Medical Xpress

Children's blood lead levels linked to lower test scores

October 19 2009

Exposure to lead in early childhood significantly contributes to lower performances on end-of-grade (EOG) reading tests among minority and low-income children, according to researchers at Duke University and North Carolina Central University.

"We found a clear dose-response pattern between lead exposure and test performance, with the effects becoming more pronounced as you move from children at the high end to the low end of the test-score curve," said lead investigator Marie Lynn Miranda, director of the Children's Environmental Health Initiative (CEHI) at Duke's Nicholas School of the Environment.

"Given the higher average lead exposure experienced by African-American children in the United States, our results show that lead does in fact explain part of the observed achievement gap that blacks, children of low socioeconomic status and other disadvantaged groups continue to exhibit in school performance in the U.S. education system, compared to middle- and upper-class whites," Miranda said.

The study, published online in the peer-reviewed journal NeuroToxicology, linked data on blood-lead levels from the North Carolina Childhood Lead Poisoning Prevention Program surveillance registry to EOG reading test scores for 4th graders in all 100 of the state's counties.

Researchers used innovative methods, including the use of a statistical

approach called quantile regression, to measure the contribution of lead exposure to declining levels in children's EOG scores.

Their analyses revealed that early childhood exposure to lead, the family's poverty status and parental education all account for test-score declines. On average, exposure to lead accounts for between 7 percent and 16 percent of the decline, with the larger declines associated with higher blood-lead levels.

By comparison, they found the family's poverty status, as indicated by enrollment in a free or reduced-price school lunch program, accounts for 25 percent to 28 percent of EOG declines.

And parental education accounts for the largest portion of the drop in test scores, between 58 percent and 65 percent of the total.

"This demonstrates the particular vulnerabilities of socioeconomically and environmentally disadvantaged children," said Miranda, an associate professor at the Nicholas School and Duke Medical School's department of pediatrics. "Children who experience these cumulative deficits are especially disadvantaged when they enter the school system."

The team's analysis showed that children already at the low end of the test-score curve were more greatly affected by lead exposure - the greater the exposure, the greater the impact on their scores. However, downward shifts were also documented in exposed children at the high end of the EOG curve. This is important, the study noted, because EOG scores are used to place students into advanced and intellectually gifted (AIG) programs at schools across the United States.

"Our findings show that even low-level lead exposure can push some children out of the score range that would make them eligible for these special programs," Miranda said. "To the extent that low-income and

minority children are systematically exposed to more lead, AIG programs become less economically and racially diverse."

Source: Duke University (news : web)