Examining Control Strategies for Cholera Incorporating Spatial Dynamics

Group Name: The Plague Doctors

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This assignment is **due in class** on **Wednesday March 27 2019 at 10:30am**.

Abstract

We solve everything because we're really smart

Contents

1 Background

It's time for a theory of everything. Since we're all really smart, we've created one.

2 Model Description And Biological Processes

$$\begin{aligned}
dS_i &= \mu N_i - S_1(\beta_n^i + \kappa W_i + \mu) \\
dI_i &= S_i(\beta_n^i + \kappa W_i) - I_i(\gamma + \mu + \alpha) \\
dR_i &= \gamma I_i - \mu R_i \\
dW_i &= \beta_v I_i + \sum_1^j \left(1 - \frac{W_j}{dist_{i,j}}\right) - \sigma W_i \\
\beta_n^i &= \sum_j^n \beta_t \Big(1 - \frac{dist(i,j)}{maxdist}\Big) I_j + \beta_i I_i
\end{aligned}$$

- μ = natural birth/death rate
- β_n^i =infectivity of all neighbours of i on i
- γ =rate of recovery from disease
- β_v =rate infectious people transmit cholera to water
- σ = rate of water sanitation/cholera death
- α = death rate from cholera
- β_t =transmisison rate within a patch
- κ = rate at which 1 unit of chlera infects people

3 Multipatch Models Of Cholera

There is one equation for our theory:

$$U = 0\,. \tag{1}$$

We leave it as an exercise for the reader to define U. We exploit Euler's formula,

$$e^{i\pi} + 1 = 0\,. \tag{2}$$

```r
#Setting the seed for the entire document, for reproducible stochastic simulations
seed <- 9
set.seed(seed)
```

4 Comparing Containment Strategies

test [1] test [2] test [3] test [4] test [5] test [6] test [7] test [8] test [9] test [10] test [11] test [12] test [13] test [14] test [15] test [16]

5 Discussion

This is really important stuff.

— END OF PROJECT—

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