Pulmonary tuberculosis in inmates in Antananarivo, Madagascar

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Background

- Tuberculosis:

Infectious agent: ***Mycobacterium tuberculosis*** *(*obligate pathogen); 2nd cause of death by infectious disease after Covid-19

Madagascar: data on TB infections are lacking in the prison population

- Statistical model: What are the factors associated with active pulmonary tuberculosis (APTB)?

- Mechanistic model: How is the infected people change over the time of follow-ups?

What are the factors associated with APTB?

- **Cross-sectional study, march - July 2021**
- **Response variable:** active PTB (= confirmed + non-confirmed TB)
- **Family:** Binomial
- **Link:** Logit
- **Potential predictors:** age groups, sex, number of TB cases per room, antecedent of treatment of tuberculosis, length of incarceration, marital status, corticoids drugs

R code:

```
m1 <-  glm (TBpulm ~ sexef + age_classY + incarf + nb_tb_chambre + trait_antituber2f + med_cortif + epouxf, data= df, family="binomial")
summary (m1)
```

Prevalence of APTB : 04 /748 (0.5 %) [95%CI: 0.1-1.4]

Risk factors associated with the outcome "being a confirmed or probable TB case" (N= 747 inmates)

Exposure variable Categories	Confirmed or probable TB case		Crude Odds Ratio (95% CI)*	Adjusted Odds Ratio (95% CI)*	p-value
	Yes N = 14	No N = 733			
Age group					
Age 13 to 39 years	5 (35.7%)	556 (75.9%)	Ref	Ref	0.01
Age ≥ 40 years	9 (64.3%)	177 (24.1%)	5.6 (1.9-18.6)	4.4 (1.5 - 15.1)	
Ever received TB treatment at any time in your life					
No	10 (71.4%)	704 (96.0%)	Ref	Ref	0.004
Yes	4 (28.6%)	29 (4.0%)	9.7 (2.5-31.0)	6.3 (1.6 - 21.3)	

AIC: 128.81

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How is the infected people change over the time of follow-ups?

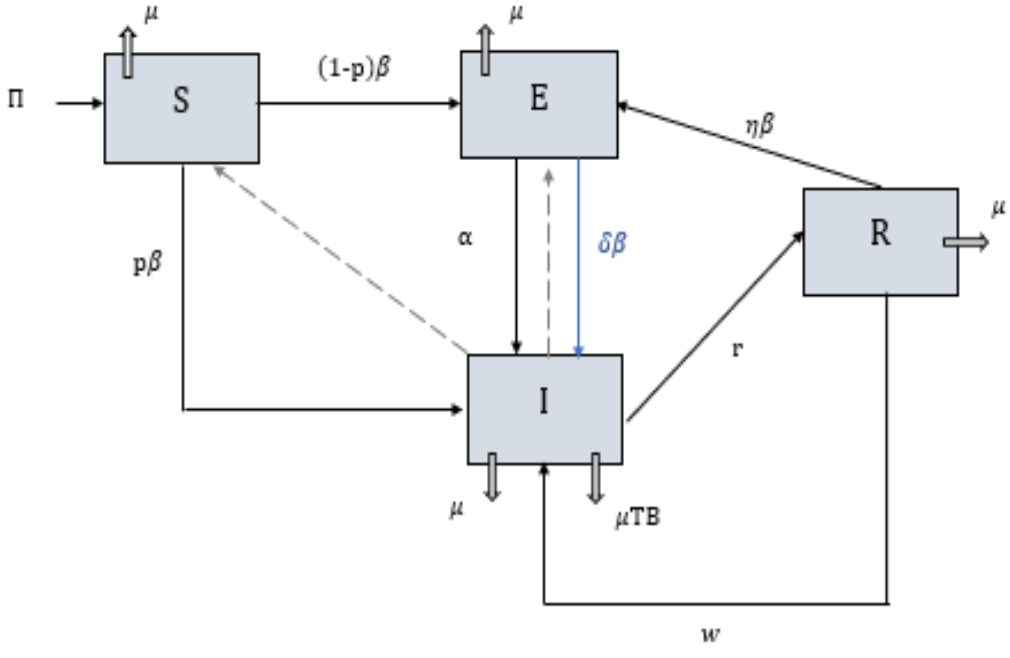

Table 1: Parameters of the model and its descriptions

Parameter	Description
β	Transmission rate
Π	Recruitment rate
α	Progression rate from latent TB to active TB
μ	Natural mortality rate
μTB	Mortality rate or fatality rate due to TB
w	Relapse rate
p	Proportion of new infections that produce active TB
$\delta\beta$	Exogenous reinfection rate of latent TB
$\eta\beta$	Exogenous reinfection rate of recovered
r	Treatment rate

S: Susceptible, E: Exposed

I : Infected = active pulmonary TB, **R : Recovered**

Next Steps

- Publishing the paper about the statistical model
- Mechanistic model
  - Define parameter values
  - Refine my mechanistical model framework if necessary
  - Fit it to my data

Aknowledgement: Dr Fanjasoa, E2M2 instructor team, Mirana