1. Main Variables of the study

Below table displays the description of the main variables involved in the study.

Variable	Description
GDP_df	GDP per capita, PPP (constant 2017 international $) (Country Wise)
precipitation_df	Average precipitation in depth (mm per year) (Country Wise)

2. Model equation

$Precipitation_i = \beta_0 + \beta_1 (GDP\ per\ capita)_i + \varepsilon_i$

2.1 Assumptions

1) There is a simple linear relationship between GDP (independent variable) and precipitation (dependent variable).
2) There are no omitted variables.

3. Results

For every region, the optimum coefficient and their t-statistic values are displayed below:

Region	Coefficient	t-statistic
South Asia	0.0724559	0.752386
Europe and Central Asia	0.00704199	2.71024
Middle East and North Africa	-0.00164379	-0.779365
Sub-Saharan Africa	0.00483372	0.177918
Latin America and Caribbean	-0.0302572	-1.5456
East Asia and Pacific	-0.0113937	-1.06492

Note: These values may change when the .ipynb file is re-run. The data is for the year 2020. The coefficients belong to training dataset. The t-statistic values are associated with these coefficients.

For all regions, excluding Europe and Central Asia, the t-statistic value is not statistically significant, i.e., the mod of t-value is below 1.64 (t-critical value at 90% confidence interval). Therefore, we fail to reject the null hypothesis, that the coefficient of GDP is zero. **In other words, GDP does not have a significant effect on the precipitation level for all those regions.**

For Europe and Central Asia region, the mod of t-statistic value is 2.71, which is greater than 2.576 (t-critical value at 99% confidence interval). Therefore, we reject the null hypothesis, that the coefficient of GDP is zero. Hence, we can say that on an average, with increase in GDP per capita by $100, average precipitation would increase by .7 mm. **This could mean that as the economy becomes more prosperous, there might be more resources available for water management and infrastructure, leading to increased precipitation.**

4. Suggested Policy Implications

1) Global policy implications:

   As observed in the analysis, most of the regions have an insignificant impact of GDP on precipitation. Therefore, I would suggest integrated policies that focus on several relevant factors like geographical and climatic conditions, rather than solely focusing on economic growth, in understanding the precipitation patterns.

2) Regional policy implications:

   Since, Europe and Central Asia region show a clear impact of GDP on precipitation, my suggestion would be to implement better water management policies by building strong infrastructure to store excess water, and using advanced technology to forecast extreme weather conditions.

   Other regions should focus on developing good research and development policies to analyze the relevant factors affecting

precipitation patterns. They should invest in capacity building and knowledge dissemination to ensure growth in this arena.

5. Limitations

1) Data limitations - The unit of observation is country which are further combined into regions. This results in only a few data points per region which is one of the reasons for insignificant t-values.
2) Omitted variable bias – This study is based on simple linear regression model which omits all other important variables.
3) Wrong functional form – Some regions have depicted a scatter plot that shows a quadratic relationship between the two variables. However, this study forces a linear relationship between both variables.

6. Suggestions for improvement in the study

1) Machine Learning algorithms like elastic net should be applied when there are several independent variables and one of the main tasks is to select the relevant factors. Therefore, according to this study, I used gradient descent which can be easily applied to linear regression models. However, a better way would have been to apply OLS estimation as this study employed simple linear regression analysis with minimal data points.