## Does South East Asia Region have more NO<sub>2</sub> emissions than the European Region in 2019?

Fail to reject the null hypothesis: The NO<sub>2</sub> emissions in the South East Asia Region and European Region are similar.

Reject the null hypothesis or alternative hypothesis: The NO<sub>2</sub> emissions in the South East Asia Region is greater than in the European Region.

After performing a t-test, the p-value was less than 0.05, which rejects the null hypothesis.

## Given that South East Asian has greater NO<sub>2</sub> emissions than Europe, additional testing was performed on France and India.

## Does France have less NO<sub>2</sub> emissions in 2016 than in 2010? We analyzed 2016 and 2010 because they have similar number of samples. We found this by grouping by country and years in R.

A bootstrap test is performed for ratio of means of “NO<sub>2</sub>.” The 95% bootstrap percentile interval for the ratio of means is (0.6566061 1.7743924). The estimated bias is approximately 0.03. The bootstrap tests also shows there is 95% confidence in the alternative hypothesis.

Yes, France has decreased their NO<sub>2</sub> emissions in 2016.

## Does India have less NO<sub>2</sub> emissions in 2018 than in 2014? We analyzed 2018 and 2014 because they have similar number of samples.

After performing a t-test, the p-value is greater than 0.05, which fails to reject the null hypothesis.

India did not decrease NO<sub>2</sub> emissions in 2018.

R library: t-test[^1]

[^1]: T.test: Student’s t-test. RDocumentation. (n.d.).

<https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/t.test>

## WHO Nitrogen Dioxide Guidelines

According to the existing WHO air quality guidelines, an annual average indoor nitrogen dioxide guideline of 40 μg/m3 is recommended. In the WHO dataset, a new column was added labeling NO<sub>2</sub> above and within 40 μg/m3[^1].

Chi-squared test is performed to assess if global compliance with recommended NO<sub>2</sub> is dependent on year.

[^1]: Jarvis DJ, Adamkiewicz G, Heroux ME, et al. Nitrogen dioxide. In: WHO Guidelines for Indoor Air Quality: Selected Pollutants. Geneva: World Health Organization; 2010. 5. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK138707/>

## Is global NO<sub>2</sub> dependent on Year?

The Chi-squared test result in p-value < 0.05, confirming the alternative hypothesis. Therefore, compliance with recommended NO<sub>2</sub> differs between the years.

Fail to reject the null hypothesis: The compliance with recommended NO<sub>2</sub> are independent from years. The compliance with recommended NO<sub>2</sub> does not differ between years.

Reject the null hypothesis or alternative hypothesis: The compliance with recommended NO<sub>2</sub> are dependent on the year. The compliance with recommended NO<sub>2</sub> differs between the years.