

# Network-based approaches for improving the treatment of infectious diseases

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# Main project: Mayuge District, Uganda

- **2012 – ongoing**
- **Mass drug administration for neglected tropical diseases**
- **25,000 people tracked**
- **Cross-disciplinary research**
  - Social networks
  - Geographical networks (GPS)
  - Household surveys
  - Water, sanitation, & hygiene behaviours
  - Treatment coverage & compliance surveys
  - Village infrastructure & ecology maps
  - Parasitology, anaemia, allergies, clinical symptoms



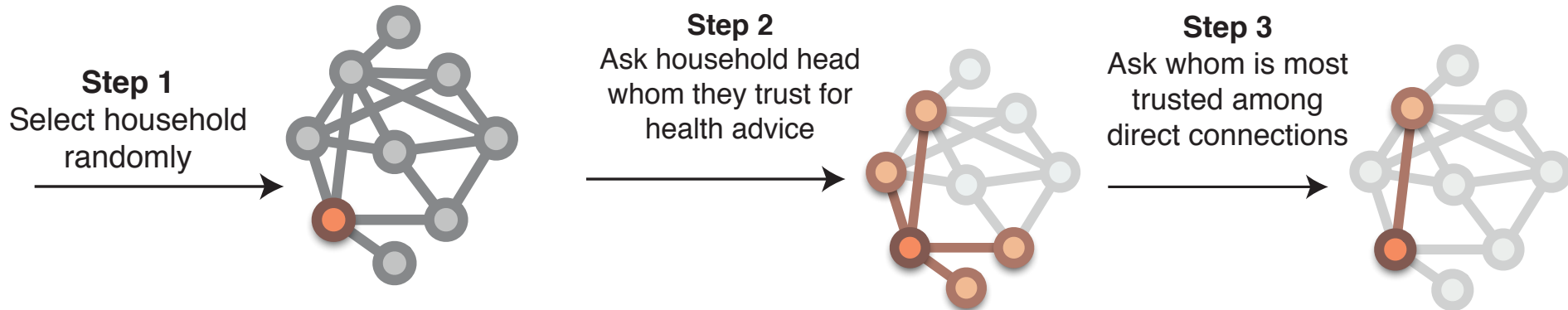
# Introducing health interventions- Targeting

*Who should be vaccinated when supplies of vaccines are limited?*

- cholera

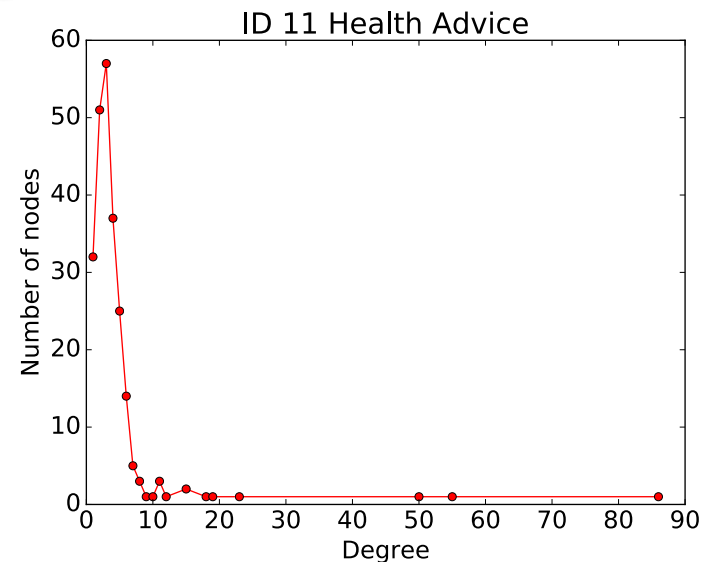
*Who should be targeted to stop the spread of drug rumours?*

- Neglected tropical diseases & mass drug administration



A simple network-based algorithm outperforms conventional medical approaches of targeting community health workers, village leaders, and school teachers.

*Chami et al 2017 PNAS*

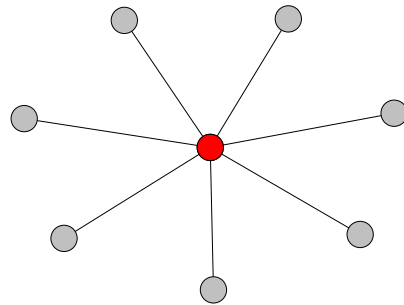


# Evaluating health interventions

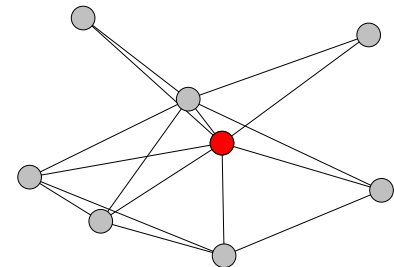
*Which individuals should be lay health workers and distribute drugs during en masse treatment campaigns?*

- Individuals with tightly-knit friendship connections offer treatment to more people

unconnected friends



tightly-knit friends



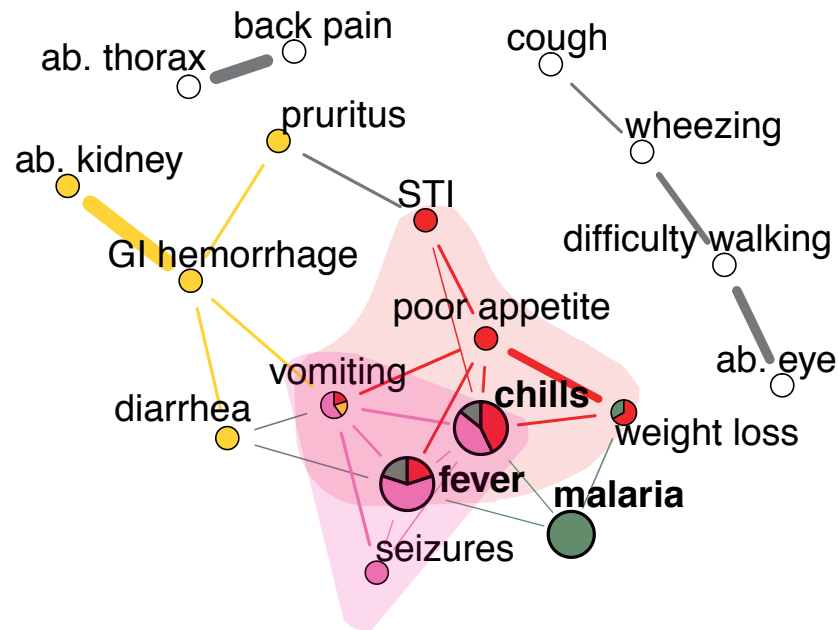
*Competing epidemiological models*

Single contact effective, clustered ties redundant

Single contact ineffective, clustered ties necessary to reinforce decisions

# Tailoring medical treatments

- Computational methods to classify clinical symptoms



*Submitted*

# Building capacity for research in low-income countries: training the next generation of mathematicians

- *One model:* Cambridge-Africa Programme
- Fellowships for early-career African researchers
- 30 African host institutions
- 2 hubs: Ghana & Uganda
- Provides
  - Scientific infrastructure
  - Research training
  - Mentorship
- Scientific questions originate from African researchers