Social influence in the adoption of mosquito bites preventive measures in Meghalaya, India

Exploring policy interventions through an empirical agent-based model

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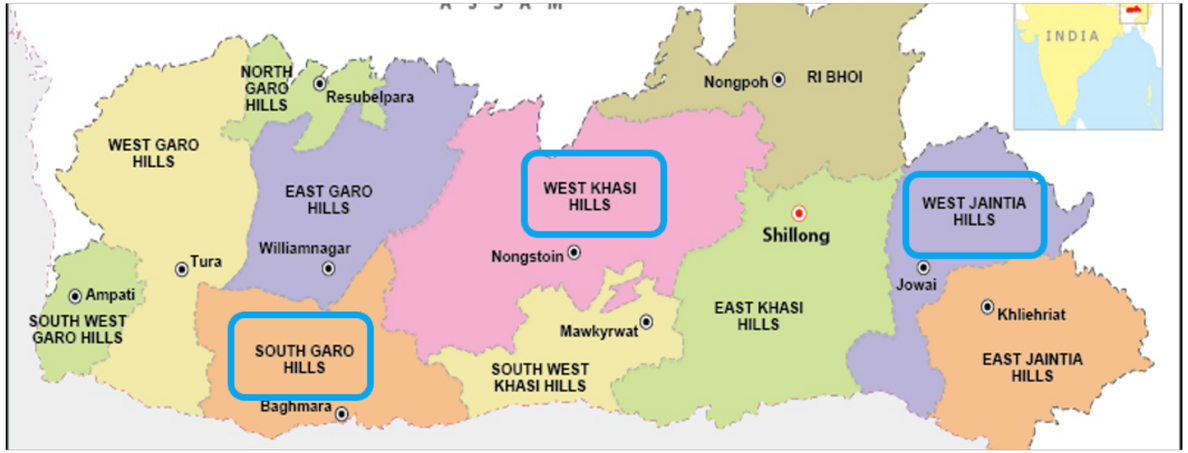
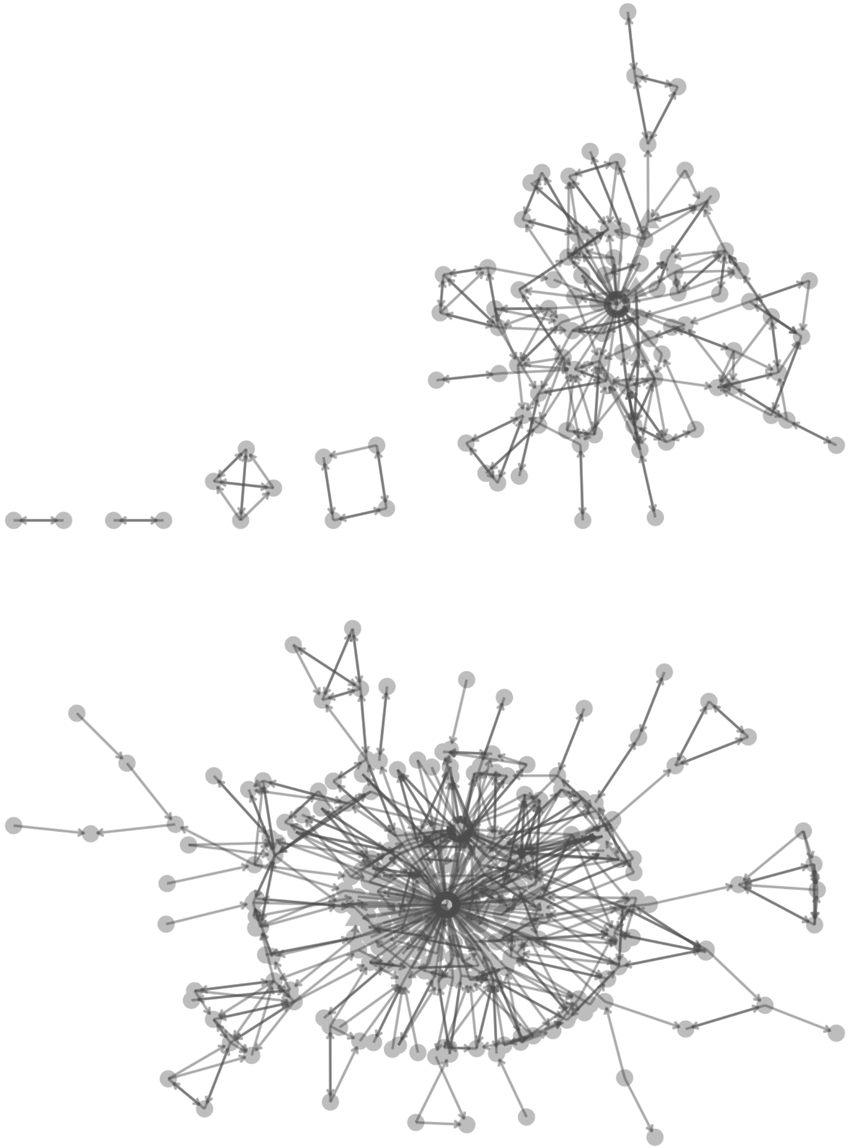
Malaria prevention in hard-to-reach populations

- WHO goal: eradicating malaria by 2030
- **Hard-to-reach populations** still face a high risk of infection —> policy needs to be designed in cooperation with local population
- **10 villages** in **Meghalaya, North-Eastern India** (mountainous area with patches of tropical forest)
- Hard-to-reach tribal population (Garo and Khasi-Jaintia): geographical **marginalization**, low socio-economic status, **poor access to health care**, resistance to instituzionaled health practices because of cultural/religious beliefs



Data

- **Full-network** design - **cross-sectional** data
- Data collection: 2020 - 2021 through face-to-face questionnaire administration
- 10 villages selected because of availability of register data and small enough to ensure high respondent ratio
- Networks:
  - **Whom they talk to about health**
  - **Whom they avoid to talk to about health**
- Behaviour: **which prevention measures they adopted**
- Socio-demographic characteristics
- **ASHA** (Accredited Social Health Activist) + **traditional healer**



Preventive measures

- Measures of **indoor biting** prevention are highly adopted
- **Low adoption of outdoor biting prevention measures** (spray, body cream, boots, special clothing)

Inside vs outside biting preventive measures

Mawlan

nodes = 102

ties = 276

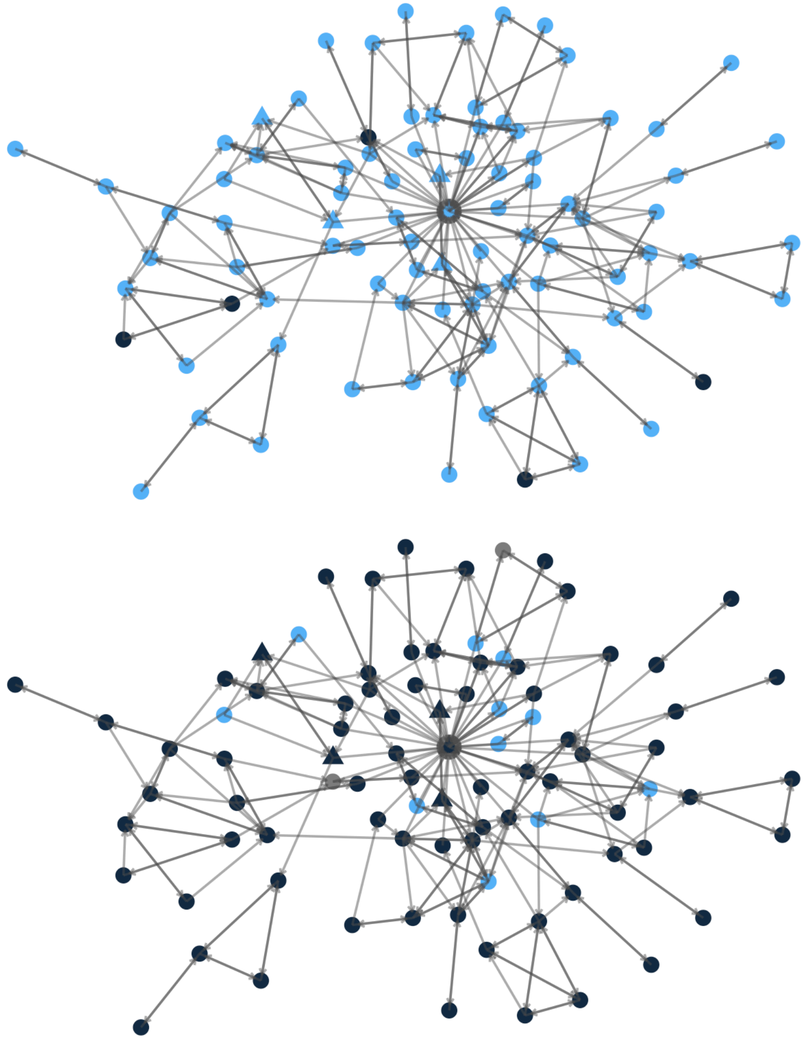
avg. degree (positive ties) = 2.71

components = 5

diameter (main component) = 13

adoption rate bednets = 95.10%

adoption rate cream = 12.75%



Inside vs outside biting preventive measures

Bambthong

nodes = 293

ties = 642

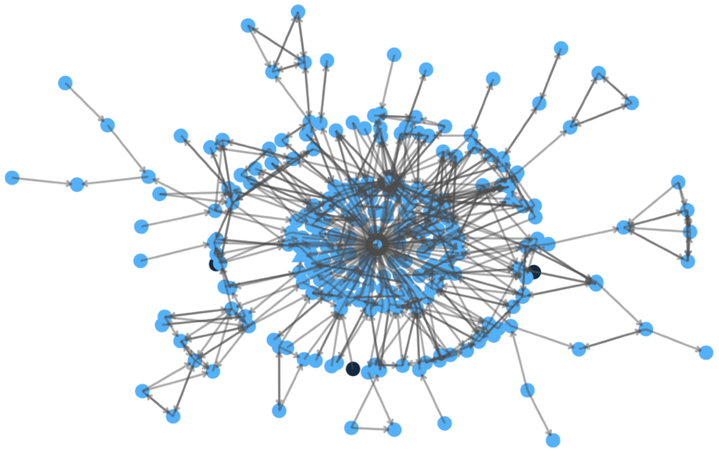
avg. degree (positive ties) = 2.19

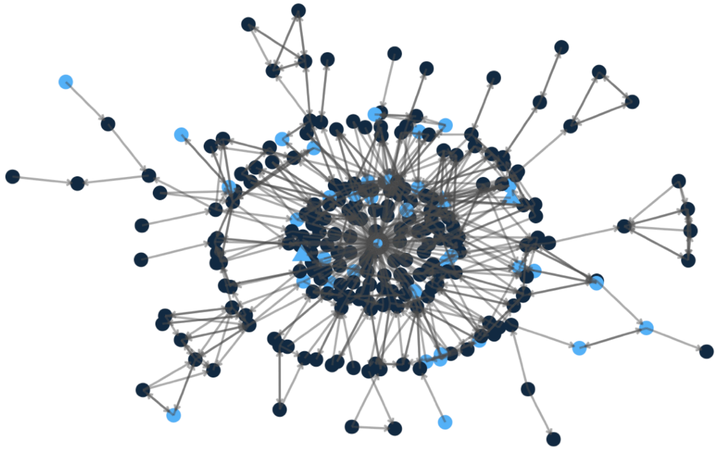
components = 25

diameter (main component) = 10

adoption rate bednets = 98.98%

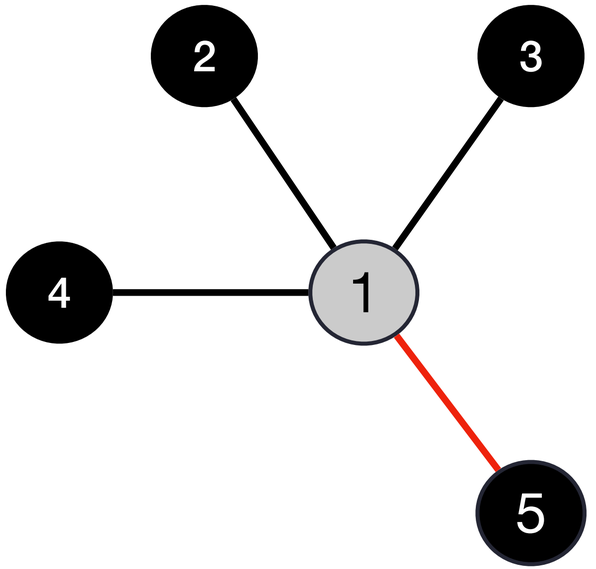
adoption rate cream = 17.39%





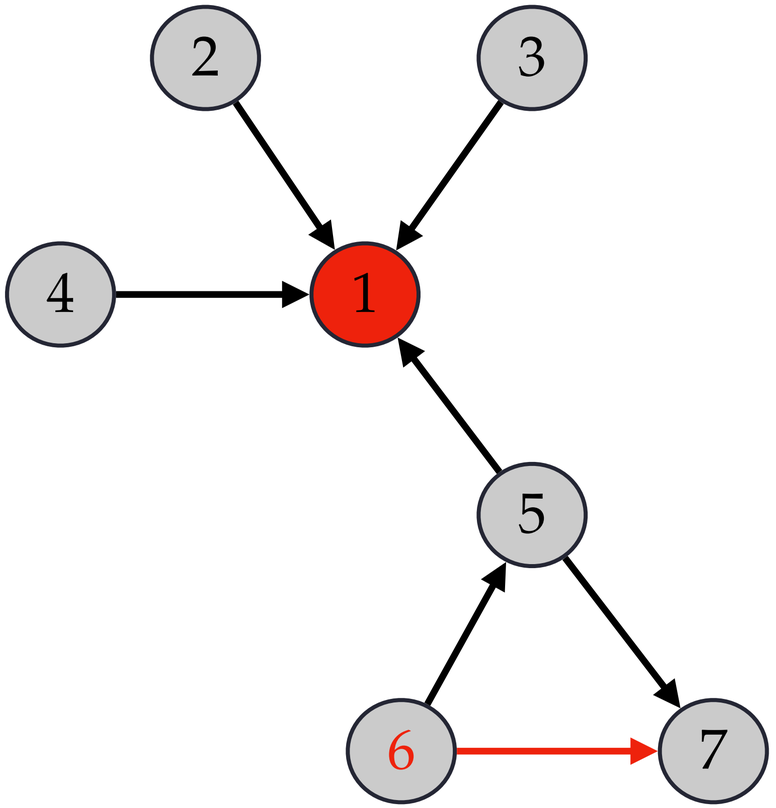
Social influence and complex contagion

- Diffusion of outdoor prevention measures requires individuals changing behaviours easily observable by others in small communities
- Sort of diffusion that requires **strong reinforcement by strong ties** (complex rather simple contagion)
- Threshold-based influence effect
- **Negative influence** through negative ties
- Role of '**stubborn agents**' like ASHA or traditional healer (Mobilia 2003)



Agent-based model estimating behaviour

- Computational dynamic models assuming different objective functions for behaviour adoption within empirical networks
- Estimating:
  - threshold levels for behaviour adoption (complex contagion)
  - threshold levels of resistance to behaviour adoption in case of negative influence
- Assuming that
  - Heterogeneity: threshold can vary across agents
  - ASHA and traditional healers are ‘stubborn agents’
- Aim: fitting the adoption distribution by simulating the adoption dynamic in the empirical networks
- Method: simulation-based search of best parameter combination



Simulation-based policy testing

- Explaining diffusion is not enough
- We need to test policy interventions in a way that is both
  - Practically feasible
  - Ethically acceptable
- Which nodes are the most efficient to be targeted to maximise overall adoption?
- How would adoption change if ASHA or the traditional healer had different network positions?

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