

# Supplemental Tables for: Multi-scale models and data for infectious diseases: A systematic review

## S1 Exclusion Part I and Part II

Reason to exclude	Number of Papers	% of Papers
No between-host component	10	8.3
No data	41	34.2
No model	24	20.0
No within-host component	6	5.0
Other	10	8.3
Out of Scope	14	11.7
Review	15	12.5

## S2 Study Properties

### S2.1 Focal host species type?

Host Species	Included Papers	% of Included Papers	Excluded Papers	% of Excluded Papers
Birds	2	10.5	7	5.8
Human	8	42.1	28	23.3
Invertebrates (Insects/snails/worms/etc)	0	0.0	14	11.7
Non-human Mammal	5	26.3	15	12.5
Other	2	10.5	19	15.8
Plants	1	5.3	8	6.7
Reptile/Amphibian/Fish	1	5.3	1	0.8

### S2.5 What is the type of infection?

Type of Pathogen	Number of Included Papers	Number of Excluded Papers
Bacterial	1	18
Fungal	1	5
Macroparasite (Worms/ticks/etc)	1	7
Multiple	1	1
Other	1	12
Protozoa (Malaria parasite/etc)	4	14
Viral	10	35

## S4 Model Properties

### S4.1 How is infection transmission modeled?

How is infection transmission modeled	Number of Papers	% of Papers
Direct contact	13	68.4
Indirect contact	4	21.1
Multiple	2	10.5

### S4.2 Are the results primarily strategic or tactical?

Strategic vs Tactical Models	Number of Papers	% of Papers
Both	1	5.3
Strategic	16	84.2
Tactical	2	10.5

### S4.3 What is the primary focus of the main results?

Primary Focus of Results	Number of Papers	% of Papers
Impact of between-host dynamics on within-host dynamics	1	5.3
Impact of within-host dynamics on between-host dynamics	12	63.2
Other	6	31.6

## S5 Model Type

### S5.1 What type of within-host model is used?

Type of Within-Model Used	Number of Papers	% of Papers
Deterministic	9	47.4
Individual-based	2	10.5
Statistical	7	36.8
Stochastic	1	5.3

### S5.3 What type of between-host model is used?

Type of Between-Model Used	Number of Papers	% of Papers
Deterministic	11	57.9
Individual-based	3	15.8
Statistical	3	15.8
Stochastic	2	10.5

## S5.5 How are the models linked?

Within-Between Models Linking	Number of Papers	% of Papers
Both	9	47.4
Within-host linked to between-host	10	52.6
Between-Host linked to Within-host	0	0.0

## S5.6 Linking Mechanism, states, traits, or both?

Linking Mechanism Used	Number of Papers	% of Papers
Both	7	36.8
States	9	47.4
Traits	3	15.8

## S6 Within-Host Linking Mechanisms

### S6.1-5 Are the pathogen growth rate/load/death rate/immune response/symptoms used as a within-host linking mechanism?

Within-Host Linking Mechanisms	Number of Papers
Pathogen Growth Rate	4
Pathogen Load	14
Pathogen Death Rate	2
Host Immune	2
Host Symptoms	1

## S7 Between-Host Linking Mechanisms

### S7.1-5 Are the pathogen transmission rate/ recovery rate/ death rate/ virulence/ frequency of strains used as a between-host linking mechanism?

Between-Host Linking Mechanisms	Number of Papers
Transmission Rate	13
Host Recovery Rate	2
Host Death Rate	3
Pathogen Virulence	3
Pathogen Frequency	3

## S8 Data

### S8.1 Is data used at the within-host level?

Data used at Within-Host Level	Number of Papers	% of Papers
No	2	10.5
Yes	17	89.5

**S8.2 If data is used at the within-host level (8.1a), is data top-down (fitting states) or bottom-up (fitting traits)?**

How is data used?	Number of Papers	% of Papers
Not Data Used at Within-Host Level	2	10.5
Bottom-up	10	52.6
Other	1	5.3
Top-down	6	31.6

**S8.3 If data is used at the within-host level (8.1a), which fitting method is used?**

Within Data Fitting Method	Number of Papers	% of Papers
Not Data Used at Within-Host Level	2	10.5
Bayesian Inference	2	10.5
Least squares	6	31.6
Maximum likelihood	6	31.6
Other	3	15.8

**S8.5 Is data used for the linking mechanism?**

Data used in Linking Method	Number of Papers	% of Papers
No	11	57.9
Yes	8	42.1

**S8.6 If data is used for the linking mechanism (8.5a), is data top-down (fitting states) or bottom-up (fitting traits)?**

How is data used?	Number of Papers	% of Papers
Not Data Used at linking Level	11	57.9
Both	1	5.3
Bottom-up	6	31.6
Top-down	1	5.3

**S8.7 If data is used for the linking mechanism (8.5a), which fitting method is used?**

Linking Data fitting method	Number of Papers	% of Papers
Not Data Used at linking Level	11	57.9
Least squares	3	15.8
Maximum likelihood	3	15.8
Other	2	10.5

### S8.9 Is data used at the between-host level?

Data used at between-host level?	Number of Papers	% of Papers
No	11	57.9
Yes	8	42.1

### S8.10 If data is used at the between-host level (8.9a), is data top-down (fitting states) or bottom-up (fitting traits)?

How is data used?	Number of Papers	% of Papers
Not Data Used at Between-Host Level	11	57.9
Both	2	10.5
Bottom-up	4	21.1
Top-down	2	10.5

### S8.11 If data is used at the between-host level (8.9a), which fitting method is used?

Between-Host fitting method	Number of Papers	% of Papers
Not Data Used at Between-Host Level	12	63.2
Bayesian Inference	1	5.3
Maximum likelihood	1	5.3
Other	5	26.3