

## Number of Schools (K–12)

This EnviroAtlas community demographic map layer depicts the number of schools found in each U.S. Census Block Group in 2010.

### Why is the number of schools important?

The location of schools, where children spend a significant portion of their day, may provide children with basic environmental benefits or expose them to environmental risks. Environmental conditions play an important role in fostering the current and future health of children because they are rapidly growing and developing physically and mentally. [Ecosystem services](#) support child development by providing healthful food and water, air filtration, natural hazard mitigation, and mental well-being through a lifelong connection with the natural world.

The trend in school siting over the last few decades is to consolidate school districts and build new schools on large campuses on the outskirts of communities. The number of schools in the United States has fallen by 70 percent since the 1930s even though the population has increased greatly since then.<sup>1</sup> While consolidation may create new buildings, this practice separates schools from neighborhoods and eliminates their function as community centers. School siting distant from neighborhoods limits children's ability to walk or bike to school and to use the school grounds for physical activities after hours.<sup>1</sup> Surveys conducted by the Centers for Disease Control and Prevention show that childhood obesity has increased more than 10% since 1976.<sup>2</sup> Optimizing walkable and bike-able access and the use of school grounds as community open space and activity centers may increase activity levels to help reduce childhood obesity and other health risks.

Children in low income or high-density urban neighborhoods are more likely to go to school near degraded physical environments and to be exposed to toxic substances, including lead, asbestos, air pollutants, and industrial waste.<sup>3</sup> Children are particularly susceptible to asthma and acute respiratory illnesses that can be caused and exacerbated by air pollution from car exhaust, oil refineries, and coal-fired power plants. A recent study showed that children exposed to higher levels of traffic pollution at home and at school were at increased risk of developing asthma.<sup>4</sup> Over 6 million children have asthma in the US.<sup>4</sup> Economic losses from asthma occur through school absences and increased use of health services, particularly emergency room visits.



Exposure to toxic substances early in life increases the risk of developing cancers and other diseases that require years to develop and manifest. A recent survey of 95 schools in 30 states found that the air near 64 of the schools surveyed had levels of one or more of the chemicals manganese, chromium, benzene, and naphthalene high enough to represent a risk to children's health.<sup>5</sup>

From a city planning perspective, the risks of several adverse health conditions in children could be reduced by linking schools and homes with street trees and green space along with other aspects of pedestrian-oriented design. The opportunities for physical exercise and engagement with nature provided by trees and green space have been linked in numerous studies to children's health and well-being.<sup>6</sup> Urban trees reduce heat and provide filtration and cleaner air for children by reducing concentrations of fine airborne particles and gaseous air pollutants. Simply viewing green space while outdoors or even through a window has been shown to reduce stress, increase feelings of self-worth, and help children concentrate.<sup>6</sup>

Addressing inequalities in the distribution of ecosystem services relative to school locations may improve the health and well-being of children. For example, schools located near busy roadways may benefit from a solid wall or vegetative barrier to protect children's health. The [environmental justice](#) movement seeks policies that reduce environmental inequalities in the distribution of environmental benefits and risks. It is in the best interest of

society to ensure that all children grow up healthy to meet their full potential.

### How can I use this information?

This demographic information can be used in conjunction with other EnviroAtlas data to identify the numbers of schools within census block groups relative to nearby ecosystem services and benefits. Areas with significant disparities can be identified, and planners can consider additional investments to provide services to meet existing or projected demand. For example, the number of schools in a given area could be combined with other data layers such as busy roadways or industrial facilities. Children attending school in close proximity to these air pollution sources could be at increased risk for developing asthma and potentially subject to delayed cognitive development. Once identified, these areas could be evaluated for emission reductions and enhanced tree cover to help filter harmful air pollutants.

Other pertinent EnviroAtlas data layers may be found in the Table of Contents under Community Ecosystem Services: Clean Air: Health Benefits of Pollutants Removed by Tree Cover, which includes data layers addressing negative health outcomes avoided (e.g., asthma exacerbation and acute respiratory symptoms) and the estimated monetary value of avoided health and productivity losses. Users may examine populations within 300 meters of busy roadways and roadways with and without tree buffers under Clean Air: Near Road Environments. Estimated views of green space from schools and daycare centers are mapped under Community Ecosystem Services: Recreation, Culture, and Aesthetics: Viewsheds.

### How were the data for this map created?

This map layer was created by combining the US Census 2010 TIGER/Shapefile boundary data with Homeland Security Infrastructure Protection (HSIP) data for public and

private schools. Public and private school data were merged and these data were joined to the US Census 2010 boundary data using the block-group code.

### What are the limitations of these data?

A block-group is a collection of census blocks, the smallest area mapped by the U.S. Census Bureau. EnviroAtlas data aggregated to the block group are useful to screen for vulnerable populations, hazards, and beneficial natural features. However, it is important to remember these are not distributed evenly throughout the area of a block-group. Block groups identified to be of potential concern require further exploration using local knowledge and site-specific information.

### How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. Data from the [2010 U.S. Census](#) may be viewed and downloaded from the census website. [HSIP](#) data are not available for general public use.

### Where can I get more information?

A selection of resources on the relationships among school siting, children's health, and ecosystem services is listed below. For additional information on the data creation process, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about this data layer, please contact the [EnviroAtlas Team](#).

### Acknowledgments

The data for this map were prepared by Timothy Wade, EPA. The fact sheet was created by Sandra Bryce, Innovate!, Inc.

### Selected Publications

1. ChangeLab Solutions. 2014. [Smart school siting: How school locations can make students healthier and communities stronger](#). Accessed June 2014.
2. Environmental Protection Agency. 2013. [America's children and the environment: Third edition](#). U.S. Environmental Protection Agency, Washington, D.C. 504 p.
3. Brulle, R.J., and D.N. Pellow. 2006. [Environmental justice: Human health and environmental inequalities](#). *Annual Review of Public Health* 27:103–124.
4. McConnell, R., T. Islam, K. Shankardass, M. Jerrett, F. Lurmann, F. Gilliland, J. Gauderman, E. Avol, N. Kunzli, L. Yao, J. Peters, and K. Berhane. 2010. [Childhood incident asthma and traffic-related air pollution at home and school](#). *Environmental Health Perspectives* 118(7):1021–1026.
5. Hubbard, G. "Air tests reveal elevated levels of toxics around schools," *USA Today*, December 9, 2008.
6. Taylor, A.F., and F.E. Kuo. 2006. [Is contact with nature important for healthy child development? State of the evidence](#). Pages 124–140 in Spencer, C., and M. Blades (eds.), *Children and their environments*, Cambridge University Press, Cambridge, United Kingdom.