The Associations Between Mismanaged Plastic Waste and Per Capita GDP and Coastal Populations

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1 Introduction

1.1 Background Information

https://github.com/rfordatascience/tidytuesday/tree/master/data/2019/2019-05-21

- motivation for this analysis = supranational organizations, like the UN, would like to know how per capita GDP is associated with the country's ratio of mismanaged (define this!) to total plastic waste (pollution) - good!

1.2 Research Aims

How is a country's per capita GDP associated with its proportion of mismanaged plastic waste?

How is a country's coastal population proportion (Number of individuals living on/near coast / total population) associated with its proportion of mismanaged plastic waste?

1.3 Data Description and Key Variables

1.4 Hypotheses

1.5 Exploratory Data Analysis

2 Methodology

conduct a complete case analysis (first exclude non-countries, then exclude countries without full information - Kosovo, Timor (island; East Timor - sovereign, West Timor part of Indonesia) excluded for lack of population data) - response variable is created from mismanaged and total plastic waste - per capita GDP (based on 2011 international rates) and proportion of country's coastal population to total population (reported by Gapminder) are covariates of interest

-> only consider 2010 since that's when plastic waste data is available -> create response variable: Per Capita Mismanaged Waste (Per Day) / Per Capita Waste (Per Day) -> create second covariate: Coastal Population / Total Population

-> tried to manually adjust total population for countries whose coastal population > total population, but found that the issue persisted for some countries - issues with data collection of coastal population (how is it collected?)

response variable: between [0, 1] beta regression! - not a GLM

- logit link
- Y ~ Beta(Alpha, Beta)
- logit(E(Y|X)) = X' beta
- log(Alpha / Beta) = X' beta
- Y = ratio of mismanaged to total plastic waste
- no error term
- interpretations: linear predictor of logit of conditional expectation
- why use logit link? - interpretability
- interactions -> no because interpreting quantitative-quantitative interactions is difficult, not aligned with objective
- assumptions for beta regression? - independence (only 2010 -> satisfied), linearity of predictors

3 Results

4 Discussion

4.1 Conclusions

4.2 Limitations and Future Directions

4.3 Summary

5 Appendices