

Demand Side Constraints to the Adoption of 'Urea Deep Placement' for Rice Production :

A Proposed Randomized Control Trial

Dr. Andrew Dillon, Michigan State University

Dr. Lenis Saweda Liverpool-Tasie, Michigan State University

Dr. Bolarin Omonona, University of Ibadan

Dr. Yemisi Kuku-Shittu, International Food Policy Institute

Introduction

- Technology adoption is influenced by many factors including the profitability of the technology itself, but also how farmers learn about the technology and understand how to use it.
- Why don't farmers use fertilizer?
 - Liquidity constraints
 - Farmers report not enough money to buy fertilizer
 - Uncertainty about returns
 - Experience and learning about the crop
 - Negative returns or heterogeneous returns
 - Complementary inputs
 - Transaction costs
- In this study, we focus on farmer learning and what factors may influence adoption including social networks and farmer risk preferences building on recent work on UDP by IFDC and IFPRI.

Urea Deep Placement Technology

- Many potential benefits described in previous presentations from case studies.
- These case studies illustrate important policy implications for smallholders, firms, national agricultural policy and the environment.
 - Benefits only accrue if farmers adopt.....

Farmers	Fertilizer companies	Farm Sector	Environment
Lower production costs, higher yields, higher plot level profits	Product diversification, increased profitability	Increased rice productivity, lower national rice imports	Reduced nitrogen run off and volatization

Key Research Questions

1. Does targeting based on social network and/or risk aversion farmer characteristics increase take-up of UDP?
2. What is the average productivity effect of UDP use relative to non-UDP use among rice producers?
 - Does this vary by farmer characteristics such as experience, gender, social networks or risk aversion?
3. What substitution effects on other inputs or labor are attributable to UDP take-up?

Key Research Questions

4. What is the average effect on profits of UDP take-up relative to non-UDP use among rice producers?
 - Does this vary by farmer characteristics such as experience, gender, social networks or risk aversion?

5. Do differences in initial targeting based on farmer social network and risk aversion characteristics increase diffusion within villages?

The Importance of Private Sector Partners

- Notore, a private fertilizer company, has refined product delivery of UDP to rural zones.
 - EX: Repackaging fertilizer with smaller quantities and product sales at different periods, work with smallholders to link to markets. Working on innovative training strategies for farmers (time of day, seasonality, etc.)
- Key sales force of knowledgeable community sales agent to describe the new technology to farmers using advanced marketing tools such as farmer testimonials, demonstration plots, and extension advice.
- Incentives of agents align with need to provide farmers with complete information about the product.

The Importance of Methodology

- Due to many unobservable dimensions of the farmer's decision to take-up a new technology, comparisons between those who take-up and those who don't will yield biased estimates.
- Existing empirical evidence suffers from problems with:
 - Omitted or unobserved variables
 - E.g. endowment effects: farmer's initial assets/education/experience may be correlated with higher risk taking and take-up
 - Reverse causality
 - Do adopters gain higher income or do higher income farmers adopt? Or both?
- To address these challenges, an encouragement design will be used whereby some randomly selected farmers will receive discounts, though all farmers can take-up if they want.

Experimental Design

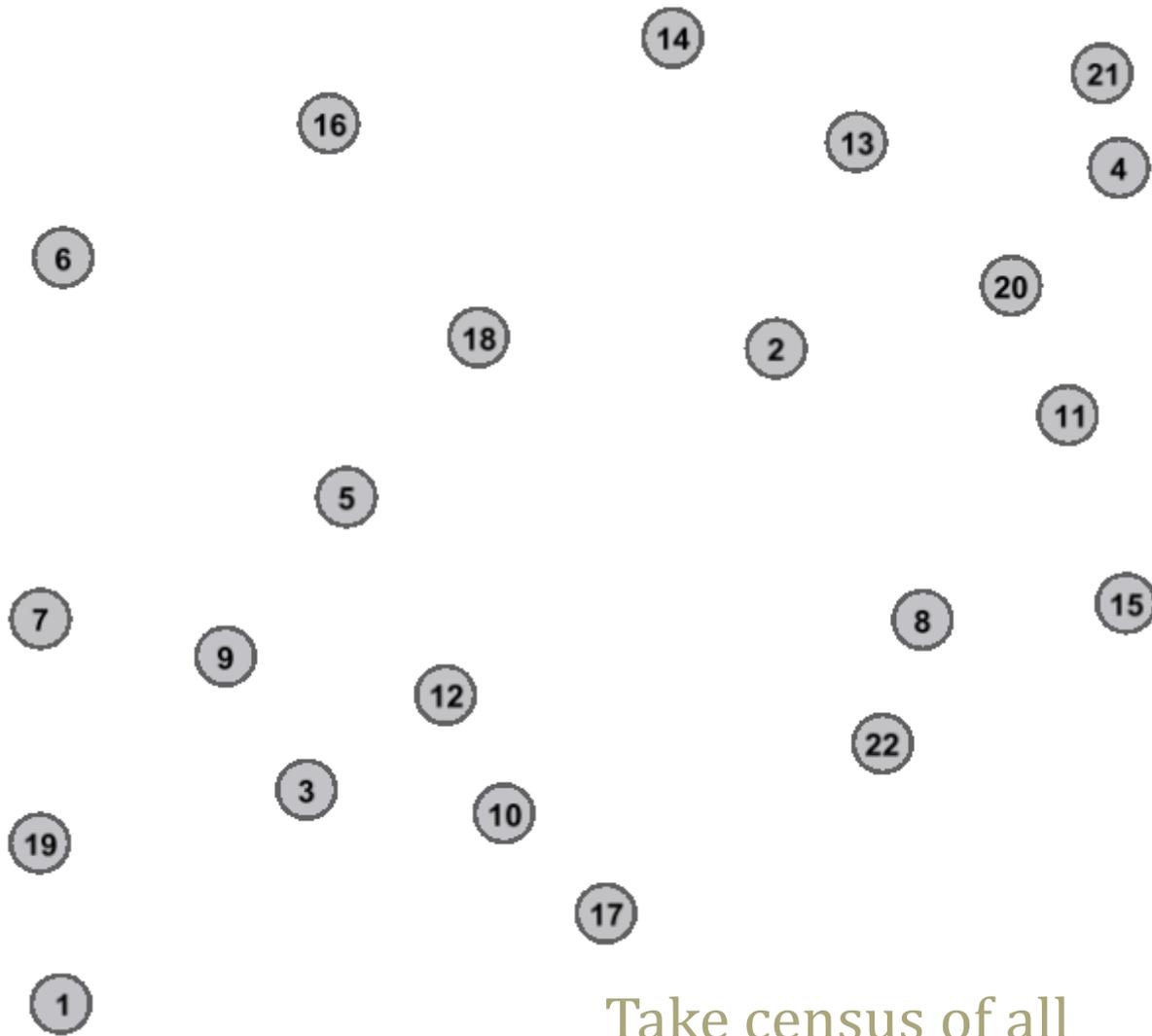
Treatment group	Treatment description	Number of canal irrigation villages	Number of lowland irrigated villages	Total number of villages
A	Training + supply guarantee	5	5	10
B	Training + supply guarantee +20% initial subsidized distribution randomly	5	5	10
C	Training + supply guarantee +20% initial subsidized distribution based on social network centrality	5	5	10
D	Training + supply guarantee +20% initial subsidized distribution based on risk aversion	5	5	10
Control	No interventions	10	10	20

Research Questions and the Link to the Experimental Design

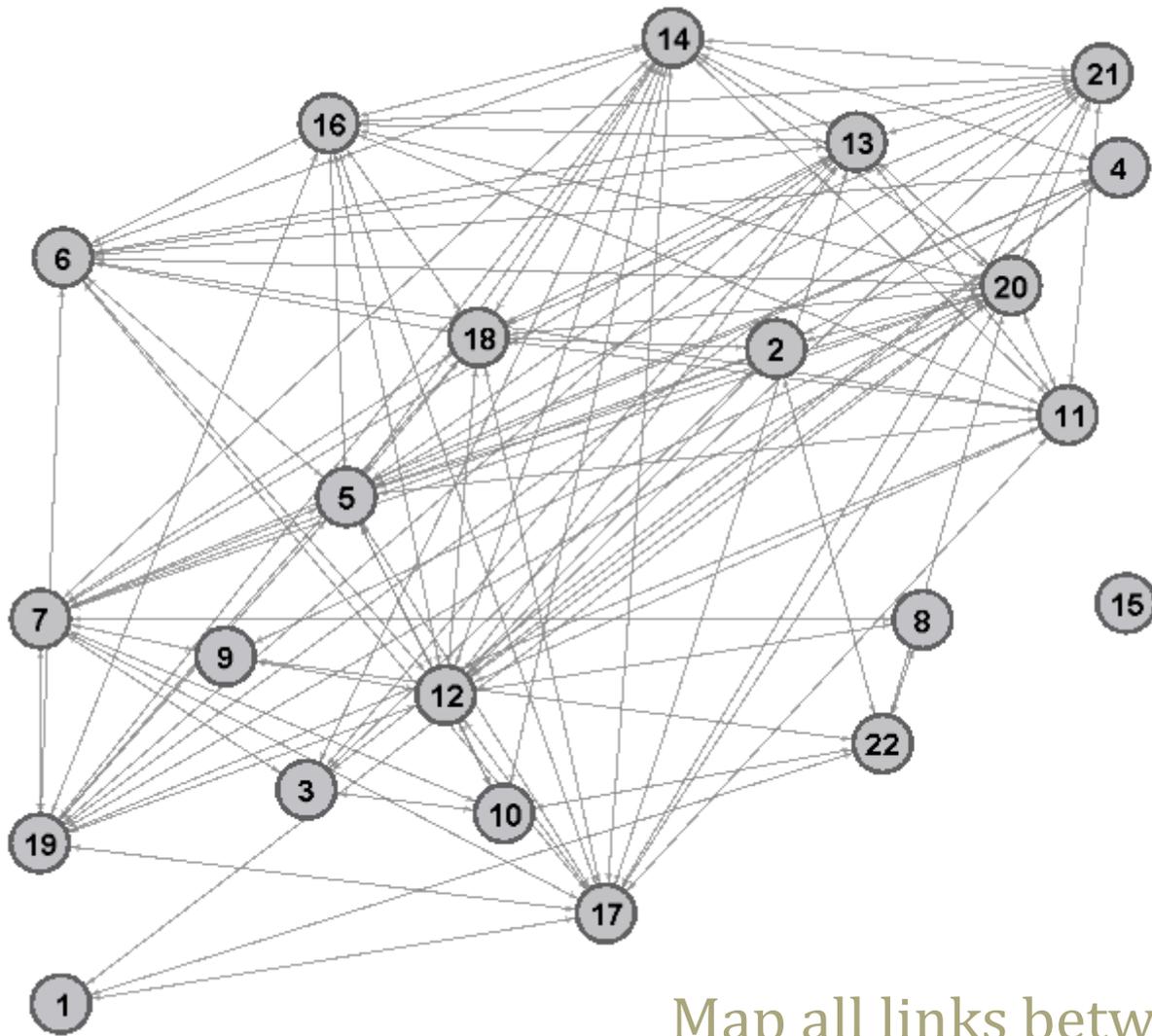
	Comparison
1. Given standard marketing techniques, what is the average productivity effect of UDP use relative to non-UDP use among rice producers? Does this vary by farmer characteristics such as experience, social networks or risk aversion?	A, Control
2. Given standard marketing techniques, what is the average effect on profits of UDP take-up relative to non-UDP use among rice producers? Does this vary by farmer characteristics such as experience, social networks or risk aversion?	A, Control
3. Does targeting based on social network and/or risk aversion farmer characteristics increase take-up of UDP and/or productivity?	B, C, D, Control
4. What substitution effects on other inputs or labor are attributable to UDP take-up?	Within village comparison of farmers who take-up and do not take-up in groups A,B,C,D
5. Do differences in initial targeting based on farmer social network and risk aversion characteristics increase diffusion within villages?	A,B,C,D

Innovations in Measuring Social Networks

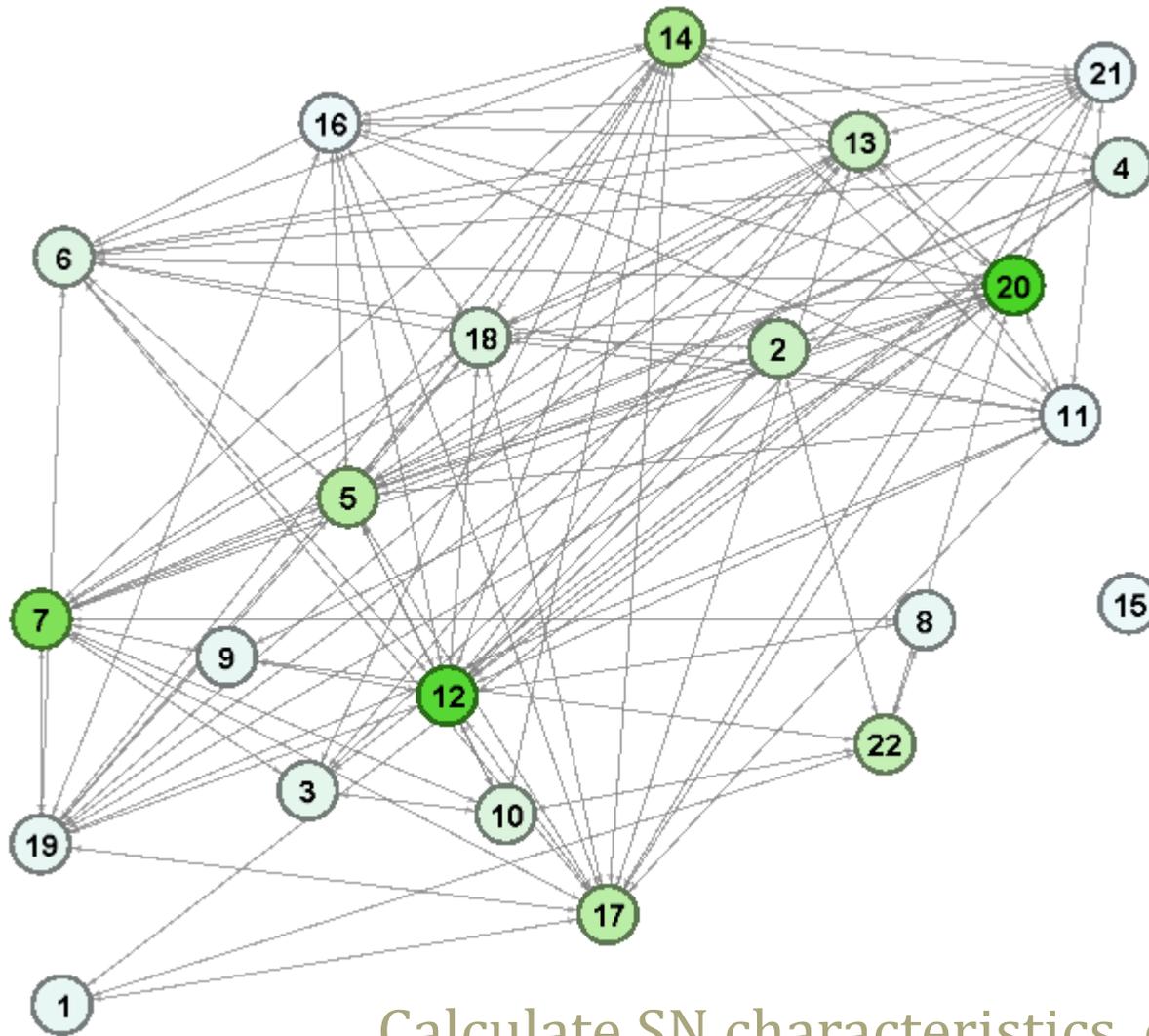
- Most social network analyses in economics has used a network sample. Some evidence that this leads to measurement error (Chandrasekhar, 2011).
 - Omission of influential links
- This study will take a censuses of all households in the community and establishes how they are linked based on several different dimensions of a social network.
 - Type of network: Farmers within village
 - Type of SN links: Relatives, organizations, plot neighbors, financial ties, people with whom they discuss agricultural issues, friends.
 - Type of information: Frequency of communication, subject of communication
 - Information on link: household composition, assets, education



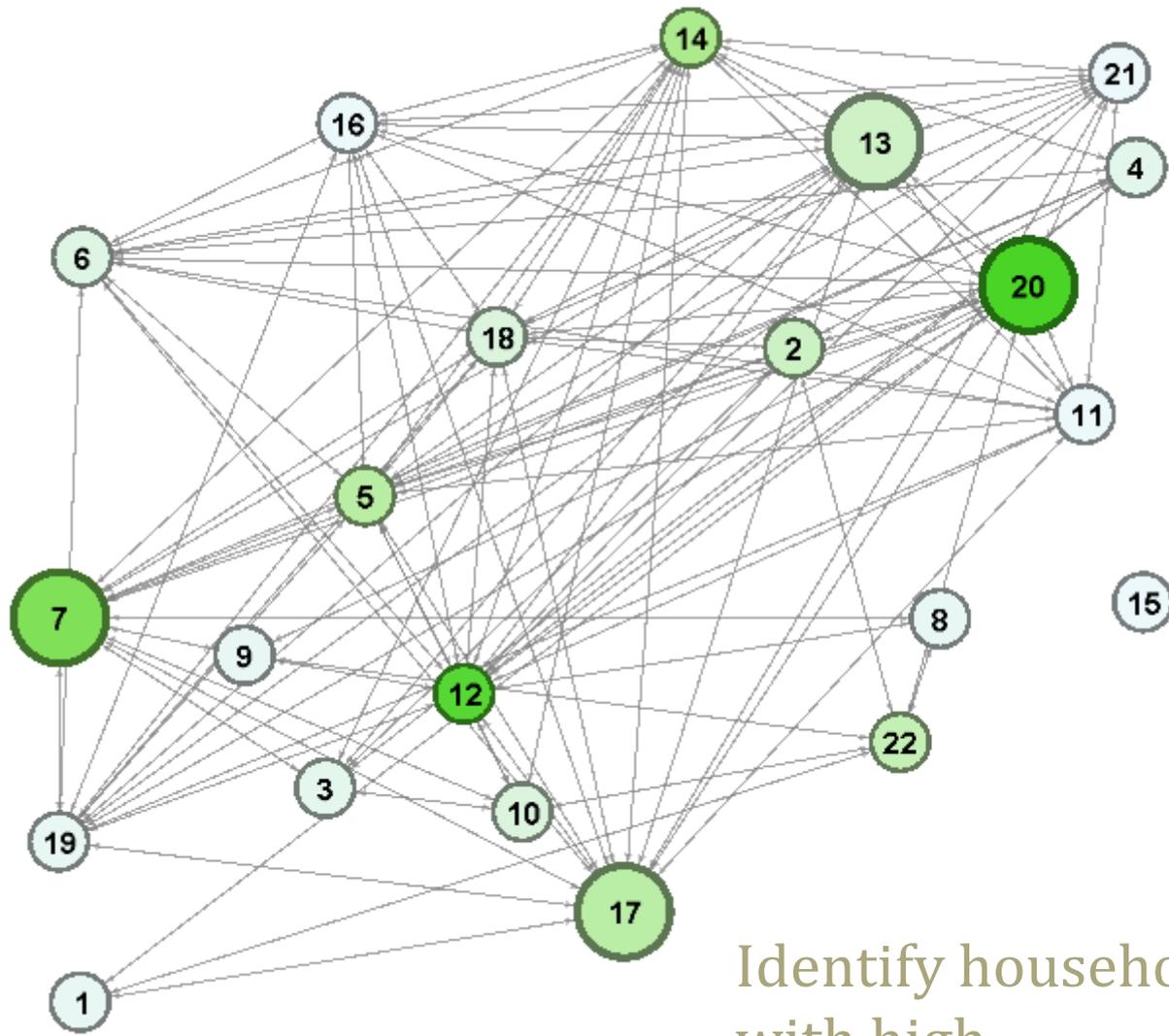
Take census of all
households in the village



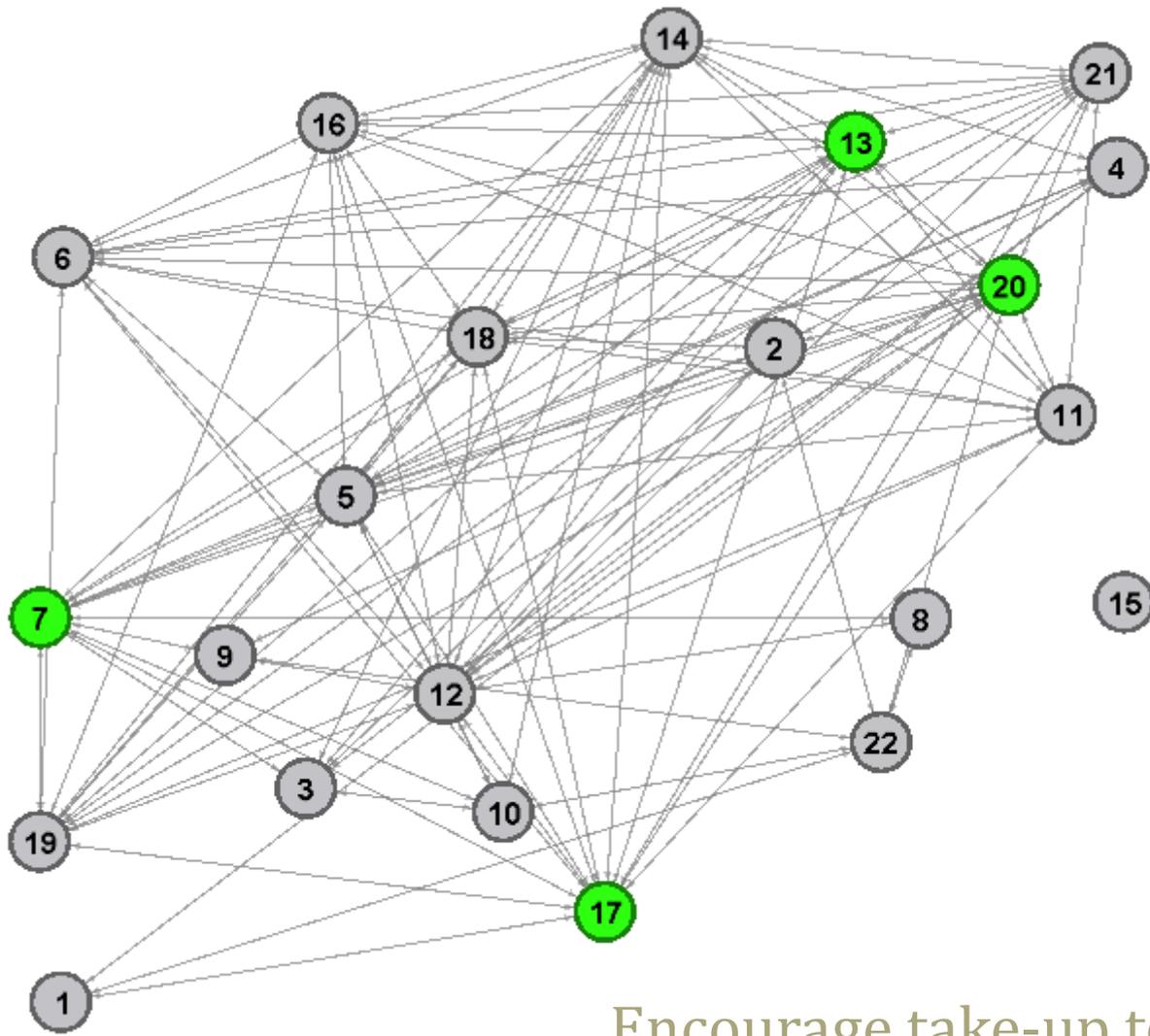
Map all links between households



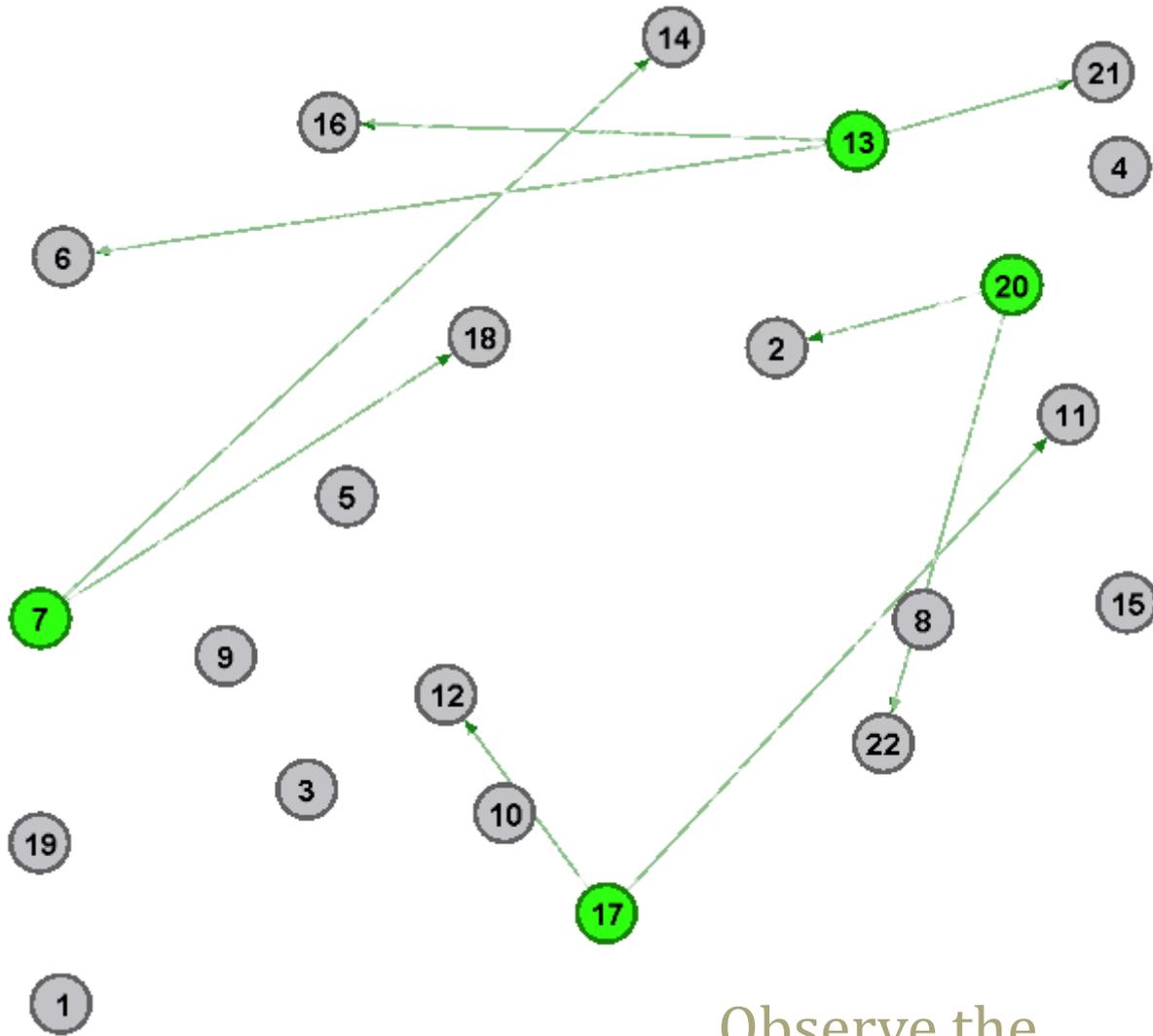
Calculate SN characteristics of all households (darker green is higher measure)



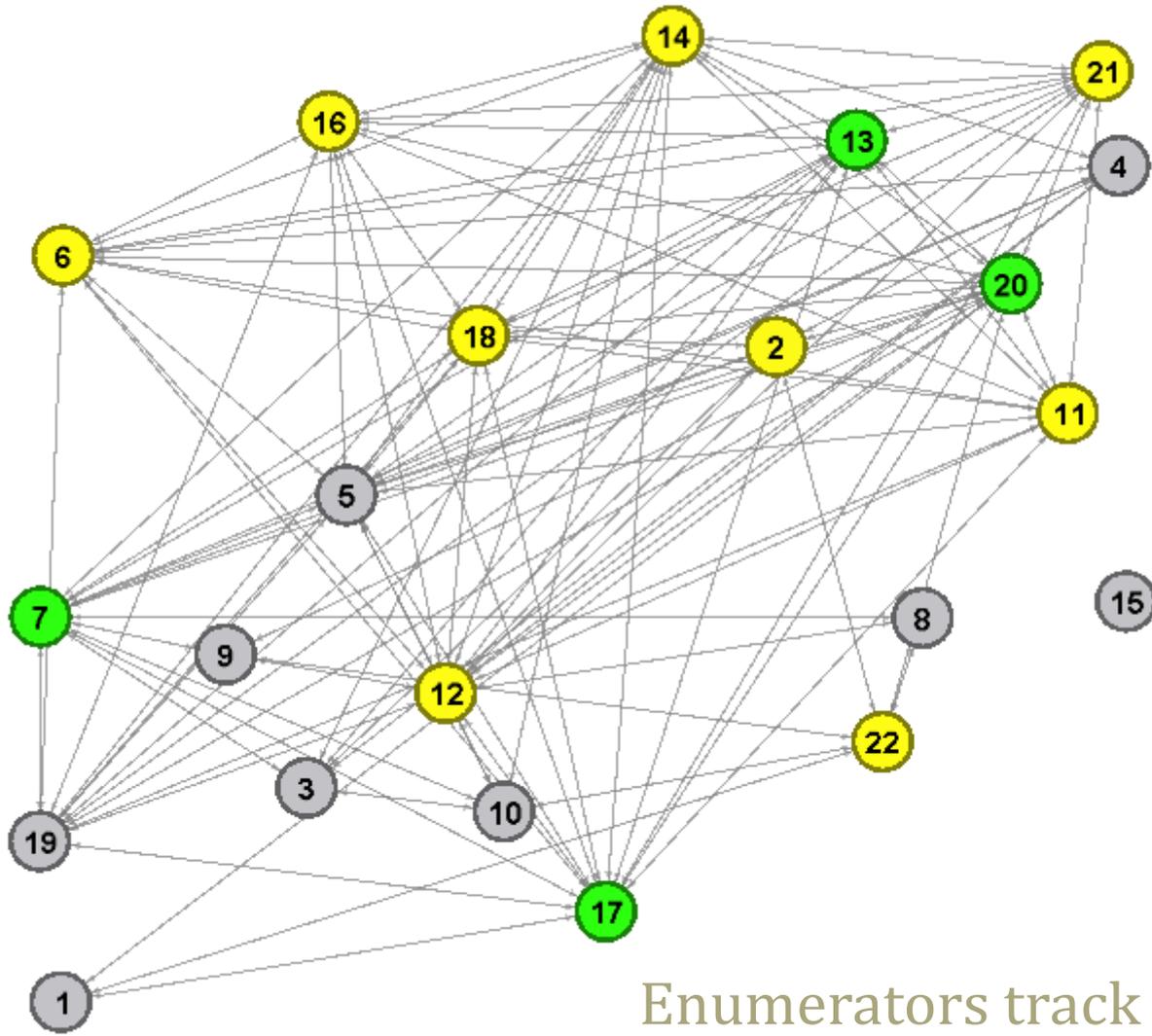
Identify households
with high
connectedness as seeds



Encourage take-up to
each seed



Observe the diffusion process



Enumerators track who take-up treatment and their characteristics

Timeline

Date	Activity
July 2013	Sample Frame Enumeration in Kwara and Selection of Data Collection Firm
September 2013	Questionnaire Development and Piloting
October 2013	SN Census and HH Enumeration including adoption and input use
December 2013	Detailed baseline Survey
May 2014	Fertilizer training and offers depending on village treatment status
November-December 2014	Detailed follow-up Survey + Adoption Survey

Key Questions for Discussion

- What factors do you think are the most important in the farmer's decision to adopt?
 - Price incentives or other incentives?
- What particularities about rice production in Kwara should we take into consideration?
- Is the more relevant stratification upland/lowland or irrigated/non-irrigated? Is there a substantial difference?
- Your feedback can really help this research as it is at a early stage!