

Controlling a Variable

At times when doing correlation research, important factors may be lost in the size of a dataset. In order to uncover this important evidence, researchers control variables. Controlling a variable ensures that things are more alike when being compared.

For instance, if there were two pre-calculus teachers at your school who gave the same final, there would be a dataset that could conclude how well the entire school performed. However, important information may be lost unless you control for a variable (in this case the teacher). Perhaps one class focused on one topic more than the other class, or perhaps one struggles with word problems. This information might not be discovered unless the variable is controlled.

In your study, you will look at the same data that you used in Activity 1, but this time you will control the government variable. There are two types of governments in this study: republics and constitutional monarchies. In these systems, the office of head of state can either be defined as executive or ceremonial. You will use this to regroup the countries into four categories: republic with an executive head of state, republic with a ceremonial head of state, constitutional monarchy with an executive head of state, and constitutional monarchy with a ceremonial head of state.

Definitions:

A **republic** is a state in which power is held by the people and their elected representatives.

A **constitutional monarchy** means that the people are protected by a constitution of some kind, but there is still a monarchy (king, queen, royal family) in there with some role.

An **executive** head of state is when the head of state possesses key powers within the framework of the government.

A **ceremonial** head of state is when the head of state has either limited executive powers or none at all, and mainly has a symbolic role.

In this assignment, you will use the data “**42 Countries for Data Analysis w/ Form of Government**” to compare the correlations between the **Percentage of Underweight Children** and three variables that you consider to have the strongest relationship from the previous assignment.

By analyzing these relationships, you may uncover interesting relationships between the types of governments and the *Percentage of Underweight Children*.

Note: The results of this correlational study are not all statistically significant. Why not?

Task:

In your groups, divide the responsibilities of the different variables, calculate the correlation coefficient with each form of government (program into TI-Graphing Calculators), and answer the questions.

1. Using the 42 Countries for Data Analysis (with Form of Government) table, determine which countries fit into each category.

Republic – Executive	Constitutional Monarchy – Executive
Republic – Ceremonial	Constitutional Monarchy - Ceremonial

2. Select three variables to use in your study:

Variables	Activity 1 Correlations Coefficient
i.	
ii.	
iii.	

Justify your selections:

3. Complete the tables to determine the strength of the correlations with the *Percent of Underweight Children* data controlling for the type of Government

Republic - Executive

Variable	Correlation Coefficient	Strength of Correlation

Republic - Ceremonial

Variable	Correlation Coefficient	Strength of Correlation

Constitutional Monarchy - Executive

Variable	Correlation Coefficient	Strength of Correlation

Constitutional Monarchy - Ceremonial

Variable	Correlation Coefficient	Strength of Correlation

4. Which correlation(s), if any, differed most greatly from those calculated in Activity 1?
How do you explain the difference?

5. Do any of the correlations from the previous assignment disappear or reverse?
6. Describe the reliability of the statistics. Which categories appear to have more reliable results? Why?
7. Based on your data, do you think the type of government is a factor in the relationships between underweight children and the other variables? Can your group draw any conclusions as a result of this study?

42 Countries for Data Analysis (with Form of Government)

Country	Constitutional Form	Head of State	Total Population	GDP Per Capita (Income per person)	Under-weight for age (% of children)	Infant Mortality (per 1000 births)	Life Expectancy at Birth	% of Population that Earn Below \$2 a Day	Human Development Index HDI	Food Supply Average Calories per Day	Agriculture (% of GDP)
	2010	2010	2010	<i>Most recent year 00-09</i>	2010	2011	<i>Most recent year 00-10</i>	2011	2007	2011	2010
Argentina	Republic	Executive	40,412,376	\$10,749	2.3	10.52	75.901	1.87	0.80	2,941	9.09
Armenia	Republic	Executive	3,092,072	\$1,327	4.2	18.21	74.241	12.43	0.72	2,279.9	20.66
Bangladesh	Republic	Ceremonial	148,692,131	\$558	41.3	48.99	68.944	76.54	0.50	2,281.2	18.43
Belarus	Republic	Executive	9,595,421	\$2,738	1.3	3.70	70.349	0.19	0.76	3,145.6	8.13
Bolivia	Republic	Executive	9,929,849	\$1,233	4.5	40.94	66.618	24.89	0.66	2,064.1	11.75
Brazil	Republic	Executive	194,946,470	\$4,699	2.2	20.50	73.488	10.82	0.72	3,112.5	5.46
Cambodia	Constitutional Monarchy	Ceremonial	14,138,255	\$558	28.8	54.08	63.125	53.27	0.52	2,267.6	36.02
Chile	Republic	Executive	17,113,688	\$6,334	0.5	7.40	79.12	2.72	0.81	2,920.4	3.40
China	Republic	Executive	1,341,335,152	\$2,425	4.6	15.62	73.456	29.79	0.69	2,980.5	10.04
Republic of the Congo	Republic	Executive	4,042,899	\$1,253	11.8	74.22	57.379	74.40	0.53	2,511.9	3.75
Cote d'Ivoire	Republic	Executive	19,737,800	\$591	29.4	63.20	55.377	46.34	0.40	2,527.5	24.31
Croatia	Republic	Ceremonial	4,403,330	\$6,338	1.0	6.06	76.640	0.09	0.80	2,989.9	5.47

Dominican Republic	Republic	Executive	9,927,320	\$4,049	3.4	21.30	73.396	9.88	0.69	2295.1	6.10
Egypt	Republic	Executive	81,121,077	\$1,976	6.8	24.23	73.235	15.43	0.64	3,194.6	13.95
El Salvador	Republic	Executive	6,192,993	\$2,557	6.6	19.66	72.196	16.94	0.67	2,589.6	12.71
Ethiopia	Republic	Ceremonial	82,949,541	\$221	34.6	60.90	59.274	77.63	0.36	19,79.7	41.87
Germany	Republic	Ceremonial	82,302,465	\$25,306	1.1	3.51	80.414	—	0.91	3,547.0	—
Ghana	Republic	Executive	24,391,823	\$359	14.3	40.90	64.228	51.84	0.54	2,907.0	27.27
Honduras	Republic	Executive	7,600,524	\$1,392	8.6	19.85	73.126	29.84	0.63	2,623.4	12.40
India	Republic	Ceremonial	1,224,614,327	\$787	43.5	46.07	65.438	68.72	0.55	2,351.9	17.22
Indonesia	Republic	Executive	239,870,937	\$1,144	19.6	27.00	69.366	46.12	0.62	2,538.4	16.88
Jamaica	Constitutional Monarchy	Ceremonial	2,741,052	\$3,665	1.9	14.30	73.127	5.44	0.73	2,851.6	5.87
Jordan	Constitutional Monarchy	Executive	6,187,227	\$2,534	1.9	15.83	73.403	1.59	0.70	3,015.4	3.33
Kazakhstan	Republic	Executive	16,026,367	\$2,482	4.9	23.06	67.017	1.12	0.75	3,490.1	5.26
Kenya	Republic	Executive	40,512,682	\$469	16.4	43.61	57.134	67.21	0.51	2,089.3	23.13
Lesotho	Constitutional Monarchy	Ceremonial	2,171,318	\$496	16.6	53.44	48.196	62.25	0.45	2,476.2	7.76
Mauritania	Republic	Executive	3,459,773	\$609	15.9	58.93	58.582	47.69	0.45	2,841.1	16.26
Mexico	Republic	Executive	113,423,047	\$6,105	3.4	16.77	76.954	5.19	0.77	3,266.3	3.73
Morocco	Constitutional Monarchy	Executive	31,951,412	\$1,844	9.9	26.49	72.15	14.03	0.58	3,236	15.09
Mozambique	Republic	Executive	23,390,765	\$390	18.3	76.85	50.239	81.77	0.32	2,066.6	31.96

Pakistan	Republic	Ceremonial	173,593,383	\$669	31.3	61.27	65.437	60.19	0.50	2,292.8	21.62
Paraguay	Republic	Executive	6,454,548	\$1,621	3.4	22.24	72.477	13.22	0.67	2,634.4	21.99
Peru	Republic	Executive	29,076,512	\$3,180	4.5	21.50	73.99	12.74	0.73	2,457.0	7.82
Philippines	Republic	Executive	93,260,798	\$1,383	20.7	18.75	68.749	41.53	0.64	2,564.9	13.04
Senegal	Republic	Executive	12,433,728	\$562	14.5	55.16	59.318	60.36	0.46	2,347.7	17.84
South Africa	Republic	Executive	50,132,817	\$3,746	8.7	42.67	52.797	31.33	0.62	2,998.5	2.40
Tanzania	Republic	Executive	44,841,226	\$456	16.7	46.50	58.199	87.87	0.47	2,032.4	27.11
Thailand	Constitutional Monarchy	Ceremonial	69,122,234	\$2,713	7	15.90	74.126	4.59	0.68	2,538.6	12.37
Tunisia	Republic	Executive	10,480,934	\$3,165	3.3	24.98	74.515	8.06	0.70	3,326.5	8.32
Ukraine	Republic	Executive	45,448,329	\$1,037	0.9	8.38	68.494	0.17	0.73	3,223.7	8.29
United States	Republic	Executive	310,383,948	\$37,491	1.3	6.00	78.531	—	0.91	3,748.4	—
Yemen	Republic	Executive	24,052,514	\$610	43.1	53.50	65.493	46.60	0.46	2,067.6	7.70