JHSPH Biostat Qualifying Exam 2011 Take Home

Background:

In the late 1990's the Bill and Melinda Gates Foundation began donating tens of millions of dollars to decrease the size of schools. Other charitable organizations have also taken up the cause including the Annenberg Foundation, the Carnegie Corporation, the Center for Collaborative Education, the Center for School Change, Harvard's Change Leadership Group, Open Society Institute, Pew Charitable Trusts, and the U.S. Department of Education's Smaller Learning Communities Program. These programs were motivated by the observation that a large fraction of small schools were among the top performing schools on standardized tests (**Table 1**).

School Size	Percentage of Schools Scoring in the "Top 25" 1997-2000
Smallest Decile	27.7%
2nd Decile	11.8%
3rd Decile	8.2%
4th Decile	3.6%
5th Decile	2.4%
6th Decile	3.6%
7th Decile	4.8%
8th Decile	7.1%
9th Decile	0%
Largest Decile	1.2%

Table 1. A table of the percent of schools in the "Top 25" in North Carolina for the years 1997-2000 by school size.

Your Project:

A careful evaluation of the association between school size and assessment scores is important because of the huge amount of money and resources being spent on this cause. In Maryland schools are evaluated on the basis of the Maryland School Assessment (MSA)- an annual assessment program that tests grades 3 through 8 in reading and mathematics (http://www.mdreportcard.org/). Your project is to

analyze data from the MSA and write a short letter either in favor of or against spending money to decrease school sizes.

The letter should be written to the director of a charitable organization. This person would be familiar with MSA data, but have only a basic understanding of statistics. Explain your figures/analyses in clear, but precise and accurate, language.

Your letter should focus on:

(1) The association between enrollment and the percent of students scoring "Advanced" on the MSA in Reading and Math in the 5th grade.
(2) The change in the number of students scoring "Advanced" in Reading and Math from one year to the next (at minimum consider the change from 2009-2010) versus enrollment.
(3) Potential reasons for results like those in **Table 1**.

The Data:

Assessment data for 2010 are available from:

http://www.mdreportcard.org/downloadindex.aspx?WDATA=download

For previous years (2003-2009) the data are available from:

http://www.mdreportcard.org/downloadindexprevious.aspx#downloads2009

For each year, the files you should use are "MSA Data" and "Enrollment Data".

Length Requirements:

Less than 2,000 words. No more than 1 figure and 1 table.

Reproducibility:

The political nature of education means that your analysis will be carefully scrutinized. You should include code that fully reproduces the

analyses/figures/tables in your report, starting from the MSA and Enrollment data files as an appendix.