Top 10 Mortality Causes of South Korea of the years 2000, 2010, 2015, 2019*

Poisson and Negative Bionimal Modelling of Annual Death Number and Cause

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First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

The remainder of this paper is structured as follows. Section 2….

2 Data

2.1 Raw Data

2.2 Cleaned Data

Some of our data is of penguins (**?@fig-bills**), from Horst, Hill, and Gorman (2020).

Table 1: Top 10 Mortality Rates of South Korea

Year	Cause	Deaths	Death Rate	Ranking
2000	Stroke	44109	93	1
2000	Ischaemic heart disease	18837	39	2
2000	Stomach cancer	13205	27	3
2000	Trachea, bronchus, lung cancers	12879	27	4
2000	Road injury	12141	25	5
2000	Liver cancer	10893	22	6

*Code and data are available at: LINK.

Talk more about it.

And also planes (**?@fig-planes**). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

Year	Cause	Deaths
2000	Stroke	44109
2000	Ischaemic heart disease	18837
2000	Stomach cancer	13205
2000	Trachea, bronchus, lung cancers	12879
2000	Liver cancer	10893
2000	Self-harm	6860

Common Mortality Causes of All Four Years 2000, 2010, 2015, 2019

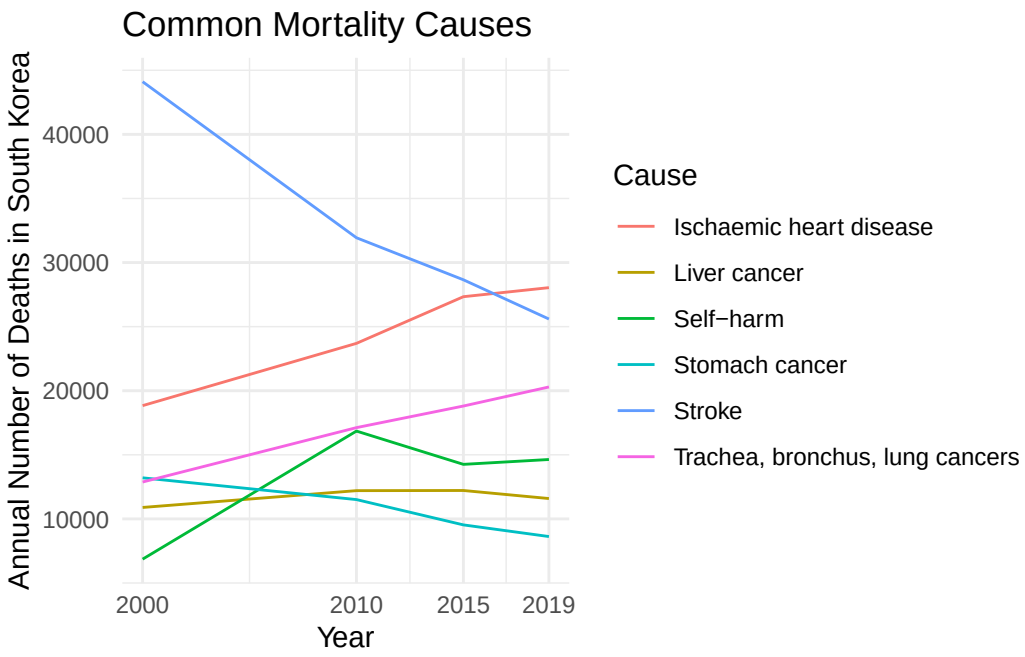


Figure 1: Line Graph of Common Mortality Causes of South Korea

Talk way more about it.

Table 3: Summary statistics of the number of yearly deaths, by cause, in South Korea

	Min	Mean	Max	SD	Var	N
Deaths	6860	18 320	44 109	8927	79 687 233	24

2.3 Basic Summary Statistics

3 Model

The goal of our modelling strategy is twofold. Firstly,…

Here we briefly describe the Bayesian analysis model used to investigate… Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular…

We can use maths by including latex between dollar signs, for instance θ.

Table 4: Poisson model of most prevalent cause of deaths in South Korea 2000, 2010, 2015, 2019

	Poisson
Intercept	10.105
Liver Cancer	−0.736
Self Harm	−0.621
Stomach Cancer	−0.826
Stroke	0.286
Trachea, Bronchus, Lung Cancer	−0.349
Num.Obs.	24
Log.Lik.	−8157.665
ELPD	−8835.6
ELPD s.e.	2653.7
LOOIC	17 671.3
LOOIC s.e.	5307.3
WAIC	22 572.8
RMSE	3830.21

4 Results

Our results are summarized in **?@tbl-modelresults**.

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Table 5: Negative Binomial model of most prevalent cause of deaths in South Korea 2000, 2010, 2015, 2019

	Negative Binomial
Intercept	10.102
	(0.190)
Liver Cancer	−0.726
	(0.266)
Self Harm	−0.610
	(0.268)
Stomach Cancer	−0.814
	(0.276)
Stroke	0.296
	(0.274)
Trachea, Bronchus, Lung Cancer	−0.341
	(0.272)
Num.Obs.	24
Log.Lik.	−237.440
ELPD	−240.6
ELPD s.e.	2.4
LOOIC	481.2
LOOIC s.e.	4.8
WAIC	481.0
RMSE	3832.16

Appendix

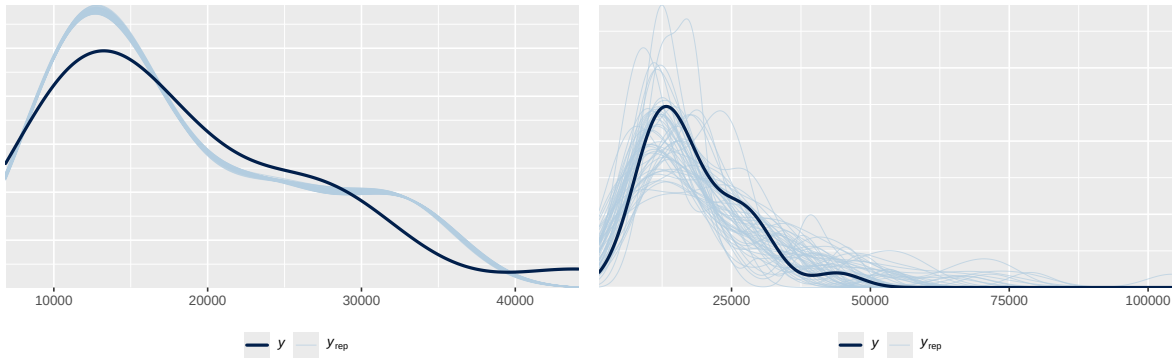
A Additional data details

B Model details

B.1 Posterior predictive check

In Figure 2a we implement a posterior predictive check. This shows...

In Figure 2b we compare the posterior with the prior. This shows...



(a) Posterior prediction check

(b) Comparing the posterior with the prior

Figure 2: Examining how the model fits, and is affected by, the data

B.2 Diagnostics

?@fig-stanareyouokay-1 is a trace plot. It shows... This suggests...

?@fig-stanareyouokay-2 is a Rhat plot. It shows... This suggests...

```
                                    elpd_diff se_diff
cause_of_death_south_korea_neg_binomial     0.0       0.0
cause_of_death_south_korea_poisson      -8595.0    2652.1
```

Figure 3: Checking the convergence of the MCMC algorithm

References

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

Horst, Allison Marie, Alison Presmanes Hill, and Kristen B Gorman. 2020. *Palmerpenguins: Palmer Archipelago (Antarctica) Penguin Data*. https://doi.org/10.5281/zenodo.3960218.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.