

## INTRODUCTION

Worldwide, around 60'000 people die of canine mediated rabies every year. Over 99% of human cases are transmitted by free-roaming domestic dogs (FRDD). The WHO, OIE and FAO aim to globally eradicate canine-mediated human rabies by 2030. However, current control programs do not consider the variability of behavior between individual dogs and between dog populations, which may help to refine rabies control. Knowledge on FRDD ecology is limited and restricted to studies on small populations. In this study we present one aspect of dog ecology, namely comparison of social interactions of dogs within and between population.

**Objectives:** assess the heterogeneity of dog behaviour within and between contact networks using social network analysis

## METHODS

### Data collection

- Selection of a 1km<sup>2</sup> urban/semi-urban and a 1km<sup>2</sup> rural area in each country
- Collaring of all FRDD whose owner's household is located in the areas with a contact sensor



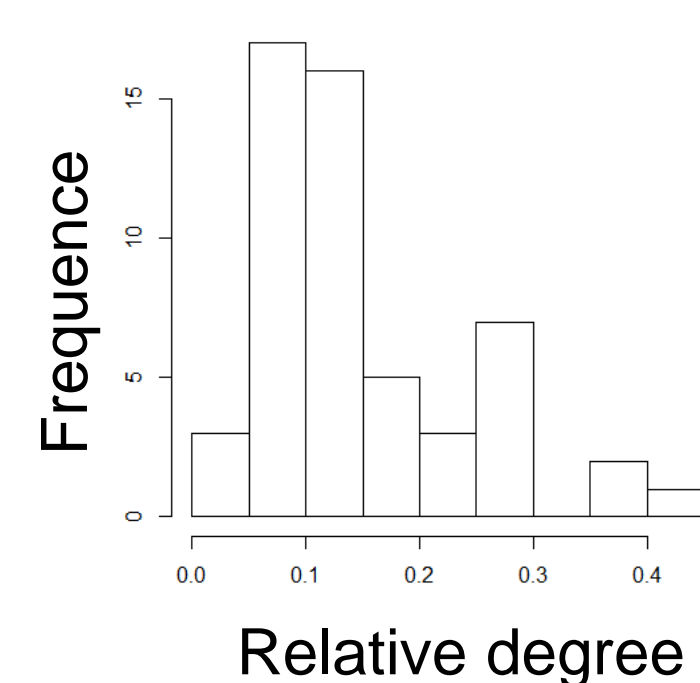
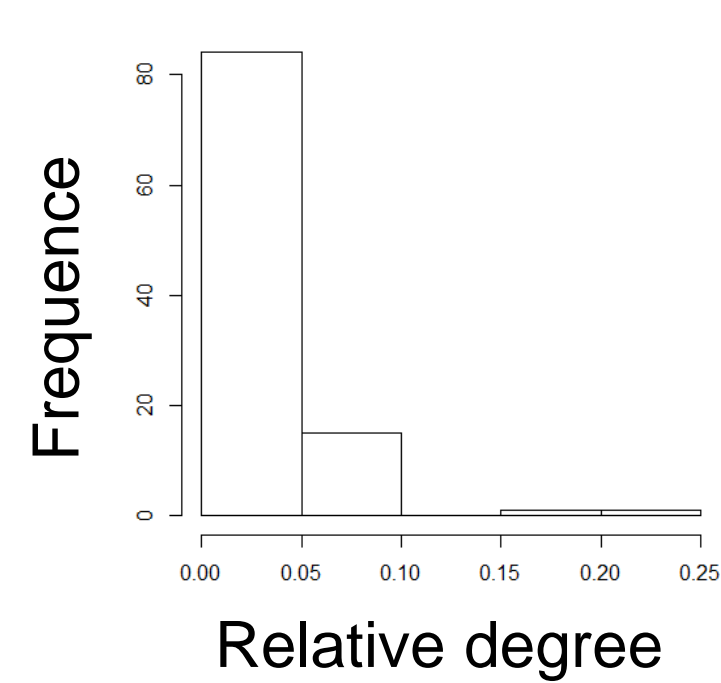
### Data analysis

1. Comparison between networks
  - Network degree computation
  - Individual relative degree computation, fitting of a negative binomial distribution and comparison
2. Comparison between individual dog within one network
  - Individual degree and betweenness computation, hierarchical clustering and cluster's comparison

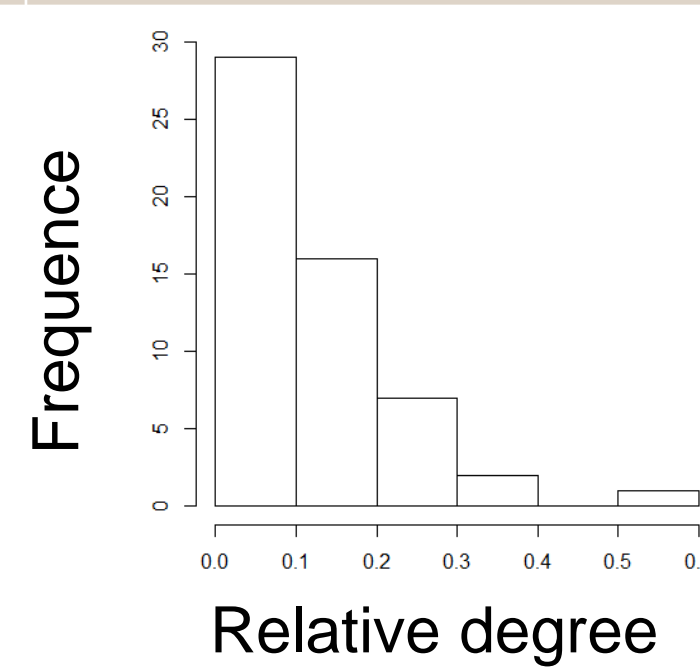
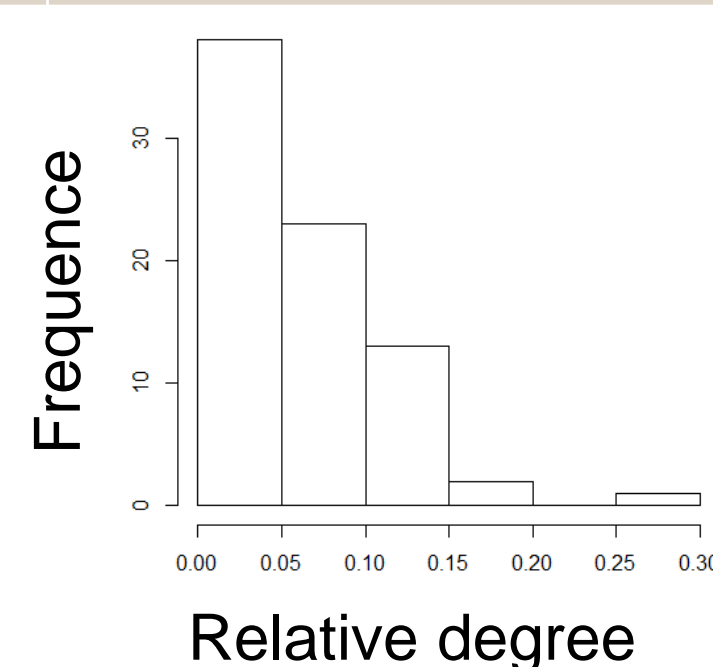
## RESULTS

### 1. Comparison of urban and rural networks in Guatemala and Indonesia

	Guatemala	
	Urban/semi-urban	Rural
density	0.04	0.15
$\mu$ (negative binomial distribution)	0.03	0.13

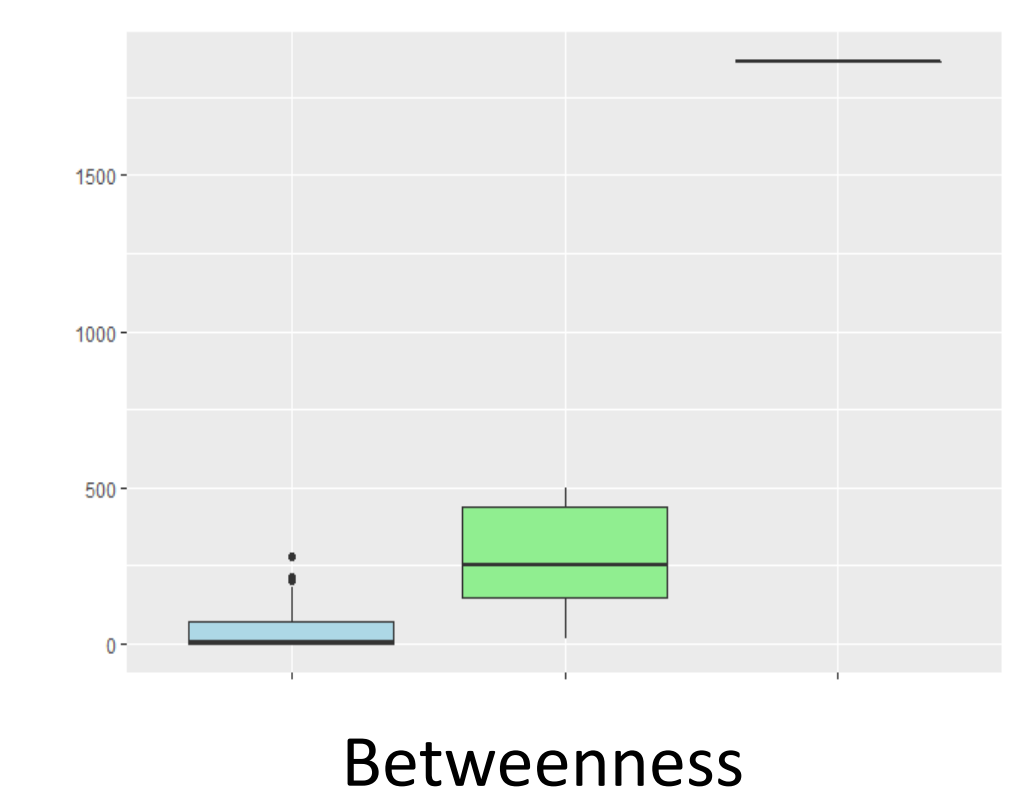
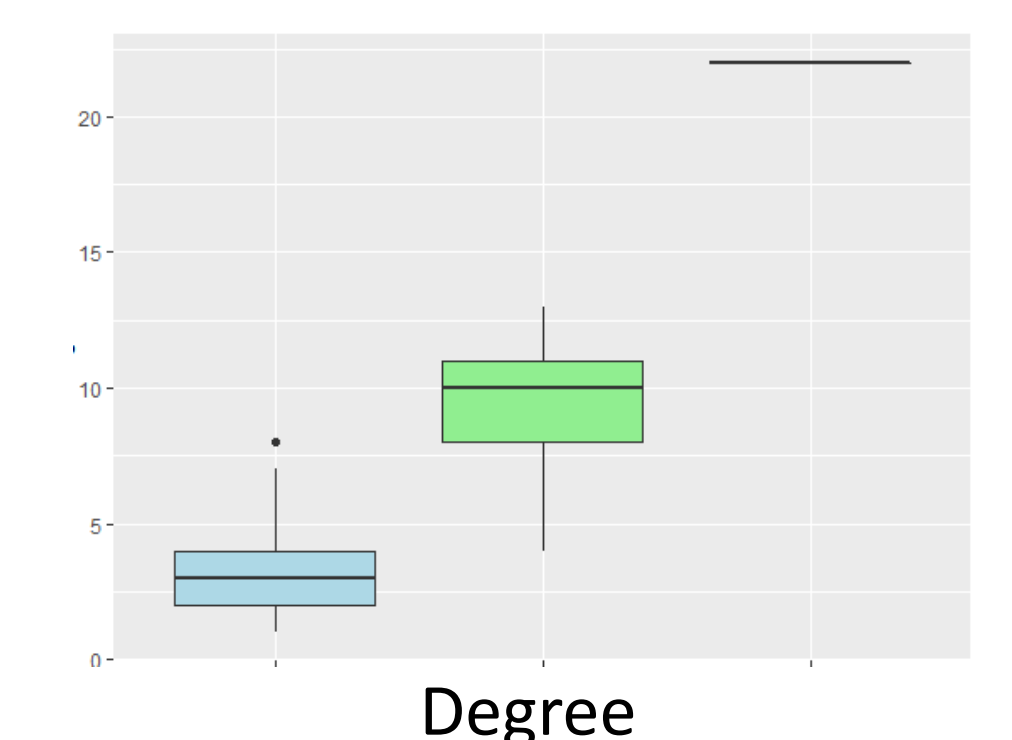
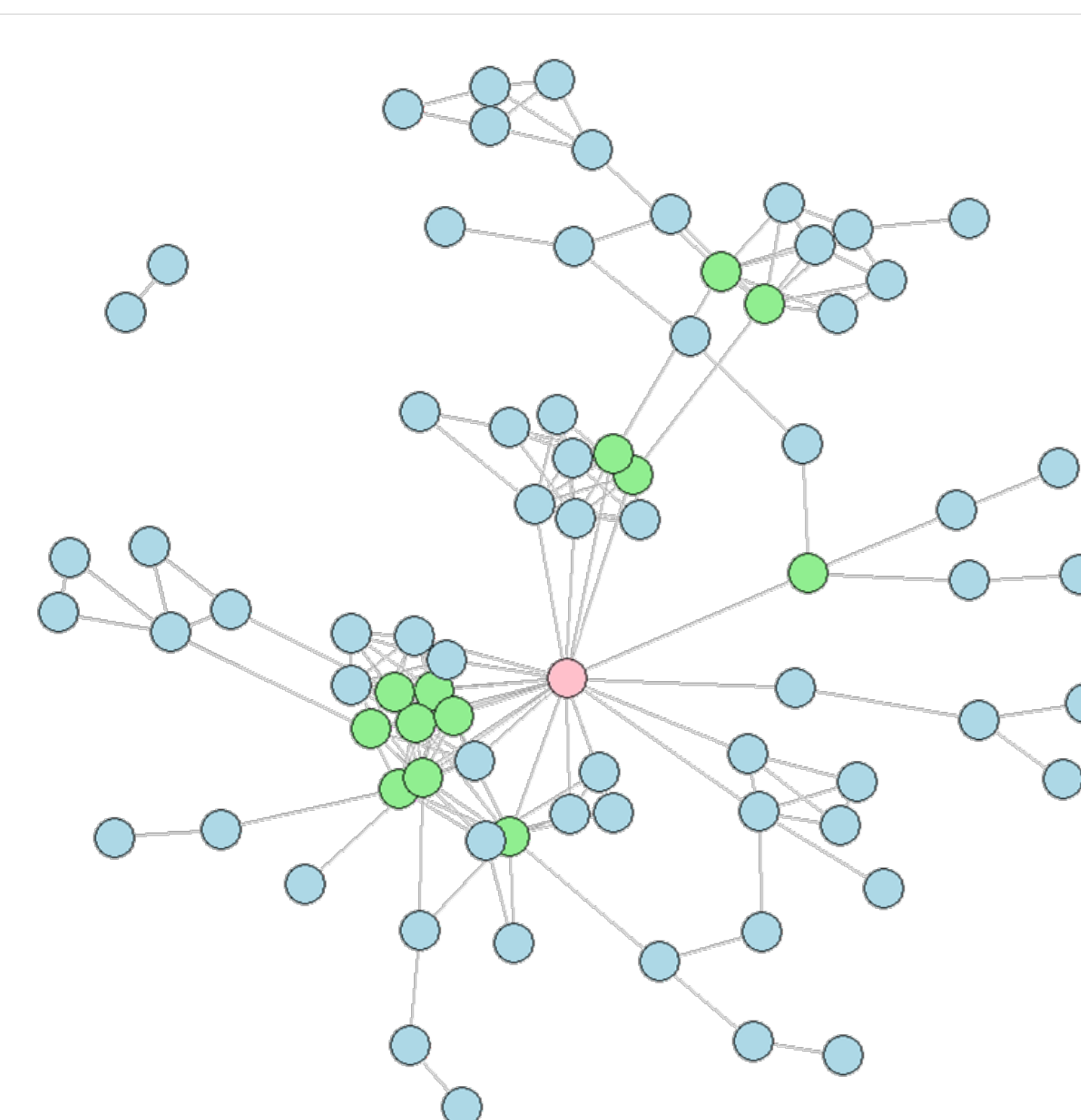
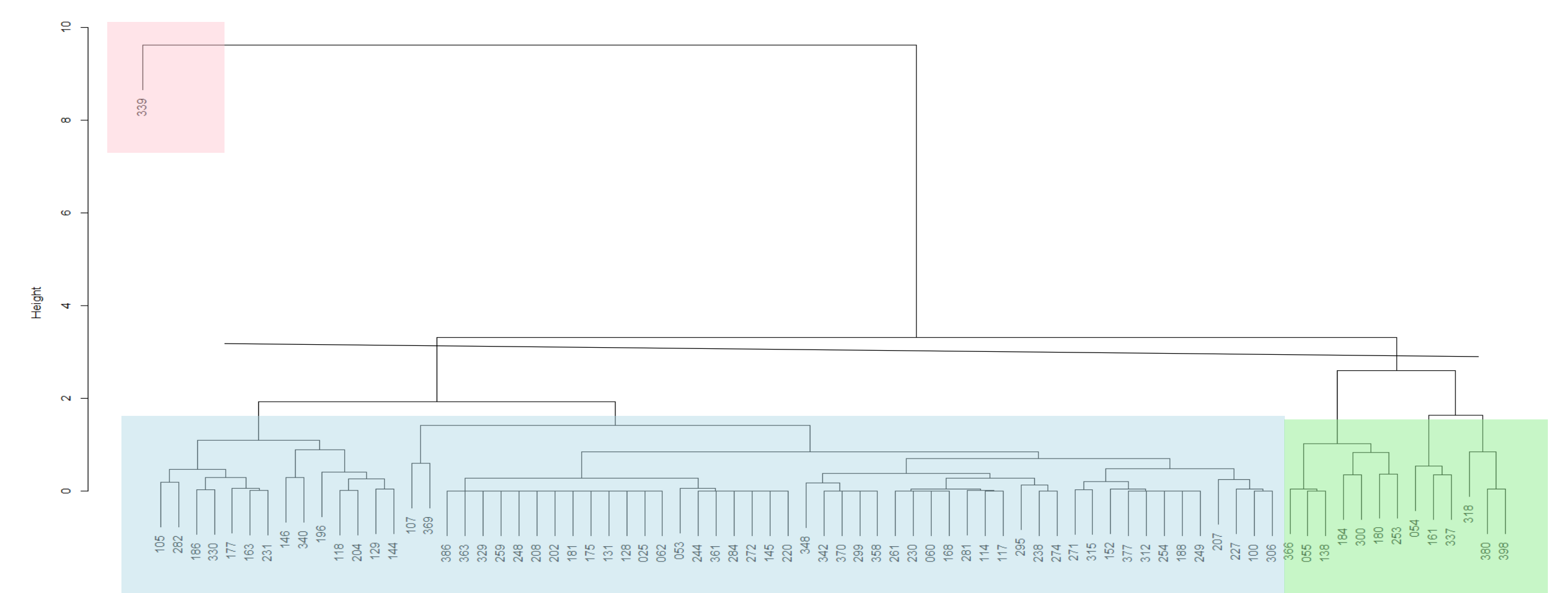


	Indonesia	
	Urban/semi-urban	Rural
density	0.06	0.12
$\mu$	0.05	0.09



The expected value of the relative degree distribution is higher in rural than in the urban/semi-urban settings.

### 2. Comparison of individual dogs in urban/semi-urban network in Indonesia



18% of dogs have higher centrality measures (pink and green clusters) than others (blue cluster)

## DISCUSSION

- Dog's centrality measures are **heterogeneous** between and within networks.
- **Focusing on dogs with a higher degree and betweenness could improve the effectiveness of control program.**
- **Infectious disease modelling based on the empirical networks could be used to assess the effectiveness of specific control strategies;** for example for rabies control, targeting vaccination coverage in rural areas or on highly connected dogs.