A scalable data model for analyzing and addressing infrastructure gaps

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Section 1: Study Overview & Significance

Across the country, public school buildings are in disrepair. A 2020 Government Accountability Office report found that about half of all schools have serious infrastructural problems, including damaged floors, walls, and ceilings, malfunctioning electric systems, gas leaks, mold, pests, water contamination, and heating and air conditioning failures[1]. Research shows that poor building conditions pose a threat to both student learning and health.[2] Conversely, improving school facilities can significantly enhance student outcomes. Recent research finds that closing infrastructure spending gaps between high- and low-income districts could reduce achievement gaps by as much as 25 percent[3]. Yet, most states underinvest in their facilities, placing the onus on local school districts to finance new construction and repair. This study offers a simple, scalable data model for analyzing and addressing infrastructure gaps. Using a small set of widely available data—school building age, square footage, local fiscal capacity, and state funding—it demonstrates how policymakers can:

1. estimate district-level facility investment needs;
2. identify gaps between infrastructure needs and available funding; and
3. design state funding approaches that better align local capacity, state support, and facility repair and modernization needs.

Section 2: Current Policy Landscape

This study focuses on California, where districts vary widely in their ability to finance school facilities. For example, Santa Rita Union Elementary District in coastal Monterey County has reached its legal bonding limit at $27 million—far short of the roughly $100 million needed to bring its schools into good repair. Its bonding capacity is about $7,700 per student, compared to roughly $190,000 per student in the nearby Carmel Unified School District. [4] These disparities stem from the fact that local bond measures backed by property taxes are the primary means of funding school facilities. While the state provides some support through the School Facility Program (SFP), this funding is limited and unevenly distributed. The SFP allocates flat-rate aid on a first-come, first-served, project-by-project basis—an approach that tends to favor larger and wealthier districts that apply more frequently and for larger projects. The program does not systematically target funding based on underlying facility need. Moreover, because aid is provided as flat-rate reimbursement, districts with greater property wealth receive larger state funds, resulting in substantial disparities in overall investment.

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[1] U.S. Government Accountability Office. (2020). *K-12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement.* Washington D.C. https://www.gao.gov/products/gao-20-494.

[2] Biasi B., Lafortune J. & Schonholzer D. (2024). *What Works and for Whom? Effectiveness and Efficiency of School Capital Investments across the U.S.* NBER Working Paper N. 32040, https://www.nber.org/system/files/working_papers/w32040/w32040.pdf.

[3] Ibid.

[4] Fensterwald, J. (June 18, 2024). *Behind the scenes, a battle looms over fair funding for school construction*. EdSource. https://edsource.org/2024/behind-the-scenes-a-big-battle-looms-over-fair-funding-for-school-construction/714186.

Addressing these challenges requires better data—not only on the age and condition of school facilities, but also on how funding flows across districts. Improved data can help policymakers target resources more effectively and ensure that state funding is aligned with both need and local capacity.

Section 3: What the Research Shows

This study constructs a dataset linking school building conditions, local fiscal capacity, and state facility funding across districts in Orange and San Francisco Counties—two regions selected to reflect broader statewide variation. Using publicly available data on property values, state aid, and district facility plans, the study demonstrates that even a small set of inputs can generate credible estimates of:

- five-year facility investment needs,
- the gap between infrastructure needs and current spending, and
- the extent to which districts must rely on local resources versus state support.

The resulting data reveal substantial variation across districts. At the high end, some districts face five-year facility needs exceeding **$717 million**, with average building ages approaching **72 years**. At the low end, districts face needs as low as **$24 million**, with average building ages below **49 years**.

Just as importantly, the database shows that infrastructure need is not simply a function of building age. While policymakers often begin by citing aging facilities, the data indicate that funding pressures depend critically on local fiscal capacity and state support. Districts with similar infrastructure profiles can face dramatically different financial burdens. High-wealth districts may well have aging buildings but low facility funding gaps. State support and local property wealth enable them to keep up with maintenance even as buildings age. Conversely, low-wealth districts may have buildings of average age, but high per-pupil funding shortfalls due to limited local capacity and lower levels of state support (Figure 1).

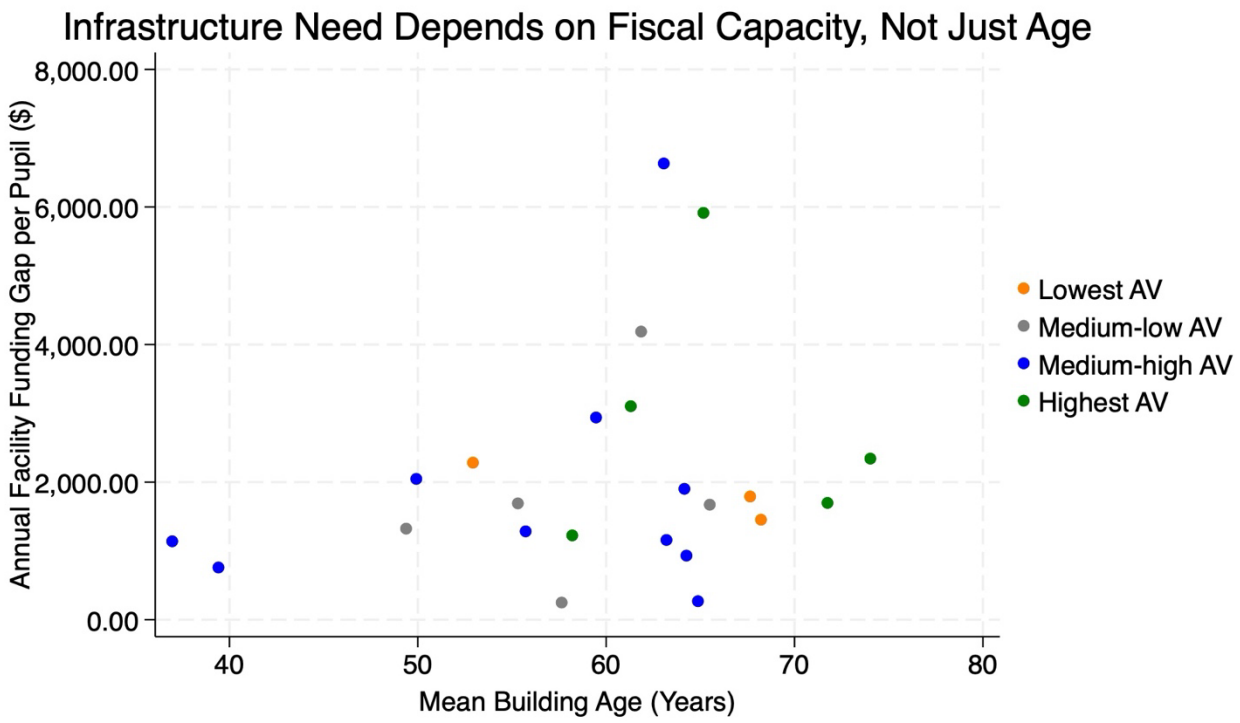

Figure 1 A scatterplot showing mean building age versus facility funding gaps in Orange County and San Francisco Districts. Colors represent distinct quintiles of property wealth (note: no districts fall in quintile 1 in this sample).

Districts with similar building ages can face dramatically different infrastructure funding gaps. High-wealth districts may well have aging buildings but low facility funding gaps. Low-wealth districts may well have newer buildings, but high per-pupil funding shortfalls due to limited local capacity and lower levels of state support.

Section 4: Recommendations for Policymakers and Advocates

Across the country, responsibility for school facilities planning rests largely with local districts. Districts typically develop master facility plans using standard technical inputs such as building age and square footage. While these are useful starting points, they are insufficient on their own. They do not capture the key factors that determine whether infrastructure needs can be met—namely, local fiscal capacity and the distribution of state support.

To address these gaps, states should prioritize improving and standardizing their facility data systems. This study demonstrates that a simple, scalable data model linking building characteristics, local fiscal capacity, and state funding can generate meaningful estimates of infrastructure need and funding gaps across districts.

With such data in place, policymakers can take several concrete steps:

- **Target funding based on need and capacity.** Use district-level estimates of facility need and fiscal capacity to direct resources toward districts with the largest funding gaps.
- **Develop ongoing capital support programs.** Move beyond one-time project funding toward annual capital renewal grants that support routine maintenance and reduce long-term costs.

- **Strengthen support for low-wealth districts.** Design programs that explicitly account for differences in local property wealth and ensure that districts with limited tax bases can meet basic infrastructure standards.
- **Improve transparency and accountability.** Use standardized data to monitor how funds are distributed across districts and within districts, ensuring that investments reach the highest-need schools.

Looking ahead, states should also invest in better estimates of deferred maintenance. Many of the most important policy tradeoffs in facilities funding concern timing—whether to address infrastructure needs now or defer them at greater cost in the future. These decisions are becoming more urgent as districts face fiscal constraints and rising infrastructure costs, including those associated with climate-related damage.

Better data will not solve these challenges on its own. But without it, policymakers lack the basic tools needed to allocate resources effectively, plan for long-term capital needs, and ensure that all students learn in safe and functional school environments.

Spotlight Example

Consider Santa Ana Unified and Huntington Beach City Elementary. Both districts have comparable infrastructure profiles, with similar average building ages and facility needs. Yet their fiscal realities diverge sharply.

Huntington Beach benefits from substantially higher property wealth per pupil and a stronger capacity to finance infrastructure locally. Santa Ana, by contrast, operates with far less property wealth and receives state modernization funding that covers less than 10% of its annual need.

As a result, Santa Ana faces annual facility funding gaps exceeding $2,000 per student, despite having infrastructure demands similar to its wealthier neighbor. This contrast illustrates a central finding: infrastructure challenges are not simply a function of building condition or age, but of unequal fiscal capacity and varying state support. This example underscores the importance of data systems that link school building conditions to school finance. About half of all school buildings in the U.S. are in disrepair. But with simple data collection linking school finance to building conditions, policymakers can begin to make the improvements that will critically enhance student learning and safety.

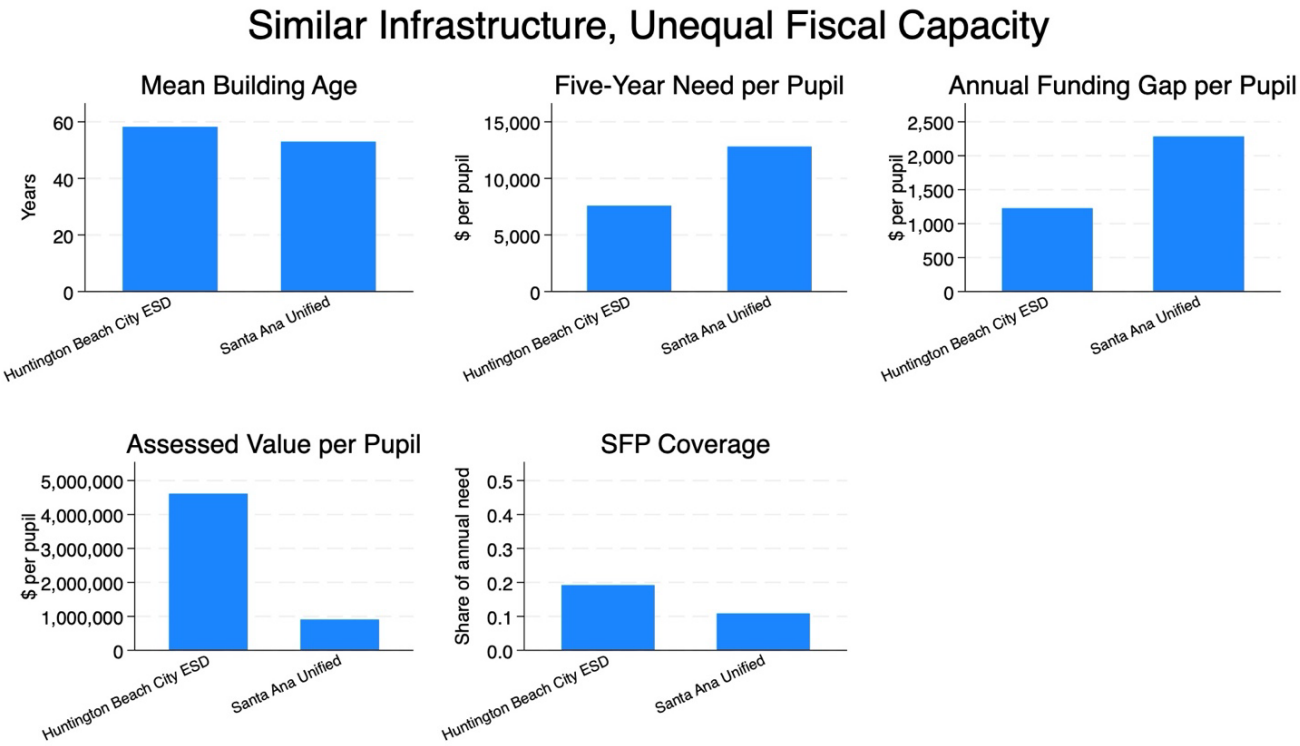

Figure 2 A Comparison of Huntington Beach and Santa Ana--Two Districts with Similar Infrastructure Needs but Divergent Fiscal Profiles