.37	0.56	0.24	0.50	0.48	0.78	0.23	0.68	0.35	0.54	0.28	0.56	0.15	0.49	0.26	0.58
75 Percentile	0.65	1.41	0.76	1.69	0.51	1.20	0.97	1.65	0.47	1.74	0.73	1.36	0.46	1.08	0.35	1.08	0.59	1.34
Tier1 - Mean	0.03	0.04	0.05	0.07	0.15	0.34	0.07	0.09	0.08	0.15	0.08	0.13	0.11	0.31	0.11	0.36	0.10	0.22
25 Percentile	0.02	0.00	0.02	0.02	0.09	0.20	0.02	0.04	0.02	0.00	0.04	0.08	0.08	0.18	0.06	0.19	0.03	0.05
75 Percentile	0.04	0.07	0.05	0.07	0.18	0.47	0.09	0.11	0.09	0.26	0.10	0.21	0.16	0.41	0.17	0.62	0.12	0.25
Toptier - Mean	0.13	0.30	0.16	0.37	0.26	0.57	0.26	0.38	0.13	0.28	0.19	0.39	0.16	0.42	0.21	0.61	0.21	0.45
25 Percentile	0.08	0.16	0.09	0.19	0.16	0.31	0.13	0.19	0.07	0.07	0.12	0.21	0.10	0.24	0.12	0.36	0.11	0.22
75 Percentile	0.16	0.38	0.21	0.47	0.33	0.74	0.29	0.48	0.20	0.42	0.22	0.48	0.22	0.57	0.28	0.75	0.25	0.58
Number of Records	798	814	488	488	618	620	1,603	1,608	239	248	1,314	1,317	429	429	535	535	9,504	9,548

Table A-7. Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for kindergarten students, by race.

	Asian		Black		Hispanic		Native American		Other		White		All Races	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	28	14	31	15	30	15	32	15	28	14	27	14	30	15
25 Percentile	26	14	28	14	26	14	27	14	26	13	26	13	26	14
75 Percentile	30	16	35	16	33	17	36	17	29	16	27	15	32	17
Tier1 - Mean	6	3	6	2	7	3	6	2	7	3	7	3	7	3
25 Percentile	3	2	3	2	5	2	4	2	7	2	7	2	4	2
75 Percentile	9	3	8	3	9	3	9	3	9	3	9	4	9	3
Top Tier - Mean	12	7	12	6	14	7	14	7	14	7	13	7	13	7
25 Percentile	8	6	8	6	11	6	9	6	13	6	13	6	9	6
75 Percentile	15	8	16	7	15	7	17	8	15	7	15	7	15	7
W/in 1.5mi - All tiers - Mean	10	8	14	10	12	9	16	11	10	8	8	7	12	9
25 Percentile	6	5	10	7	9	7	12	10	6	5	5	5	8	6
75 Percentile	13	11	19	13	17	12	21	13	13	11	10	9	17	12
Tier1 - Mean	2	2	2	2	2	2	2	2	2	2	2	2	2	2
25 Percentile	2	1	1	1	1	1	2	1	1	1	2	1	1	1
75 Percentile	3	3	3	2	3	3	3	2	3	3	3	3	3	3
Toptier - Mean	5	4	5	4	5	4	6	5	5	4	5	4	5	4
25 Percentile	3	3	4	3	4	3	4	4	4	3	3	3	4	3
75 Percentile	6	5	6	5	6	5	7	6	6	5	6	5	6	5
Number of Records	746	748	3,159	3,174	3,742	3,766	29	29	209	210	1,619	1,621	9,504	9,548

Table A-8. Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for kindergarten students, by race.

	Asian		Black		Hispanic		Native American		Other		White		All Race	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1,237	548	1,403	674	1,274	598	1,405	673	1,180	609	1,158	599	1,293	619
25 Percentile	1,086	491	1,213	593	1,086	494	1,150	579	1,046	537	1,050	545	1,098	533
75 Percentile	1,387	628	1,581	768	1,454	684	1,562	785	1,263	667	1,204	667	1,471	700
Tier1 - Mean	265	105	220	88	286	96	251	82	278	111	275	127	260	100
25 Percentile	114	59	114	60	171	60	143	61	225	59	225	75	135	60
75 Percentile	381	152	299	96	397	131	330	99	373	141	372	169	373	131
Toptier - Mean	513	246	510	262	567	244	552	261	551	259	544	265	540	254
25 Percentile	379	206	379	231	468	212	417	233	521	227	521	232	392	221
75 Percentile	625	296	648	298	634	280	695	286	625	288	617	303	634	288
W/in 1.5mi - All tiers - Mean	465	326	670	483	546	377	731	523	447	353	353	292	546	393
25 Percentile	269	223	443	337	340	236	574	400	259	223	223	198	317	238
75 Percentile	649	414	912	616	795	504	960	662	611	461	441	377	789	534
Tier1 - Mean	94	82	72	63	99	72	78	65	97	85	109	95	91	75
25 Percentile	48	37	38	38	39	38	44	43	38	38	42	42	39	38
75 Percentile	135	122	91	76	141	95	90	77	139	117	169	139	135	96
Toptier - Mean	193	155	203	169	208	159	231	185	200	172	192	170	202	164
25 Percentile	159	108	155	144	166	132	199	159	159	139	134	120	158	133
75 Percentile	234	205	258	211	258	201	286	227	250	212	244	221	255	211
Number of Records	746	748	3,159	3,174	3,742	3,766	29	29	209	210	1,619	1,621	9,504	9,548

Table A-9. Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for kindergarten students, by race.

	Asian		Black		Hispanic		Native American		Other		White		All Race	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.35	1.72	1.17	1.24	1.28	1.52	1.28	1.44	1.19	1.49	1.03	1.34	1.20	1.41
25 Percentile	0.68	0.94	0.73	0.77	0.70	0.88	0.82	0.82	0.70	0.86	0.65	0.84	0.70	0.83
75 Percentile	1.37	2.28	1.47	1.67	1.47	1.87	1.62	2.02	1.43	1.95	1.36	1.84	1.42	1.83
Tier1 - Mean	0.43	0.55	0.21	0.20	0.32	0.32	0.24	0.18	0.30	0.38	0.27	0.41	0.28	0.32
25 Percentile	0.14	0.13	0.09	0.08	0.17	0.11	0.15	0.08	0.17	0.13	0.17	0.16	0.15	0.08
75 Percentile	0.43	0.85	0.26	0.23	0.42	0.36	0.40	0.23	0.41	0.47	0.40	0.55	0.40	0.35
Toptier - Mean	0.70	1.00	0.47	0.52	0.64	0.71	0.53	0.66	0.61	0.72	0.53	0.70	0.57	0.67
25 Percentile	0.34	0.42	0.22	0.29	0.39	0.36	0.35	0.29	0.39	0.39	0.39	0.39	0.35	0.33
75 Percentile	0.72	1.48	0.50	0.62	0.72	0.84	0.60	0.63	0.82	0.91	0.72	0.89	0.72	0.81
W/in 1.5mi - All tiers - Mean	0.53	1.13	0.53	0.97	0.54	1.07	0.61	1.24	0.44	1.02	0.32	0.85	0.49	1.00
25 Percentile	0.24	0.62	0.32	0.58	0.27	0.61	0.35	0.68	0.24	0.62	0.18	0.52	0.26	0.59
75 Percentile	0.55	1.58	0.68	1.34	0.63	1.37	0.79	1.86	0.55	1.34	0.43	1.17	0.59	1.34
Tier1 - Mean	0.21	0.38	0.07	0.14	0.11	0.23	0.07	0.13	0.10	0.28	0.11	0.31	0.10	0.23
25 Percentile	0.03	0.08	0.02	0.04	0.03	0.06	0.03	0.05	0.04	0.07	0.04	0.08	0.03	0.05
75 Percentile	0.13	0.66	0.09	0.19	0.15	0.30	0.09	0.20	0.15	0.35	0.15	0.41	0.12	0.26
Toptier - Mean	0.29	0.66	0.17	0.37	0.24	0.49	0.20	0.55	0.21	0.52	0.19	0.50	0.21	0.46
25 Percentile	0.10	0.28	0.10	0.19	0.12	0.25	0.13	0.24	0.12	0.28	0.11	0.28	0.11	0.24
75 Percentile	0.24	1.07	0.22	0.46	0.28	0.61	0.28	0.52	0.28	0.67	0.26	0.66	0.25	0.60
Number of Records	746	748	3,159	3,174	3,742	3,766	29	29	209	210	1,619	1,621	9,504	9,548

Table A-10. Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood region.

	Downtown		Semiurban		Southern Core		Wings		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	13	14	15	13	15	14	12	12	14	13
25 Percentile	10	12	12	11	12	13	13	10	12	11
75 Percentile	16	17	16	16	19	16	13	14	16	16
Tier1 - Mean	3	2	2	1	2	1	4	2	3	1
25 Percentile	2	1	0	0	2	1	4	1	2	1
75 Percentile	5	2	2	2	2	2	4	2	4	2
Top Tier - Mean	8	6	6	5	5	5	9	5	7	5
25 Percentile	6	5	4	4	4	4	9	4	4	4
75 Percentile	10	7	7	6	8	6	9	6	9	6
W/in 1.5mi - All tiers - Mean	5	5	3	3	8	7	3	3	6	5
25 Percentile	4	4	2	2	6	5	2	2	3	3
75 Percentile	6	7	5	5	10	9	4	4	9	7
Tier1 - Mean	1	1	0	1	0	0	1	1	1	1
25 Percentile	0	0	0	0	0	0	0	0	0	0
75 Percentile	1	1	1	1	1	1	2	1	1	1
Toptier - Mean	3	3	2	2	2	2	2	2	2	2
25 Percentile	2	2	1	1	1	1	2	1	1	1
75 Percentile	4	4	2	3	3	2	3	3	3	3
Number of Records	685	697	1,344	1,356	2,785	2,798	1,321	1,344	6,135	6,195

Table A-11. Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood region.

	Downtown		Semiurban		Southern Core		Wings		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	740	849	741	771	865	857	676	766	783	816
25 Percentile	552	743	596	695	737	800	701	707	676	727
75 Percentile	924	972	848	897	982	975	767	948	915	948
Tier1 - Mean	163	90	93	86	145	99	187	125	145	101
25 Percentile	130	10	0	0	130	10	174	23	112	10
75 Percentile	189	132	130	112	140	141	270	176	174	141
Toptier - Mean	458	381	314	331	325	319	502	336	376	333
25 Percentile	392	331	192	244	288	273	461	308	288	280
75 Percentile	538	442	339	399	383	369	528	408	496	391
W/in 1.5mi - All tiers - Mean	302	327	174	176	427	382	199	185	309	286
25 Percentile	242	281	108	108	333	311	140	136	179	188
75 Percentile	390	412	246	244	530	457	267	237	436	399
Tier1 - Mean	43	58	21	34	37	34	65	51	40	40
25 Percentile	0	0	0	0	0	0	0	0	0	0
75 Percentile	25	35	46	56	84	84	142	104	84	84
Toptier - Mean	178	212	87	103	86	80	143	120	109	109
25 Percentile	136	138	46	52	28	28	112	75	56	46
75 Percentile	273	298	130	140	122	106	189	150	140	145
Number of Records	685	697	1,344	1,356	2,785	2,798	1,321	1,344	6,135	6,195

Table A-12. Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood region.

	Downtown		Semiurban		Southern Core		Wings		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.45	1.99	1.65	1.80	1.57	1.48	1.34	1.83	1.53	1.69
25 Percentile	0.80	0.81	0.75	0.93	0.69	0.64	0.67	1.11	0.71	0.79
75 Percentile	2.08	2.86	2.39	2.51	2.18	2.03	1.77	2.10	2.06	2.19
Tier1 - Mean	0.38	0.43	0.22	0.39	0.30	0.22	0.40	0.47	0.32	0.34
25 Percentile	0.10	0.02	0.00	0.00	0.10	0.02	0.19	0.19	0.10	0.02
75 Percentile	0.65	0.45	0.30	0.49	0.34	0.27	0.67	0.55	0.58	0.50
Toptier - Mean	0.91	1.13	0.78	1.07	0.61	0.54	0.99	1.08	0.76	0.84
25 Percentile	0.53	0.38	0.39	0.43	0.22	0.24	0.49	0.56	0.39	0.31
75 Percentile	1.41	1.64	1.22	1.47	0.73	0.76	1.32	1.32	1.01	1.05
W/in 1.5mi - All tiers - Mean	0.59	1.09	0.44	0.77	0.77	0.83	0.39	0.83	0.59	0.84
25 Percentile	0.27	0.41	0.16	0.34	0.34	0.35	0.21	0.55	0.27	0.37
75 Percentile	0.82	1.67	0.62	1.04	1.10	1.15	0.51	1.04	0.76	1.11
Tier1 - Mean	0.13	0.29	0.05	0.23	0.08	0.11	0.13	0.27	0.09	0.19
25 Percentile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75 Percentile	0.11	0.11	0.04	0.49	0.06	0.13	0.27	0.37	0.08	0.26
Toptier - Mean	0.34	0.67	0.24	0.54	0.17	0.22	0.27	0.58	0.23	0.42
25 Percentile	0.13	0.19	0.04	0.15	0.03	0.02	0.13	0.26	0.06	0.07
75 Percentile	0.51	1.06	0.35	0.79	0.25	0.35	0.36	0.80	0.33	0.55
Number of Records	685	697	1,344	1,356	2,785	2,798	1,321	1,344	6,135	6,195

Table A-13. Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood.

	Allston/Brig..		Back Bay/Beacon ..		Central		Charlestown		East Boston		Fenway/Ken..		Hyde Park		Jamaica Plain	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	12	15	12	14	11	15	11	13	12	11	17	14	12	11	16	16
25 Percentile	8	13	10	13	8	13	8	11	13	10	15	13	11	10	14	14
75 Percentile	13	19	14	17	15	18	13	16	14	12	18	15	13	12	18	19
Tier1 - Mean	3	1	3	2	3	3	3	3	4	2	5	1	2	1	2	1
25 Percentile	0	1	0	1	0	2	4	3	4	1	5	1	2	1	0	0
75 Percentile	4	2	5	4	5	4	4	3	5	2	5	2	2	2	2	1
Top Tier - Mean	9	7	9	6	9	7	9	7	9	4	10	6	4	4	8	7
25 Percentile	8	6	8	6	8	6	8	6	9	3	9	6	4	3	6	6
75 Percentile	9	9	10	7	10	8	9	8	9	5	11	7	5	5	10	8
W/in 1.5mi - All tiers - Mean	4	5	4	4	4	6	4	4	3	2	6	5	2	2	7	7
25 Percentile	4	4	3	3	4	5	2	4	2	2	5	5	1	1	6	6
75 Percentile	5	5	4	6	5	7	5	5	4	3	8	7	2	2	9	9
Tier1 - Mean	1	1	1	2	2	3	2	3	1	1	1	1	1	1	0	0
25 Percentile	0	0	0	1	0	2	2	3	0	0	0	1	0	0	0	0
75 Percentile	1	1	2	3	3	3	3	3	2	1	1	1	1	1	0	0
Toptier - Mean	3	3	3	3	3	5	3	4	2	1	2	2	1	1	3	3
25 Percentile	2	2	2	3	2	4	2	4	1	1	2	1	0	0	2	3
75 Percentile	3	3	3	4	4	6	4	4	3	2	3	3	2	2	4	4
Number of Records	260	263	17	17	111	112	165	166	896	915	66	66	369	375	268	270

Table A-13 (cont.). Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood.

	Mattapan		North Dorchester		Roslindale		Roxbury		South Boston		South Dorchester		South End		West Roxbury		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	13	14	16	14	15	13	18	15	12	14	13	14	14	14	15	14	14	13
25 Percentile	12	13	13	12	14	11	17	14	11	12	12	13	12	13	14	11	12	11
75 Percentile	14	16	17	16	17	15	20	16	13	18	15	15	17	17	16	16	16	16
Tier1 - Mean	2	1	2	1	1	1	2	1	2	1	2	2	4	1	1	2	3	1
25 Percentile	2	1	2	1	0	0	2	0	2	0	2	2	1	1	0	2	2	1
75 Percentile	2	1	3	2	2	1	3	1	3	2	2	2	5	2	2	3	4	2
Top Tier - Mean	4	5	5	5	6	4	8	5	5	5	4	6	9	6	6	6	7	5
25 Percentile	4	4	4	4	4	3	6	4	4	5	4	5	8	6	4	5	4	4
75 Percentile	5	6	5	5	7	5	9	6	6	7	4	6	10	7	7	7	9	6
W/in 1.5mi - All tiers - Mean	7	5	8	6	4	3	10	8	4	4	8	6	5	6	2	3	6	5
25 Percentile	5	4	6	5	2	2	10	7	4	3	6	5	4	5	1	2	3	3
75 Percentile	8	7	10	8	5	4	12	10	5	5	9	7	7	7	2	3	9	7
Tier1 - Mean	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
25 Percentile	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0
75 Percentile	0	0	1	1	0	1	0	0	1	1	1	1	1	1	1	2	1	1
Toptier - Mean	1	1	2	1	2	2	3	2	2	2	2	2	3	3	2	2	2	2
25 Percentile	0	0	2	1	1	1	2	2	1	1	2	1	2	3	1	2	1	1
75 Percentile	2	1	2	2	3	2	3	3	3	3	2	2	4	4	2	3	3	3
Number of Records	550	557	323	324	394	395	1,018	1,022	183	189	894	895	308	313	313	316	6,135	6,195

Table A-14. Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood.

	Allston/Brig..		Back Bay/Beacon ..		Central		Charlestown		East Boston		Fenway/Ken..		Hyde Park		Jamaica Plain	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	635	792	635	887	595	921	628	802	696	752	878	774	769	699	792	828
25 Percentile	450	730	530	820	446	784	450	706	701	707	789	727	737	643	604	749
75 Percentile	711	896	711	998	739	1,066	701	954	777	948	938	878	831	815	928	919
Tier1 - Mean	155	39	134	136	150	185	155	196	203	135	202	69	145	86	100	40
25 Percentile	0	13	0	17	0	35	110	161	174	84	184	10	130	46	0	0
75 Percentile	189	16	199	186	270	327	189	176	296	274	252	101	140	106	112	10
Toptier - Mean	496	365	486	408	496	434	496	448	505	308	528	345	297	294	385	365
25 Percentile	446	339	446	372	426	353	446	433	466	308	496	298	288	206	314	346
75 Percentile	528	423	528	485	545	518	528	517	528	381	561	407	372	350	526	406
W/in 1.5mi - All tiers - Mean	159	173	208	256	263	355	264	274	199	172	298	265	103	94	302	295
25 Percentile	128	138	140	176	224	308	140	273	140	121	258	229	46	50	258	244
75 Percentile	170	223	244	313	308	412	351	301	267	228	344	321	134	134	399	359
Tier1 - Mean	8	10	62	81	91	135	124	165	71	41	23	23	24	30	1	2
25 Percentile	0	13	0	10	0	35	97	161	0	0	0	10	0	0	0	0
75 Percentile	13	13	140	172	161	210	161	176	142	84	10	10	46	50	0	0
Toptier - Mean	117	114	158	187	233	298	221	259	136	96	101	93	60	61	105	120
25 Percentile	90	83	138	142	140	239	140	224	112	20	59	52	0	0	80	87
75 Percentile	127	127	157	239	298	364	273	288	189	137	138	138	112	84	135	152
Number of Records	260	263	17	17	111	112	165	166	896	915	66	66	369	375	268	270

Table A-14 (cont.). Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood.

	Mattapan		North Dorchester		Roslindale		Roxbury		South Boston		South Dorchester		South End		West Roxbury		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	831	814	905	856	731	738	928	853	761	862	799	887	757	829	679	844	783	816
25 Percentile	779	728	659	794	604	655	873	801	666	745	607	800	614	711	596	729	676	727
75 Percentile	905	918	1,081	982	848	862	1,049	964	875	964	930	996	960	957	773	935	915	948
Tier1 - Mean	149	84	161	94	71	60	130	52	169	71	154	162	158	68	52	158	145	101
25 Percentile	130	50	130	50	0	0	112	0	130	0	130	134	13	10	0	112	112	10
75 Percentile	134	134	157	141	112	112	147	57	140	109	140	190	184	53	112	282	174	141
Toptier - Mean	296	298	336	302	301	278	400	298	319	358	254	361	510	381	289	413	376	333
25 Percentile	288	225	196	272	192	216	316	270	280	306	144	356	446	354	192	352	288	280
75 Percentile	340	369	344	354	335	328	509	352	404	434	292	376	673	444	335	498	496	391
W/in 1.5mi - All tiers - Mean	349	308	450	421	198	183	468	402	306	314	421	391	320	340	115	160	309	286
25 Percentile	271	258	317	311	140	140	411	352	276	282	325	321	242	283	84	112	179	188
75 Percentile	417	399	573	501	248	224	544	464	364	384	521	451	413	439	140	196	436	399
Tier1 - Mean	0	0	48	38	25	24	8	7	35	41	88	83	34	47	28	77	40	40
25 Percentile	0	0	0	0	0	0	0	0	0	0	84	84	0	10	0	56	0	0
75 Percentile	0	0	84	56	0	56	0	0	10	10	84	84	10	10	56	112	84	84
Toptier - Mean	29	26	134	126	95	98	90	80	175	192	100	95	177	217	95	142	109	109
25 Percentile	0	0	84	38	52	52	28	28	140	145	97	84	136	138	76	112	56	46
75 Percentile	65	46	193	193	164	112	132	118	254	236	112	106	283	337	112	168	140	145
Number of Records	550	557	323	324	394	395	1,018	1,022	183	189	894	895	308	313	313	316	6,135	6,195

Table A-15. Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood.

	Allston/Bright..		Back Bay/Beacon Hill		Central		Charlestown		East Boston		Fenway/Kenm..		Hyde Park		Jamaica Plain	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.24	2.63	1.40	2.61	1.53	2.76	1.17	2.04	1.40	1.57	1.74	1.78	1.40	1.69	1.68	1.63
25 Percentile	0.67	1.14	0.76	1.39	0.84	1.46	0.67	1.11	0.67	0.90	0.88	0.88	0.62	0.84	0.83	0.74
75 Percentile	1.66	3.61	1.79	3.80	1.76	3.78	1.60	2.75	1.77	1.82	2.36	2.57	2.09	2.44	2.39	2.31
Tier1 - Mean	0.32	0.24	0.32	0.71	0.52	1.14	0.31	1.02	0.44	0.43	0.46	0.25	0.30	0.44	0.24	0.11
25 Percentile	0.00	0.08	0.00	0.05	0.00	0.11	0.19	0.70	0.19	0.28	0.22	0.02	0.10	0.16	0.00	0.00
75 Percentile	0.56	0.23	0.69	1.12	0.88	1.39	0.56	1.03	0.70	0.53	0.69	0.36	0.34	0.53	0.22	0.09
Toptier - Mean	0.98	1.53	1.13	1.61	1.28	1.91	0.93	1.64	1.00	0.85	1.08	1.07	0.57	1.04	0.88	0.79
25 Percentile	0.49	0.64	0.53	0.85	0.76	1.00	0.49	1.01	0.49	0.56	0.54	0.47	0.22	0.58	0.40	0.34
75 Percentile	1.32	1.90	1.52	2.35	1.52	2.45	1.32	1.97	1.32	0.95	1.45	1.57	0.69	1.48	1.38	1.09
W/in 1.5mi - All tiers - Mean	0.32	1.12	0.46	1.04	0.63	1.69	0.47	1.36	0.39	0.65	0.52	0.81	0.25	0.53	0.59	0.88
25 Percentile	0.16	0.63	0.24	0.41	0.33	0.73	0.28	0.96	0.21	0.47	0.29	0.37	0.04	0.26	0.34	0.46
75 Percentile	0.48	1.24	0.54	1.49	0.87	2.67	0.43	1.95	0.57	0.93	0.68	1.27	0.26	0.72	0.89	1.16
Tier1 - Mean	0.01	0.11	0.15	0.47	0.27	0.84	0.23	0.97	0.15	0.19	0.07	0.15	0.04	0.23	0.00	0.01
25 Percentile	0.00	0.00	0.00	0.02	0.00	0.11	0.18	0.70	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
75 Percentile	0.01	0.23	0.24	1.03	0.51	1.35	0.36	1.03	0.28	0.37	0.11	0.08	0.04	0.26	0.00	0.00
Toptier - Mean	0.24	0.72	0.37	0.96	0.54	1.35	0.37	1.31	0.26	0.41	0.20	0.40	0.14	0.42	0.23	0.40
25 Percentile	0.12	0.35	0.24	0.29	0.33	0.73	0.28	0.96	0.13	0.26	0.08	0.08	0.00	0.00	0.13	0.21
75 Percentile	0.29	0.95	0.53	1.32	0.65	2.07	0.41	1.74	0.36	0.61	0.30	0.58	0.13	0.54	0.35	0.52
Number of Records	260	263	17	17	111	112	165	166	896	915	66	66	369	375	268	270

Table A-15 (cont.). Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for 6th grade students, by neighborhood.

	Mattapan		North Dorchester		Roslindale		Roxbury		South Boston		South Dorchester		South End		West Roxbury		All	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.38	1.46	1.59	1.45	1.75	1.61	1.73	1.47	1.32	1.99	1.50	1.52	1.43	1.73	1.79	2.31	1.53	1.69
25 Percentile	0.58	0.62	0.73	0.59	0.77	0.76	0.83	0.65	0.61	0.81	0.63	0.65	0.85	0.65	0.75	1.18	0.71	0.79
75 Percentile	2.04	1.93	2.18	1.99	2.39	2.19	2.67	2.04	2.06	2.86	2.18	2.01	2.10	2.64	2.39	3.28	2.06	2.19
Tier1 - Mean	0.28	0.15	0.34	0.24	0.21	0.21	0.30	0.10	0.37	0.27	0.32	0.39	0.32	0.30	0.14	0.81	0.32	0.34
25 Percentile	0.10	0.05	0.10	0.05	0.00	0.00	0.15	0.00	0.10	0.00	0.10	0.18	0.01	0.02	0.00	0.49	0.10	0.02
75 Percentile	0.30	0.16	0.58	0.44	0.15	0.28	0.56	0.16	0.58	0.23	0.34	0.58	0.56	0.21	0.15	1.16	0.58	0.50
Toptier - Mean	0.51	0.47	0.58	0.50	0.84	0.80	0.81	0.51	0.57	0.83	0.45	0.62	0.93	1.02	0.88	1.66	0.76	0.84
25 Percentile	0.22	0.15	0.25	0.17	0.40	0.28	0.40	0.20	0.27	0.33	0.22	0.28	0.53	0.38	0.40	0.83	0.39	0.31
75 Percentile	0.69	0.69	0.73	0.71	1.38	1.25	1.33	0.69	0.81	1.16	0.69	0.77	1.45	1.48	1.38	2.44	1.01	1.05
W/in 1.5mi - All tiers - Mean	0.60	0.69	0.77	0.88	0.57	0.78	0.79	0.88	0.52	1.03	0.84	0.82	0.64	0.96	0.36	0.94	0.59	0.84
25 Percentile	0.27	0.26	0.36	0.37	0.24	0.31	0.35	0.37	0.23	0.41	0.32	0.34	0.31	0.41	0.08	0.49	0.27	0.37
75 Percentile	0.85	0.93	1.13	1.18	0.89	1.18	1.27	1.25	0.82	1.62	1.10	1.15	0.88	1.46	0.48	1.26	0.76	1.11
Tier1 - Mean	0.00	0.00	0.12	0.10	0.07	0.15	0.03	0.02	0.10	0.11	0.18	0.28	0.11	0.22	0.08	0.50	0.09	0.19
25 Percentile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.13	0.00	0.00	0.00	0.28	0.00	0.00
75 Percentile	0.00	0.00	0.17	0.13	0.00	0.21	0.00	0.00	0.03	0.02	0.21	0.42	0.03	0.02	0.08	0.97	0.08	0.26
Toptier - Mean	0.07	0.08	0.23	0.20	0.29	0.47	0.17	0.21	0.29	0.34	0.21	0.32	0.33	0.65	0.29	0.88	0.23	0.42
25 Percentile	0.00	0.00	0.07	0.05	0.07	0.11	0.05	0.02	0.11	0.11	0.07	0.13	0.13	0.29	0.08	0.49	0.06	0.07
75 Percentile	0.07	0.13	0.34	0.32	0.44	0.73	0.20	0.29	0.49	0.37	0.27	0.52	0.42	1.06	0.46	1.00	0.33	0.55
Number of Records	550	557	323	324	394	395	1,018	1,022	183	189	894	895	308	313	313	316	6,135	6,195

Table A-16. Average, 25th percentile, and 75th percentile of number of schools in choice baskets under 3Z and HBAP for 6th grade students, by race.

	Asian		Black		Hispanic		Native American		Other		White		All Races	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	13	15	15	13	15	13	15	14	14	15	13	15	14	13
25 Percentile	10	13	13	11	13	11	13	12	12	12	11	12	12	11
75 Percentile	15	19	18	15	17	15	18	16	16	18	14	17	16	16
Tier1 - Mean	2	2	2	1	3	1	2	1	2	1	2	2	3	1
25 Percentile	2	1	2	0	2	1	2	1	0	0	0	1	2	1
75 Percentile	3	3	3	2	4	2	3	2	2	2	3	2	4	2
Top Tier - Mean	6	6	6	5	7	5	7	5	6	6	6	6	7	5
25 Percentile	4	5	4	4	5	4	4	4	4	5	4	5	4	4
75 Percentile	8	8	8	6	9	6	9	6	8	8	8	7	9	6
W/in 1.5mi - All tiers - Mean	5	6	7	6	6	5	7	6	5	6	4	4	6	5
25 Percentile	3	4	5	3	3	2	5	4	4	4	2	2	3	3
75 Percentile	7	7	10	8	9	7	9	8	8	8	5	6	9	7
Tier1 - Mean	1	1	0	0	1	1	1	1	1	1	1	1	1	1
25 Percentile	0	1	0	0	0	0	0	0	0	0	0	0	0	0
75 Percentile	2	2	1	1	1	1	1	1	1	1	1	2	1	1
Toptier - Mean	2	3	2	2	2	2	2	2	2	3	2	2	2	2
25 Percentile	2	2	1	1	2	1	2	1	2	1	1	1	1	1
75 Percentile	2	4	3	2	3	3	3	3	2	4	2	3	3	3
Number of Records	570	573	1,897	1,906	2,642	2,688	24	24	86	87	916	917	6,135	6,195

Table A-17. Average, 25th percentile, and 75th percentile of number of seats in choice baskets under 3Z and HBAP for 6th grade students, by race.

	Asian		Black		Hispanic		Native American		Other		White		All Race	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.35	1.72	1.17	1.24	1.28	1.52	1.28	1.44	1.19	1.49	1.03	1.34	1.20	1.41
25 Percentile	0.68	0.94	0.73	0.77	0.70	0.88	0.82	0.82	0.70	0.86	0.65	0.84	0.70	0.83
75 Percentile	1.37	2.28	1.47	1.67	1.47	1.87	1.62	2.02	1.43	1.95	1.36	1.84	1.42	1.83
Tier1 - Mean	0.43	0.55	0.21	0.20	0.32	0.32	0.24	0.18	0.30	0.38	0.27	0.41	0.28	0.32
25 Percentile	0.14	0.13	0.09	0.08	0.17	0.11	0.15	0.08	0.17	0.13	0.17	0.16	0.15	0.08
75 Percentile	0.43	0.85	0.26	0.23	0.42	0.36	0.40	0.23	0.41	0.47	0.40	0.55	0.40	0.35
Toptier - Mean	0.70	1.00	0.47	0.52	0.64	0.71	0.53	0.66	0.61	0.72	0.53	0.70	0.57	0.67
25 Percentile	0.34	0.42	0.22	0.29	0.39	0.36	0.35	0.29	0.39	0.39	0.39	0.39	0.35	0.33
75 Percentile	0.72	1.48	0.50	0.62	0.72	0.84	0.60	0.63	0.82	0.91	0.72	0.89	0.72	0.81
W/in 1.5mi - All tiers - Mean	0.53	1.13	0.53	0.97	0.54	1.07	0.61	1.24	0.44	1.02	0.32	0.85	0.49	1.00
25 Percentile	0.24	0.62	0.32	0.58	0.27	0.61	0.35	0.68	0.24	0.62	0.18	0.52	0.26	0.59
75 Percentile	0.55	1.58	0.68	1.34	0.63	1.37	0.79	1.86	0.55	1.34	0.43	1.17	0.59	1.34
Tier1 - Mean	0.21	0.38	0.07	0.14	0.11	0.23	0.07	0.13	0.10	0.28	0.11	0.31	0.10	0.23
25 Percentile	0.03	0.08	0.02	0.04	0.03	0.06	0.03	0.05	0.04	0.07	0.04	0.08	0.03	0.05
75 Percentile	0.13	0.66	0.09	0.19	0.15	0.30	0.09	0.20	0.15	0.35	0.15	0.41	0.12	0.26
Toptier - Mean	0.29	0.66	0.17	0.37	0.24	0.49	0.20	0.55	0.21	0.52	0.19	0.50	0.21	0.46
25 Percentile	0.10	0.28	0.10	0.19	0.12	0.25	0.13	0.24	0.12	0.28	0.11	0.28	0.11	0.24
75 Percentile	0.24	1.07	0.22	0.46	0.28	0.61	0.28	0.52	0.28	0.67	0.26	0.66	0.25	0.60
Number of Records	746	748	3,159	3,174	3,742	3,766	29	29	209	210	1,619	1,621	9,504	9,548

Table A-18. Average, 25th percentile, and 75th percentile of number of seat shares in choice baskets under 3Z and HBAP for 6th grade students, by race.

	Asian		Black		Hispanic		Native American		Other		White		All Race	
	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB	3Z	HB
All Schools - All tiers - Mean	1.35	1.72	1.17	1.24	1.28	1.52	1.28	1.44	1.19	1.49	1.03	1.34	1.20	1.41
25 Percentile	0.68	0.94	0.73	0.77	0.70	0.88	0.82	0.82	0.70	0.86	0.65	0.84	0.70	0.83
75 Percentile	1.37	2.28	1.47	1.67	1.47	1.87	1.62	2.02	1.43	1.95	1.36	1.84	1.42	1.83
Tier1 - Mean	0.43	0.55	0.21	0.20	0.32	0.32	0.24	0.18	0.30	0.38	0.27	0.41	0.28	0.32
25 Percentile	0.14	0.13	0.09	0.08	0.17	0.11	0.15	0.08	0.17	0.13	0.17	0.16	0.15	0.08
75 Percentile	0.43	0.85	0.26	0.23	0.42	0.36	0.40	0.23	0.41	0.47	0.40	0.55	0.40	0.35
Toptier - Mean	0.70	1.00	0.47	0.52	0.64	0.71	0.53	0.66	0.61	0.72	0.53	0.70	0.57	0.67
25 Percentile	0.34	0.42	0.22	0.29	0.39	0.36	0.35	0.29	0.39	0.39	0.39	0.39	0.35	0.33
75 Percentile	0.72	1.48	0.50	0.62	0.72	0.84	0.60	0.63	0.82	0.91	0.72	0.89	0.72	0.81
W/in 1.5mi - All tiers - Mean	0.53	1.13	0.53	0.97	0.54	1.07	0.61	1.24	0.44	1.02	0.32	0.85	0.49	1.00
25 Percentile	0.24	0.62	0.32	0.58	0.27	0.61	0.35	0.68	0.24	0.62	0.18	0.52	0.26	0.59
75 Percentile	0.55	1.58	0.68	1.34	0.63	1.37	0.79	1.86	0.55	1.34	0.43	1.17	0.59	1.34
Tier1 - Mean	0.21	0.38	0.07	0.14	0.11	0.23	0.07	0.13	0.10	0.28	0.11	0.31	0.10	0.23
25 Percentile	0.03	0.08	0.02	0.04	0.03	0.06	0.03	0.05	0.04	0.07	0.04	0.08	0.03	0.05
75 Percentile	0.13	0.66	0.09	0.19	0.15	0.30	0.09	0.20	0.15	0.35	0.15	0.41	0.12	0.26
Toptier - Mean	0.29	0.66	0.17	0.37	0.24	0.49	0.20	0.55	0.21	0.52	0.19	0.50	0.21	0.46
25 Percentile	0.10	0.28	0.10	0.19	0.12	0.25	0.13	0.24	0.12	0.28	0.11	0.28	0.11	0.24
75 Percentile	0.24	1.07	0.22	0.46	0.28	0.61	0.28	0.52	0.28	0.67	0.26	0.66	0.25	0.60
Number of Records	746	748	3,159	3,174	3,742	3,766	29	29	209	210	1,619	1,621	9,504	9,548

Appendix B. Equitable Assignment

B.1. Data Preparation

Data for analyses of equitable assignment included variables derived from the BPS Enrollment dataset from school years 2011-2012 through 2016-2017. The BPS Enrollment dataset represents school years within students, such that students appear in the dataset once for every school year they are enrolled in BPS, including students who repeat the previous grade level in a subsequent year. All kindergarten and 6th grade students across the six school years were extracted to create the intended analysis sample. Data preparation for the analysis of equitable assignment included (a) checks for duplicate students within a school year, (b) examining the rates of missingness on key demographic variables and address information, and (c) constructing the school quality variable from the available BPS Tier data for school years 2014-2015 and 2016-2017. The sample was then geocoded and the 90% of students with a home address that could be geocoded to a known address in Boston were retained for the final sample. Total sample and sub-sample frequencies were analyzed across the dataset generally and in consideration of distance measurements.

B.2. Measuring Distance

In our analysis of accessibility, we sought to evaluate whether measuring distance "as the crow flies" is a sufficient proxy for understanding the total effort required for a commute from home to school. We thus compared it to estimated travel times to schools. We estimated the distance and time to travel for a student's home to a particular school using a combination of OpenTripPlanner (OTP) and the Google Maps API. Google Maps provides the estimated travel time and distance for the route between two points taking the least amount of time. Using historical data on average driver speeds and traffic, it is able to estimate these metrics for a specified date and time in the future. The Google Maps API, however, has a limit on the number of queries that can be made per day. OTP generates routes using road networks and similarly provides estimates for shortest travel time and distances between two points. While it has no limit on its API, the shortcoming of OTP is that it does not take traffic into account. Note that these distances and times are of direct routes and do not factor in the circuitous routes traveled by buses, but they should have a similar overall variation.

Running queries for every discrete address in the student data set to every school in the district was unfeasible (millions of pairings), so we took the centroid of every street segment in the city with properties on it (n = 13,048 street segments, based on the merger of U.S. Census TIGER line data with City of Boston

Tax Assessments) and attributed each student to their street of residence. This is an acceptable estimate as the average street segment in Boston is 70 m, meaning the average discrepancy in distance would be ±17.5 m (1/4th of a block), and thus negligible for the interpretations of our analysis. We then created a list of pairs of every street centroid with every BPS school for which we calculated: Euclidean distance (i.e., "as the crow flies"), using GIS tools in R statistical software; and shortest travel by roads was calculated using OTP, using a road network obtained from OpenStreetMap.

To calculate travel time, we combined the metrics obtained via OTP with the Google Maps API. The amount of routes we needed to calculate would have made it infeasible to use the Google Maps API directly due to the rate limits; thus, we simplified our requests to the Google Maps API by only requesting routes between each pairing of census block group centroid and school. These produced both travel time and distance for the shortest route. In order to best simulate the effort of traveling to and from school during rush hour, we set the departure time for all Google Maps queries to 8 am on a Wednesday. We then estimated travel time from each street segment to each school by: (a) taking the ratio between *shortest travel distance-street segment* and *shortest travel distance-census block group*; (b) multiplying that ratio by the *shortest travel time-census block group*, thereby estimating shortest travel time-street segment.

B.2. Detailed Tables and Figures

The tables and figures in this section provide the full results for the three questions asked and answered in Chapter 6: are students attending school closer to home under HBAP?; are they attending higher quality schools under HBAP?; and are they attending high quality schools close to home under HBAP? The first and third questions are addressed with a single set of tables on distance traveled. The second question requires a separate set of figures describing the quality of assignments.

B.2.1. Tables for Distance Traveled

The following tables examine the estimated one-way travel distance (Euclidean distance, or “as the crow flies”) and time (estimated using Google Maps, see Section B.1) to school by students under 3Z and HBAP. The tables show these comparisons across Tier levels (Tables B-1 and B-2) neighborhood regions (see Section 2.5 for categorization; Table B-3), individual neighborhoods (Tables B-4 and B-5), races (Table B-6), poverty status (Table B-7), English Language Learner status (Table B-8), and Special Education status (Table B-9) for both kindergarten and 6th grade.

The same comparisons were then made separating by Tier level (Tables B-10 through B-23. Contents of these tables are discussed in more detail in Chapter 5.

Table B-1. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP, for both kindergarten and 6th grade.

Grade / Quality 1415

	K2						6				
SY	1	2	3	4	NO TIER	ELC	1	2	3	4	NO TIER
SY1314	2,037	2,264	2,263	2,266	2,170	1,993	2,754	3,162	2,526	1,897	5,950
SY1415	1,808 -11.21%	2,033 -10.21%	1,822 -19.52%	1,828 -19.32%	2,105 -3.01%	1,981 -0.61%	2,544 -7.64%	2,918 -7.72%	2,426 -3.96%	2,427 27.89%	5,092 -14.41%

% Difference in Avg. Distance Eu

-19.52% 27.89%

Table B-2. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP, for both kindergarten and 6th grade.

Grade / Quality 1415

	K2						6				
SY	1	2	3	4	NO TIER	ELC	1	2	3	4	NO TIER
SY1314	557	598	656	615	600	625	713	839	717	516	1,613
SY1415	519 -6.78%	560 -6.33%	568 -13.32%	519 -15.64%	582 -3.03%	621 -0.65%	686 -3.74%	800 -4.68%	693 -3.32%	637 23.45%	1,240 -23.15%

% Difference in Avg. Time 8AM

-23.15% 23.45%

Table B-3. Changes in estimated one-way travel distance and time to school (in meters) for each neighborhood region between 3Z and HBAP, for both kindergarten and 6th grade.

		K2				6			
	Policy	Downtown	Semiurban	Southern Core	Wings	Downtown	Semiurban	Southern Core	Wings
Avg. Distance	Pre	2,075	2,596	2,315	1,952	2,526	3,034	2,944	2,639
	Post	1,692	2,149	1,914	1,519	2,194	2,939	2,822	2,477
% Difference in Avg. Distance from the Previou..	Pre								
	Post	-18.48%	-17.23%	-17.34%	-22.18%	-13.15%	-3.14%	-4.13%	-6.13%
Percentile (75) of Distance	Pre	3,035	3,580	3,183	2,446	4,128	3,913	4,201	3,324
	Post	2,187	2,836	2,254	1,914	3,365	4,075	3,748	3,087
% Difference in Percentile (75) of Distance from the P..	Pre								
	Post	-27.93%	-20.79%	-29.20%	-21.73%	-18.49%	4.13%	-10.77%	-7.12%
Avg. Time 8AM	Pre	583	659	640	567	701	772	795	750
	Post	521	559	561	483	649	743	777	715
% Difference in Avg. Time 8AM from the Previous alo..	Pre								
	Post	-10.59%	-15.24%	-12.27%	-14.80%	-7.38%	-3.76%	-2.28%	-4.61%
Percentile (75) of Time 8AM	Pre	847	871	858	683	1,025	1,009	1,089	1,158
	Post	727	671	678	614	901	981	1,032	1,086
% Difference in Percentile (75) of Time 8AM from the ..	Pre								
	Post	-14.17%	-22.96%	-20.98%	-10.07%	-12.12%	-2.75%	-5.28%	-6.22%
Number of Records	Pre	1,272	2,803	5,933	2,570	966	2,116	5,024	1,794
	Post	1,238	2,763	5,620	2,484	1,021	2,063	4,753	1,887

Table B-4. Changes in estimated one-way travel distance (in meters) and time (in seconds) to school for each neighborhood between 3Z and HBAP, for kindergarten.

	Policy	Allston/Br..	Back Bay/ Beacon Hill	Central	Charlesto..	East Boston	Fenway/ Kenmore	Hyde Park	Jamaica Plain
Avg. Distance	Pre	2,082	2,511	1,927	1,504	2,012	2,702	3,390	1,971
	Post	1,805	2,277	1,375	1,287	1,476	2,387	2,723	1,591
% Difference in Avg. Distance from the Previou..	Pre								
	Post	-13.27%	-9.34%	-28.64%	-14.45%	-26.65%	-11.66%	-19.67%	-19.28%
Percentile (75) of Distance	Pre	2,184	3,294	2,816	1,461	2,639	3,831	4,721	2,885
	Post	2,109	2,897	2,052	1,711	1,897	3,102	3,309	2,084
% Difference in Percentile (75) of Distance from the P..	Pre								
	Post	-3.42%	-12.04%	-27.14%	17.07%	-28.11%	-19.01%	-29.90%	-27.78%
Avg. Time 8AM	Pre	538	829	526	515	590	756	750	590
	Post	492	781	462	524	467	706	607	533
% Difference in Avg. Time 8AM from the Previous alo..	Pre								
	Post	-8.44%	-5.71%	-12.31%	1.70%	-20.74%	-6.62%	-19.08%	-9.58%
Percentile (75) of Time 8AM	Pre	625	977	829	811	704	998	948	818
	Post	589	857	707	819	573	885	698	667
% Difference in Percentile (75) of Time 8AM from the ..	Pre								
	Post	-5.76%	-12.31%	-14.72%	1.02%	-18.61%	-11.32%	-26.42%	-18.46%
Number of Records	Pre	577	36	233	386	1,607	129	703	635
	Post	571	52	277	433	1,480	129	747	644

Table B-4 (cont.). Changes in estimated one-way travel distance (in meters) and time (in seconds) for each neighborhood between 3Z and HBAP, for kindergarten.

	Policy	Mattapan	North Dorchester	Roslindale	Roxbury	South Boston	South Dorchester	South End	West Roxbury
Avg. Distance	Pre	2,950	1,954	2,336	2,066	1,776	2,438	2,135	2,794
	Post	2,084	1,701	1,991	1,791	1,812	2,057	1,538	2,257
% Difference in Avg. Distance from the Previou..	Pre								
	Post	-29.34%	-12.96%	-14.73%	-13.33%	2.05%	-15.62%	-27.97%	-19.22%
Percentile (75) of Distance	Pre	4,346	2,637	3,407	2,673	2,418	3,562	3,522	3,596
	Post	2,516	2,128	2,631	2,132	2,311	2,380	1,814	2,929
% Difference in Percentile (75) of Distance from the P..	Pre								
	Post	-42.10%	-19.28%	-22.78%	-20.22%	-4.42%	-33.17%	-48.48%	-18.55%
Avg. Time 8AM	Pre	770	617	651	582	499	654	598	650
	Post	579	580	558	538	519	574	475	531
% Difference in Avg. Time 8AM from the Previous alo..	Pre								
	Post	-24.78%	-5.99%	-14.27%	-7.46%	4.00%	-12.30%	-20.54%	-18.19%
Percentile (75) of Time 8AM	Pre	1,032	808	919	741	629	926	870	786
	Post	675	733	713	652	753	695	610	607
% Difference in Percentile (75) of Time 8AM from the ..	Pre								
	Post	-34.59%	-9.28%	-22.39%	-12.04%	19.75%	-24.97%	-29.86%	-22.77%
Number of Records	Pre	1,034	719	876	2,345	333	1,835	541	589
	Post	961	675	761	2,206	316	1,778	464	611

Table B-5. Changes in estimated one-way travel distance (in meters) and time (in seconds) for each neighborhood between 3Z and HBAP, for 6th grade.

	Policy	Allston/Br..	Back Bay/ Beacon Hill	Central	Charlesto..	East Boston	Fenway/ Kenmore	Hyde Park	Jamaica Plain
Avg. Distance	Pre	2,700	1,617	1,838	1,979	2,790	3,425	4,202	2,851
	Post	2,235	2,819	1,407	1,983	2,698	3,392	3,940	2,421
% Difference in Avg. Distance from the Previou..	Pre								
	Post	-17.24%	74.37%	-23.48%	0.20%	-3.30%	-0.97%	-6.22%	-15.09%
Percentile (75) of Distance	Pre	3,401	2,000	2,969	3,350	3,250	5,241	6,233	4,120
	Post	2,525	3,801	1,684	1,824	3,250	4,843	5,518	3,665
% Difference in Percentile (75) of Distance from the P..	Pre								
	Post	-25.76%	90.01%	-43.29%	-45.56%	0.00%	-7.59%	-11.47%	-11.05%
Avg. Time 8AM	Pre	630	652	639	632	826	901	961	826
	Post	557	819	565	646	795	874	885	725
% Difference in Avg. Time 8AM from the Previous alo..	Pre								
	Post	-11.48%	25.66%	-11.64%	2.23%	-3.68%	-3.00%	-7.90%	-12.20%
Percentile (75) of Time 8AM	Pre	825	747	890	1,257	1,201	1,194	1,336	1,127
	Post	625	962	652	1,007	1,198	1,194	1,078	1,061
% Difference in Percentile (75) of Time 8AM from the ..	Pre								
	Post	-24.24%	28.78%	-26.74%	-19.89%	-0.25%	0.00%	-19.30%	-5.86%
Number of Records	Pre	405	13	128	289	1,100	114	627	463
	Post	454	22	181	289	1,144	101	587	474

Table B-5 (cont.). Changes in estimated one-way travel distance (in meters) and time (in seconds) for each neighborhood between 3Z and HBAP, for 6th grade.

	Policy	Mattapan	North Dorchester	Roslindale	Roxbury	South Boston	South Dorchester	South End	West Roxbury
Avg. Distance	Pre	3,642	2,637	2,576	2,851	2,537	2,825	2,529	2,656
	Post	3,481	2,762	2,682	2,652	2,078	2,666	2,285	2,574
% Difference in Avg. Distance from the Previou..	Pre								
	Post	-4.41%	4.74%	4.13%	-6.98%	-18.10%	-5.60%	-9.65%	-3.11%
Percentile (75) of Distance	Pre	5,535	2,934	3,655	4,156	3,060	3,776	4,492	3,304
	Post	5,395	3,173	3,685	3,559	2,552	3,582	3,766	3,227
% Difference in Percentile (75) of Distance from the P..	Pre								
	Post	-2.53%	8.14%	0.84%	-14.37%	-16.62%	-5.14%	-16.15%	-2.33%
Avg. Time 8AM	Pre	979	754	697	752	570	773	750	619
	Post	938	791	731	723	529	744	696	592
% Difference in Avg. Time 8AM from the Previous alo..	Pre								
	Post	-4.22%	4.88%	4.92%	-3.83%	-7.16%	-3.79%	-7.21%	-4.37%
Percentile (75) of Time 8AM	Pre	1,473	931	920	1,055	756	1,011	1,119	717
	Post	1,385	962	986	983	771	998	946	692
% Difference in Percentile (75) of Time 8AM from the ..	Pre								
	Post	-5.97%	3.33%	7.12%	-6.82%	1.98%	-1.29%	-15.42%	-3.49%
Number of Records	Pre	924	631	611	1,837	288	1,632	423	415
	Post	907	541	590	1,767	270	1,538	447	412

Table B-6. Changes in estimated one-way travel distance (in meters) and time (in seconds) for each race between 3Z and HBAP, for both kindergarten and 6th grade.

		K2				6			
	Policy	Asian/ Asian Am.	Black	Hisp/ Latino	White	Asian/ Asian Am.	Black	Hisp/ Latino	White
Avg. Distance	Pre	2,249	2,503	2,308	1,837	2,539	2,922	2,957	2,177
	Post	1,663	2,030	1,844	1,690	2,177	3,080	2,695	2,328
% Difference in Avg. Distance from the Previous along Pane (Down)	Pre								
	Post	-26.06%	-18.88%	-20.13%	-8.00%	-14.28%	5.41%	-8.87%	6.93%
Percentile (75) of Distance	Pre	3,217	3,635	3,198	2,366	3,509	4,133	4,221	2,772
	Post	2,185	2,404	2,377	2,231	2,816	4,236	3,655	2,968
% Difference in Percentile (75) of Distance from the Previous along Pane (Down)	Pre								
	Post	-32.08%	-33.86%	-25.68%	-5.68%	-19.77%	2.49%	-13.42%	7.09%
Avg. Time 8AM	Pre	628	662	639	515	722	777	815	568
	Post	516	570	543	492	648	818	749	622
% Difference in Avg. Time 8AM from the Previous along Pane (Down)	Pre								
	Post	-17.85%	-13.96%	-15.06%	-4.44%	-10.36%	5.27%	-8.06%	9.43%
Percentile (75) of Time 8AM	Pre	908	888	869	645	951	1,069	1,153	669
	Post	647	688	671	645	823	1,092	1,063	792
% Difference in Percentile (75) of Time 8AM from the Previous along Pane (Down)	Pre								
	Post	-28.71%	-22.52%	-22.74%	0.00%	-13.44%	2.15%	-7.81%	18.34%
Number of Records	Pre	889	3,648	6,111	1,707	869	3,003	4,053	886
	Post	983	4,210	5,198	2,091	961	2,954	4,916	1,180

Table B-7. Changes in estimated one-way travel distance (in meters) and time (in seconds) by poverty status between 3Z and HBAP, for both kindergarten and 6th grade.

		K2		6	
	Policy	0	1	0	1
Avg. Distance	Pre	2,077	2,380	2,621	2,952
	Post	1,675	1,959	2,526	2,765
Percentile (75) of Distance	Pre	2,754	3,327	3,501	4,259
	Post	2,155	2,465	3,152	3,784
% Difference in Percentile (75) of Distance from the ..	Pre				
	Post	-21.75%	-25.90%	-9.96%	-11.16%
Avg. Time 8AM	Pre	578	646	711	795
	Post	496	563	681	762
% Difference in Avg. Time 8AM from the Previous al..	Pre				
	Post	-14.21%	-12.86%	-4.30%	-4.19%
Percentile (75) of Time 8AM	Pre	754	880	1,009	1,126
	Post	629	700	882	1,065
% Difference in Percentile (75) of Time 8AM from th..	Pre				
	Post	-16.58%	-20.45%	-12.59%	-5.42%
Number of Records	Pre	4,240	8,338	2,656	7,244
	Post	4,075	8,030	2,067	7,657

Table B-8. Changes in estimated one-way travel distance (in meters) and time (in seconds) by English Language Learner status between 3Z and HBAP, for both kindergarten and 6th grade.

		K2			6	
	Policy	0	1	Null	0	1
Avg. Distance	Pre	2,274	2,284		2,809	2,971
	Post	1,835	1,910	3,836	2,671	2,831
% Difference in Avg. Distance from the Previou..	Pre					
	Post	-19.32%	-16.39%		-4.90%	-4.73%
Percentile (75) of Distance	Pre	3,059	3,173		3,972	4,220
	Post	2,248	2,518	5,344	3,561	3,851
% Difference in Percentile (75) of Distance from the P..	Pre					
	Post	-26.50%	-20.63%		-10.34%	-8.74%
Avg. Time 8AM	Pre	617	634		754	812
	Post	529	561	914	729	787
% Difference in Avg. Time 8AM from the Previous alo..	Pre					
	Post	-14.34%	-11.54%		-3.25%	-3.16%
Percentile (75) of Time 8AM	Pre	813	865		1,068	1,138
	Post	640	711	1,313	993	1,095
% Difference in Percentile (75) of Time 8AM from the ..	Pre					
	Post	-21.25%	-17.83%		-7.02%	-3.74%
Number of Records	Pre	8,304	4,943		7,305	3,170
	Post	8,063	4,702	5	7,518	2,757

Table B-9. Changes in estimated one-way travel distance (in meters) and time (in seconds) to school by Special Education status between 3Z and HBAP, for both kindergarten and 6th grade.

		K2				6				
	Policy	ELL	GEN ED	SPED	Null	AWC	ELL	GEN ED	SPED	Null
Avg. Distance	Pre	2,344	2,165	3,329		2,578	3,023	2,701	4,115	
	Post	1,739	1,777	2,931	1,097	2,468	2,820	2,533	4,086	3,330
% Difference in Avg. Distance from the Previou..	Pre									
	Post	-25.82%	-17.93%	-11.94%		-4.27%	-6.71%	-6.22%	-0.70%	
Avg. Time 8AM	Pre	652	596	843		695	822	741	1,024	
	Post	529	521	749	425	687	776	707	1,032	995
% Difference in Avg. Time 8AM from the Previous alo..	Pre									
	Post	-18.82%	-12.49%	-11.14%		-1.10%	-5.65%	-4.69%	0.70%	
% Difference in Median Time 8AM from the Previo..	Pre									
	Post	-15.72%	-9.81%	-11.93%		-2.89%	-6.54%	-8.52%	0.82%	
Percentile (75) of Time 8AM	Pre	919	777	1,162		889	1,165	1,057	1,423	
	Post	713	630	991	529	885	1,065	956	1,374	1,355
% Difference in Percentile (75) of Time 8AM from the ..	Pre									
	Post	-22.44%	-18.89%	-14.72%		-0.42%	-8.54%	-9.56%	-3.44%	
Number of Records	Pre	2,769	9,632	846		1,224	807	7,316	1,128	
	Post	1,897	9,846	1,024	3	1,103	653	7,379	1,138	2

Note: ELL students with a SPED designation included under SPED.

Table B-10. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by neighborhood region, for both kindergarten and 6th grade.

Grade / Zones

Quality 1415	SY	K2 Downtown	K2 Semiurban	K2 Southern Core	K2 Wings	6 Downtown	6 Semiurban	6 Southern Core	6 Wings
1	SY1314	1,747	2,007	2,913	1,633	2,848	2,701	3,233	2,220
	SY1415	1,439 -17.6%	1,943 -3.2%	2,602 -10.7%	1,366 -16.3%	2,295 -19.4%	2,401 -11.1%	2,935 -9.2%	2,364 6.5%
2	SY1314	3,396	2,496	2,271	1,795	2,239	3,192	3,769	2,809
	SY1415	3,443 1.4%	2,183 -12.5%	2,149 -5.4%	1,378 -23.2%	2,092 -6.6%	2,946 -7.7%	3,949 4.8%	2,237 -20.4%
3	SY1314	1,398	3,772	2,794	1,500	2,389	2,959	2,413	2,508
	SY1415	1,423 1.8%	2,333 -38.2%	2,345 -16.1%	1,149 -23.4%	1,895 -20.7%	2,571 -13.1%	2,424 0.5%	2,592 3.4%
4	SY1314	1,714	2,641	2,122	5,896	6,420	2,968	1,673	
	SY1415	1,940 13.2%	2,274 -13.9%	1,530 -27.9%	5,592 -5.1%	4,928 -23.2%	3,453 16.4%	1,930 15.3%	7,965
NO TIER	SY1314	2,794	6,159	1,778		1,799	7,184	5,852	8,245
	SY1415	3,520 26.0%	6,061 -1.6%	1,680 -5.5%	2,010	4,864 170.4%	7,609 5.9%	4,636 -20.8%	4,756 -42.3%
ELC	SY1314	4,319	3,609	1,581	1,533				
	SY1415	3,695 -14.4%	2,781 -23.0%	2,048 29.5%	1,534 0.1%				

% Difference in Avg. Distance

-42.3% 170.4%

Table B-11. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by neighborhood region, for both kindergarten and 6th grade.

		Grade / Zones							
		K2				6			
Quality 1415	SY	Downtown	Semiurban	Southern Core	Wings	Downtown	Semiurban	Southern Core	Wings
1	SY1314	538	510	687	534	719	616	730	784
	SY1415	467 -13.2%	515 0.9%	638 -7.2%	478 -10.4%	592 -17.7%	536 -13.0%	681 -6.7%	844 7.7%
2	SY1314	839	626	628	481	713	829	992	708
	SY1415	869 3.5%	569 -9.0%	598 -4.8%	423 -12.1%	668 -6.3%	800 -3.5%	1,041 4.9%	611 -13.7%
3	SY1314	424	939	822	444	601	785	715	690
	SY1415	463 9.2%	630 -32.9%	731 -11.1%	377 -15.1%	513 -14.7%	672 -14.5%	725 1.4%	697 1.0%
4	SY1314	545	683	580	1,485	1,407	709	475	
	SY1415	604 10.8%	587 -14.0%	453 -21.9%	1,484 -0.1%	1,126 -20.0%	883 24.5%	527 11.1%	1,756
NO TIER	SY1314	806	1,361	523		588	1,858	1,628	1,614
	SY1415	931 15.5%	1,347 -1.1%	492 -6.1%	634	1,084 84.4%	1,794 -3.5%	1,175 -27.8%	1,022 -36.7%
ELC	SY1314	1,067	1,035	537	508				
	SY1415	1,029 -3.5%	754 -27.1%	655 22.0%	515 1.3%				

% Difference in Avg. Time 8AM

-36.7% 84.4%

Table B-12. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by neighborhood, for kindergarten.

		Allston/ Brighton	Back Bay/ Beacon Hill	Central	Charlesto..	East Boston	Fenway/ Kenmore	Hyde Park	Jamaica Plain
1	SY1314	5,391	2,070	1,265	812	1,766	3,526	2,430	3,563
	SY1415	3,164 -41.3%	1,698 -17.9%	959 -24.2%	748 -7.8%	1,858 5.2%	2,446 -30.6%	2,384 -1.9%	2,907 -18.4%
2	SY1314	1,554		5,869	5,679	1,782	3,325	4,462	1,783
	SY1415	1,208 -22.3%		7,870 34.1%	7,369 29.8%	1,344 -24.6%	3,239 -2.6%	3,721 -16.6%	1,473 -17.4%
3	SY1314	1,311		4,235	5,153	1,418	1,496	8,975	2,608
	SY1415	1,385 5.6%		4,556 7.6%	4,421 -14.2%	1,011 -28.7%	1,395 -6.7%	4,606 -48.7%	1,676 -35.8%
4	SY1314	6,895	2,265	1,510		5,685	1,600	2,500	1,248
	SY1415	7,316 6.1%	2,994 32.2%	3,214 112.8%	4,531	5,637 -0.9%	2,059 28.7%	2,033 -18.7%	1,375 10.2%
ELC	SY1314	1,593	4,740			1,494	2,438	3,487	1,481
	SY1415	1,570 -1.5%	-100.0%		2,914	1,490 -0.3%	4,287 75.9%	3,048 -12.6%	1,269 -14.3%
NO TIER	SY1314						2,137	6,518	3,362
	SY1415	376		6,594	4,914	1,732	-100.0%	7,200 10.5%	4,264 26.8%

Table B-12 (cont.). Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by neighborhood, for kindergarten.

		Mattapan	North Dorchester	Roslindale	Roxbury	South Boston	South Dorchester	South End	West Roxbury
1	SY1314	3,698	2,963	1,523	3,578	2,880	1,835	1,695	1,843
	SY1415	2,592 -29.9%	3,544 19.6%	1,404 -7.8%	2,859 -20.1%	3,659 27.1%	2,065 12.5%	1,236 -27.0%	1,859 0.9%
2	SY1314	2,690	1,656	2,287	2,735	2,871	1,716	2,838	2,559
	SY1415	1,973 -26.7%	1,502 -9.3%	2,262 -1.1%	2,526 -7.7%	2,673 -6.9%	2,132 24.2%	3,361 18.4%	2,096 -18.1%
3	SY1314	4,525	1,165	1,559	2,919	1,114	2,937	2,206	4,506
	SY1415	3,400 -24.9%	1,217 4.4%	1,472 -5.6%	2,327 -20.3%	990 -11.1%	3,028 3.1%	2,047 -7.2%	4,729 4.9%
4	SY1314	2,759	2,464	4,051	1,364	2,685	3,013	1,152	5,574
	SY1415	1,803 -34.6%	1,763 -28.4%	3,260 -19.5%	1,151 -15.6%	2,856 6.3%	2,092 -30.6%	924 -19.8%	3,787 -32.1%
ELC	SY1314	1,334	1,077	4,909	1,243		2,772	5,739	7,377
	SY1415	1,215 -8.9%	2,073 92.4%	4,500 -8.3%	1,705 37.2%	3,032	3,336 20.3%	3,712 -35.3%	4,998 -32.3%
NO TIER	SY1314	2,200	2,038		1,790	3,232	1,337		9,520
	SY1415	1,618 -26.5%	2,125 4.3%	5,137	1,931 7.9%	3,284 1.6%	1,542 15.3%	1,386	10,297 8.2%

Table B-13. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by neighborhood, for 6th grade.

		Allston/ Brighton	Back Bay/ Beacon Hill	Central	Charlesto..	East Boston	Fenway/ Kenmore	Hyde Park	Jamaica Plain
1	SY1314	3,461	2,019	1,852	674	3,399	4,956	2,902	4,762
	SY1415	3,706 7.1%	1,583 -21.6%	1,213 -34.5%	648 -3.9%	3,302 -2.8%	3,908 -21.1%	2,461 -15.2%	5,386 13.1%
2	SY1314	2,411	1,354	1,912	5,944	2,605	3,921	5,353	2,479
	SY1415	1,845 -23.5%	2,517 85.9%	1,593 -16.7%	4,784 -19.5%	2,146 -17.6%	4,048 3.2%	5,211 -2.7%	2,168 -12.5%
3	SY1314	1,893		3,888	6,491	2,588	1,744	5,632	2,894
	SY1415	2,790 47.4%		2,851 -26.7%	5,533 -14.8%	2,295 -11.3%	1,549 -11.2%	4,408 -21.7%	2,346 -18.9%
4	SY1314						5,734	2,991	2,919
	SY1415	8,136		6,193		7,862	3,712 -35.3%	3,993 33.5%	1,468 -49.7%
NO TIER	SY1314					8,245	1,799	11,025	5,264
	SY1415	1,080				9,350 13.4%	4,149 130.7%	10,170 -7.8%	4,857 -7.7%

Table B-13 (cont.). Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by neighborhood, for 6th grade.

		Mattapan	North Dorchester	Roslindale	Roxbury	South Boston	South Dorchester	South End	West Roxbury
1	SY1314	4,498	3,808	2,595	5,089	5,665	1,973	2,735	2,118
	SY1415	4,882 8.5%	2,992 -21.4%	2,438 -6.1%	5,968 17.3%	4,773 -15.7%	1,638 -17.0%	2,201 -19.5%	2,094 -1.2%
2	SY1314	4,847	3,768	3,068	3,591	926	3,797	2,198	2,645
	SY1415	5,716 17.9%	3,780 0.3%	2,827 -7.9%	3,320 -7.6%	1,081 16.8%	4,715 24.2%	2,237 1.8%	2,046 -22.7%
3	SY1314	3,978	1,536	1,772	1,981	2,276	2,594	2,658	4,035
	SY1415	3,185 -19.9%	1,874 22.0%	1,555 -12.3%	2,223 12.3%	1,864 -18.1%	2,494 -3.8%	1,940 -27.0%	4,286 6.2%
4	SY1314	1,011	2,352	2,957	1,711	7,105	2,380		
	SY1415	1,215 20.1%	3,295 40.1%	4,463 50.9%	1,842 7.6%	6,479 -8.8%	2,448 2.9%	2,577	6,406
NO TIER	SY1314	8,060	7,523		4,414		5,619		
	SY1415	5,589 -30.7%	6,820 -9.3%	7,393	3,875 -12.2%	5,701	3,950 -29.7%	4,704	7,754

Table B-14. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by neighborhood, for kindergarten.

		Allston/ Brighton	Back Bay/ Beacon Hill	Central	Charlestown	East Boston	Fenway/ Kenmore	Hyde Park	Jamaica Plain
1	SY1314	976	801	459	349	620	903	560	841
	SY1415	658 -32.5%	692 -13.5%	392 -14.6%	388 11.1%	565 -9.0%	790 -12.4%	563 0.6%	737 -12.4%
2	SY1314	438		881	1,512	468	916	943	527
	SY1415	413 -5.6%		1,334 51.4%	1,854 22.6%	401 -14.3%	907 -1.0%	805 -14.6%	504 -4.3%
3	SY1314	391		911	1,554	418	474	2,035	754
	SY1415	383 -2.1%		952 4.5%	1,331 -14.3%	368 -12.0%	523 10.5%	996 -51.1%	599 -20.7%
4	SY1314	1,198	793	657		1,546	549	560	463
	SY1415	982 -18.0%	848 6.9%	869 32.3%	1,369	1,565 1.2%	657 19.8%	460 -17.8%	478 3.3%
NO TIER	SY1314						628	1,374	1,037
	SY1415	243		1,451	1,390	559	-100.0%	1,408 2.5%	1,147 10.6%
ELC	SY1314	538	1,316			488	617	895	534
	SY1415	536 -0.4%	-100.0%		1,027	493 1.0%	1,161 88.2%	585 -34.7%	458 -14.2%

Table B-14 (cont.). Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by neighborhood, for kindergarten.

		Mattapan	North Dorchester	Roslindale	Roxbury	South Boston	South Dorchester	South End	West Roxbury
1	SY1314	758	656	440	827	663	485	497	453
	SY1415	595 -21.5%	800 22.0%	434 -1.4%	712 -13.9%	817 23.2%	529 9.1%	374 -24.8%	483 6.7%
2	SY1314	706	516	632	741	711	493	816	562
	SY1415	538 -23.8%	517 0.2%	605 -4.3%	686 -7.5%	603 -15.2%	577 17.0%	855 4.8%	471 -16.1%
3	SY1314	1,239	488	443	825	330	836	705	886
	SY1415	925 -25.3%	530 8.5%	417 -5.9%	739 -10.4%	332 0.6%	841 0.6%	682 -3.3%	1,006 13.5%
4	SY1314	719	717	1,146	423	790	743	391	1,314
	SY1415	489 -32.0%	593 -17.2%	840 -26.7%	370 -12.6%	816 3.3%	565 -24.0%	367 -6.1%	852 -35.2%
NO TIER	SY1314	624	610		536	925	401		2,157
	SY1415	513 -17.8%	614 0.6%	1,336	565 5.5%	894 -3.4%	430 7.3%	560	2,038 -5.5%
ELC	SY1314	345	598	1,508	524		681	1,378	1,845
	SY1415	285 -17.5%	713 19.1%	1,425 -5.5%	627 19.7%	1,088	952 39.7%	982 -28.7%	1,263 -31.6%

Table B-15. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by neighborhood, for 6th grade.

		Allston/ Brighton	Back Bay/ Beacon Hill	Central	Charlestown	East Boston	Fenway/ Kenmore	Hyde Park	Jamaica Plain
1	SY1314	679	727	602	285	1,265	1,128	619	1,076
	SY1415	734 8.0%	799 9.9%	454 -24.6%	307 7.9%	1,226 -3.0%	976 -13.5%	512 -17.3%	1,263 17.5%
2	SY1314	571	601	698	1,612	658	1,033	1,274	774
	SY1415	486 -14.9%	609 1.3%	603 -13.6%	1,419 -12.0%	582 -11.6%	1,024 -0.8%	1,265 -0.7%	693 -10.4%
3	SY1314	524		1,133	1,626	717	464	1,285	844
	SY1415	698 33.2%		763 -32.7%	1,527 -6.1%	639 -11.0%	404 -13.1%	951 -26.0%	696 -17.6%
4	SY1314						1,208	700	660
	SY1415	1,685		1,272		1,798	1,044 -13.6%	843 20.5%	486 -26.4%
NO TIER	SY1314					1,614	588	2,492	1,541
	SY1415	345				1,869 15.8%	942 60.1%	2,132 -14.4%	1,226 -20.5%

Table B-15 (cont.). Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by neighborhood, for 6th grade.

		Mattapan	North Dorchester	Roslindale	Roxbury	South Boston	South Dorchester	South End	West Roxbury
1	SY1314	1,001	789	615	1,099	884	496	721	508
	SY1415	966 -3.5%	671 -15.0%	585 -4.8%	1,257 14.4%	728 -17.6%	457 -7.8%	569 -21.0%	467 -8.0%
2	SY1314	1,261	1,074	792	932	377	993	709	587
	SY1415	1,467 16.4%	1,024 -4.6%	778 -1.8%	903 -3.1%	357 -5.4%	1,175 18.3%	730 3.0%	498 -15.1%
3	SY1314	1,095	570	544	567	539	778	725	892
	SY1415	908 -17.1%	630 10.5%	481 -11.6%	646 13.9%	453 -16.0%	759 -2.5%	594 -18.1%	1,004 12.5%
4	SY1314	345	732	749	468	1,606	610		
	SY1415	409 18.5%	852 16.4%	1,242 66.0%	499 6.5%	1,373 -14.5%	616 1.0%	725	1,540
NO TIER	SY1314	2,082	1,681		1,315		1,630		
	SY1415	1,376 -33.9%	1,498 -10.9%	1,870	1,069 -18.7%	1,164	1,035 -36.5%	1,081	1,680

Table B-16. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP across race, for both kindergarten and 6th grade.

Grade / Race

		K2					6				
Quality 1415	SY	Asian/ Asian Am.	Black	Hisp/Lati..	Other	White	Asian/ Asian Am.	Black	Hisp/Lati..	Other	White
1	SY1314	2,289	2,647	2,042	2,176	1,519	2,154	3,932	3,040	2,629	1,814
	SY1415	1,834 -19.9%	2,210 -16.5%	1,867 -8.5%	1,468 -32.6%	1,554 2.3%	2,035 -5.5%	3,217 -18.2%	2,843 -6.5%	2,962 12.7%	1,964 8.3%
2	SY1314	2,057	2,719	2,239	1,266	1,977	2,763	3,838	3,041	3,398	2,686
	SY1415	1,509 -26.7%	2,583 -5.0%	1,939 -13.4%	1,730 36.6%	1,696 -14.2%	2,077 -24.8%	3,950 2.9%	2,767 -9.0%	3,265 -3.9%	2,498 -7.0%
3	SY1314	1,775	2,777	2,196	2,126	1,907	2,389	2,479	2,581	3,314	2,146
	SY1415	1,660 -6.4%	2,211 -20.4%	1,627 -25.9%	1,978 -7.0%	1,856 -2.7%	2,129 -10.9%	2,587 4.3%	2,402 -6.9%	2,618 -21.0%	2,171 1.2%
4	SY1314	2,342	2,206	2,241	2,531	2,859	1,261	1,732	2,251	1,926	844
	SY1415	2,188 -6.6%	1,706 -22.7%	1,906 -14.9%	1,946 -23.1%	2,170 -24.1%	1,952 54.7%	2,171 25.4%	2,743 21.9%	1,800 -6.6%	3,263 286.6%
NO TIER	SY1314	3,848	2,121	2,059	1,881	2,837	7,502	6,069	5,782		5,786
	SY1415	1,185 -69.2%	1,887 -11.0%	2,539 23.3%	2,324 23.6%	2,806 -1.1%	8,337 11.1%	5,086 -16.2%	4,411 -23.7%	3,364	8,600 48.6%
ELC	SY1314	2,045	2,084	2,057	2,368	1,448					
	SY1415	2,180 6.6%	2,017 -3.2%	1,902 -7.5%	4,203 77.5%	1,783 23.2%					

% Difference in Avg. Distance Eu

-69.2% 286.6%

Table B-17. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP across races, for both kindergarten and 6th grade.

Grade / Race

Quality 1415	SY	K2					6				
		Asian/ Asian Am.	Black	Hisp/Lati..	Other	White	Asian/ Asian Am.	Black	Hisp/Lati..	Other	White
1	SY1314	650	645	569	566	441	551	870	836	552	486
	SY1415	544 -16.3%	562 -12.9%	529 -7.0%	472 -16.5%	481 9.0%	523 -5.2%	767 -11.9%	825 -1.3%	722 30.8%	516 6.3%
2	SY1314	516	692	601	381	533	815	999	804	875	684
	SY1415	462 -10.5%	670 -3.2%	544 -9.5%	565 48.3%	475 -10.8%	653 -19.9%	1,031 3.2%	760 -5.4%	882 0.8%	689 0.7%
3	SY1314	603	795	634	610	530	700	715	732	849	572
	SY1415	602 -0.1%	647 -18.7%	533 -15.9%	592 -3.0%	528 -0.5%	644 -8.1%	739 3.4%	695 -5.0%	700 -17.5%	541 -5.5%
4	SY1314	641	593	619	672	765	320	485	586	543	258
	SY1415	602 -6.1%	482 -18.6%	548 -11.4%	542 -19.4%	606 -20.8%	512 60.0%	566 16.7%	723 23.5%	541 -0.3%	839 225.3%
NO TIER	SY1314	997	587	580	568	701	2,131	1,643	1,538		1,663
	SY1415	393 -60.6%	539 -8.1%	666 15.0%	644 13.4%	721 2.9%	1,847 -13.3%	1,252 -23.8%	1,103 -28.2%	817	1,879 13.0%
ELC	SY1314	574	650	640	795	499					
	SY1415	668 16.3%	637 -1.9%	605 -5.4%	1,005 26.4%	559 12.2%					

% Difference in Avg. Time 8AM

-60.6% 225.3%

Table B-18. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by poverty status, for both kindergarten and 6th grade.

		K2		6	
Quality 1415	SY	0	1	0	1
1	SY1314	1,754	2,335	2,237	3,043
	SY1415	1,628 -7.17%	1,971 -15.61%	2,137 -4.44%	2,718 -10.66%
2	SY1314	1,904	2,511	2,997	3,206
	SY1415	1,754 -7.87%	2,202 -12.30%	2,548 -15.00%	3,006 -6.22%
3	SY1314	2,168	2,319	2,258	2,591
	SY1415	1,620 -25.24%	1,916 -17.37%	2,255 -0.14%	2,456 -5.24%
4	SY1314	2,333	2,240	2,061	1,864
	SY1415	1,676 -28.17%	1,873 -16.41%	2,938 42.58%	2,372 27.28%
NO TIER	SY1314	2,382	2,106	7,264	5,762
	SY1415	1,902 -20.18%	2,187 3.88%	6,591 -9.26%	4,933 -14.39%
ELC	SY1314	2,053	1,958		
	SY1415	1,789 -12.85%	2,075 5.96%		

% Difference in Avg. Distance

-28.17% 42.58%

Table B-19. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by poverty status, for both kindergarten and 6th grade.

		K2		6	
Quality 1415	SY	0	1	0	1
1	SY1314	1,754	2,335	2,237	3,043
	SY1415	1,628 -7.17%	1,971 -15.61%	2,137 -4.44%	2,718 -10.66%
2	SY1314	1,904	2,511	2,997	3,206
	SY1415	1,754 -7.87%	2,202 -12.30%	2,548 -15.00%	3,006 -6.22%
3	SY1314	2,168	2,319	2,258	2,591
	SY1415	1,620 -25.24%	1,916 -17.37%	2,255 -0.14%	2,456 -5.24%
4	SY1314	2,333	2,240	2,061	1,864
	SY1415	1,676 -28.17%	1,873 -16.41%	2,938 42.58%	2,372 27.28%
NO TIER	SY1314	2,382	2,106	7,264	5,762
	SY1415	1,902 -20.18%	2,187 3.88%	6,591 -9.26%	4,933 -14.39%
ELC	SY1314	2,053	1,958		
	SY1415	1,789 -12.85%	2,075 5.96%		

% Difference in Avg. Distance

-28.17% 42.58%

Table B-20. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by English Language Learner status, for both kindergarten and 6th grade.

		K2		6	
Quality 1415	SY	0	1	0	1
1	SY1314	1,927	2,248	2,599	3,433
	SY1415	1,727 -10.38%	1,962 -12.73%	2,457 -5.48%	2,865 -16.55%
2	SY1314	2,353	2,170	3,141	3,217
	SY1415	2,122 -9.82%	1,910 -11.96%	2,939 -6.43%	2,871 -10.74%
3	SY1314	2,484	2,028	2,437	2,694
	SY1415	1,983 -20.18%	1,571 -22.51%	2,428 -0.37%	2,422 -10.10%
4	SY1314	2,276	2,239	1,782	2,347
	SY1415	1,766 -22.41%	1,995 -10.90%	2,154 20.88%	3,057 30.26%
NO TIER	SY1314	2,293	1,900	6,479	5,209
	SY1415	1,861 -18.84%	2,860 50.50%	4,670 -27.92%	6,865 31.79%
ELC	SY1314	2,216	1,712		
	SY1415	2,021 -8.79%	1,940 13.31%		

% Difference in Avg. Distance

-27.92% 50.50%

Table B-21. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by English Language Learner status, for both kindergarten and 6th grade.

		K2		6	
Quality 1415	SY	0	1	0	1
1	SY1314	518	633	659	948
	SY1415	497 -3.97%	561 -11.35%	646 -2.03%	835 -11.95%
2	SY1314	624	570	840	838
	SY1415	572 -8.29%	543 -4.73%	807 -3.94%	785 -6.31%
3	SY1314	718	589	692	764
	SY1415	588 -18.02%	537 -8.85%	686 -0.79%	708 -7.39%
4	SY1314	611	628	500	578
	SY1415	499 -18.32%	573 -8.72%	580 16.00%	769 32.99%
NO TIER	SY1314	624	548	1,749	1,423
	SY1415	532 -14.73%	737 34.46%	1,144 -34.61%	1,642 15.40%
ELC	SY1314	689	544		
	SY1415	630 -8.45%	611 12.22%		

% Difference in Avg. Time 8AM

-34.61% 34.46%

Table B-22. Changes in estimated one-way travel distance to school (in meters) for each Tier between 3Z and HBAP by Special Education status, for both kindergarten and 6th grade.

		K2			6			
Quality 1415	SY	ELL	GEN ED	SPED	AWC	ELL	GEN ED	SPED
1	SY1314	2,362	1,842	3,306	1,877	3,527	2,586	4,934
	SY1415	1,855 -21.5%	1,638 -11.1%	3,164 -4.3%	2,329 24.1%	3,136 -11.1%	2,306 -10.8%	4,489 -9.0%
2	SY1314	2,089	2,224	3,620	2,597	2,913	3,098	5,071
	SY1415	1,814 -13.2%	2,006 -9.8%	3,096 -14.5%	2,086 -19.6%	3,069 5.4%	2,903 -6.3%	4,811 -5.1%
3	SY1314	1,921	2,302	3,015	2,307	2,926	2,352	3,278
	SY1415	1,452 -24.4%	1,817 -21.1%	2,661 -11.7%	2,408 4.4%	2,669 -8.8%	2,279 -3.1%	3,210 -2.1%
4	SY1314	2,117	2,196	3,266	1,740	2,167	1,806	2,511
	SY1415	1,909 -9.8%	1,760 -19.8%	2,527 -22.6%	3,804 118.6%	3,443 58.9%	2,122 17.5%	2,884 14.9%
NO TIER	SY1314	1,831	1,994	3,326				5,950
	SY1415	2,721 48.6%	1,902 -4.6%	4,601 38.3%	8,386	6,029	4,476	6,246 5.0%
ELC	SY1314	1,625	2,102	1,923				
	SY1415	1,277 -21.4%	1,984 -5.6%	2,668 38.7%				

% Difference in Avg. Distance

-24.4% 118.6%

Note: ELL students with a SPED designation included under SPED.

Table B-23. Changes in estimated one-way travel time to school (in seconds) for each Tier between 3Z and HBAP by Special Education status, for both kindergarten and 6th grade.

		K2			6			
Quality 1415	SY	ELL	GEN ED	SPED	AWC	ELL	GEN ED	SPED
1	SY1314	679	507	800	466	1,030	687	1,109
	SY1415	560 -17.5%	480 -5.3%	786 -1.7%	556 19.4%	1,002 -2.7%	643 -6.5%	1,084 -2.3%
2	SY1314	540	595	923	723	754	836	1,183
	SY1415	515 -4.7%	555 -6.7%	771 -16.5%	631 -12.7%	817 8.3%	802 -4.1%	1,156 -2.3%
3	SY1314	565	670	801	640	829	681	882
	SY1415	509 -10.0%	569 -15.1%	688 -14.0%	652 1.9%	801 -3.3%	666 -2.3%	839 -4.9%
4	SY1314	626	592	846	577	543	498	619
	SY1415	573 -8.5%	504 -14.8%	627 -25.9%	1,015 76.0%	818 50.7%	567 13.7%	736 19.0%
NO TIER	SY1314	507	565	850				1,613
	SY1415	654 28.9%	545 -3.6%	1,056 24.1%	1,835	1,270	1,071	1,613 0.0%
ELC	SY1314	541	649	611				
	SY1415	490 -9.4%	615 -5.2%	779 27.4%				

% Difference in Avg. Time 8AM

-25.9% 76.0%

Note: ELL students with a SPED designation included under SPED.

B.2.2. Figures and Tables for Assignments and Quality

The following tables and figures illustrate differences in assignment across Tiers for neighborhood regions (see Section 2.5 for categorization), individual neighborhoods, races, poverty status, English Language Learner status, and Special Education status for both kindergarten (Table B-24 and Figures B-1 through B-5) and 6th grade (Table B-25 and Figures B-6 through B-10). Contents of these tables are discussed in more detail in Chapter 5.

Figure B-1. The distribution of kindergarten students to schools of each Tier level by neighborhood region.

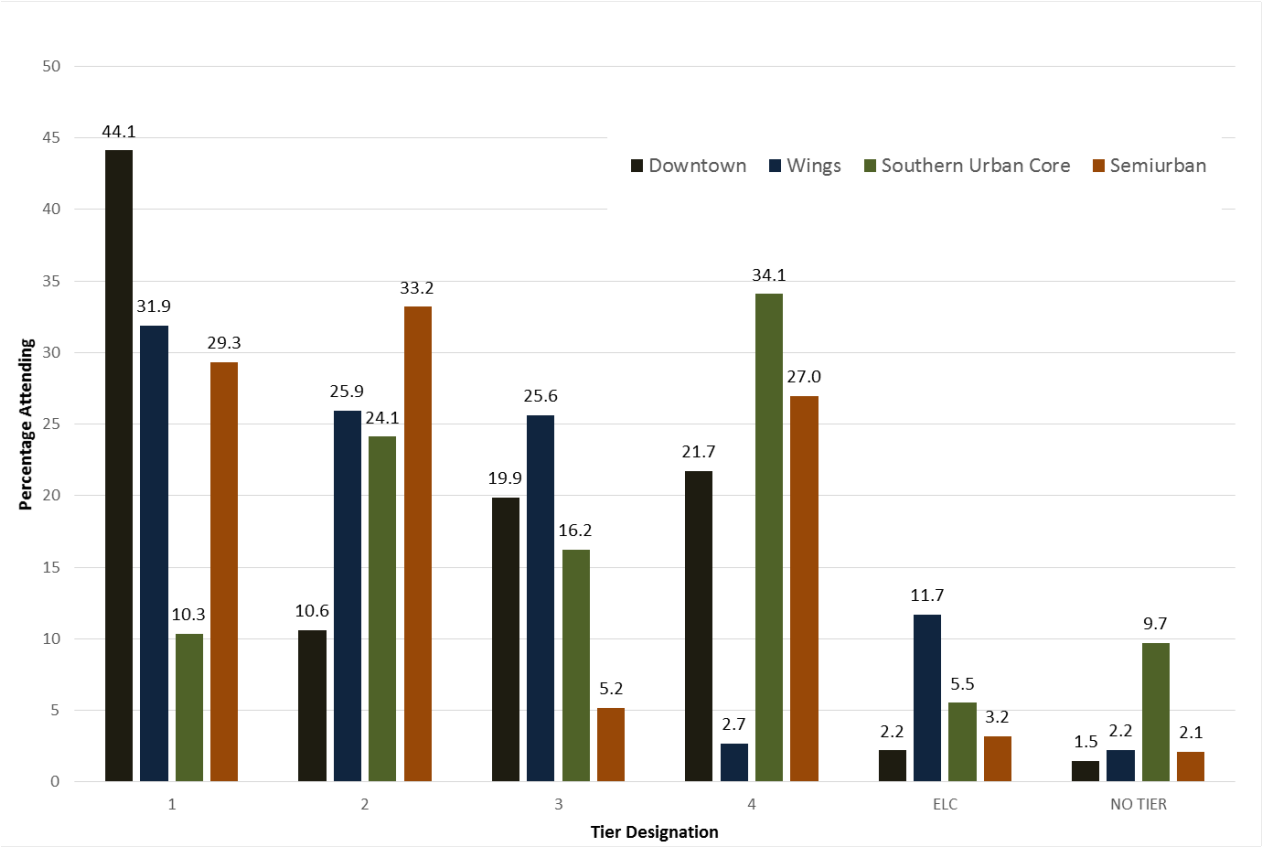


Table B-24. The distribution of kindergarten students to schools of each Tier level by neighborhood.

		K2					
Neighborhood	Policy	1	2	3	4	ELC	NO TIER
Allston/Brighton	Pre	10.70%	38.00%	32.20%	2.10%	16.70%	0.20%
	Post	10.30%	34.50%	34.70%	2.00%	17.80%	0.70%
Back Bay/Beacon Hill	Pre	74.30%	5.70%	5.70%	8.60%	5.70%	0.00%
	Post	84.60%	1.90%	1.90%	5.80%	3.80%	1.90%
Central	Pre	80.30%	10.30%	3.90%	5.20%	0.40%	0.00%
	Post	86.00%	5.50%	1.50%	4.40%	2.20%	0.40%
Charlestown	Pre	85.30%	6.30%	3.90%	3.40%	0.30%	0.80%
	Post	81.70%	9.00%	2.10%	4.00%	2.10%	1.00%
East Boston	Pre	22.90%	32.60%	30.40%	5.00%	8.90%	0.10%
	Post	25.80%	27.50%	28.90%	2.50%	12.10%	3.20%
Fenway/Kenmore	Pre	23.80%	33.30%	19.00%	15.90%	5.60%	2.40%
	Post	16.30%	29.50%	17.80%	31.80%	3.90%	0.80%
Hyde Park	Pre	24.80%	12.30%	4.80%	51.40%	2.20%	4.00%
	Post	25.70%	20.20%	3.70%	43.90%	3.00%	3.50%
Jamaica Plain	Pre	15.30%	44.40%	7.30%	24.90%	6.90%	1.10%
	Post	14.90%	42.20%	8.50%	26.20%	6.10%	2.20%
Mattapan	Pre	4.00%	19.50%	14.50%	45.30%	4.50%	8.00%
	Post	5.20%	21.10%	11.90%	40.60%	5.00%	16.20%
North Dorchester	Pre	11.00%	19.60%	30.60%	27.80%	3.50%	5.40%
	Post	10.30%	25.80%	32.90%	20.50%	3.80%	6.60%
Roslindale	Pre	42.30%	33.40%	8.10%	12.90%	3.10%	0.20%
	Post	32.20%	37.10%	6.50%	20.50%	2.00%	1.80%
Roxbury	Pre	11.20%	20.60%	8.10%	47.30%	7.30%	3.70%
	Post	9.20%	22.50%	13.80%	42.20%	6.80%	5.60%
South Boston	Pre	11.50%	5.40%	52.30%	28.40%	0.30%	0.90%
	Post	13.40%	6.40%	54.30%	22.70%	0.60%	2.60%
South Dorchester	Pre	13.00%	20.50%	17.70%	34.80%	3.20%	5.40%
	Post	14.70%	27.10%	15.30%	25.60%	4.90%	12.40%
South End	Pre	44.90%	18.50%	9.70%	23.20%	2.40%	1.30%
	Post	43.40%	12.20%	9.80%	30.30%	2.60%	1.50%
West Roxbury	Pre	50.30%	34.50%	2.20%	9.30%	3.30%	0.30%
	Post	45.30%	34.90%	2.00%	15.10%	2.00%	0.70%

Figure B-2. The distribution of kindergarten students to schools of each Tier level by race.

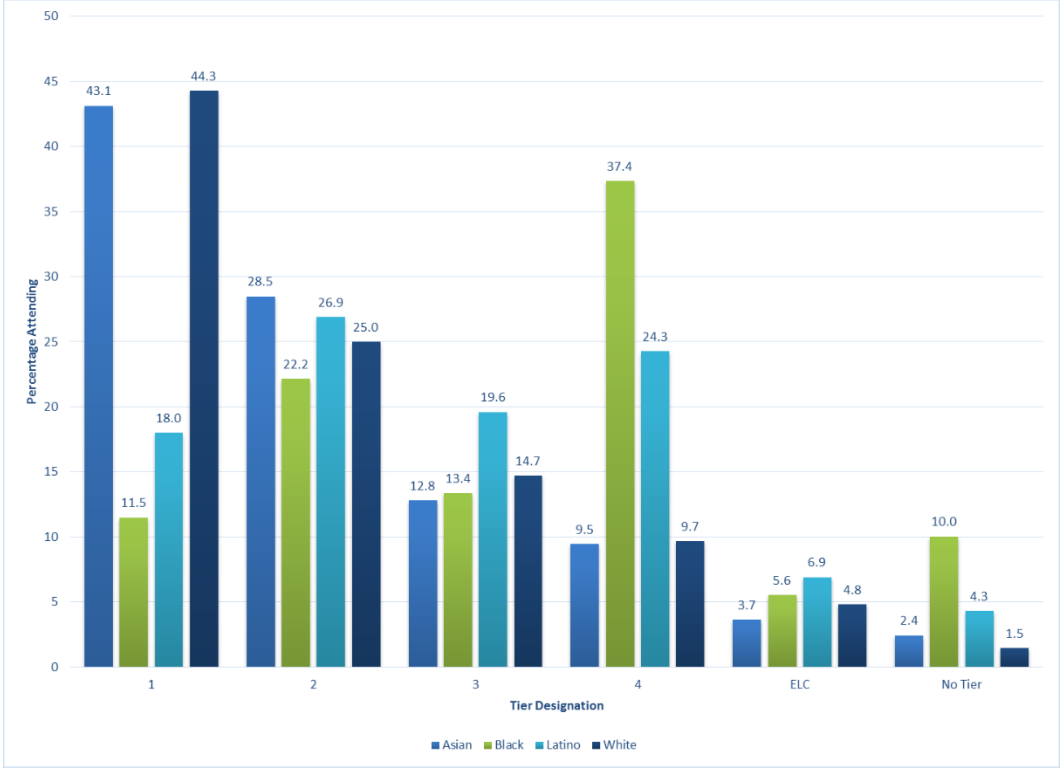


Figure B-3. The distribution of kindergarten students to schools of each Tier level by poverty status.

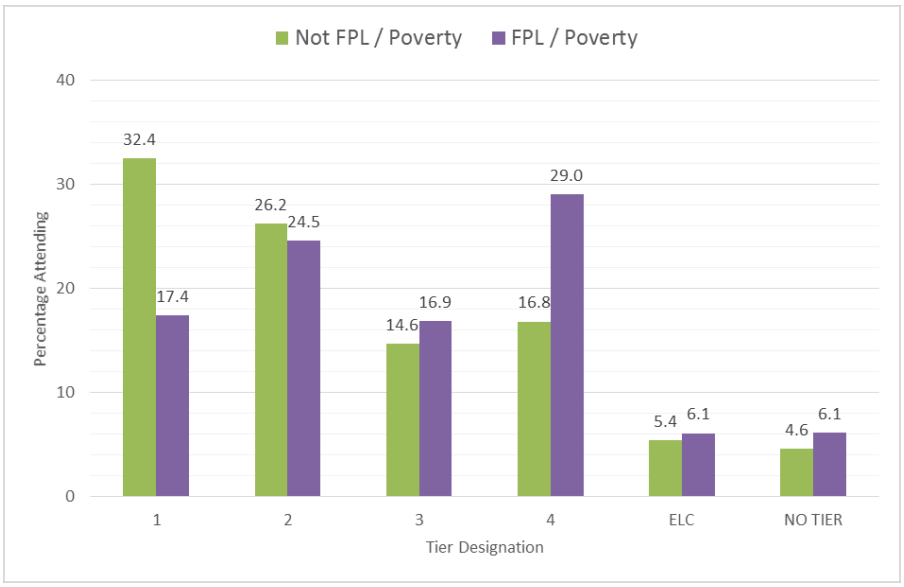


Figure B-4. The distribution of kindergarten students to schools of each Tier level by English Language Learner status.

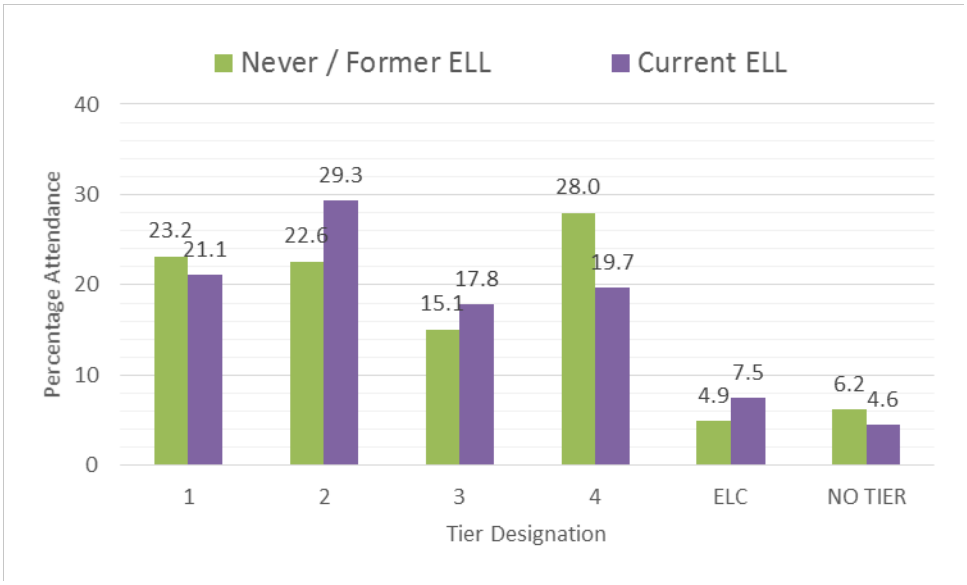
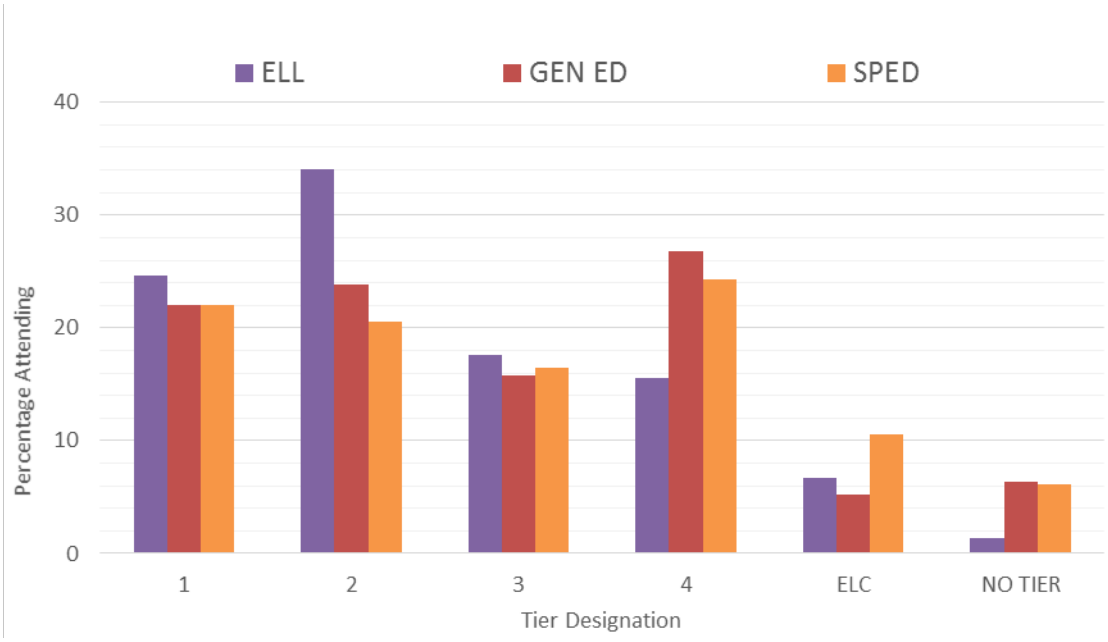


Figure B-5. The distribution of kindergarten students to schools of each Tier level by Special Education status.



Note: ELL students with a SPED designation included under SPED.

Figure B-6. The distribution of 6th grade students to schools of each Tier level by neighborhood region.

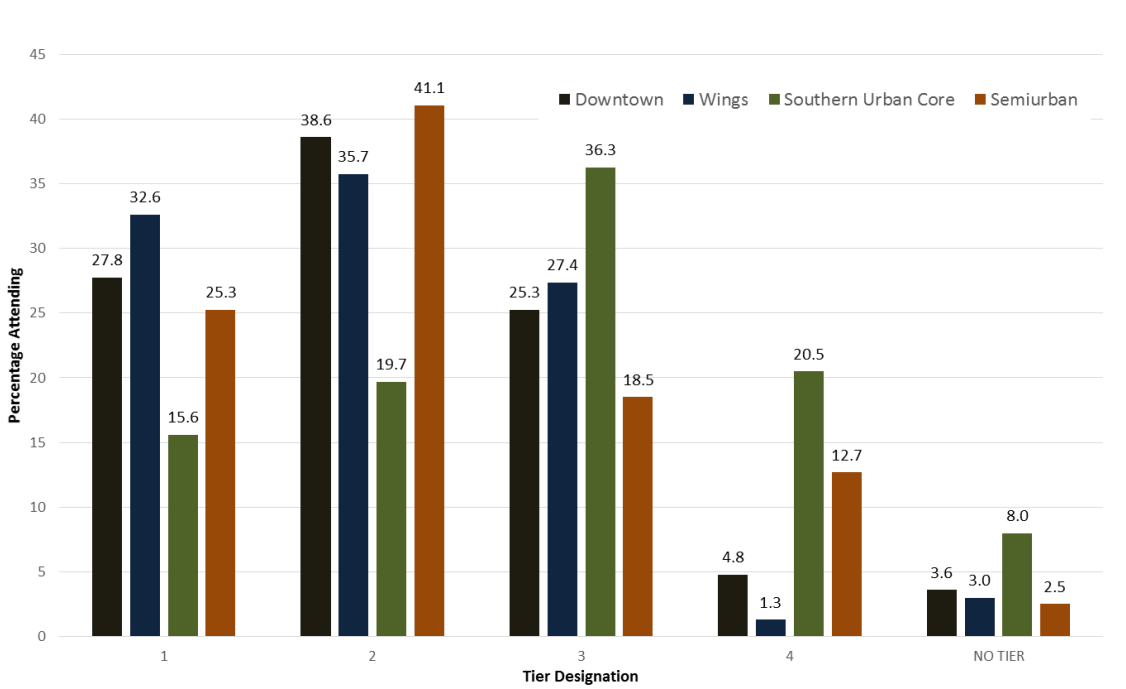


Table B-25. The distribution of 6th grade students to schools of each Tier level by neighborhood.

		6				
Neighborhood	Policy	1	2	3	4	NO TIER
Allston/Brighton	Pre	13.10%	68.80%	16.60%	0.50%	0.50%
	Post	11.10%	54.40%	25.60%	1.10%	7.80%
Back Bay/Beacon Hill	Pre	53.80%	38.50%	7.70%	0.00%	0.00%
	Post	61.90%	28.60%	9.50%	0.00%	0.00%
Central	Pre	29.90%	64.60%	3.10%	0.80%	0.00%
	Post	49.40%	45.00%	3.90%	1.10%	0.60%
Charlestown	Pre	70.00%	23.30%	4.20%	0.00%	1.10%
	Post	69.30%	17.00%	12.00%	0.40%	1.40%
East Boston	Pre	26.60%	48.10%	23.20%	0.00%	0.30%
	Post	32.00%	33.00%	31.90%	1.60%	1.50%
Fenway/Kenmore	Pre	15.30%	61.30%	15.30%	0.90%	1.80%
	Post	18.80%	45.50%	20.80%	9.90%	5.00%
Hyde Park	Pre	23.50%	17.60%	40.00%	11.10%	0.30%
	Post	28.90%	30.30%	23.00%	14.00%	3.80%
Jamaica Plain	Pre	7.70%	51.90%	33.50%	2.40%	1.30%
	Post	8.10%	51.60%	16.40%	20.70%	3.20%
Mattapan	Pre	10.50%	12.80%	43.50%	21.40%	1.00%
	Post	10.50%	16.80%	35.20%	26.50%	11.00%
North Dorchester	Pre	19.70%	19.60%	45.00%	4.70%	0.50%
	Post	17.10%	21.70%	45.80%	10.00%	5.50%
Roslindale	Pre	13.70%	36.20%	43.60%	4.30%	0.30%
	Post	16.90%	46.80%	24.60%	9.60%	2.10%
Roxbury	Pre	7.60%	34.60%	41.50%	9.90%	0.90%
	Post	7.80%	27.90%	32.50%	26.30%	5.60%
South Boston	Pre	12.70%	19.70%	54.60%	2.50%	1.10%
	Post	11.50%	24.40%	53.10%	6.90%	4.20%
South Dorchester	Pre	25.10%	10.80%	42.10%	10.60%	1.30%
	Post	27.00%	11.20%	37.90%	14.10%	9.80%
South End	Pre	25.20%	58.30%	12.00%	0.20%	1.20%
	Post	29.00%	43.30%	19.30%	4.10%	4.30%
West Roxbury	Pre	46.70%	33.20%	17.70%	1.00%	0.00%
	Post	51.60%	36.00%	5.80%	6.10%	0.50%

Figure B-7. The distribution of 6th grade students to schools of each Tier level by race.

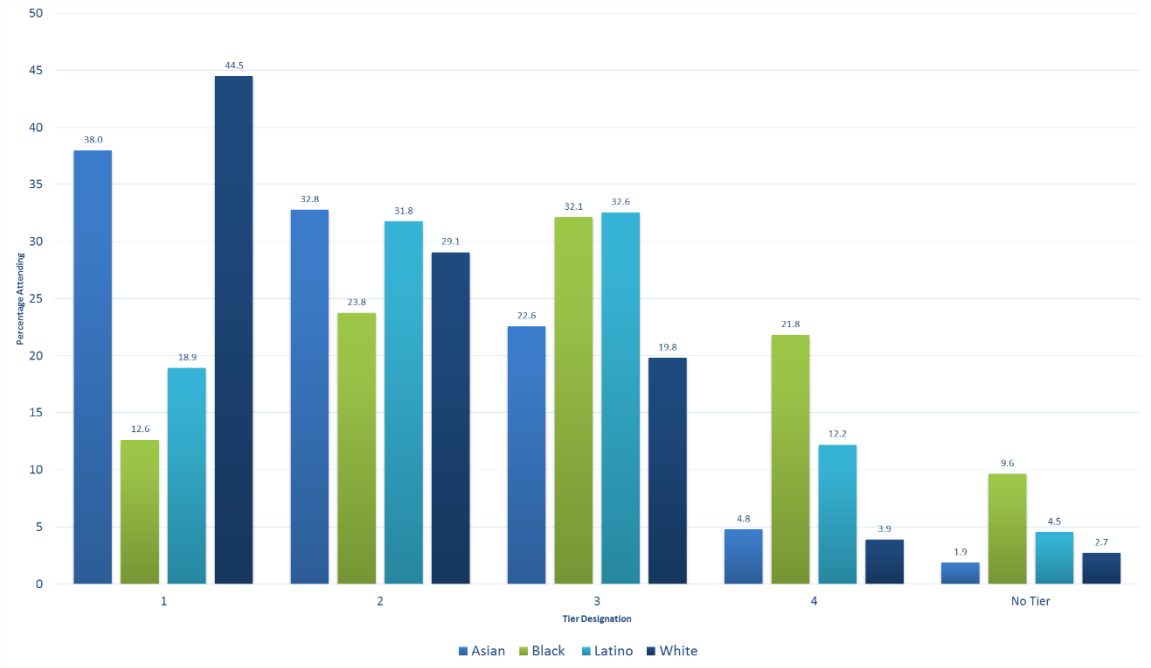


Figure B-8. The distribution of 6th grade students to schools of each Tier level by poverty status.

Figure B-9. The distribution of 6th grade students to schools of each Tier level by English Language Learner status.

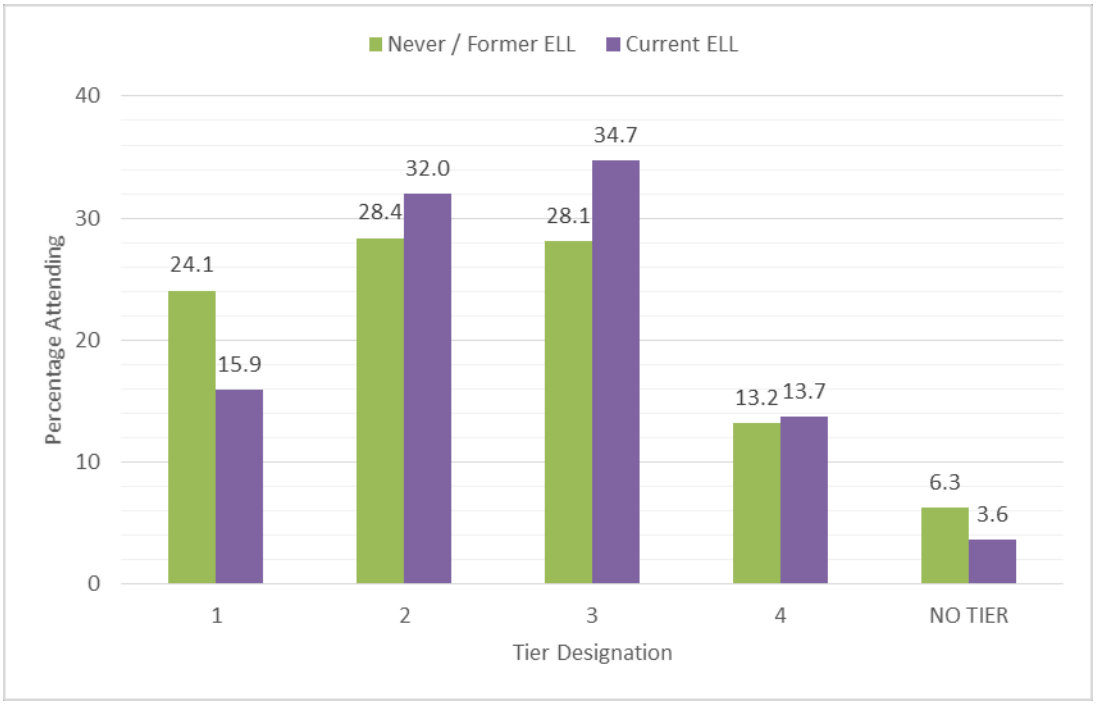
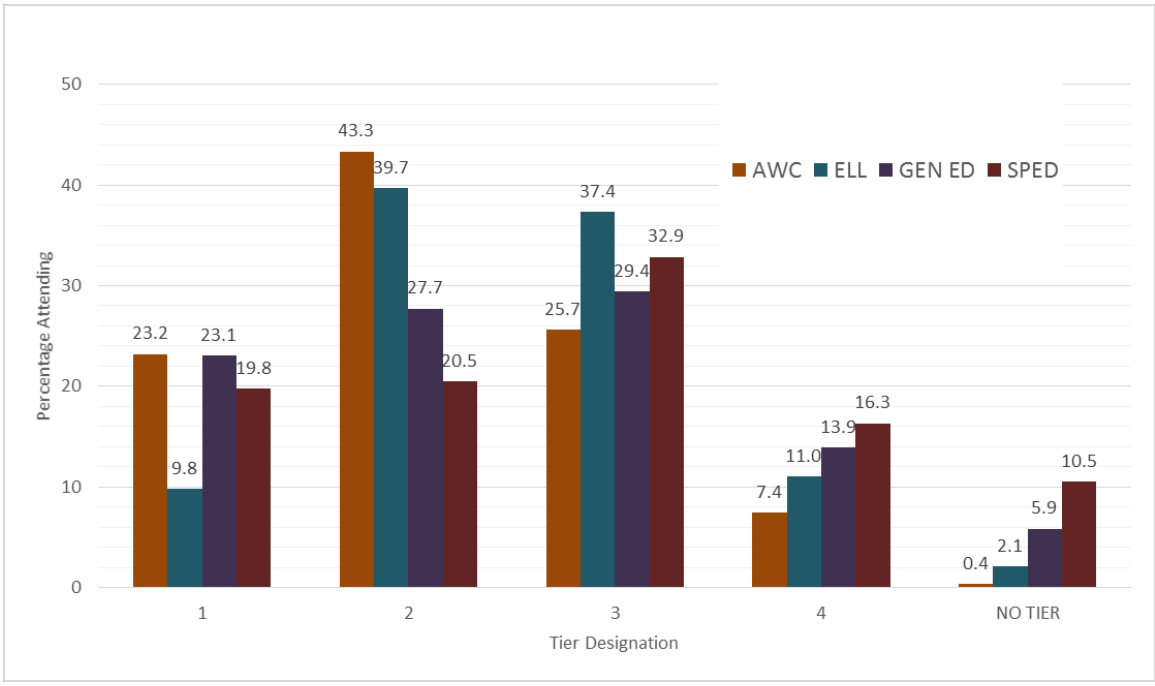


Figure B-10. The distribution of 6th grade students to schools of each Tier level by Special Education status.



Appendix C. The Lottery Process

Chapter 6 explored the aspects of the lottery process that can help us to understand HBAP's effect on equitable outcomes: the effect of entering at different rounds of assignment; the likelihood with which families receive their top choices; administrative assignment of students who did not receive a submitted choice; and the entry of students into BPS at either pre-kindergarten or kindergarten. The following sections provide the methodological details for these analyses. All results for the analysis of the likelihood of receiving one's top choice and administrative assignment were reported in the main text.

C.1. Data Preparation and Methodology

Data for analysis of the lottery process included variables derived from the BPS Enrollment dataset and BPS Assignment (or Choice) dataset across school years 2011-2012 through 2016-2017. The BPS Enrollment dataset represents school years within students, such that students appear in the dataset once for every school year they are enrolled in BPS, including students who repeat the previous grade level in a subsequent year. The BPS Assignment dataset consists of assignment rounds within school years within students, such that there is a separate row for each round in which a student participates in the lottery in each year that the student participates in the lottery. For most school years under consideration, there were 4 rounds of lottery, though the vast majority of students enter the lottery during Round 1, students may or may not enter the lottery during Round 1. All kindergarten and 6th grade students across the six school years of the Enrollment dataset were extracted to create the intended analysis sample; additionally pre-kindergarten students in the Enrollment dataset were extracted for school years 2011-2012 through 2016-2017 to inform the pre-kindergarten enrollment analyses. Data preparation for these analyses used the same sample as was used for the analysis of equitable assignment (see Appendix B).

For the purposes of identifying (a) whether a student was administratively assigned and (b) the receipt of first choice, data preparation focused on the first lottery round in which a student participated in a given school year, including: (a) the first round in which a student entered the lottery, (b) the student's assignment status at the end of that round, (c) the priority explaining the student's assignment (e.g., walk zone), and (d) the 4-digit school code of the student's top-ranked school selection of that round. The assigned priority variable was recoded to reflect that 'Administrative Assignment', 'Administrative Assignment HomeBased', and 'Administrative Assignment Walk' values indicated a student was *Administratively Assigned* (0/1 variable). Next *Receipt of First Choice* (0/1 variable) was defined as whether the school code of the top-ranked selected school was the same as the

school in which the student was eventually enrolled. Total sample and sub-sample frequencies for each construct of interest were analyzed across the dataset generally and in consideration of distance measurements.

For the purposes of understanding the effects of pre-kindergarten enrollment on assignment in kindergarten, pre-kindergarten (K1) and kindergarten (K2) students were designated to respective school year cohorts such that if a student was in grade level K2 during school year 2013-2014, that case was designated to K2 Cohort SY1213. Cases with multiple K2 Cohort designations indicated that the student repeated a grade. These cases were identified and subsequently excluded from the K1-K2 analyses (less than 5% of the sample). Logical statements were computed to indicate whether a student engaged in a contiguous school year transition from K1 to K2 or whether a student lacked a K1 (or contiguous K1-K2) and thus were considered *K2 Entrants*. Next, within those students who were identified as contiguous K1-K2 enrollees, the 4-digit school codes for each student's respective K1 and K2 schools were compared. If the school was the same, then the student was coded as *K1K2 Pathway Maintained* (0/1 variable), whereas any difference between school codes reflected a *K1K2 Pathway Shifted* (0/1 variable). Total sample and sub-sample frequencies of school quality were analyzed across the dataset generally and in consideration of distance measurements.

Appendix D. School Composition

D.1. Data Preparation and Methodology

The role of BPS's schools as places where students from diverse geographic and demographic backgrounds come together is best understood as a network, enabling the use of cutting-edge techniques from network science. Networks consist of nodes (or entities or objects) and edges (or connections between the entities). In the case of BPS, there is a "two-mode network," meaning there are two types of nodes that link to each other: each neighborhood sends students to one or more schools, and each school receives students from one or more neighborhoods. These edges, or linkages, can be quantified by tabulating the number of students traveling from each neighborhood to each school (i.e., a valued network).[28] Network analytic methods then allow for the analysis of each of these relationships and their implications for the district as a whole. Rather than analyzing outcomes independent of one another, the network approach accounts for the interdependencies of the phenomena and frequently analyzes the structure directly.

Geocoded student addresses (see Appendix A), which included containing census tracts, were used to generate the attendance network linking neighborhoods and schools. Students without sufficient information for geocoding were dropped from the analyses. Then for each school year, beginning with 2011-12, the number of students from each census tract that attended any of the schools was then tabluated. These values (i.e., the number of students from a census tract that attended a school) describe the edges of the network. Separate networks were constructed for kindergarten and 6th grade students for each of the last three years of 3Z and the first three years of HBAP (from 2011-2012 to 2016-2017). This yielded twelve total networks that permit analysis longitudinally under the two policies as well as comparisons between the two grade levels.

The analysis of the two-mode networks was selected because the one-mode projections would lose important features of the networks. For example, the one mode projection of census tracts would only provide information on the amount of overlap between student enrollments across schools, but the number of schools would be omitted. This would preclude an examination of the number of schools to which a census tract sends students, an important aspect for assessing a census tracts' overall connectedness. The number of schools (ignoring the number of students for a moment) to which a census tract sends students would be the degree of that census tract. Degree centrality can be calculated in two-mode networks to show how many schools a census tract sends students to and for

[28] In contrast to a binary network which establishes a yes-or-no relationship between two entities, e.g., does a neighborhood send any students to a school

schools, how many census tracts send students to it. However, two census tracts could send students to the same number of schools (and thus, have the same degree centrality) but differ in how central the schools they send students to are. This was a motivating factor for analyzing eigenvector centrality.

Eigenvector centrality defines the centrality of a node as proportional to the centrality of the nodes to which it is connected.[29] In a one-mode network, the centrality (C) of node p_i is expressed as

$$C(p_i) \approx \mathrm{C}(p_j)\, x_{ij} \tag{1}$$

where, x is the adjacency matrix and j are the nodes connected to node i. Identifying centrality values that satisfy this equation for all nodes in a network involves solving a system of linear equation. This can be expressed in matrix notation as

$$Xc = \lambda c \tag{2}$$

Where X is again the adjacency matrix of all nodes in a network, λ is the largest eigenvalue, and c is the vector of centrality scores (i.e.; the eigenvector associated with the largest eigenvalue). Analysis of a two-mode network requires accounting for the different numbers of nodes in each mode; the equation is

$$\lambda \begin{bmatrix} c^N \\ c^M \end{bmatrix} = x \begin{bmatrix} c^N \\ c^M \end{bmatrix} \tag{3}$$

Where C^N and C^M indicate the centralities of nodes in the first and second mode respectively.[30] Relating this back to equation 1, equation 3 can be rewritten

$$C^N(n_i) = \frac{1}{\lambda} \sum_{k=1}^{h} C^M(m_k) x_{ik} \tag{4}$$

Equation 4 shows how the centrality of a node in one mode is related to the centralities of the nodes in the other mode that it is connected with. Finally, to make the eigenvector centralities comparable across school years, the values must be scaled to account for the different numbers of nodes in the networks over time. Specifically, each node's eigenvector centrality is scaled by

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[29] Bonacich, P., 1972. Technique for analyzing overlapping memberships. *Sociological methodology*, *4*, pp.176-185.

[30] Bonacich, P., 1991. Simultaneous group and individual centralities. *Social networks*, *13*(2), pp.155-168; Faust, K., 1997. Centrality in affiliation networks. *Social networks*, *19*(2), pp.157-191.

$$\sqrt{\frac{1}{2n_o}} \quad (5)$$

where n_o is the number of nodes in the mode of which the node is a member.[31] This generates scaled eigenvector centrality values for each node based on the size of the network, and it enables comparison across the networks. The R package SNA was used to generate these values, and then scaled them using our own code.[32] The scaled eigenvector centrality values where then used in the composition analyses and related to the other variables discussed in the main document.

D.2. Detailed Tables

The tables in this section provide the full results for the analysis of diversity (including racial diversity and representativeness) and integration (including network-based eigenvector centrality) as well as measures of the dispersion (or concentration) of a neighborhood's students across schools. These entail correlations between the measures as well as analyses of their change between 3Z and HBAP.

[31] Borgatti, S.P. and Everett, M.G., 1997. Network analysis of 2-mode data. *Social networks*, *19*(3), pp.243-269.

[32] Butts, Carter T. (2016). sna: Tools for Social Network Analysis. R package version 2.4. https://CRAN.R-project.org/package=sna.

Table D-1. Correlations between measures of diversity and centrality for census tracts and schools for kindergarten under 3Z.

	Census Tracts' Centrality	Census Tracts' Diversity of Schools	Schools' Racial Diversity	Schools' Geographic Diversity	Schools' Racial Representativeness	Schools' Centrality
Census Tracts' Centrality	1					
Census Tracts' Diversity of Schools	0.41	1				
Schools' Racial Diversity			1			
Schools' Geographic Diversity			0.41	1		
Schools' Racial Representativeness			-0.48	-0.36	1	
Schools' Centrality			-0.22	0.06	0	1

Table D-2. Correlations between measures of diversity and centrality for census tracts and schools for kindergarten under Home-Based.

	Census Tracts' Centrality	Census Tracts' Diversity of Schools	Schools' Racial Diversity	Schools' Geographic Diversity	Schools' Racial Representativeness	Schools' Centrality
Census Tracts' Centrality	1					
Census Tracts' Diversity of Schools	0.30	1				
Schools' Racial Diversity			1			
Schools' Geographic Diversity			0.33	1		
Schools' Racial Representativeness			-0.71	-0.31	1	
Schools' Centrality			-0.48	-0.19	0.30	1

Table D-3. Correlations between measures of diversity and centrality for census tracts and schools for 6th grade under 3Z.

	Census Tracts' Centrality	Census Tracts' Diversity of Schools	Schools' Racial Diversity	Schools' Geographic Diversity	Schools' Racial Representativeness	Schools' Centrality
Census Tracts' Centrality	1					
Census Tracts' Diversity of Schools	0.52	1				
Schools' Racial Diversity			1			
Schools' Geographic Diversity			0.45	1		
Schools' Racial Representativeness			-0.67	-0.44	1	
Schools' Centrality			0.18	0.32	-0.27	1

Table D-4. Correlations between measures of diversity and centrality for census tracts and schools for 6th grade under Home-Based.

	Census Tracts' Centrality	Census Tracts' Diversity of Schools	Schools' Racial Diversity	Schools' Geographic Diversity	Schools' Racial Representativeness	Schools' Centrality
Census Tracts' Centrality	1					
Census Tracts' Diversity of Schools	0.14	1				
Schools' Racial Diversity			1			
Schools' Geographic Diversity			0.37	1		
Schools' Racial Representativeness			-0.53	-0.39	1	
Schools' Centrality			-0.30	0.03	0.12	1

Table D-5. Measures of school diversity and centrality indices for kindergarten and 6th grade, including changes between 3Z and HBAP.

		Mean Values		
School Descriptors	**Grade**	**3Z**	**HBAP**	**Wilcoxon Significance**
Racial Diversity	K2	0.52	0.53	
	6th	0.52	0.53	
Racial Representativeness	K2	0.32	0.35	*
	6th	0.31	0.3	
Geographic Diversity	K2	0.91	0.9	***
	6th	0.9	0.92	
Centrality	K2	0.66	0.6	**
	6th	0.45	0.33	***
Neighborhood Descriptors				
Diversity of Schools	K2	0.74	0.73	
	6th	0.68	0.69	
Centrality	K2	0.65	0.52	***
	6th	0.84	0.53	***

Significance: * $p < .05$, ** $p < .01$, *** $p < .001$