Calculate the final size of an epidemic

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Epiverse TRACE

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Pillar 3: Long-term planning and policy

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Features

Quick solving of the final size equation:

$$\pi(i) = 1 - \sum_k p_{ik} e^{-\sum_j \sigma_{ik} \Lambda_{ij} N_j \pi(j)}$$

Accounts for variation in:

- **Contact patterns** between demographic groups
- **Susceptibility to infection** between and within groups

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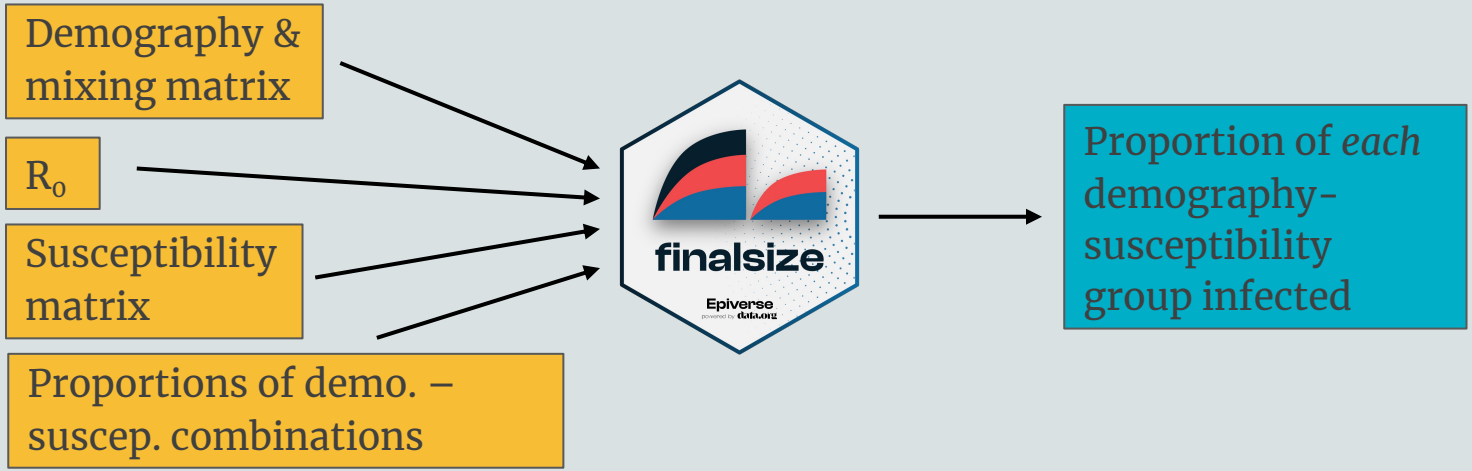
Workflow


Demography & mixing matrix
R_0
Susceptibility matrix
Proportions of demo. – suscep. combinations
finalsize
Epiverse
Proportion of *each* demography-susceptibility group infected

Get social contacts

from e.g. {socialmixr} POLYMOD

```
contact_matrix <- polymod_uk$contact_matrix
contact.age.group         [,1]         [,2]         [,3]
          [0,20)  4.514575e-08 1.600071e-08 8.965770e-09
          [20,40) 1.600071e-08 2.489595e-08 1.346051e-08
          40+     8.965770e-09 1.346051e-08 1.464763e-08

demography <- polymod_uk$demography_vector
         [0,20)          [20,40)             40+
"14.80 million" "16.53 million" "28.96 million"
```

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Model susceptibility variation by age group

- Older people are more susceptible,
- 50% individuals are immunised, with 30% lower susceptibility.

	Intrinsic susc.	Immunised susc.
susc. of [0,20) :	0.5	0.35
susc. of [20,40) :	0.5	0.35
susc. of 40+ :	1.0	0.70

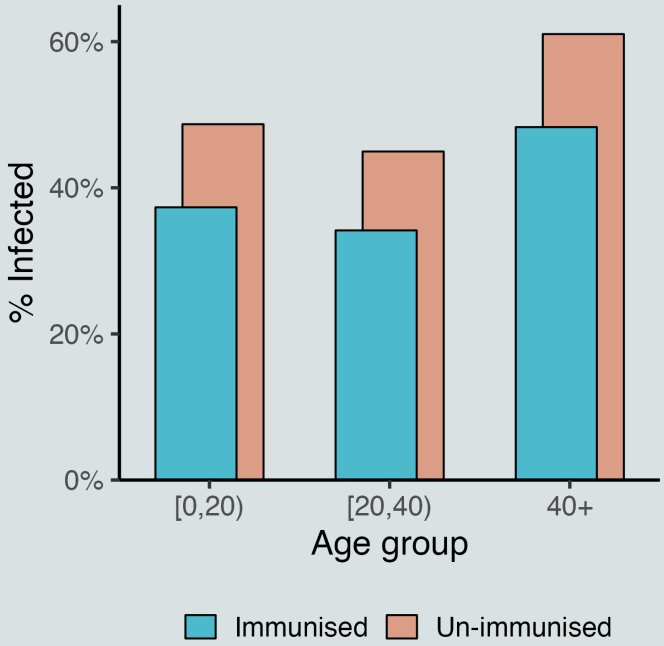
Proportion in each age & susceptibility group

	p(un-immunised)	p(immunised)
[0,20)	0.5	0.5
[20,40)	0.5	0.5
40+	0.5	0.5

Running `final_size()` with $R_o = 2.5$

```
data <- final_size(
  r0 = r0,
  contact_matrix = contact_matrix,
  demography_vector = demography,
  susceptibility = susc,
  p_susceptibility = p_susc
)
```

	demo_grp	susc_grp	susceptibility	p_infected
1	[0,20)	Intrinsic susc.	0.50	0.4869665
2	[20,40)	Intrinsic susc.	0.50	0.4496359
3	40+	Intrinsic susc.	1.00	0.6103328
4	[0,20)	Immunised susc.	0.35	0.3732389
5	[20,40)	Immunised susc.	0.35	0.3416527
6	40+	Immunised susc.	0.70	0.4830058



Get *finalsize* & documentation

CRAN: install.packages("finalsize")

Website: epiverse-trace.github.io/finalsize

Contribute & get in touch

Github org: epiverse-trace/finalsize

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In development!

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