Unequal distribution of scientific laboratory practice in high schools in Rio de Janeiro, Brazil: impact on student performance and relations with higher education.

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Brazilian high school students demonstrated low performance in the Programme for International Student Assessment (PISA). Less than half of the students achieved a minimum level of learning in mathematics and science. Science education is relevant for promoting scientific literacy and the formation of critically literate citizens. A previous study indicates disparities in science education investment in schools, with most investments concentrated in schools near public Higher Education Institutions (HEI) in the state of Rio de Janeiro (RJ), resulting in a concentration of investments in metropolitan areas to the detriment of others. This study aims to investigate the distribution of high school science laboratories in each mesoregion of the state of RJ and correlate it with the presence of a nearby public HEI and Gross Domestic Product (GDP). Data were obtained from the 2022 School Census. Upon analyzing the total number of schools, the Metropolitan region of the state has the majority of public schools, the highest number in population concentration, HEI and GDP. Interestingly, when considering the proportion of total schools and schools with science laboratories per mesoregion, it was found that the South of RJ, and not the Metropolitan region, presents the highest concentration (66.5%) of science laboratories, along with the third-highest GDP and second-highest number of HEI. The Metropolitan region has 49.5% of schools with a laboratory, a number lower than the North of RJ, which has 55.1%. The correlations found between the presence of high school science laboratories were significant when correlated with the presence of HEI ($R^2 = 0.9742$ and $p = 0.0003$) and GDP ($R^2 = 0.9943$ and $p < 0.0001$). The results highlight the need for science decentralization policies, investigation of science education disparities and equity in the distribution of high school science laboratories.