

# RR-TB Updates - Aug. 31

## Updates

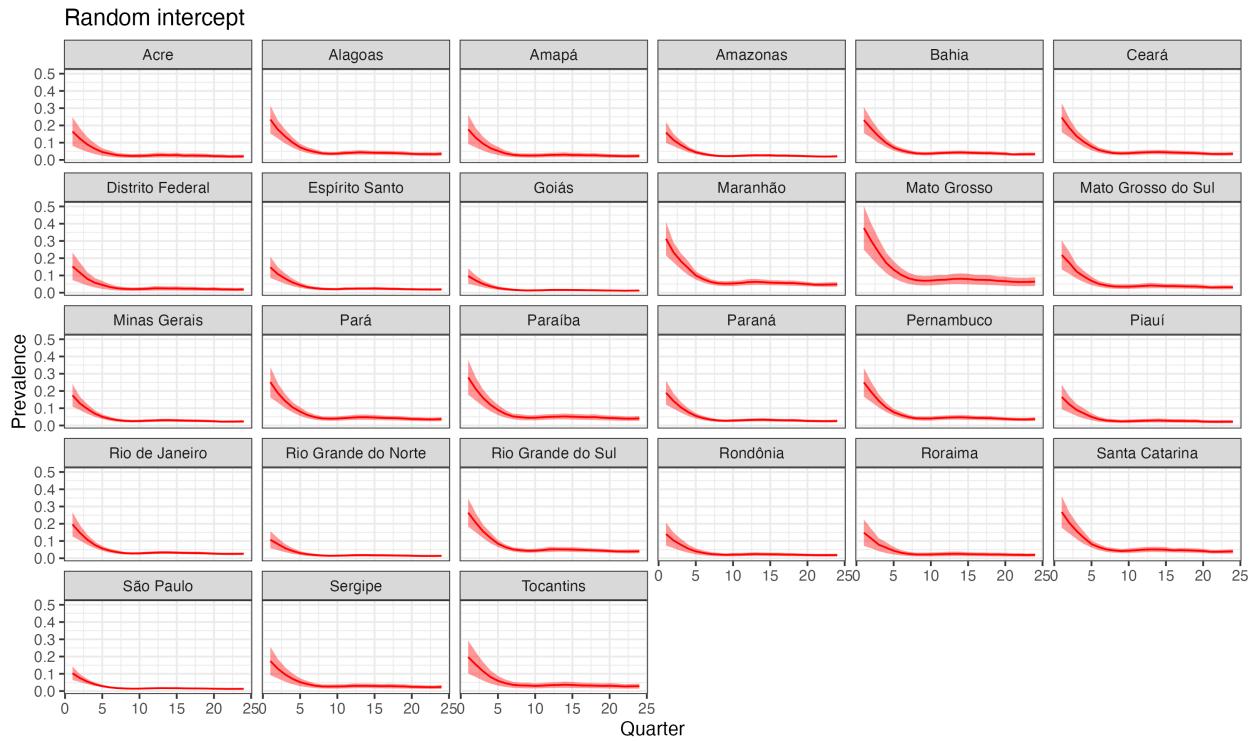
- Updated HIV values (to prioritize test result, then self-report)
- Ran models for relapsed and re-entry cases; Played with K settings in smooths (effect is pretty marginal)
- Health Unit:
  - Not added to models yet
  - I noticed there was a lot of missingness in Sao Paulo between 2018-2019 (it looks like it jumps from a few hundred missing cases to >20k, and then back down in 2020) – I'm double checking whether this is an issue on my end or worth asking the Brazil team about
- Finalized list of potential individual and municipal-level covariates to add in and found data sources:
  - Urbanicity, defined as proportion of municipality pop living in urban setting
    - \* Source: IBGE - 2010 census
  - Bolsa Familia Coverage
    - \* Source: Baroni et al., 2021 paper - Database on the coverage of the “Bolsa-Família” conditioning cash-transfer program: Brazil, 2005 to 2021)
  - FHS Coverage, defined as number of people per municipality registered in 2015
    - \* Source: DATASUS
  - Household crowding, Defined as percent of household with > 2 people living in a sleeping area
    - \* Source: 2010 Census, via Atlas BR
  - Treatment abandonment rate per municipality in period quarter (or year)
    - \* Source: Calculate from Sinan

## New Cases:

- I pooled the estimated effects and standard errors across groups for each quarter in each state for the models below - they look a little off in some places, so I need to go back and check them out.

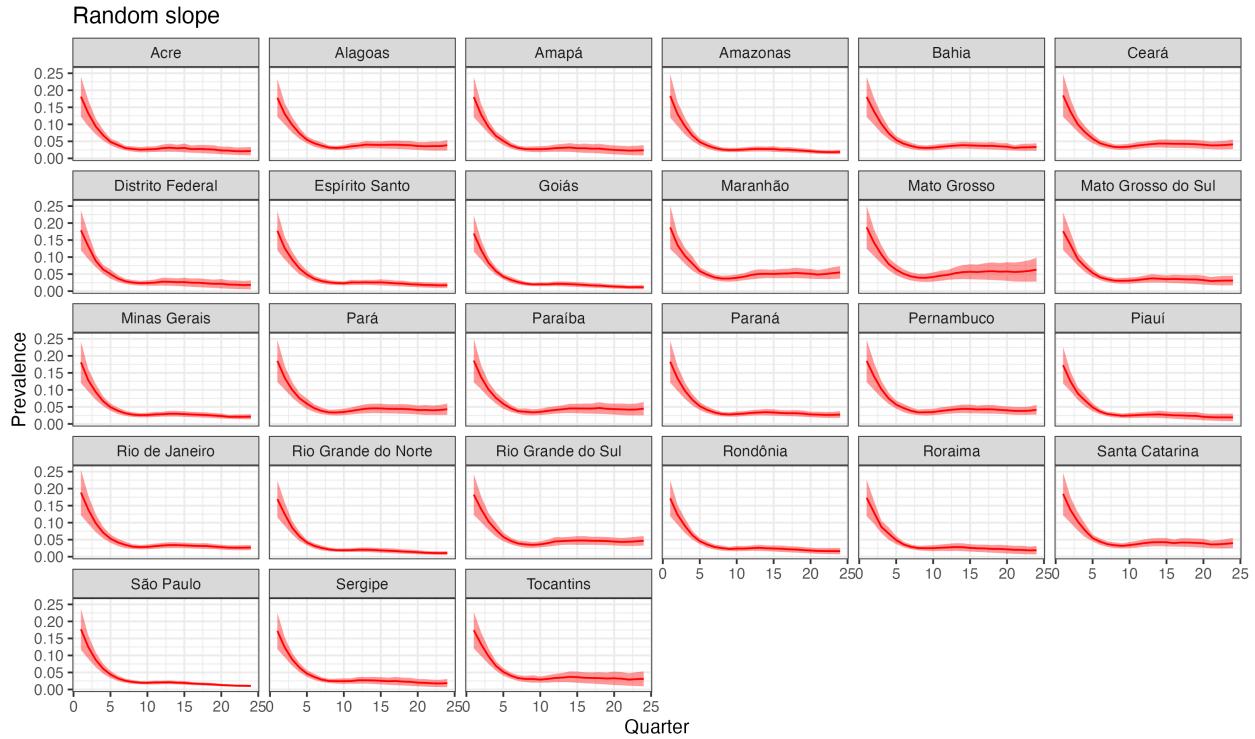
### Model 1: Random intercept

```
gam(cbind(Positive, Negative) ~ s(state, bs = "re", k = 27) + s(time, bs = "tp", k = 10)
    + age_cat + hiv_status + sex,
    data = mdf_new_grp,
    family = binomial (link = "logit"),
    method = "REML")
```



### Model 2: Random slope

```
gam(cbind(Positive, Negative) ~ s(time, bs = "tp", k = 10) + s(time, state, bs = "re", k = 27)
  + age_cat + hiv_status + sex,
  data = mdf_new_grp,
  family = binomial(link = "logit"),
  method = "REML")
```

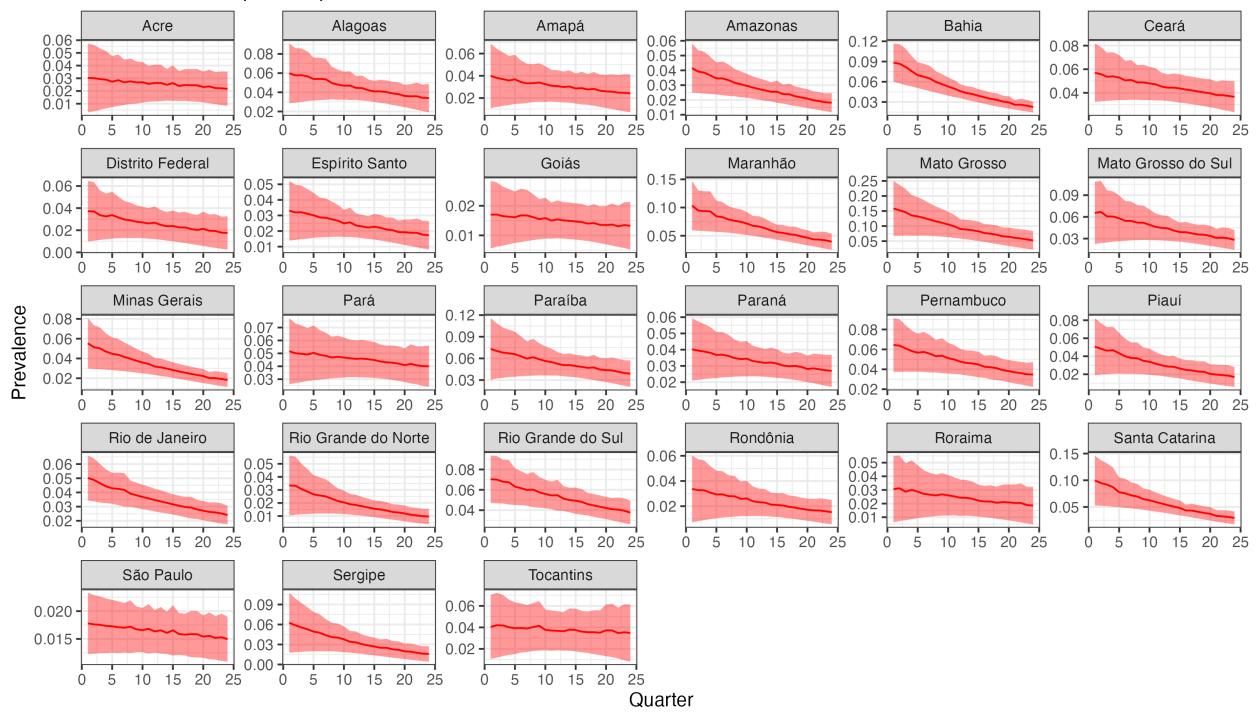


### Model 3: Random intercept + Random slope

```
gam(cbind(Positive, Negative) ~ s(state, bs = "re", k = 27) + s(time, state, bs = "re", k = 27)
  + age_cat + hiv_status + sex,
  data = mdf_new_grp,
  family = binomial(link = "logit"),
  method = "REML")
```

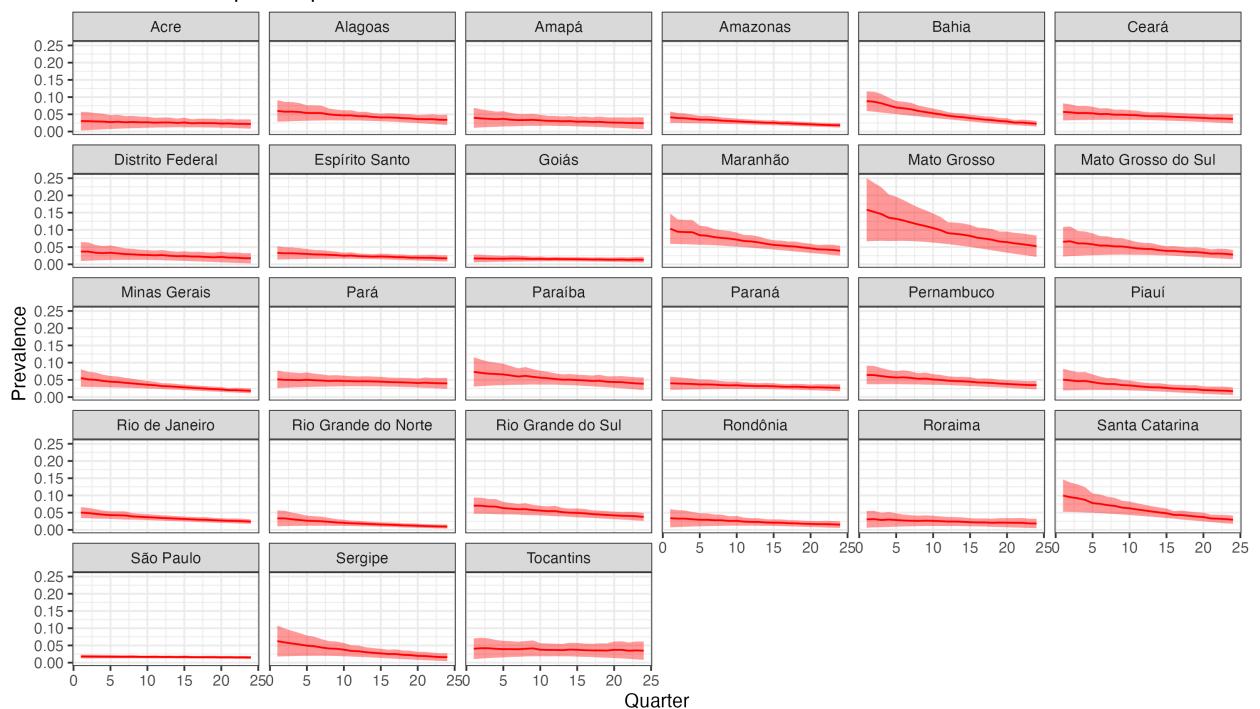
Note: For the 95% CIs, the Y axes vary for each state to capture the state-specific variation over time.

### Random intercept & slope



Same plot as above, just with fixed Y-axis.

### Random intercept & slope

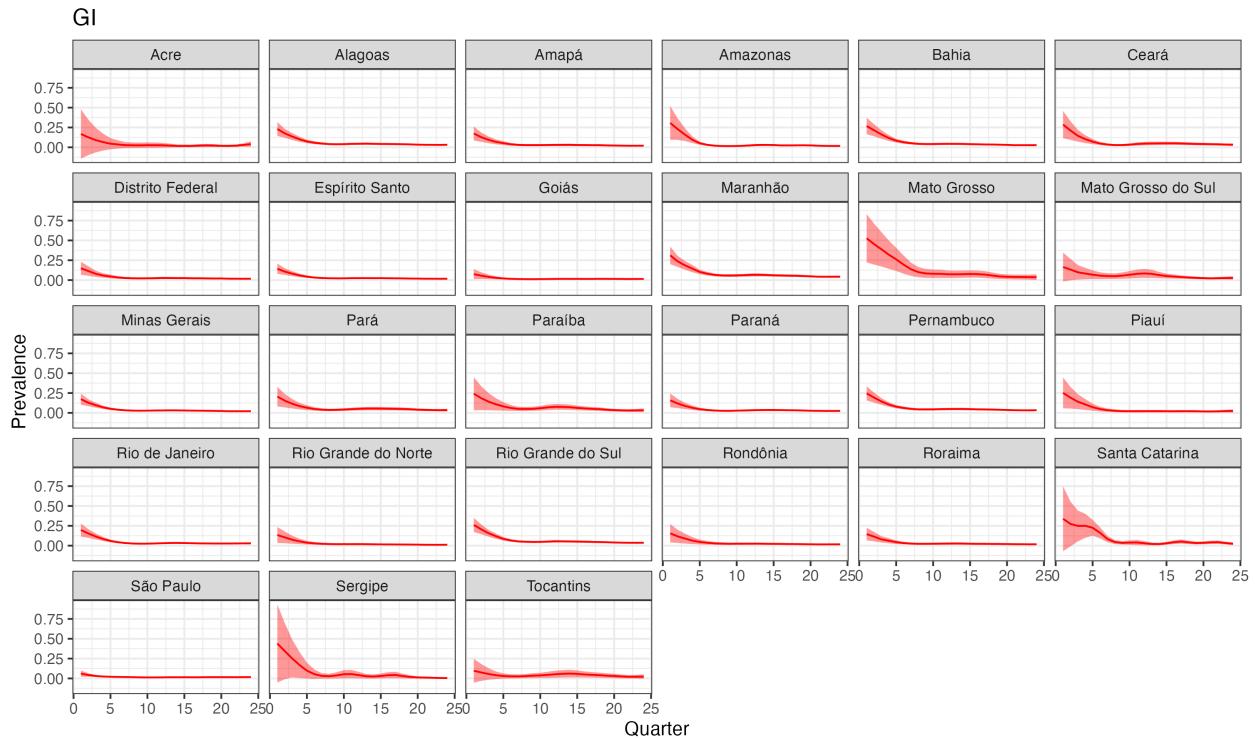


**Model 4: GI - Random intercept + group-level smooths with varying smoothness**

```

gam(cbind(Positive, Negative) ~ s(state, bs = "re", k=27) + s(time, bs = "tp", k = 10)
+ s(time, by = state, bs = "tp", m=1, k = 10) + age_cat + hiv_status + sex,
    data = mdf_new_grp,
    family = binomial (link = "logit"),
    method = "REML")

```

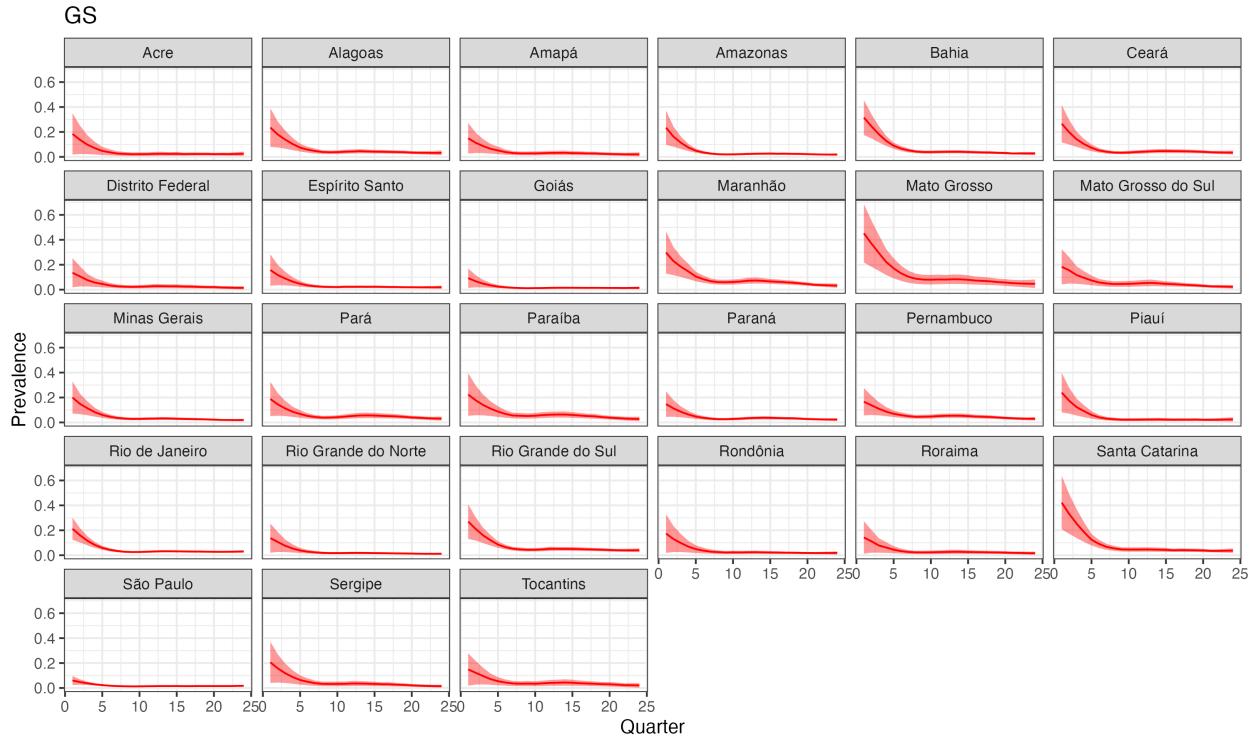


#### Model 5: GS - Global smooth + group-level smooths with same smoothness

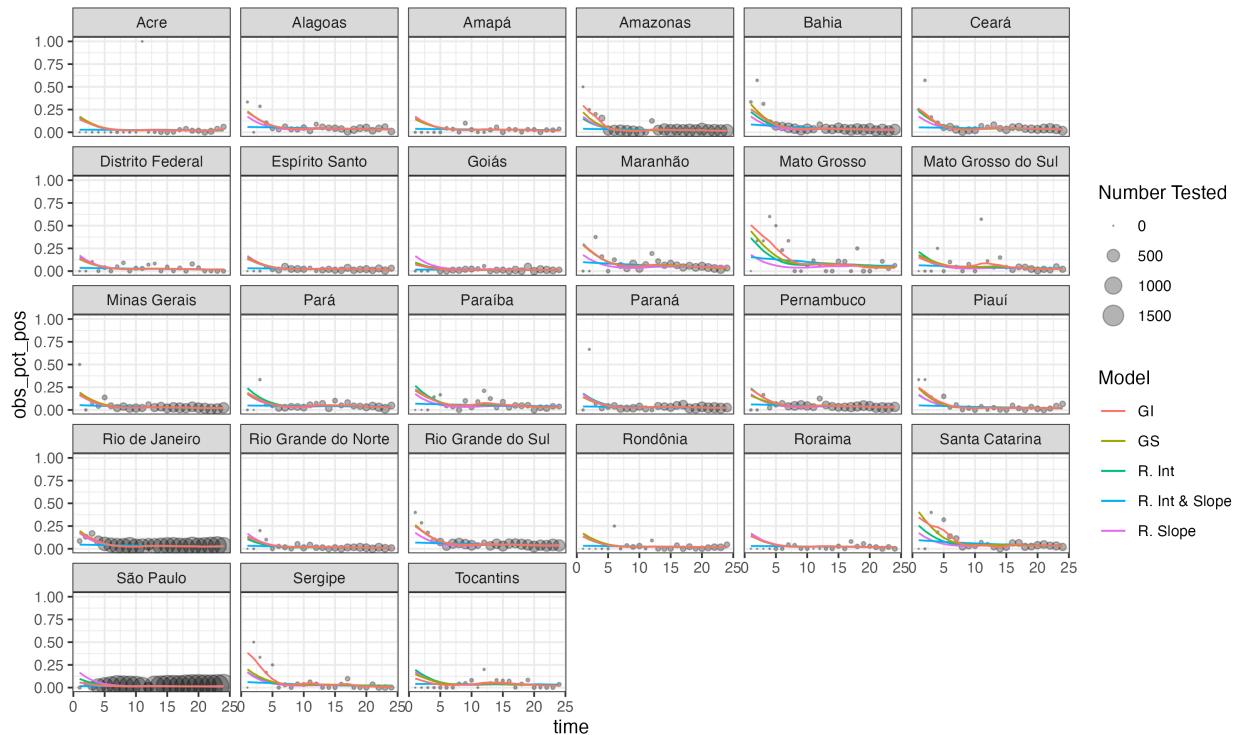
```

gam(cbind(Positive, Negative) ~ s(time, bs = "tp", m=2)
+ s(time, state, bs = "fs", m = 2) + age_cat + hiv_status + sex,
    data = mdf_new_grp,
    family = binomial (link = "logit"),
    method = "REML")

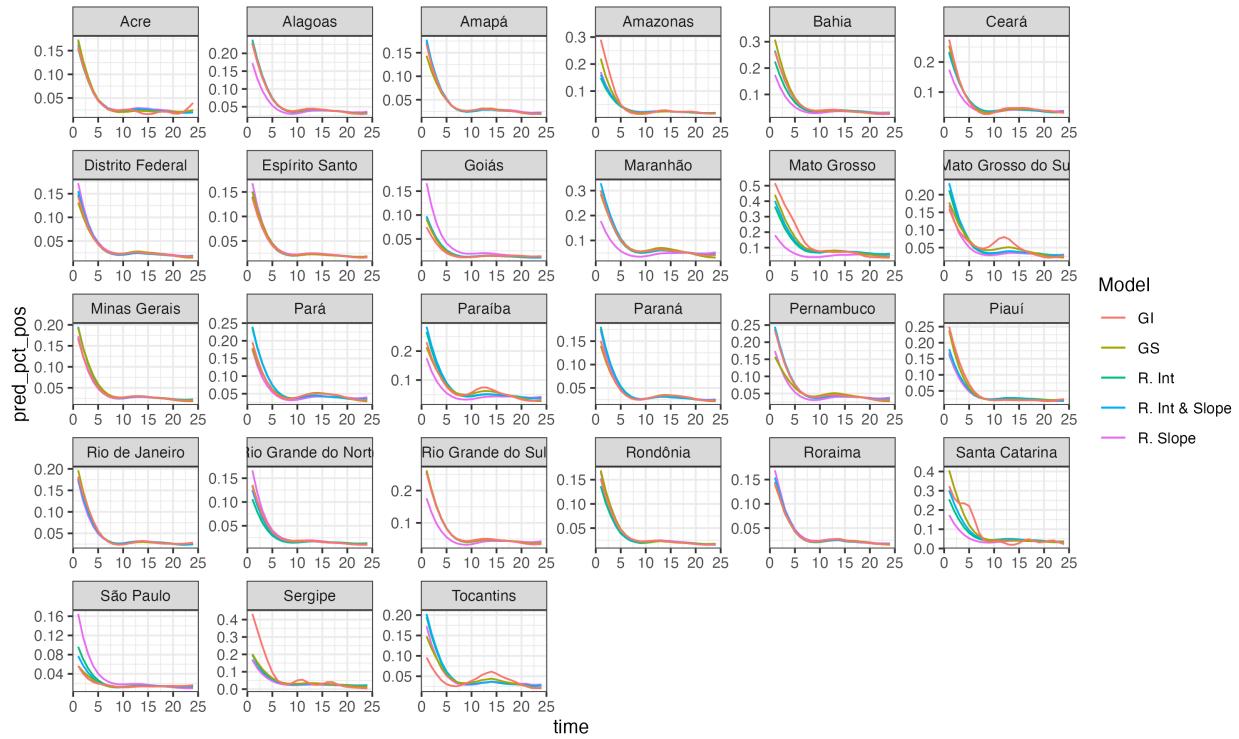
```



### Compare models



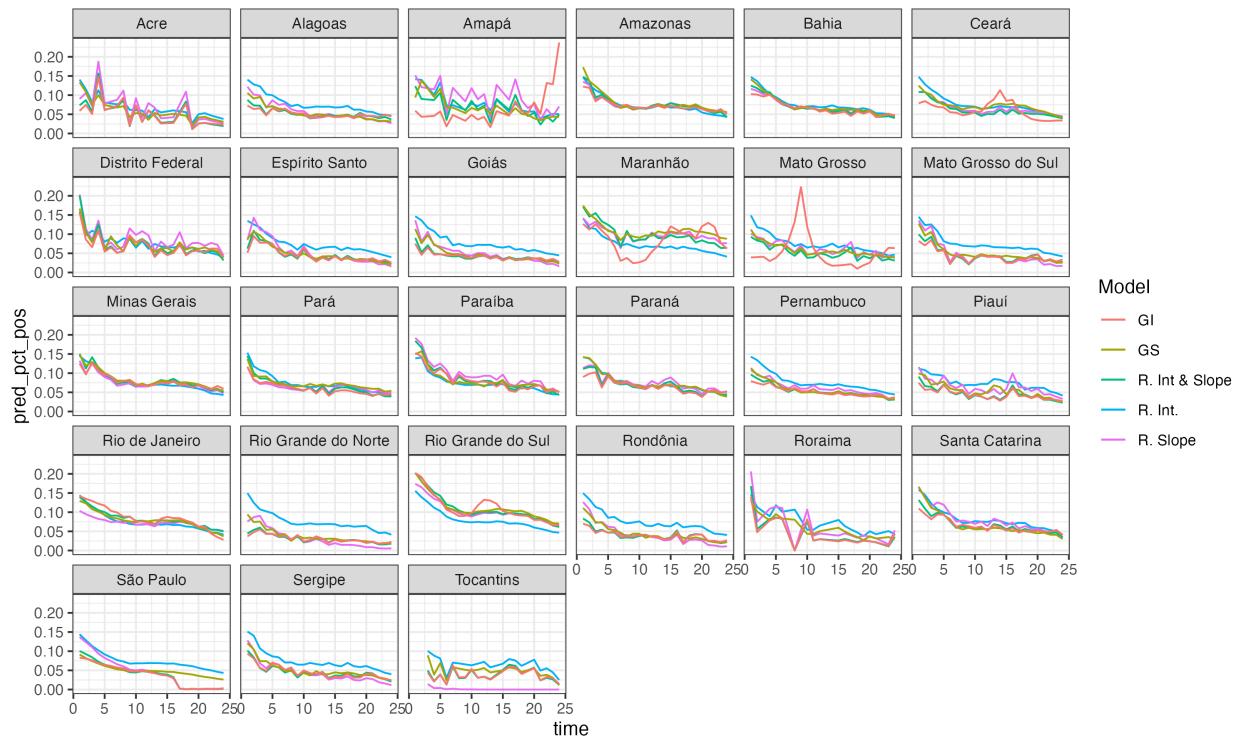
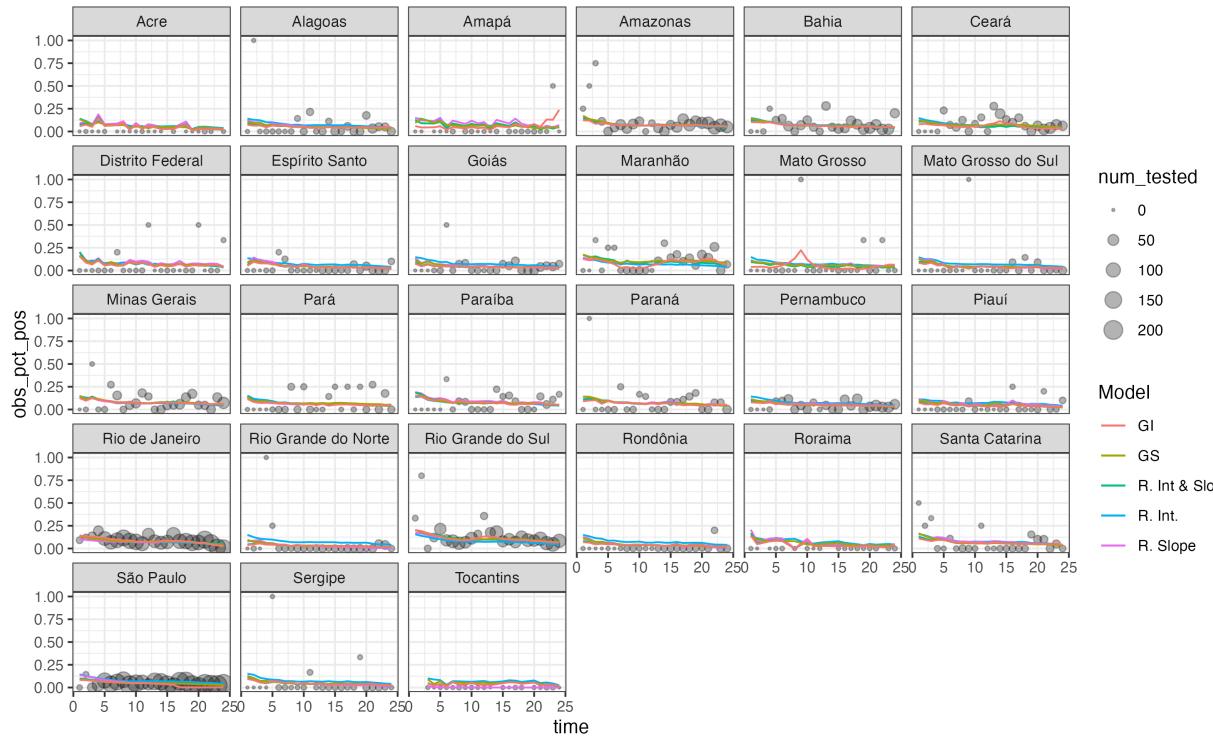
I also fit the above without the number tested to get a better sense of how the modeled trends compare to each other



## Re-Entry:

### Combined

I figured I would present these all together since each model is still noisy, especially in states where there are no rif cases (e.g. Acre, Roraima, and Tocantins). I quickly looked into potential inclusion criteria for percent tested, which would help address some of these issues, especially we define the inclusion criteria as consistently testing  $> 5\%$  of case population for at least two consecutive periods. This would largely exclude 2014-2015. I think we would want to add a threshold to the minimum number of cases tested, since some state who test a few folks, but who have only a few cases overall would exceed the threshold.



# Relapse

## Combined:

