

Income and Test Scores in Kentucky High Schools (1999-2004)

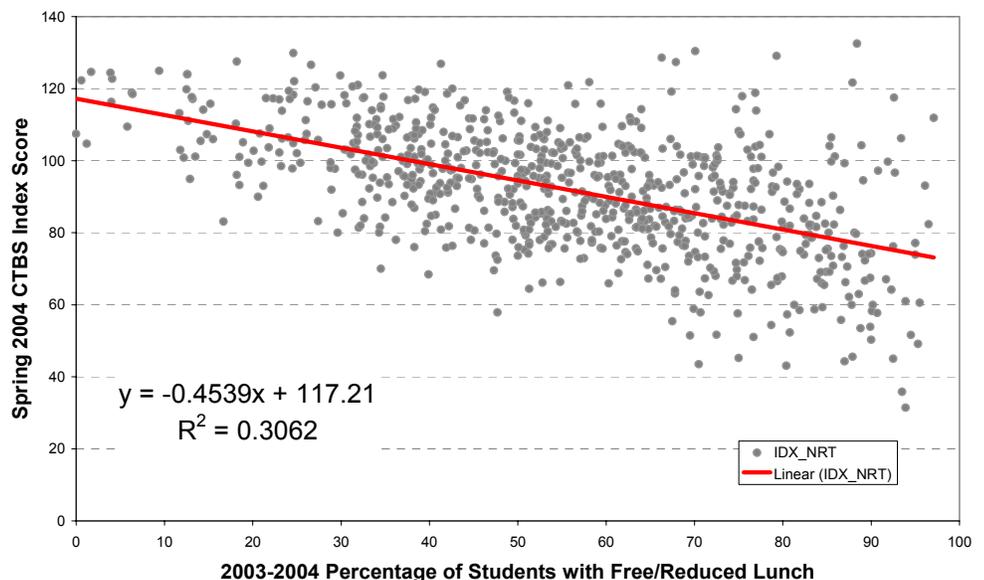
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The Kentucky Department of Education makes large amounts of testing data available to the general public on its web page (<http://www.education.ky.gov/KDE/Administrative+Resources/Testing+and+Reporting+Reports/Research+Data/default.htm>), and in particular through its FTP site (<ftp://ketsftp.k12.ky.us/OAA/>). Included in this data are CTBS/5 (Comprehensive Test of Basic Skills) reports for the years 1999 through 2004 for every public school in Kentucky, and “biographical data” that gives information on the percentage of students in each school with Free/Reduced Price Lunch (FRL). Participation in the Federal FRL program is as an indicator of the economic status of students in a school, with lower-income schools having a high percentage of FRL students, and higher-income schools having a low percentage of FRL students. The CTBS is a national norm referenced test which allows comparison between Kentucky students and students across the country.

According to the KDE FTP site, CTBS/5 tests are given to 3rd, 6th, and 9th grades in the spring of each year. A plot of recent CTBS index scores vs. percentage of students with FRL yields a correlation between index score and %FRL for all types of schools. In general, the higher a school’s %FRL the lower its CTBS index score.

In the case of elementary and middle schools, the trend is relatively weak. For both groups, the coefficient of determination is less than 0.35. The coefficient of determination is the R^2 value for the trendlines shown on the plots. The R^2 would be 1.0 if every school fell exactly on the trendline.

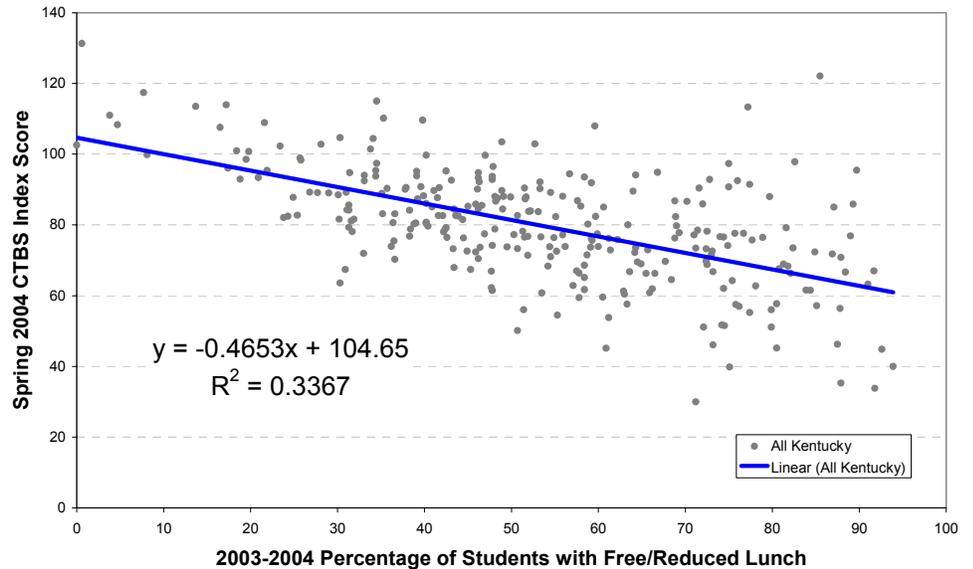
Kentucky Elementary Schools



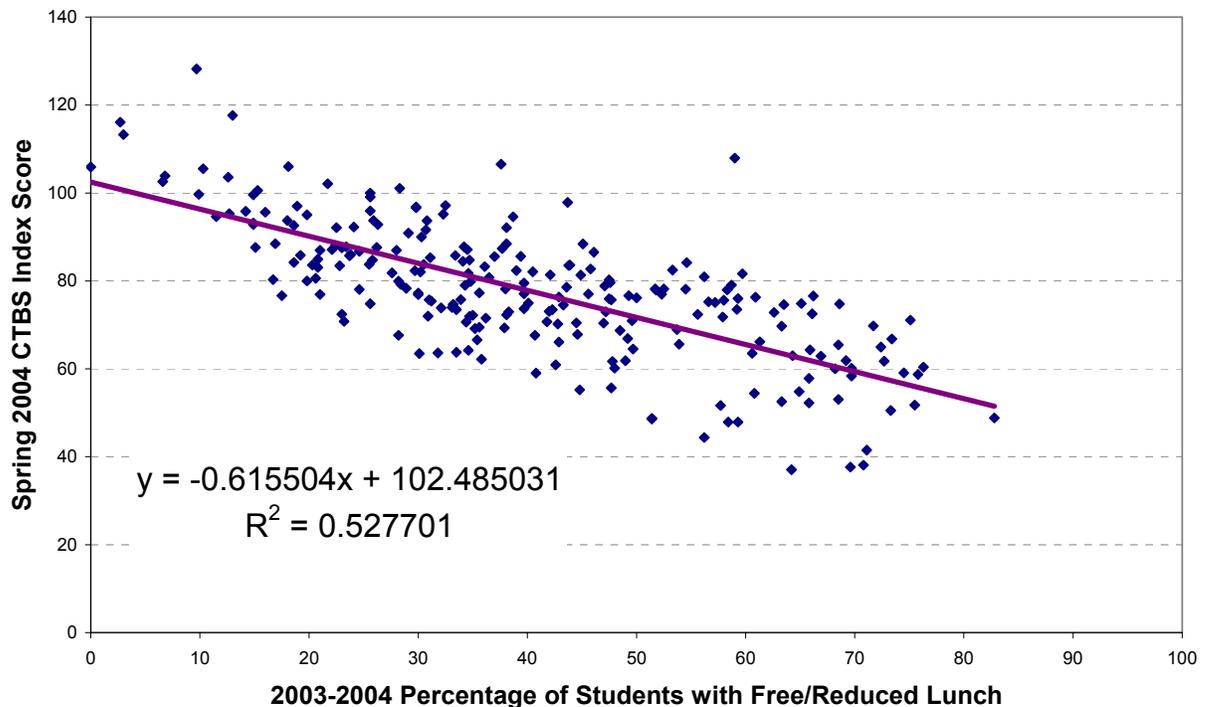
Kentucky Middle Schools

There are many schools that completely buck the trend. There are elementary schools and middle schools with high %FRL but also high CTBS scores.

Not so with high schools. The correlation is much stronger, with just a few apparent standouts in the high %FRL schools.



Kentucky High Schools

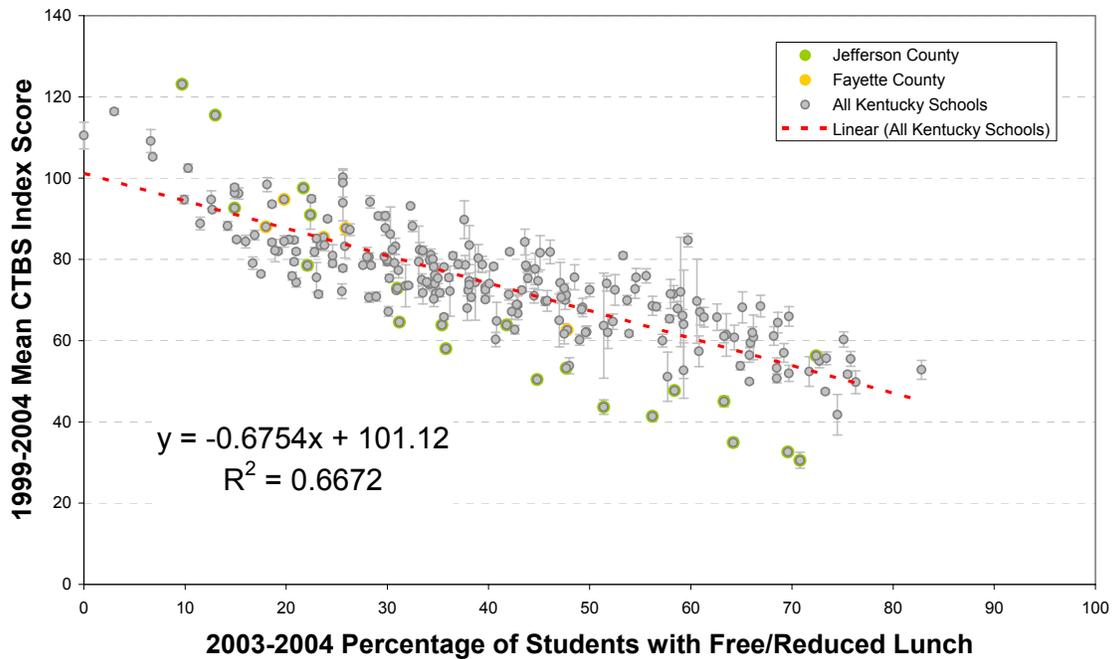


The fact that high school performance is so closely tied to income is a problem since it is generally agreed that Kentucky needs an educated population in order to compete with other regions of the country and world. If there are few examples of high-performing high schools with lower-income student bodies then the state has no examples to which it can turn in trying to figure out how to leave no students behind and to make sure that large chunks of its population are not chronically uneducated and therefore chronically uncompetitive.

However, the above chart for high schools does indicate the presence of a few such schools – at least three have CTBS scores of around 100 despite having a %FRL of roughly 35 or more. Looking at scores over several years instead of just one might indicate whether these schools really are high-performers, or whether their high scores are just flukes.

The chart below plots the mean of schools' CTBS scores from 1999 through 2004 – six years worth of data. The mean values were obtained by, for each school, weighting each year's test scores by the numbers of students taking the test. Thus, for example, if at a particular school 100 students took the test in 2000 and had a CTBS index score of 80, and 200 students took the test in 2001 and had a score of 90, the mean for those two years would be 87, not 85. The error bars are standard error for each school, magnified by an arbitrary value to make them visible. They are intended only to reflect variations between schools and within the overall data. They are not intended to reflect an absolute number.

Kentucky High Schools 1999-2004



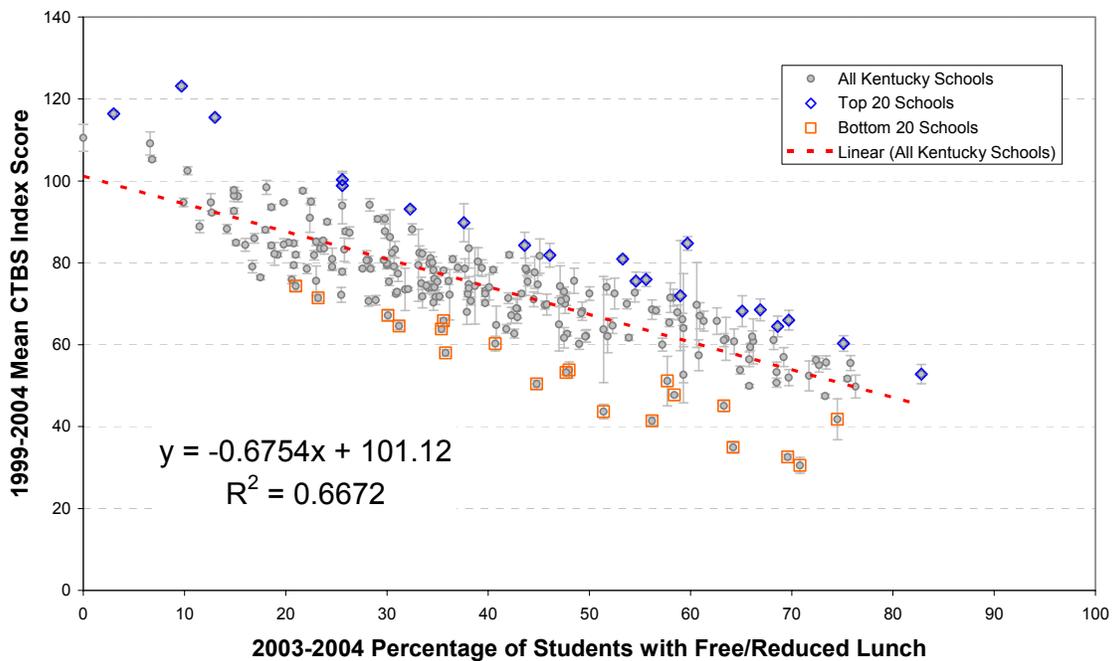
This multi-year look at high schools actually indicates an even stronger connection between high school performance and income. For the multi-year data the R^2 rises to above 0.68, and there are no schools with high %FRL that have a CTBS score anywhere near 100.

Data for Kentucky's two largest counties are highlighted for comparison. Both follow the overall trend for the state. Schools in Jefferson County with lower-income student bodies fare particularly badly.

While the trend is that schools that performed well on the CTBS between 1999 and 2004 are schools with low %FRL, it is possible to single out “good” schools among all levels of %FRL. This is done by looking at whether a certain school falls above or below the trendline for the state as a whole. For example, following the trend for Kentucky as a whole, schools with student bodies that have 70%FRL should have CTBS scores of about 50. A school with 70%FRL that has a 1999-2004 Mean CTBS score of 60 is then “beating the trend” by about 20%. A school with a high-income student body which should have a Mean CTBS score of 100 according to the trendline would have to score 120 to “beat the trend” by a comparable percentage.

Calculating this for all schools, and highlighting the 20 schools that beat the trend by the greatest percentages yields the plot below. The 20 schools that lag behind the state-wide trend by the greatest percentages are also highlighted.

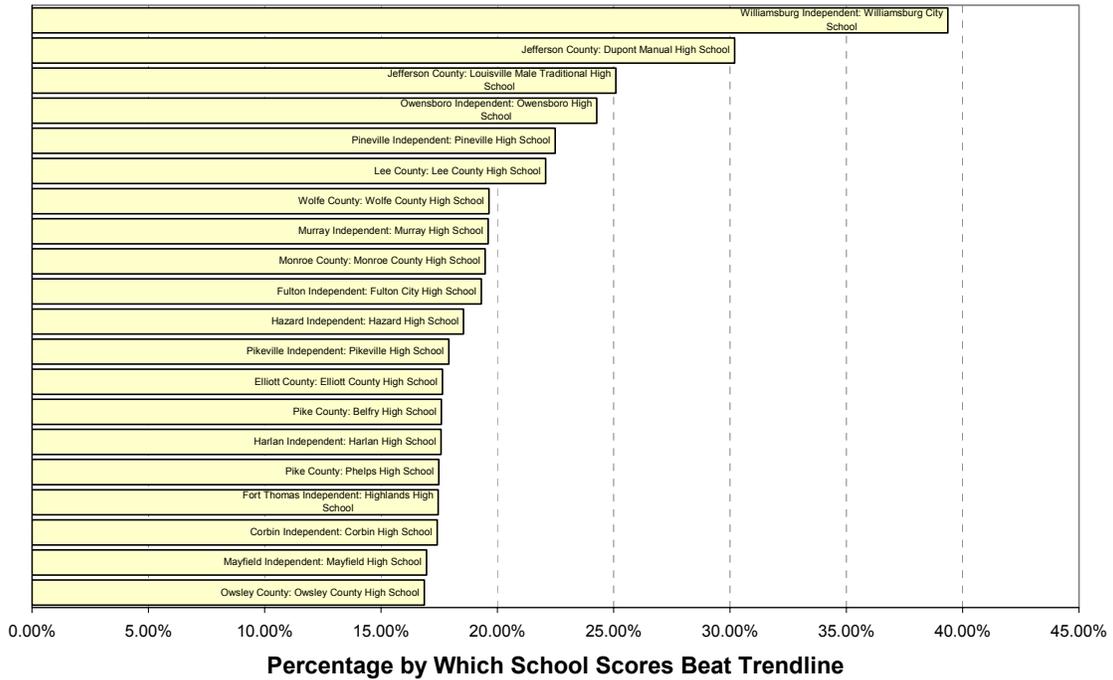
Kentucky High Schools 1999-2004



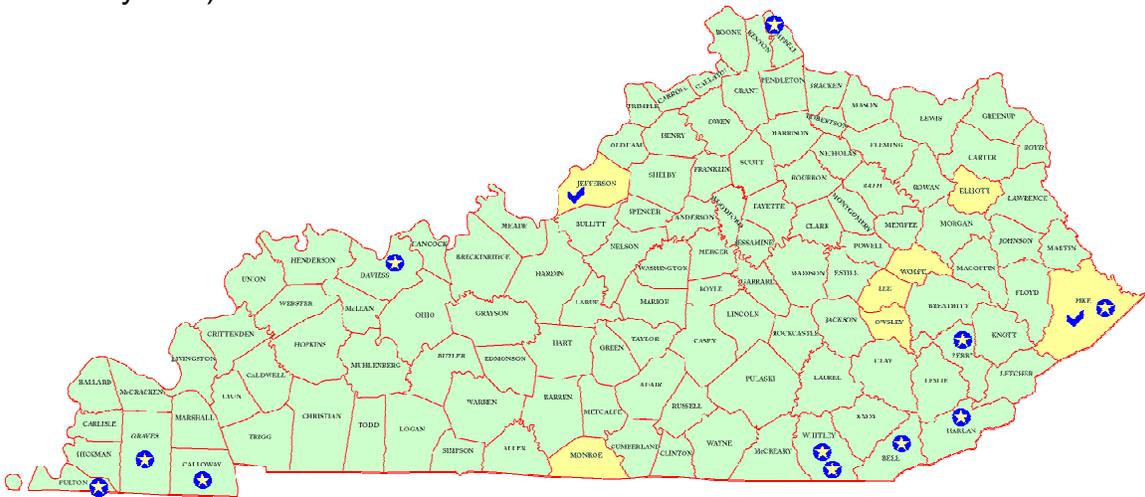
This essentially highlights the “best” and “worst” schools in the state, as measured by the CTBS scores, when a correction is made for student body income. Note that some schools with very low 1999-2004 Mean CTBS scores are actually among the “best” schools in the state by this method of measurement.

These “best” schools in the state are listed in the chart below.

Top 20 Kentucky High Schools



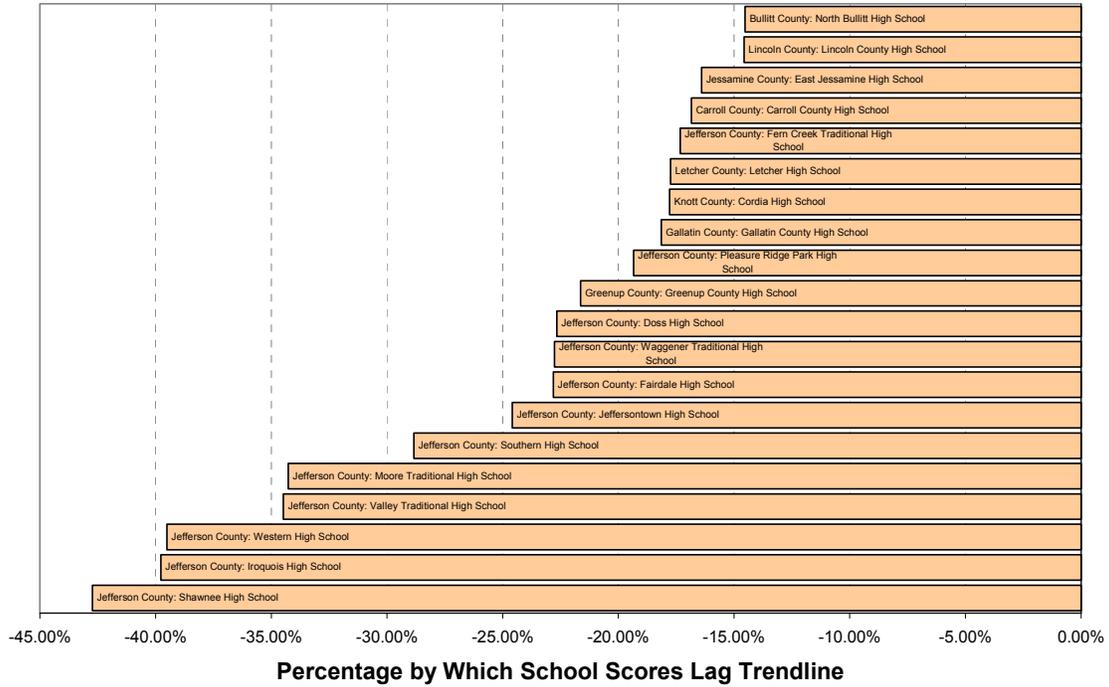
Their geographic distribution within the state is shown below. County school systems with a Top 20 school are highlighted in yellow. If they have a second Top 20 school that is indicated by a check mark. Top 20 schools that are part of public school systems that are independent of their county systems, such as Owensboro High School (which is a part of the City of Owensboro’s independent school system) are marked with a star.



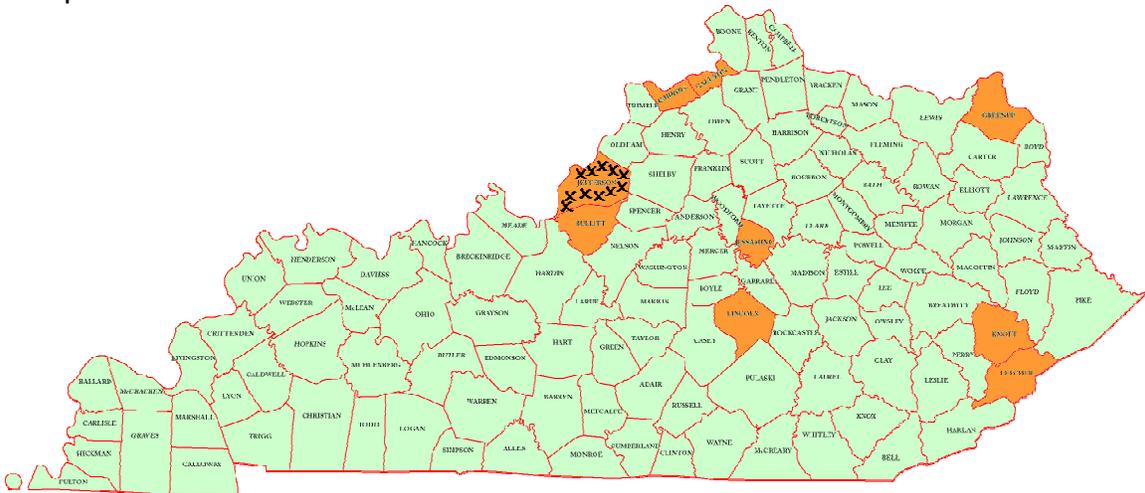
One notes immediately that these Top 20 high schools tend to be in the southern and eastern parts of the state, and that they tend to be independents.

On the other side of the coin are the “worst” schools in the state. These are listed in the chart below.

Bottom 20 Kentucky High Schools



Their geographic distribution within the state is shown below. County school systems with a Bottom 20 school are highlighted in brown. If they have a second Bottom 20 school that is indicated by an “X”. No Bottom 20 schools were independents.



The vast majority of Bottom 20 schools tend to be in Jefferson County.

This analysis of 1999-2004 CTBS data for Kentucky high schools leads to at least a couple of paths for further inquiry:

- When correcting for income, it seems that high schools that are not part of a county system tend to stand out in the CTBS data. Why? What can Kentucky learn from these schools?
- While it may be possible to correct for income and find outstanding schools with lower-income student bodies, in absolute terms lower-income schools perform poorly compared to higher-income schools, and the trend is quite strong. Kentucky needs an educated populace, and it cannot afford to write off the vast numbers of high schools whose student bodies contain a substantial percentage of students with Free/Reduced Price Lunch. Further study of why good high school education in particular does not reach lower-income people is needed. Perhaps as the elementary and middle school student cohorts noted in this paper move up into high school they will take their lower R^2 's with them! However, if not, Kentucky will have a tough job figuring out how to improve learning at lower-income high schools so that they, and the state, can compete.