

Life Expectancy

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Introduction

Table 1: Life Expectancy of the Top 10 Countries

Country	Life Expectancy
Slovenia	88.0
Denmark	86.0
Chile	85.0
Cyprus	85.0
Japan	83.7
Switzerland	83.4
Singapore	83.1
Australia	82.8
Spain	82.8
Iceland	82.7

Overview of Data

Controllable Variables

- **Alcohol**: Alcohol consumption per capita (liters of pure alcohol)
- **pct_expend**: Expenditure on health as a percentage of GDP per capita
- **hep_b**: Hepatitis B immunization rate among 1-year-olds (%)
- **Polio**: Polio immunization rate among 1-year-olds (%)
- **tot_expend**: Government expenditure on healthcare as a percentage of total government expenditure
- **Diphtheria**: Diphtheria tetnus toxoid and pertussis immunization rate among 1-year-olds (%)
- **hiv_aids**: Number of deaths of 0-4 year-olds from HIV/AIDS per 1000 live births
- **Schooling**: Average number of years of schooling

Uncontrollable Variables (Nuisance Variables)

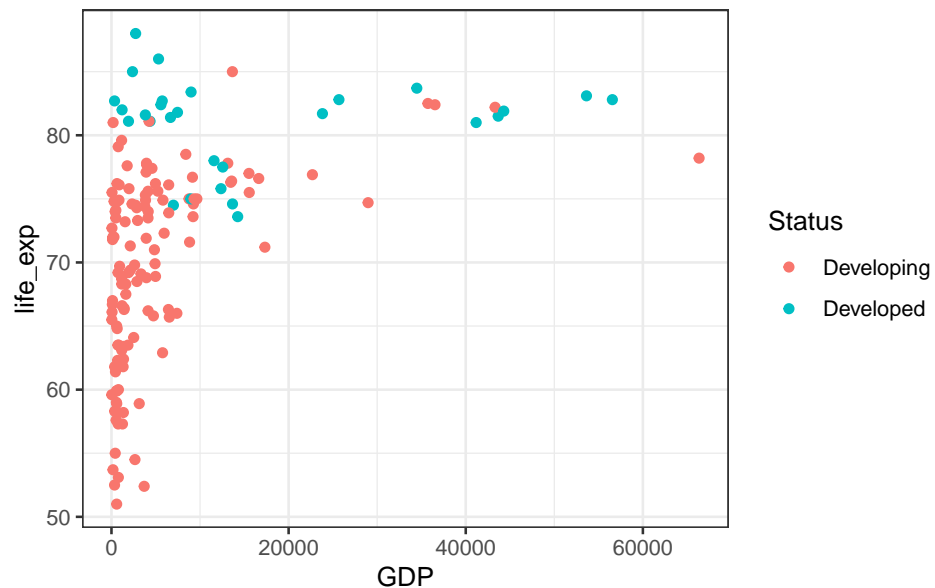
- **BMI**: Average BMI (Body Mass Index) of entire country's population

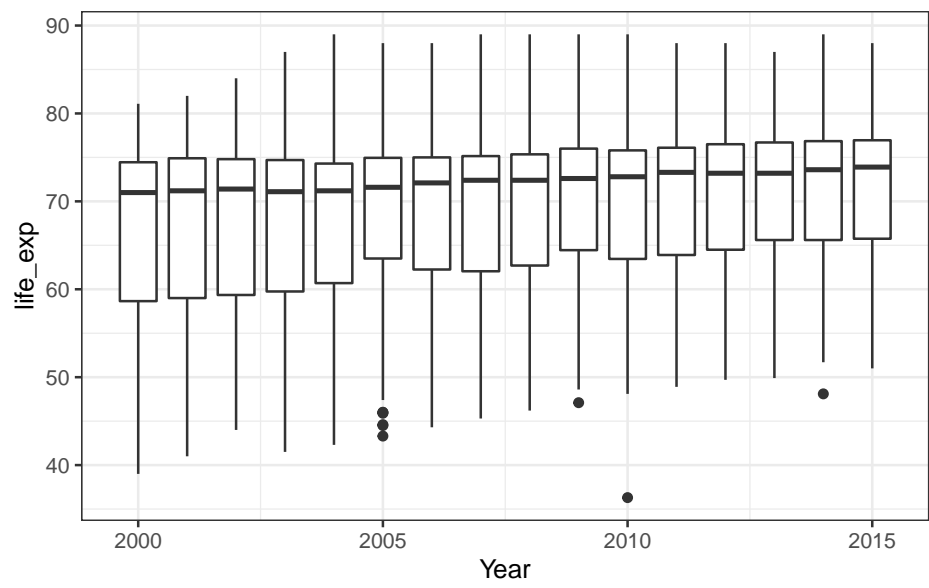
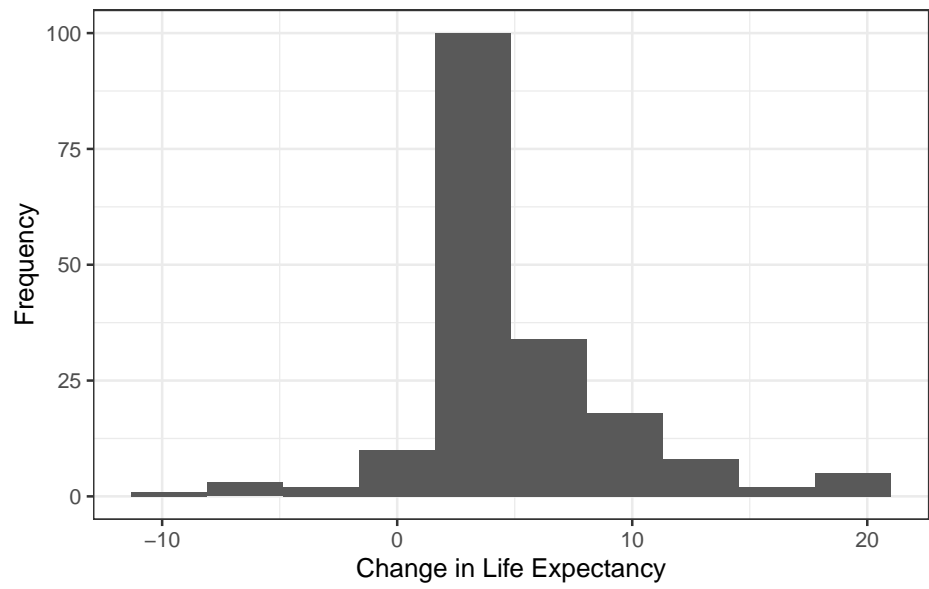
- **GDP:** GDP per capita
- **Population:** Total population of country
- **thinnes_adole:** Prevalence of “thinness” among adolescents aged 10-19 (%)
- **thinness_infant:** Prevalence of “thinness” among infants aged 5-9 (%)
- **income_comp:** Human Development Index in terms of income composition of resources (0 to 1)
- **Status:** Developmental status of country (Developed or Developing)

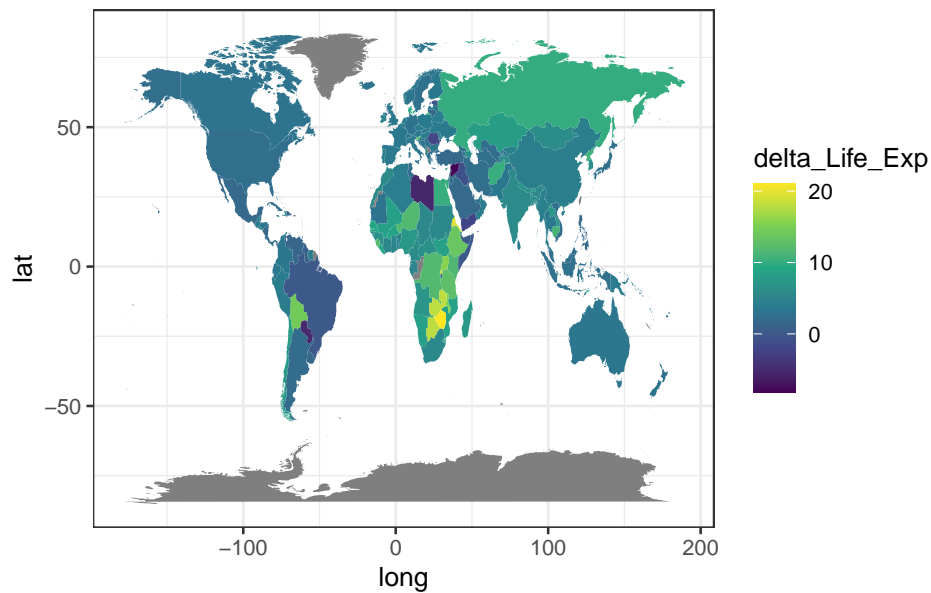
Indicator Variables

- **under_five_deaths:** Number of deaths of 5-year-olds or younger per 1000 people
- **life_exp:** Average expectancy in country (years)
- **adult_mortality:** Number of deaths of people aged 15-60 per 1000 people
- **infant_mortality:** Number of infants deaths per 1000 infants

Exploratory Data Analysis







Generally countries increased life expectancy, especially in Sub-Saharan Africa. Which countries experienced a decrease in life expectancy.

Change in Life Expectancy	Country
-8.1	Syrian Arab Republic
-5.8	Saint Vincent and the Grenadines
-5.3	Libya
-5.0	Paraguay
-2.3	Yemen
-2.0	Romania
-1.1	Iraq
-0.4	Estonia
-0.4	Grenada

From 2000-2015, the nations that experienced a decrease in life expectancy are Syria, St. Vincent and the Grenandines, Libya, Paraguay, Yemen, Romania, Iraq, Estonia, and Grenada. All of these nations except for Romania are developing.

Research Question 1: Given a country is developing, what can they do to increase their Life Expectancy?

term	estimate	p.value	significant
(Intercept)	47.3544634	0.0000000	Significant
Schooling	1.4838656	0.0000000	Significant
hiv_aids	-0.6622054	0.0000000	Significant
tot_expend	0.0993622	0.0651826	Not Significant
Alcohol	-0.0807471	0.0420498	Significant
Polio	0.0294019	0.0000238	Significant
Diphtheria	0.0218701	0.0067412	Significant
pct_expend	0.0014132	0.0000000	Significant
hep_b	-0.0004334	0.9434882	Not Significant

Include in first research question: For the small subset of countries that saw a decrease in life expectancy from 2000-2015, what factors led to this decrease in life expectancy?

Research Question 2: For countries that already have a high life expectancy, is it economically beneficial to attempt to marginally increase life expectancy?

Notes

Introduction/EDA

- start with providing scientific context, refer to article
- shift towards problem, introduce research questions
- give detailed description of data (see rubric), which predictors are uncontrollable, controllable, indicators
- start EDA, show some simple, interpretable plots regarding different predictors, find different relationships among controllable variables

Modeling

- Start with linear regression
- check out interaction effects
- ridge, lasso (for interpretable variable selection)
- trees
- stay away from uninterpretable methods like random forests, boosting

Within Research Questions

- focus on answering research question, using data/modeling merely as support for argument
- make sure models and its results would be interpretable for global health professionals and governments
- plot model diagnostics to assess models, make tables of results/predictions of models

- give suggestions based on results to policy makers (ex. “this nation should put a greater proportion of their total expenditure into health care to increase life expectancy”)

Conclusion

- suggest in which factors specific nations should invest their money in based on modeling during both research questions, or, suggest not to increase investment in health care for nations with already high life expectancy
- reference models, focus on interpretability and policy actions