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The Structure of Origin-Based Social Network and Its Influence on Migration Diffusion: The Case of a Migrant-Sending Village in the Philippines

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Abstract

While economic forces drive much of international migration, social factors are known to significantly facilitate movement. By providing information and other resources, networks reduce the cost and risk associated with international migration. But the influence of migration networks remains a black box that needs to be unpacked simply because these have been treated in the past mostly as unidimensional. In reality, however, networks do not only vary in type but also have structures. This study seeks to examine the structure of migration networks in a migrant-sending in the Philippines and to relate this to the diffusion of migration behavior in the village over time. Such socio-historical lens is an unconventional approach in the analysis of international migration perpetuation. This study shows that the density of the kinship and friendship ties and the network position of pioneer migrants in the village have a role to play in the current distribution of migration behavior in the area. The current diffused characteristic of international migration in the village is likely to have been a function of the initial social configuration of pioneer migrants in the area. This study likewise shows the importance of tie strength in the network-migration relationship. Lastly, network influence on migration is likely to have been influenced by external factors such as policy, migration infrastructure, and macroeconomic forces.

Keywords: migration networks, international migration, Philippines, network structure, network analysis, graph theory

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The Structure of Origin-based Social Network and Its Influence on Migration Diffusion:The Case of a Migrant-Sending Village in the Philippines[1]

Aubrey D. Tabuga[2]

1. Introduction

While economic forces drive much of international migration, social factors are known to significantly facilitate movement. The most commonly-cited mechanism is the ability of networks to reduce, through provision of information and resources, the costs and risks associated with migration (Massey D. , Social Structure, Household Strategies, and the Cumulative Causation of Migration, 1990). Because of this, migrant networks are known to enhance the likelihood to migrate as well as the net benefits of migration.

But despite the abundance of network-related studies, migration scholars question why some initial migration activities lead to more migration and therefore network expansion, but others do not. Moreover, we often do not see an entire community emigrating. While many scholars prove the power of networks in perpetuating migration, others question its ability to increase migration activities *ad infinitum*[3]. Empirical works show that migrants can turn from being 'bridgeheads' that help others in their migration to 'gatekeepers' (Bocker, 1994). Like other collectives, migrant networks provide resources to their kin, but they also restrict membership (Tilly, 1991). A fundamental problem concerning migrant networks "is the assumption that over time migration spreads outward to encompass all segments of society" (De Haas, 2010, p. 1601 providing critique of Massey, Social Structure, Household Strategies, and the Cumulative Causation of Migration, 1990, p.8). This is because "societies tend to be socially and ethnically stratified…" and "…migration often does not diffuse throughout entire societies, and while it may enable migration from group members, such dynamics tend to exclude non-members" (De Haas, The Internal Dynamics of Migration Processes: A Theoretical Inquiry, 2010, 1602).

Scholars, therefore, noted that there is a need for more nuanced analyses of migrant networks. Much of the literature on network effects rely on unidimensional approaches of portraying the social context under which migration decisions and behavior take place. These studies rely on either dichotomous or indirect measures of networks and the popular approach is individualistic. Such approach fails to deal with the broader meso-level social context which accounts for aspects of tie strength, network position, connectedness, and overall density of the network where one is embedded in.

In such works, the effects of migrant networks measured through binary measures and general network size are analyzed with an implicit assumption that networks are the same or that people belonging to a community with high migration incidence have equal access to the social capital that can be drawn from migrant networks. However, networks are not created equal (Granovetter M. , 1973). There are networks bound by stronger ties, others have weaker connections. The amount of social capital one can obtain may depend on the strength, degree or closeness of relations.

Moreover, strong ties are argued to foster segregation because although they facilitate migration of network members, these may tend to exclude non-members (De Haas, The Internal Dynamics of Migration Processes: A Theoretical Inquiry, 2010). Furthermore, "in relatively poor communities where

[1] This paper was lifted from Chapter 4 of the PhD Dissertation titled "The Role of Origin-Based Social Networks in International Migration: Focusing on Network Structure, Pioneer Migrants and Tie Strength." The usual disclaimer applies.

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[3] For a theoretical review of the migrant network literature, see De Haas, The Internal Dynamics of Migration Processes: A Theoretical Inquiry, 2010.

social organisation and trust are mainly based on kinship ties and 'bonding' social capital…, these bonds are a prime channel for gaining access to international migration, either through marriage, assistance with securing visas, financing irregular migration, finding work and housing, and so on… Therefore, kinship- or class-based access to migrant networks also tends to coincide with kinship- or class-based inequality in access to such networks" (2010, p.1601).
It is therefore essential to examine the structure of social networks within which migrant workers and prospective migrants are embedded in. The general literature on networks provide an argument for considering the importance of structure. They argue that the way elements in a network are interconnected, either directly or indirectly, enables or constrains the roles performed by the elements (Laumann, 1979, p.394). The structure of social relations in a specified geographically-bounded unit influence the rate of diffusion of certain things like information and infectious diseases such that "less densely connected societies exhibit no diffusion and societies that have densities (slightly) above a critical threshold exhibit substantial diffusion" (Jackson, Rogers, & Zenou, The Economic Consequences of Social Network Structure, 2016). In addition, proximity among the elements matters (Burt, 1987). Burt specifically noted that "Something about the social structural circumstances of ego and alter makes them proximate such that ego's evaluation of the innovation is sensitive to alter's adoption" (1987, p. 1288).

Similarly, the set of opportunities and constraints faced by an individual such as that related to international labor migration is influenced by the structure of the web of social relations he or she is embedded in. For instance, it is expected that initial migration behavior spreads more extensively in a community that has a high density or connectivity as opposed to one that is relatively sparsely connected. The more proximate a person is to former migrants/returnees, the more likely that he or she is influenced to migrate, with all else being equal.

In this paper, we study the influence of broader meso-level social context in international migration by analyzing the network structure of a migrant-sending village in the Philippines and how this affects the diffusion of migration. Instead of obtaining destination-based kinship and friendship ties of prospective migrants, we focus on origin-based social network or the community of origin. The latter is analyzed because, as mentioned earlier, it mirrors migrant networks at the destination. Likewise, studying the community of origin enables one to examine factors that potentially influence pre-migration decision-making – an aspect that has received less attention in the empirical literature.

To conduct social network analysis (SNA) of the kinship and friendship ties in the village of study, we implemented graph analysis and descriptively assess the network structure in terms of density, cohesion, and homophily. The SNA uses data which were collected from all 365 households of Camachile, Orion, Bataan.[4] We compared the network attributes of migrant and non-migrant household. Since migration histories for all the households were also collected, we were able to track the spread of migration through time by mapping the social network by the year of initial migration activity of each household to roughly construct the social history of migration in the origin village. The main objective is to advance the state of meso-level theories on the perpetuation of migration – an area that requires more empirical evidence as noted in De Haas' critique of the literature (De Haas, The Internal Dynamics of Migration Processes: A Theoretical Inquiry, 2010). It is part of a broader body of literature that seeks to link the structure of social relations to behaviors of individuals who make up the social network.[5]

The key research questions this study aims to investigate are - How are origin-based social networks of migrants structured? What is the extent of clustering and homophily? What characteristics of the structure could have possibly influenced, or prevented, the diffusion of migration to wider segments of the community? How are pioneer migrants related to more recent migrants and how likely that such relations influenced the spread of migration behavior across households?

[4] See Appendix 1 on details about the data used in this analysis.
[5] See Laumann (1979), Burt (1987), Jackson, Rogers and Zenou (2016)

2. Network structure in migration

The structure of origin-based social networks has not been scrutinized in great details in the past. In fact, I am not aware of any migration study that have analyzed the structure of social networks in an entire village of origin of migrants to make insights about the diffusion of migration activities in the area.[6] Others have examined the characteristics of pioneer migrants in terms of their personal and economic attributes and how they influence the development of migration streams (see for instance Lindstrom & Ramirez, 2010) but not their relative network position or how they are related to migrants who succeeded them. Other studies focus on tie strength among network members. One of the more recent ones is done on the case of Senegal nationals' migration to Europe where it found that weak ties are important in the migration of men (Liu, 2013).

The general network science literature provides some stylized facts that may be useful for this study. One dominant finding is that large networks exhibit small worlds – that is, these have short average path length. Social networks also "tend to have high clustering coefficients relative to what would emerge if the links were simply determined by an independent random process" (Jackson, Social and economic networks, 2008, p.58). In other words, network formation is unlikely to be random. Moreover, Jackson also noted that a lot of social networks exhibit homophily which refers to the tendency of people to associate with people who are similar to themselves. The Encyclopedia of Social Networks (Reno & Spence, 2011) notes strong and weak ties influence diffusion. Groups that are linked by strong ties hardly allow the exchange of ideas and information outside the close network. On the other hand, weak ties are crucial for ideas and information to spread across large networks. The concept of homophily in the analysis of diffusion is essential since it can serve as a barrier to adoption as people do not interact with others not similar to themselves (Reno & Spence, 2011). Homophily can therefore lead to segregation (Jackson M. O., Social and economic networks, 2008). A highly-segregated network may impede the flow of information including migration-related information and therefore we do not observe migration behavior penetrating other segments of the network.

I augment the literature by examining, though descriptively, the structure of kinship and friendship ties in a village that has a high migration prevalence taking into consideration not only tie strength but also homophily as well as the relative position of migrants including pioneer migrants in the area. Furthermore, I use migration history data for each household in the village so that I can map the network along with the household's initial migration period to get a sense of how migration behavior has spread through time. Roughly, this is equivalent to constructing the social history of migration in the area – something that to my knowledge has not been done in past studies of social network dynamics in the international migration context.

3. Data and Limitations

The dataset used in this analysis was obtained from the survey on social ties, migration history and intentions of households conducted in Camachile, a rural fishing village in the Philippines. This survey was purposely designed and conducted for the research objectives of this thesis.

[6] The effect of network structure on migration flow was analyzed by Anjos & Campos (2010) and found that network centrality of agents is important property in the growth of networks. However, their approach is different from what is being proposed in this study. They used Multi-Agent System to model the flow of migrants in social networks. Though they used real microdata, the social network of the individuals is simulated.

To construct the within-village social network data, we interviewed each household in the study area and asked them to identify their kin by blood and marriage, and friends amongst the households residing in the village only.[7] The points of reference in the identification of exact relations among households are the household head and spouse. For instance, household A is a sibling to household B because either the head or spouse in A has a sibling in B. The relations obtained were precise (e.g. parent, cousin, aunt) but included only the 1st (e.g. parent/child) to 4th degree (e.g. cousins, aunt-in-law) of consanguinity or affinity (see Table 3.1 below for the list of family members). More distant relations were all labeled as others.[8]

Table 3.1 List of family members[9]

CONSANGUINITY	4th Degree	Great Great Grand Parent Great Aunt/Uncle First Cousin Grand Nephew/Niece
	3rd Degree	Great Grandparent Aunt/Uncle Niece/Nephew Great Grandchild
	2nd Degree	Grandparent Brother/Sister Grandchild
	1st Degree	Parent Child
		YOU
AFFINITY	1st Degree	Spouse
	2nd Degree	Parent-in-Law Daughter/Son-in-Law
	3rd Degree	Grandparent-in-law Brother/Sister-in-Law Grandchild-in-Law
	4th Degree	Great Grand Parent-in-Law Aunt/Uncle-in-Law First Cousin-in-Law Nephew/Niece-in-Law Great Grandchild-in-Law

For friendship, a distinction between close friends and other friends was made. The formation of friendships is unlikely to be random and may even be endogenous on migration behavior. Therefore, the friendship ties that were obtained were those that are considered long-lasting, that is - at least 10 years old. Incidentally, the friendship data that were collected reflect mostly friendship since childhood.

[7] Admittedly, the social networks of the households may be much broader, encompassing physical environments beyond the village of origin. These too may affect their ability and aspirations for international migration. However, it would have been too burdensome in terms of data collection to obtain all such networks. To address this, we also obtained all social ties with migrant networks that each household has regardless of the location of these migrants. We included this variable in the regression analyses of migration behaviour and intentions. In this study, however, analysing the social network structure in the origin village can already add value to the literature since it reflects networks of both social and physical proximity.

[8] For a more thorough discussion on the primary data used for this analysis, see Appendix 1.

[9] Source: http://www.jsu.edu/hr/nepotism/index.html

The data of social relations were collected together with the demographic characteristics and migration histories and intentions, among others. Moreover, the village's 2012 CBMS data provided information on economic characteristics. The presence of these information makes it possible to analyze social relations concurrently with household attributes and migration activity.

In addition to the nature of kinship and friendship tie, we supplemented the data by obtaining information on actual interactions such as –visiting each other; giving or receiving advice and communicating. We noted that in the identification of kin and friends by the respondents, at least one of the above conditions was true. Therefore, there is a reason to believe that the social ties we have gathered pertain to active ties.

One limitation of this analysis is the absence of a comparison village that has a lower migration incidence than Camachile's 30 percent. It would have been better to have the opportunity to examine how the configuration of social relations in that village would compare to that of the study area. However, due to limited time and resources, this thesis made use of only one case – the Camachile case, after all, having just one study area still makes it possible to examine the networks of households and how their connectivity and relative position correlate with their own migration tendencies such that a meaningful interpretation or inference with regards to the diffusion of migration behavior can be made.

4. Social network analysis (SNA)

The within-village kinship and friendship data were coded in an $n \; x \; n$ weighted, undirected or reciprocal matrix. Since there were 365 households, the matrix has 365 rows and 365 columns. The weights of the matrix depend on an arbitrary coding scheme to differentiate social proximity. The first-degree[10] relations are assigned a weight of 10, 2nd degree is assigned 7, 3rd degree is given 4 while 4th degree is given a code of 3. Other relatives are assigned a weight of 2. To differentiate friends from kin, I coded 'close friends' 5 and 'other friends,' 1.

The basis for the weight comes from the social support literature which notes that the parent-adult child kinship is the most supportive, providing "high levels of emotional aid, services, and financial aid" (Wellman & Wortley, 1989, p.273). Meanwhile, 'siblings are less supportive and vary more in supportiveness than do parents and adult children…Extended kin, even those who have an active relationship with the ego, are only about half as likely to provide support as more immediate kin…They do, however, prove useful in situations where social and spatial dispersion give weak ties a comparative advantage over strong ones, such as moving or finding jobs' (Walker, Wasserman, & Wellman, 1994, p.6 citing Wellman and Wortley, 1989). The weight for close friends being near to that of siblings is based on findings from similar literature where 'friends are just as likely as siblings to provide support…' (1994, p.6).

The links, known as edges in graph theory, that connect the households (nodes) were also mapped in an adjacency matrix where all non-zero links are denoted by one (1), and zero (0), otherwise, to simplify certain aspects of the analysis. To illustrate[11], let (N, g) be a set of nodes

[10] First-degree relations refer to parent or child as well as spouse, but the data referred here on first-degree relations refer only to parent/child since the kinship data pertain only to inter-household ties and not among individuals. The spouse, if relevant, naturally and usually lives with the head or respondent. Please refer to Table 4.1 for the list of relations and the corresponding degree.

[11] See Jackson (2008) for more detailed discussion.

$N = \{1, \ldots, n\}$ and a $n\ x\ n$ matrix g such that g_{ij} represents the relation between nodes i and j. We are concerned about links so that we specify our graph as undirected, that is $g_{ij} = g_{ji}$, where the direction does not matter since the relationship is reciprocal. This is useful in assessing both direct and indirect links. Multiplying the matrix by itself once yields for each pair of observations the number of ways a node, in this case, a household, can reach the other in a path length of two, that is – there is one person between them in the network of social ties. A measure of indirect links is the number of observations or nodes that can be reached by a path length of two.

Using the coding scheme for social proximity, we have constructed matrices corresponding to close family, general family, and friendship ties to obtain more detailed network analyses. These matrices of social relation were analyzed through the UCinet software package where basic network attributes like network density, the degree of each node, and centrality scores were calculated.

4.1. Whole network structure

Density refers to the proportion of actual ties to the total number of possible ties. The formula for density is $[n * (n-1)]/2$. A low (high) density means that the network is sparsely (densely) connected as there are few (numerous) links. Networks also has what is termed as average geodesic distance - the shortest path between any pair of nodes, an indication of how far apart any two nodes will be on the average. A lower average geodesic distance means that the nodes are not far from each other. A higher distance denotes that households are far from each other or they have to pass through some intermediaries to reach one another.

Another measure of social cohesion is fragmentation. Fragmentation refers to the proportion of pairs of nodes that cannot reach each other. Fragmentation is measured as:

$$F = 1 - \frac{2\sum_{i>j} r_{ij}}{n(n-1)}$$

where $r_{ij} = 1$ if node i can reach node j by a path of any length; and $r_{ij} = 0$ otherwise. A path between two vertices or nodes refers to any sequence of non-repeating nodes that links the two nodes. If all the nodes or households are reachable from all other nodes, that is – the network is made up of one giant component, then F should be equal to zero (0). In contrary, if all nodes are isolated from each other, the F measure is one (1).

We can also determine whether village network exhibit segregation. Segregation leads to the exclusion of some portions of the village if a useful set of information gets disseminated first within a somewhat exclusive cluster. One way to find out if there's segregation is to examine the structure for homophily. Since the target area has a readily available socio-economic profile (obtained from the CBMS), the presence of homophily can be gleaned from the graph if say households that are relatively well-off tend to associate with those of similar stature. Since migrant households can be identified, it would be interesting to see whether migrant households tend to form a group of their own.

4.2. Network attributes of households

A simple and direct measure of connectedness is the degree of a node which refers to the number of direct links a household has. The higher the degree, the more connections a household has – the greater the possibility of obtaining much-needed information and resources including migration-related ones.

An important dimension of network structure is betweenness (Freeman, 1977).[12] The betweenness score is an index that denotes the extent to which an individual connects or brokers indirect connections between all other individuals in a network. In other words, betweenness measure is the number of times that a node or in this case, as household, lies along the most direct or shortest path between two other nodes. If one's betweenness score is 52, this means that more than half of indirect links run through him or her.

To illustrate, let $P(i,j)$ be the shortest distance between nodes (or in this case, households) i and j and $P_k(i,j)$ denote the shortest path between i and j that includes node k (i.e. where k lies between them). In other words, $P_k(i,j)$ is the number of paths in which node k bridges i to j. The larger $P_k(i,j)$ is, the more central or influential node k is. One can get the average of $P_k(i,j)$ for all pairs of nodes in the network to assess the overall influential position of node k in the village network. The calculation is:

$$\sum_{ij:i\neq j,k\notin\{i,j\}} \frac{P_k(i,j)/P(i,j)}{(n-1)(n-2)/2}$$

Where $\frac{P_k(i,j)}{P(i,j)} = 0$ in cases where there are no paths connecting i and j. The denominator denotes that a given household k can be found between as many as $(n-1)(n-2)/2$ pairs of other households.

The importance of being central based on betweenness is "in the potential of a point for control of information flow in the network. Positions are viewed as structurally central to the degree that they stand between others and can therefore facilitate, impede or bias the transmission of messages" (Freeman, 1977, p.36).

Another commonly-used measure of centrality is the Eigenvector centrality which indicates the importance of being an important household's friend or kin. It does not measure how influential one is directly but rather it considers the centrality or influence of all the friends and relatives that one household is connected to. Let g_{ij} be a notation that indicates a link between two households, i and j in the network g. In addition, we take C_j as the sum of the centrality of i's kin.

The eigenvector centrality measure for household i is:

$$EigenvectorC_i = a\Sigma_j g_{ij} C_j \ ,$$

where a is some proportional constant. In EigenvectorC_i, we are counting the centrality C_j of the nodes/households, j, that i is connected to in g_{ij}. A higher Eigenvector centrality means that one is connected to more central households in the network.

[12] See also (Bavelas, 1948).

Another measure of network centrality of an individual node or household is closeness. This score captures the ease of reaching other nodes in the network. The formula for closeness centrality is:

$$ClosenessC_i = \frac{(n-1)}{\sum_j l(i,j)}$$

where the term $l(i,j)$ captures the length of shortest path between i and j and summing these up for all j measures the relative distances to other entities/nodes. The larger the denominator which means that i is far from the js, the smaller the closeness centrality. If all js are directly connected to i, the closeness score will be close to 1.

The assumption is that with higher centrality measures, there is greater opportunity for one to get informed with numerous opportunities, including those related to overseas jobs. The more peripheral one's position in the web of social ties is, the less likely that one learns about various opportunities. The better the position one has in the network enables him or her to take advantage of the social capital embedded within.

4.3. Proximity to pioneer migrants

Since we can identify from the network graph the pioneer migrant households, we calculated their network centrality measures and compared these with other types of households. Pioneer migrants who are more central may be able to spread the culture of migration more effectively within and even beyond its immediate social circle. We propose that having a direct connection with pioneer migrants enhances one's likelihood of migration.

4.4. Visual analysis

Interestingly, SNA enables visualization of the web of relations and because we can identify from the data the non-migrant, and migrant households including pioneer migrants as well as the year of first migration activity of each household, the visual profiles provide a different yet meaningful assessment of the association between network structure and the spread of migration behavior. For instance, a graph of the network bearing the kinship ties and year of first migration activity for each household can illustrate how the pioneer migrant households are related to those with more recent migration activities. To carry out the SNA, I used the UCInet Software Package.

5. Results and Discussion

5.1. Whole network

To provide an understanding of the structure of social relations in a migrant-sending village, a cross-sectional, one-mode, whole-network analysis of social network in Camachile was conducted. Figure 5.1 represents the network of binary-valued, undirected relations regardless of type and strength of tie. Each square represents a household, herein referred to as the node, while each non-null link, whether it is blood or friendship tie, between any two nodes is

represented by a line. In this graph, the distance between nodes does not have a meaning. Except for two isolated nodes, all households form a single giant component.

The graph of the whole network which is made up of 365 households, is made up of 4,452 social ties. When interpreted visually, the network graph is quite dense at the core. Nonetheless, the graph analysis shows that its density, which is the number of ties (4,452) divided by the number of possible ties (that is – (n*n-1)/2 or 66,430), is only 0.067. Hence, the network is relatively sparse since the perfectly connected network where all nodes are connected to all other nodes has a density of 1. Of the 4,452 social ties, 73 percent are familial relations and 27 percent are friendship ties (see Table 5.1). The most common type is close friendship at 26 percent of the total. Only 6 percent of the inter-household relations are of the first-degree, 16 percent consists of second-degree relations, while third- and fourth-degree relations have each around 20 percent. The rest comprise of other relatives not elsewhere classified (10 percent) and other friendship (1.6 percent).

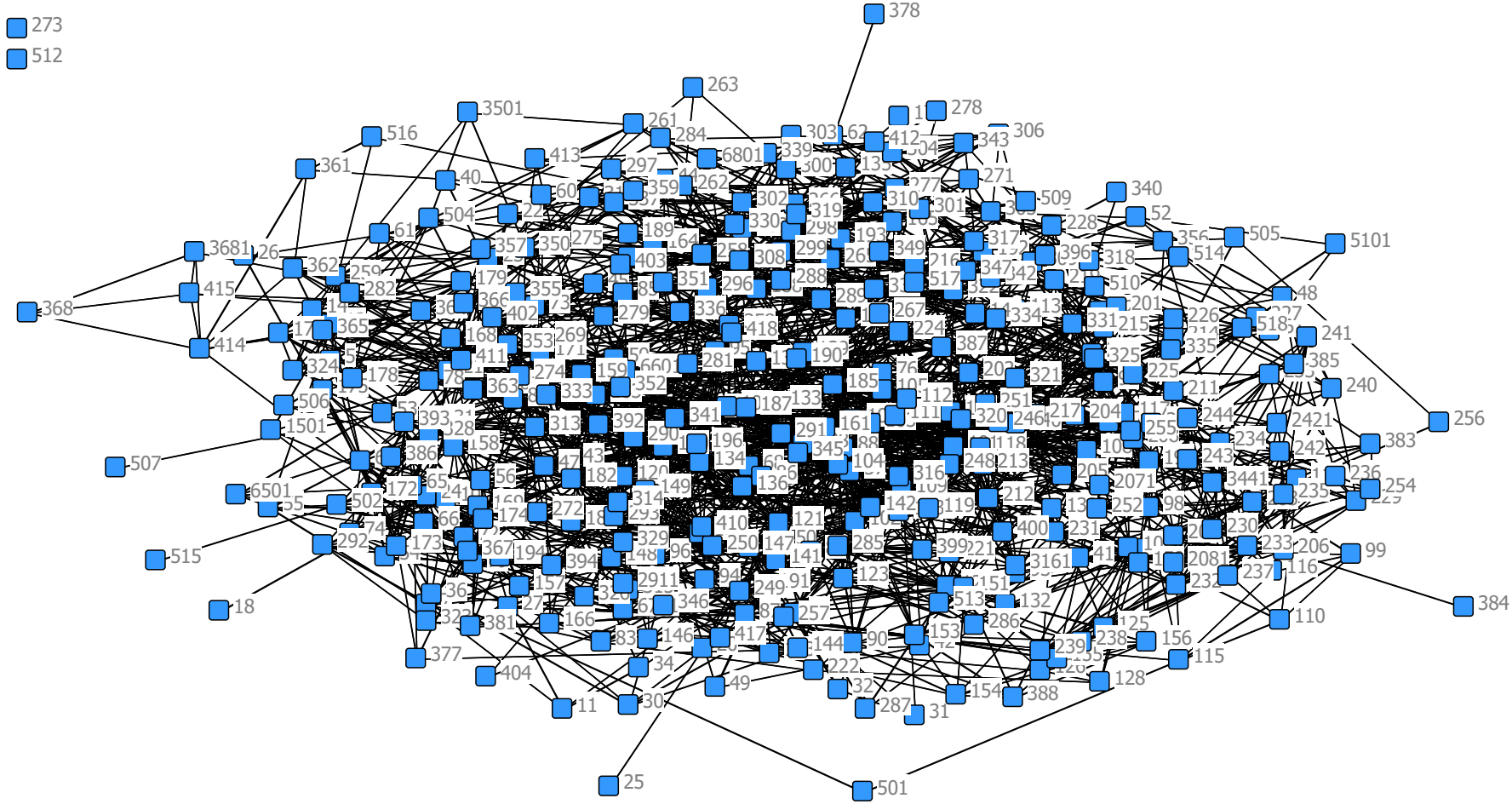

Figure 5.1. Network graph for all social ties in Camachile (2016)[13]

[13] Drawing is based on 'layout with node repulsion and equal edge length bias.'

Table 5.1. Social relations by type, Camachile (2016)

Relation	Freq.	Percent
Family		
First degree (e.g. parent/child)	254	5.71
Second degree (e.g. sibling, parent-in-law)	706	15.86
Third degree (e.g. aunt/uncle/niece/nephew, sibling-in-law)	916	20.58
Fourth degree (e.g. cousins, aunt-in-law)	900	20.22
Other relatives, N.E.C.	458	10.29
Friendship		
Close friends	1,146	25.74
Other friends	72	1.62
Total	4,452	100

The weighted network has an average geodesic distance –the shortest path between any pair of nodes, of 2.9 (with a standard deviation of 0.8) where 53 percent of the pairwise combination of two nodes are 3 links apart and another 24 percent are only 2 links apart. The average distance indicates how far apart any two nodes will be on the average. You can pick any two typical nodes in the network, and you can say that they are around 3 links apart from each other. On the average, each node has a degree of 12. Degree is simply the number of direct links a node is connected to. The diameter, the longest shortest path between any pair of nodes of the network, is 7. The diameter indicates how long it will take at most for one node to reach any node in the network. The more densely-connected a network is, the smaller the diameter.

Camachile's social network has a fragmentation measure of 0.011. Since the F measure is near zero rather than one (1), one may say that households in the village of study can easily reach other households. In terms of clustering, the network has an overall graph clustering coefficient of 0.336 and weighted overall graph clustering coefficient of 0.303. Clustering gives the fraction of one's friends/relatives that are friends/relatives of each other.

5.2. Family ties

If family connections (i.e. by blood or marriage) can be separated from the whole network, the graph reveals a giant component (see Figure 5.2). This means that, except for a few isolates, denoted in blue nodes, all households in Camachile are relatives to each other as shown by the big ball of red nodes belonging to one component. If we assume that only familial ties, both strong and weak, matter, the average geodesic distance is 3.8, with a standard deviation of 1.2. On the average, any household can reach another in about 4 steps. The sub-network's diameter is 8 which means that one household can reach any other household with utmost 8 steps. The average degree/direct link is 8.9. There are 7 nodes that are isolated from the rest while some 13 are considered as pendants or those with only 1 link. In terms of segregation, the subnetwork is made up of 1 huge principal component and four other smaller components that are connected to one another (see Figure 5.3).

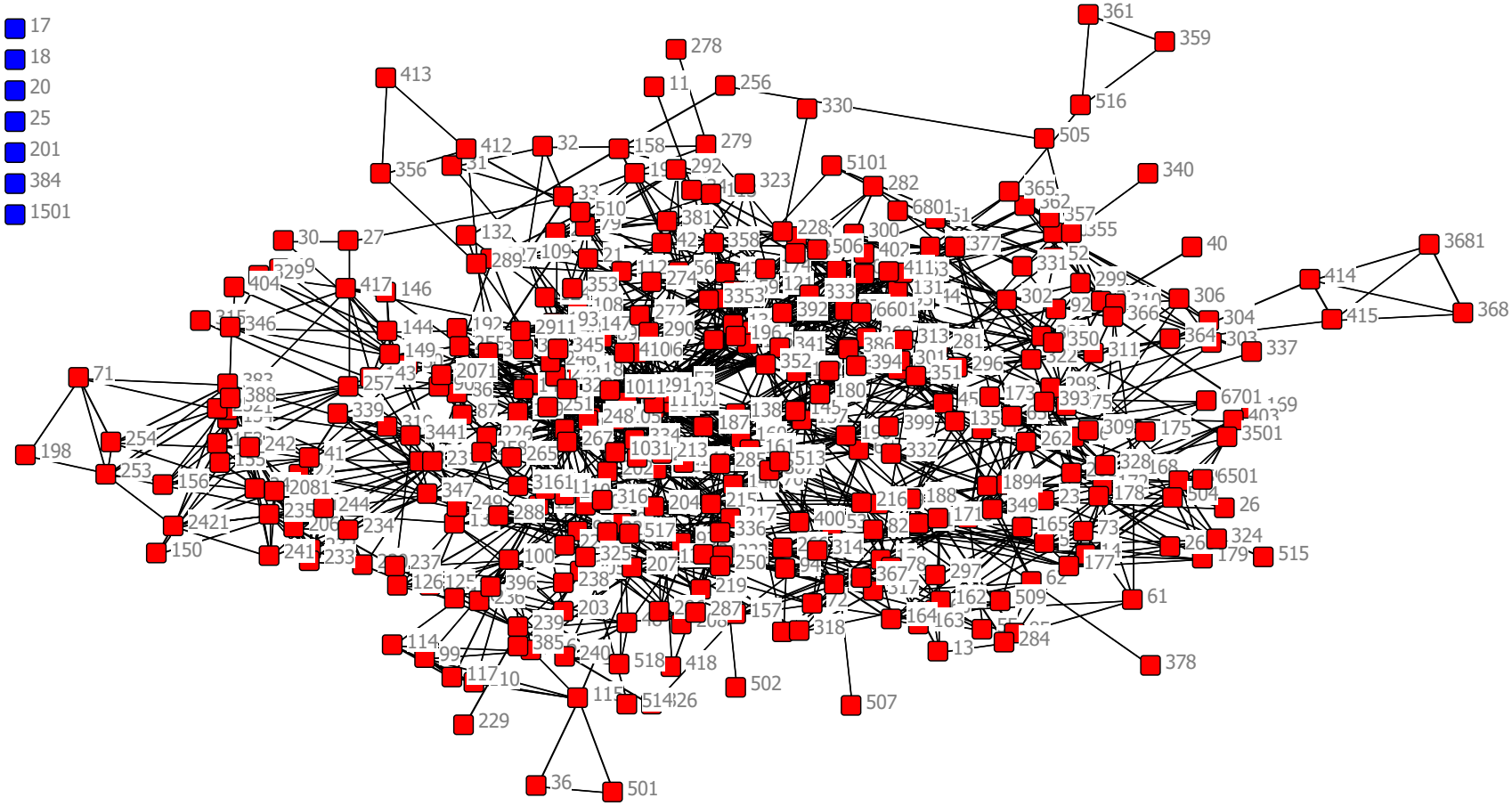

Figure 5.2. Network graph of family ties only, by component

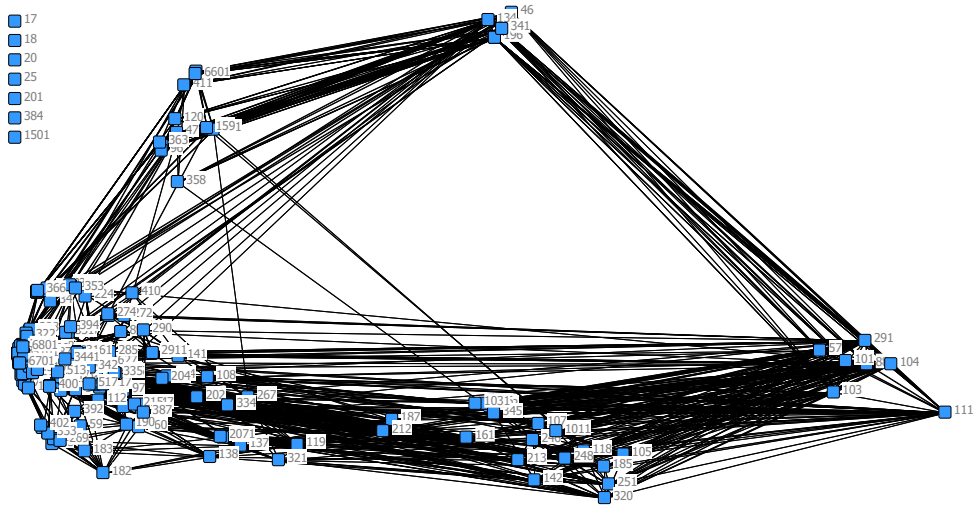

Figure 5.3. Principal components of network graph of familial ties only

Furthermore, if we assume that the network dynamics in international migration involves mainly very close familial ties (i.e. first and second degrees of consanguinity or affinity), we can map these in a graph to gain a better view of the distinct clans in the village. Each color in Figure 5.4 corresponds to a component of the network (defined as a sub-network that is connected within) but disconnected from other parts of a network. There is one major component which consists of the web of blue-colored nodes. The rest are smaller components. There are also some which do not belong to a component and are considered isolated nodes but only in terms of first- and second-degree relations. If we assume that only close familial ties matter, the average geodesic or the shortest path between two nodes rises to 6.8 with a standard deviation of 3.5. Note that in the whole network of all ties regardless of degree, the geodesic distance (GD) is merely 2.9. Hence, without the relatively weaker familial and friendship ties, it takes quite a while before a typical node reaches other nodes.

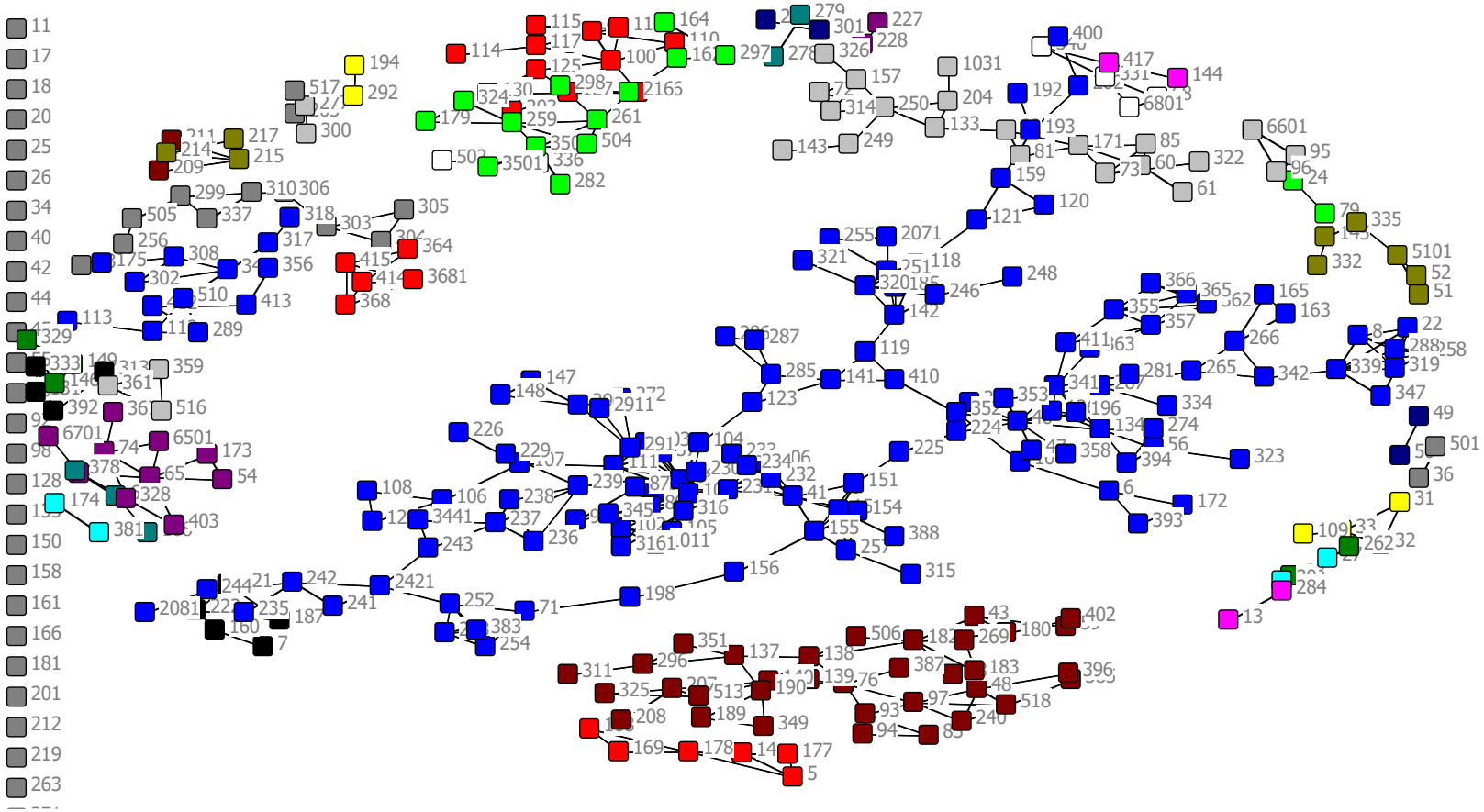

Figure 5.4. Network graph of close family (1st and 2nd degrees) ties only, by component

5.3. Friendship ties

Unlike the close familial network which consist of distinguishable components, the friendship network shown in Figure 5.5 below consists of a single giant component (in red nodes), some isolates (45 nodes) and a few disconnected pairs of nodes. A typical household has a degree or direct friendship ties of 3.35. The sub-network appears to be sparse with an average geodesic distance of 4.5 and a standard deviation of 1.4.

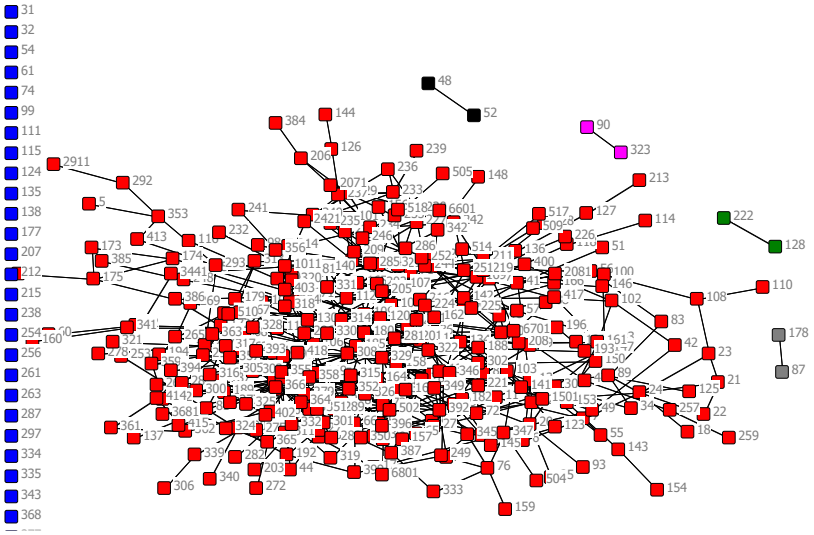

Figure 5.5. Network graph of friendship ties

5.4. Network Centrality

Network centrality indicators provide a way to ascertain the potential influence of a household relative to other members in its network. One of these measures is degree. A household's degree in an undirected network refers to the number of households it is directly linked to. In the whole network, the average degree is 12 with a standard deviation of 7.6. The degree ranges from zero (0) to 46 (see Table 5.2). A high degree indicates greater prominence in the network.

Table 5.2. Summary statistics of network parameters

Variable	Obs	Mean	Std. Dev.	Min	Max
Degree	365	12.20	7.62	0.00	46.00
Eigenvector	365	0.0292	0.0435	0.0000	0.2440
Betweenness	365	0.5198	0.6337	0.0000	4.9050
Closeness	365	0.3436	0.0406	0.1250	0.4530

Sometimes, it is not the direct connections that matter but how strategic one's position is in the web of social relations. Being in between many other households potentially increases one's chance of obtaining information and other resources than being at the periphery. The network of all ties has an average betweenness measure of 0.52 with a standard deviation of 0.63. It

means that a typical household lies in over half of all the shortest paths between any other two nodes in the network.

To illustrate the concept of betweenness, Figure 5.6 below shows the ego networks of households #104 and #180. An ego network shows the alters, or nodes connected to a node of interest, called the ego. The size of the nodes is based on the degree or direct links. The bigger the node, the greater the degree. Household #104 has the highest degree amongst all the households at 46 but it has a betweenness score of only 2.6 based on the whole network analysis while household #185 has a betweenness score of 4.5 because it lies strategically between nodes of the ego network of 180 and 104. Household 106, which has the highest betweenness score of 4.9 also lies in many shortest paths between the two ego networks. Both 185 and 106 are pioneer migrant households.

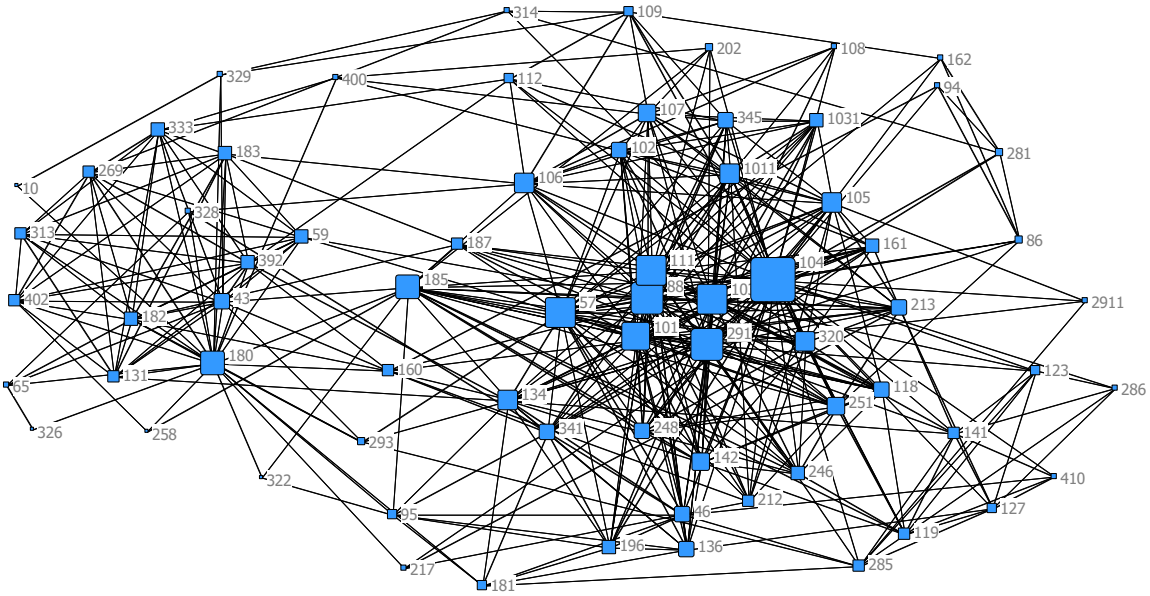

Figure 5.6. Ego network of households 104 and 180 (node size by degree)

Meanwhile, closeness centrality gives how fast can one node reach everyone in the network or how easy it is for one to reach other nodes via the social relations. A lower closeness score indicates that one is far from the rest. The average closeness measure is 0.34 with a standard deviation of 0.04.

A key measure of centrality is the eigenvector centrality. It gives how well a node is connected to other nodes in the network that are well-connected. Because it matters how influential your links are, the eigenvector centrality is a commonly-used measure of a node's influence. The average eigenvector centrality is 0.03 and the standard deviation is 0.04. Figure 5.7 below shows the graph of the whole network with the size of the nodes based on their eigenvector centrality. Those biggest in size form the core of the network acting as bridges amongst the different nodes.

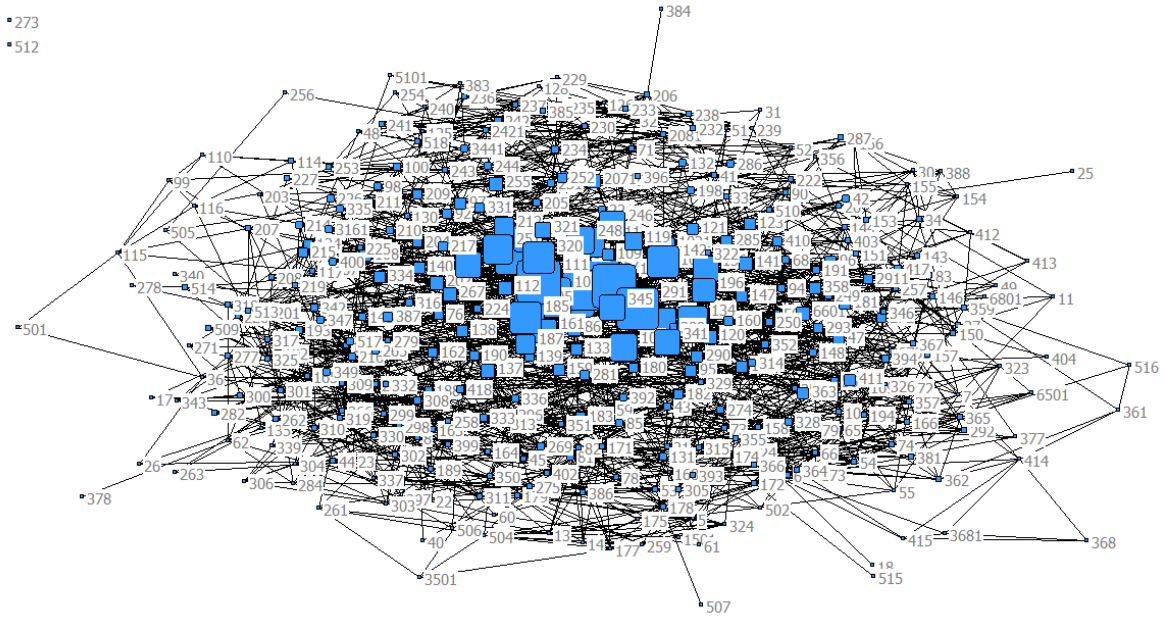

Figure 5.7. Network map for all social ties in Camachile (node size by eigenvector centrality)

Core nodes act as bridges that connect various parts of the network. Based on the UCInet software, around 28 households are considered 'core household'. Interestingly, being a core node is not correlated with economic affluence. The mean per capita income of core households is P46,265.52 while that for the peripheral ones is higher at P57,934.16. Likewise, measures of centrality are not correlated with higher income status. While the richest quintile has relatively higher average degree and betweenness scores than the poorest quintile, the other measures do not show the same trend. In fact, the average eigenvector centrality of the richest is lower than the scores of the other groups. Meanwhile, there is no significant difference in the closeness measures of all groups (see Table 5.3).

Table 5.3. Centrality score of households by per capita income quintile

Centrality measure	Poorest (n=74)	2nd (n=67)	3rd (n=75)	4th (n=68)	Richest (n=67)
Degree	10.97	13.72	12.72	12.53	12.57
Eigenvector	0.0286	0.0355	0.0333	0.0266	0.0260
Betweenness	0.4202	0.6395	0.5379	0.5651	0.5316
Closeness	0.3339	0.3512	0.3468	0.3482	0.3494

5.5. Homophily

Homophily refers to the tendency of nodes/households to link up with households of similar characteristics which can result to the formation of clusters. Within clusters, relationships are much easier to form but these may also lead to segregation. The graph below shows the whole network based on per capita income where yellow-colored nodes refer to the bottom 40 percent of per capita income while circle-shaped ones refer to the richest 40 percent. There is no clear evidence of clustering based on economic condition (see Figure 5.8).

Similarly, there seems to be no distinct pattern in terms of migration activity. In Figure 5.9, migrants' households (MH) are colored in pink; non-MH are in light blue. MH are those which have at least one member who have ever engaged in international migration. The MH appear to be spread across the network where it is quite impossible to separate the MH from the non-MH.

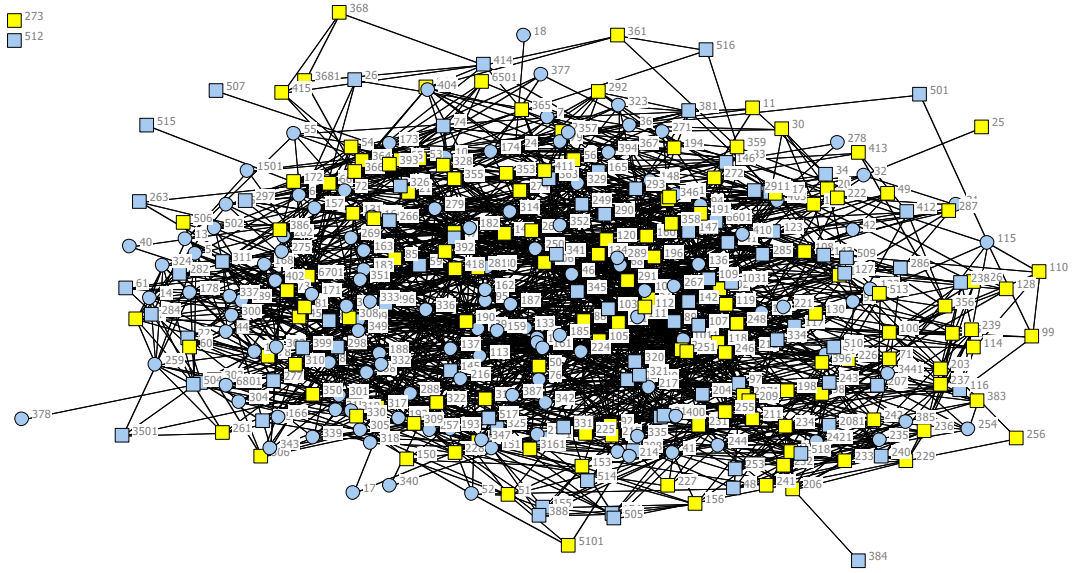

Figure 5.8. Graph of whole network by income quintile of household (Bottom 40% in yellow, richest 40% in circles)

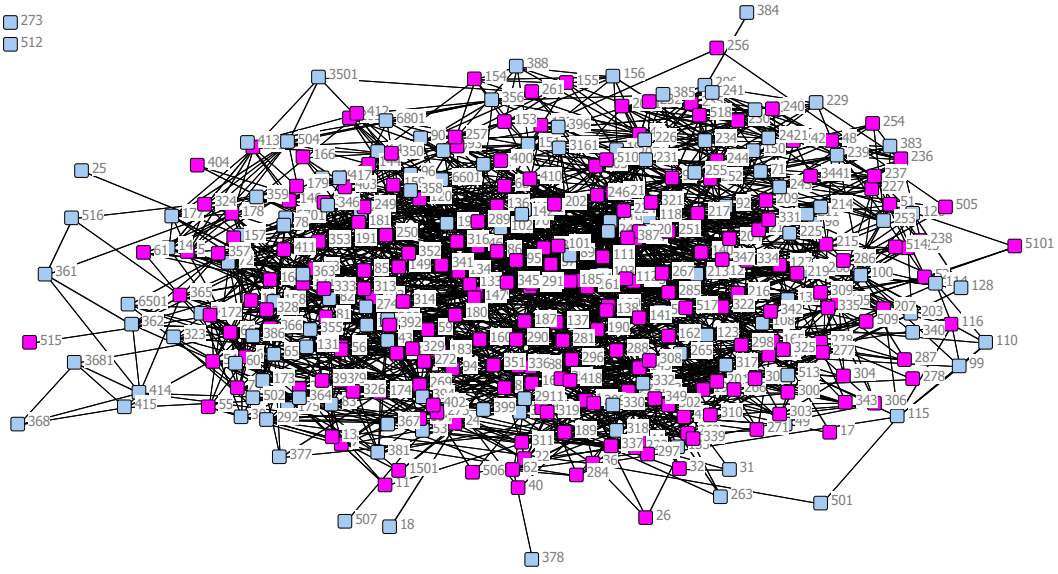

Figure 5.9. Graph of whole network by migration status of household (MH in pink)[14]

[14] MH (migrant household) refers to those with migration experience (a total of 231 households); consist of current migrant household, pioneer migrant households and other migrant households (former migrant households other than the pioneer MH).

Since the whole network is quite dense; it is easier to study patterns of homophily using selected ego networks. I take the similar example of nodes 104 and 180 because these are composed of two distinguishable clusters. The alters of 180 consist of mostly from the top 40 percent of per capita income (in circle nodes) while there are only very few alters of 104 which are of similar economic status (see Figure 5.10). When the nodes are colored based on migration status, household #180 is shown to be connected to mostly fellow migrant households (see Figure 5.11). Household #104's ties are a combination of migrant households and non-migrant households.

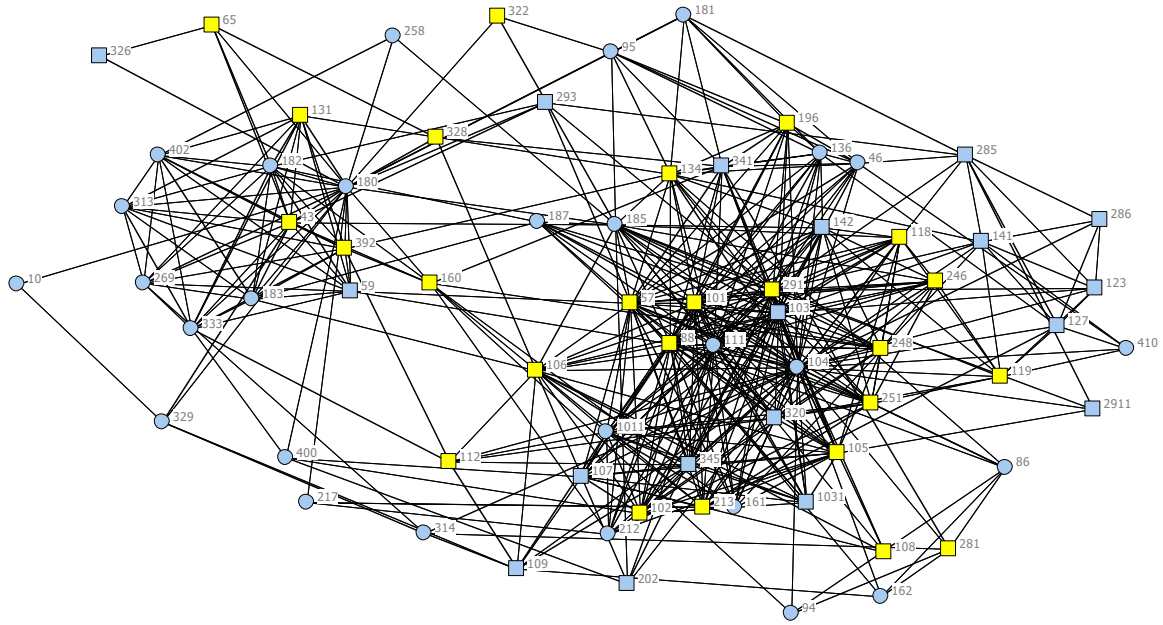

Figure 5.10. Ego networks of households 104 and 180, by economic status (bottom 40% in yellow, richest 40% in circle-shaped nodes)

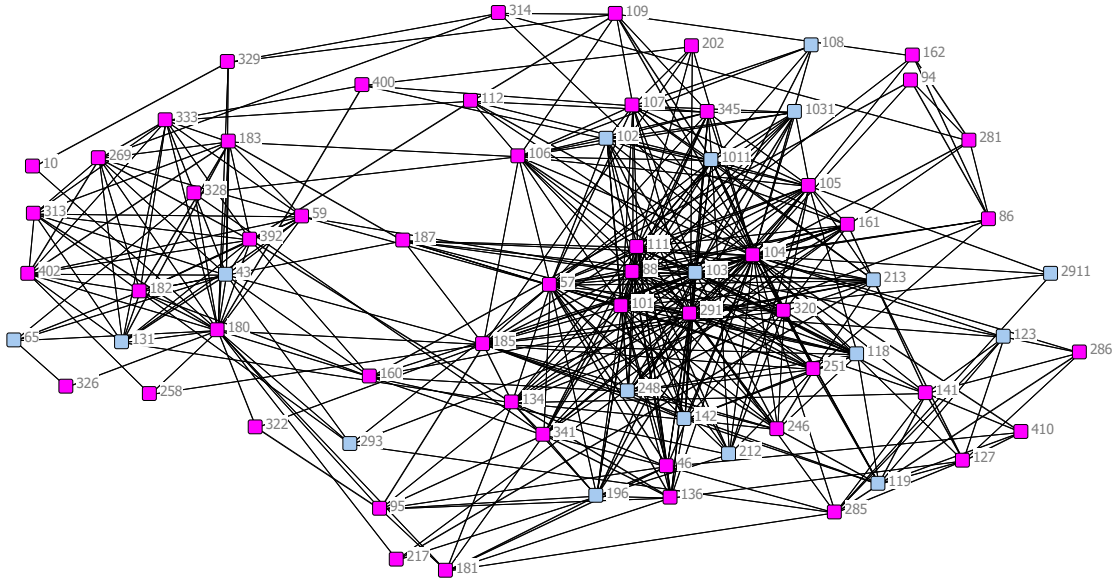

Figure 5.11. Ego networks of households 104 and 180 by migration status of household (pink-colored nodes are MH)

It would be interesting to see if there is any pattern of friendship-making based on economic status. Similarly, Figure 5.12 shows that the yellow nodes (bottom 40%) appear to be evenly distributed across the sub-network. The richest 40 percent of households likewise do not seem to exhibit clustering.

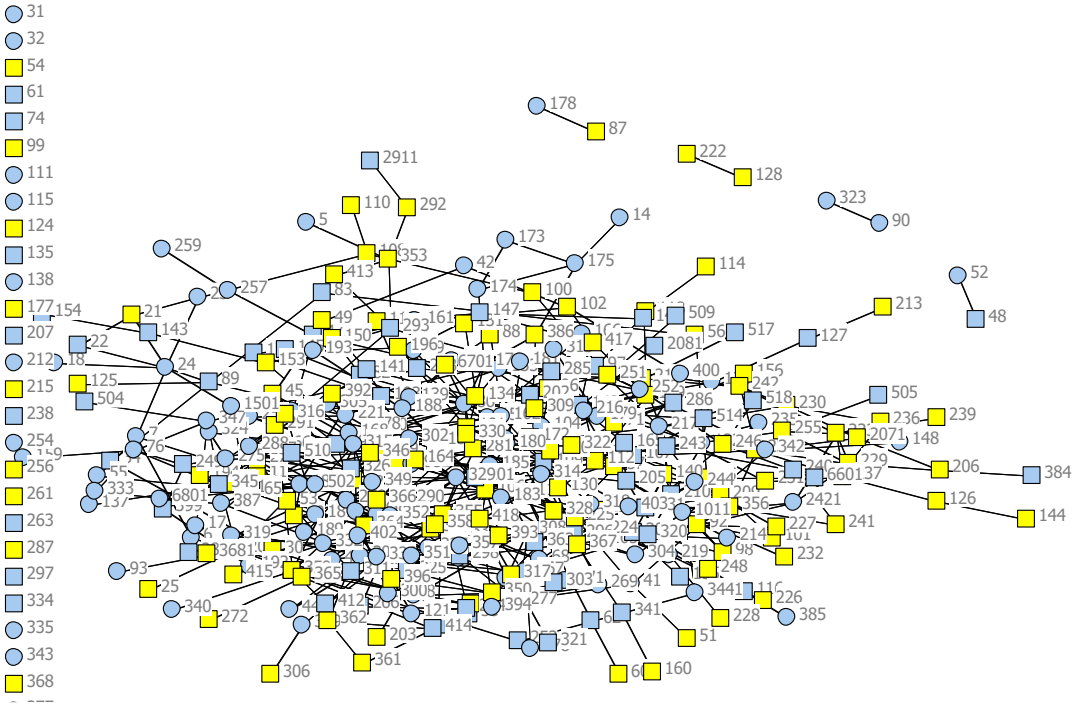

Figure 5.12. Network graph of friendship ties by economic status (yellow- bottom 40%; circle-richest 40%)

As in the whole network analysis of homophily, we can study ego networks to determine if there are households who are friends with others of relatively similar economic conditions (see Figure 5.13). For node 104 which belongs to the richest 40 percent, only 2 of its 10 alters (direct connections) belong to the bottom 40, the rest all come from upper income groups. Node 188 is a friend to 7 alters and 6 of these are of similar stature. Likewise, only 2 out of 9 alters of node 180, belong to the bottom 40, the rest are of relatively similar status. Meanwhile, nodes 106, 230 and 234 are friends to mostly fellow households from the bottom 40. Although it is not the norm, it is a fact that a non-negligible proportion of households do form friendship ties that can be considered homophilous. Excluding isolates and pendants, 4 out of 10 nodes have homophilous ego networks. The rest are heterophilous.

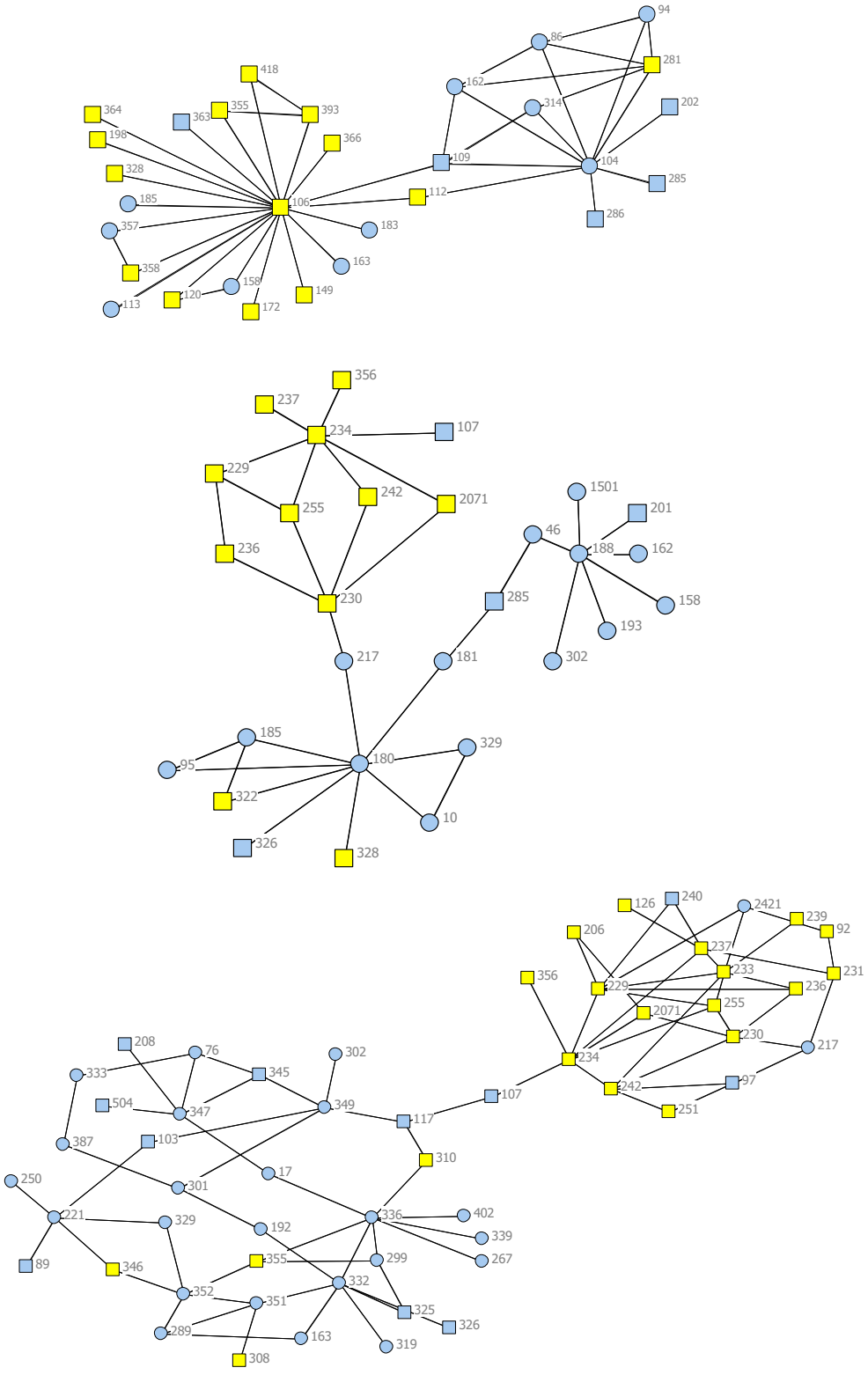

Figure 5.13. Ego network graph of friendship ties of selected nodes by economic status (yellow- bottom 40%; circle-richest 40%)

The graph of friendship ties colored by migration history is illustrated in Figure 5.14. Again, since the entire sub-network of friendship ties is quite dense, it is difficult to discern evidences of homophily. But a closer examination of individual ego networks reveals some interactions

made by households exclusively with their own type. Migrant households tend to be friends with fellow MH – such as the case of nodes 180, 24, 56, 49, 8, and 76, among others (see Figure 5.15).

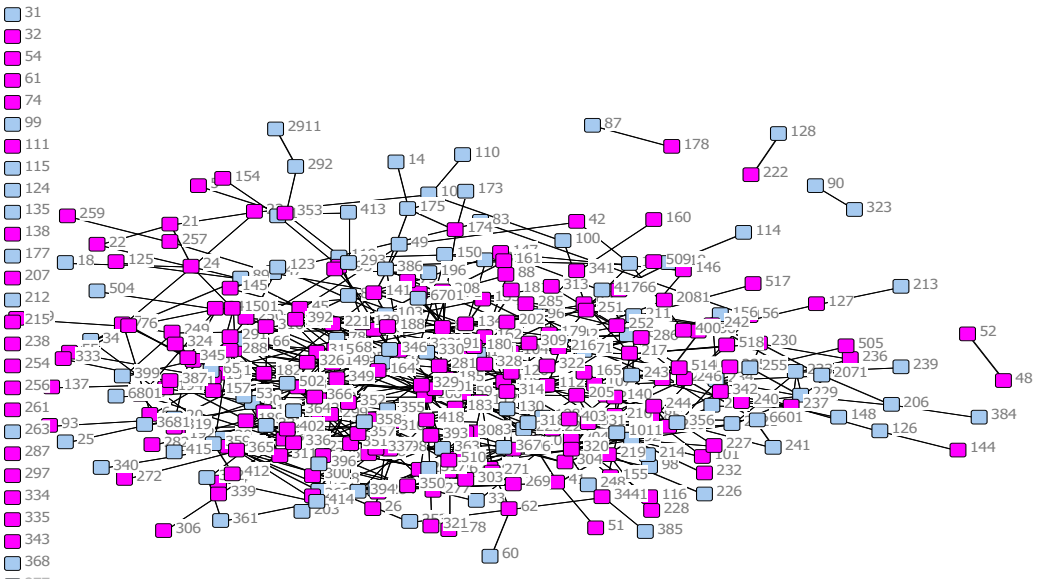

Figure 5.14. Network graph of friendship ties by migration activity (pink- migrant households)

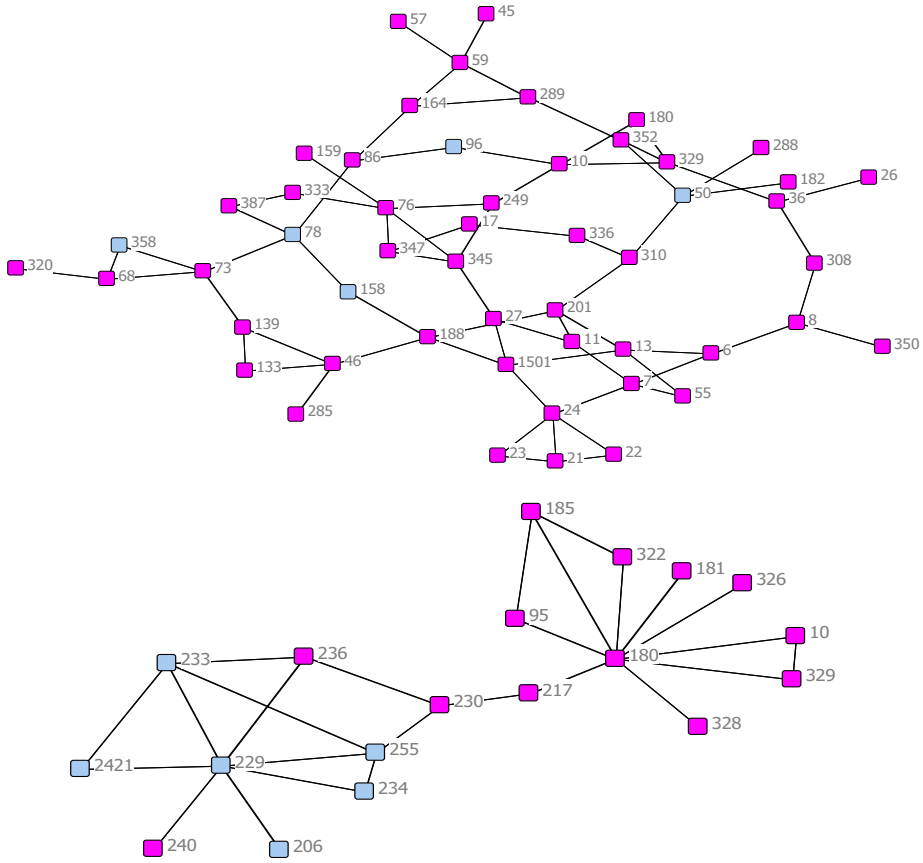

Figure 5.15. Ego network graphs of friendship ties of selected nodes by migration activity (pink- migrant households)

5.6. Network characteristics of migrant households vis-à-vis non-migrant households

A simple comparison of the network characteristics (based on whole network) of migrant households (MH) with the non-migrant households (non-MH) reveals that the former group is relatively more well-connected compared to the latter.

Of the 28 households that make up the core, 19 (68 percent) are migrant households. Table 5.4 shows the average network parameters of connectivity and centrality of all households grouped based on the year of first migration activity. The network characteristics of non-migrant households are also presented for purposes of comparison. In terms of direct links (unweighted) to the rest of households in the village, MH have an average degree of 11 to around 16, or an average of 13 while non-MH have only 10. Based on this indicator, MH are potentially more influential in terms of, say, disseminating information or influencing others simply because they can reach more households directly. MH are also strategically positioned within the network based on their betweenness centrality measure. Their scores range from 0.42 to 0.90 as opposed to a mean of only 0.35 for the non-migrant households. The 0.90 score means that in 90 percent of all the paths between any two nodes, the MH is situated along those paths. MH also have more strategic ties (i.e. being linked to more central households) since their eigenvector centrality measures range from 0.0228 to 0.0375 while non-MH has a mean eigenvector centrality of a mere 0.0246. Closeness measures for those with migration activity is around 0.35 while those without such experience has 0.33. Note that the higher the closeness parameter, the nearer one is to the rest of the nodes. In addition, non-MH exhibit greater tendency for clustering with 0.38 while MH have around 0.27 to 0.35 clustering coefficient. A higher clustering tendency may impede the flow of information between cluster members and outsiders.

Table 5.4. Measures of connectedness and centrality based on whole network (unweighted) by type of households

Network parameter	Migrant households by year of first migration activity						Non-MH (n=134)
	Up to 1979 (n=18)	1980-1989 (n=64)	1990-1999 (n=72)	2000-2009 (n=53)	2010-onwards (n=24)	All MH (n=231)	
Degree/direct links	15.78	14.23	14.06	11.45	12.13	13.44	10.05
Clustering coefficient	0.3377	0.3002	0.2748	0.3509	0.3397	0.3111	0.3817
Eigenvector centrality	0.0375	0.0365	0.0336	0.0228	0.0301	0.0319	0.0246
Betweenness centrality	0.8987	0.7024	0.6502	0.4225	0.5343	0.6197	0.3474
Closeness measure	0.3571	0.3531	0.355	0.3455	0.3493	0.3519	0.3295

Notably, households that have pioneered migration activities in the area (i.e. those who sent migrants in the 1970s and 1980s) are not only better connected but also more central amongst all types of households. In Table 5.4, those who participated in migration earlier, and hence considered pioneers (i.e. first migration is until 1979) have higher degree, eigenvector centrality, betweenness, and closeness scores.

5.7. Links to pioneer migrants

Camachile is just one of the many villages in the country that have participated in the first wave of labor migration to the Middle East in the 1970s. Eighty-two (or 22 percent) out of the 365 households are considered pioneer migrants or those who have participated in labor migration in the 1970s and 1980s.[15] We learned from the preceding discussion that pioneer migrants are more central, hence, potentially more influential, than other types of households in the network. In fact, nineteen of the 28 core households are migrant households of which 11 are pioneer MH. Pioneer MH also consist of the three households with the highest betweenness score, five of the ten households with the highest degree, and six of the ten with the highest closeness measure. Some pioneer MH also have the highest eigenvector centrality scores.

The influence of pioneer migrants on current migration activities of villagers can be discerned from the linkages between their households and those of current migrants. There are 123 households (or 34 percent of the total HH) who are considered current MH; these are those who have participated in labor migration in 2015-2016. Of these, 28 percent are also pioneer MH showing the inter-generational tendency of families to engage in labor migration. Of the 123 current MH, 93 percent have direct links to pioneer MH either through familial or friendship ties, regardless of the strength of ties. Only 7 percent of the current MH are not directly linked in any way to pioneer migrants' households, though they may be linked indirectly.

Interestingly, the same high proportion, albeit slightly lower at 83 percent, of non-MH also have direct links to pioneer migrant households (MH). The question then is whether the links between current MH and pioneer MH refer to much stronger or closer ties. One way to determine this is to look at the close familial ties between current and pioneer MH. The graph of close familial ties provides a clearer visual illustration since the graph of whole network is quite dense to allow more detailed visual interpretation.

Figure 5.16 shows the pioneer MH in red-colored nodes and the current MH as circle nodes (regardless of color). Note that the red circle nodes are both pioneer and current MH. The rest of the nodes (i.e. in blue boxes), are neither current migrant households nor pioneer migrant households. One can interpret from the graph that pioneer migrants are scattered throughout the social sphere; hence migration in the early days was not monopolized by a few families.

[15] In the sample, these refer to households who first participated in migration up to 1990.

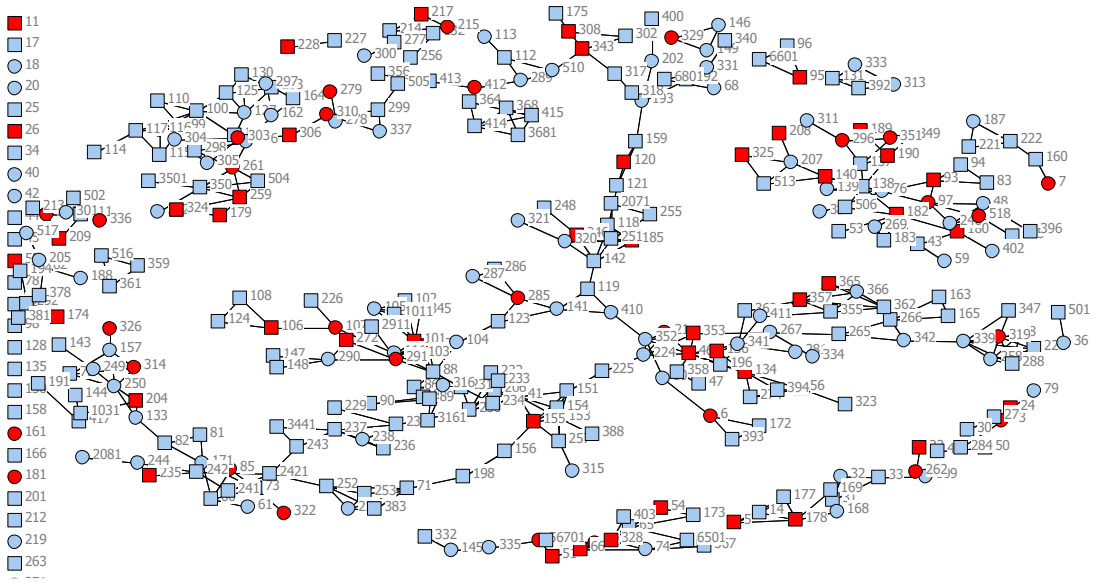

Figure 5.16. Network map of close familial ties by period of int'l. migration
Note: red node – pioneer MH (first migration, 1970s to 1980s)
circle – current MH (2015-2016)

It is also evident from the graph that many pioneer migrants tend to be closely related to each other as shown by many red nodes being directly linked with one another. They are either parent/child or sibling of each other. Note the presence of circle nodes (i.e. current MH) directly linked to red nodes (pioneer MH). For a clearer view, we can zoom in to look at the largest component in the graph (see Figure 5.17 below). Although not all current MH are directly linked to pioneer MH by way of very close social ties, a significantly large proportion are either directly linked or within a path length of 2 steps (88 percent).

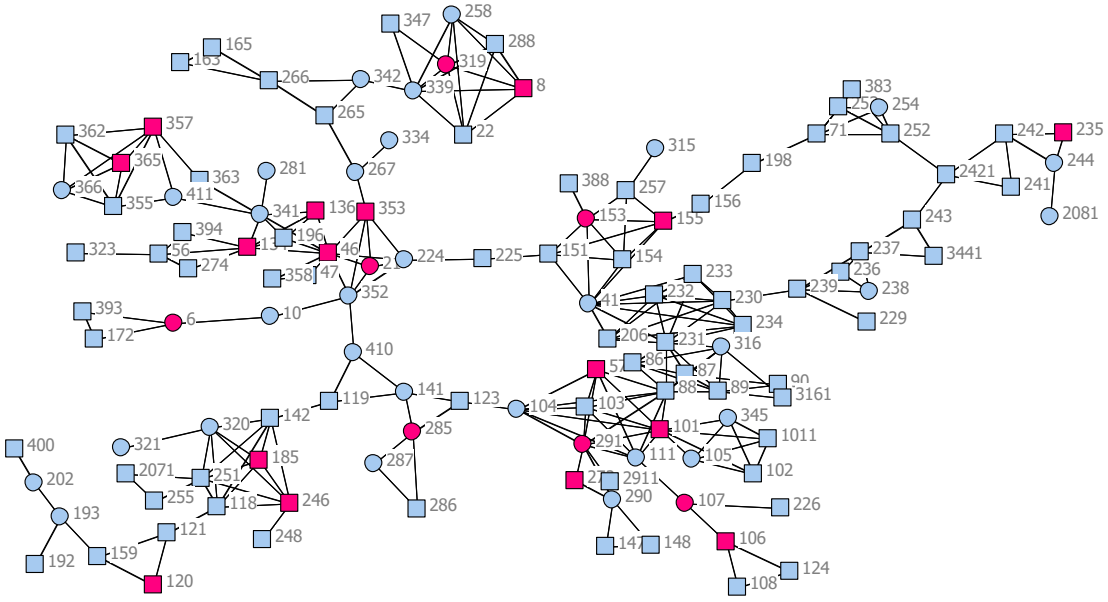

Figure 5.17. Network map of close familial ties of main component
Note: red node – pioneer MH (first migration, 1970s to 1980s)
circle – current MH (2015-2016)

5.8. The diffusion of migratory activities among close family relations

The spread of migratory activities among close blood relations can be discerned more clearly from Figure 5.18. The graph shows the close family ties among households that have had any migration experience only (i.e. MH); those without any migration history have been omitted from the graph for ease of interpretation. This aims to illustrate direct links among MH only. Note that of the total 365 households, 231 are considered MH.[16] The nodes are labeled by the year of first migration activity. Note that for households that have 2 or more members who have ever worked abroad, we took the case of the earliest migration activity.

Again, pioneer migrant households (or households whose first MW went abroad between the 1960s to 1990) are denoted as red-colored nodes. This time, circle-shaped nodes represent recent (not current) MH – that is those which have sent their first migrant member during the period 1991 to 2000. The rest (i.e. in blue boxes) are households with most recent migration activities – where their first migration activities took place between 2001 up to present.

The connection between the pioneer MH and the households of the succeeding wave of migrant workers is evident. Apart from some 28 isolated nodes in terms of close familial ties from other MH and a few clusters of more recent migrants which are not connected to pioneer MH, all other nodes with recent migration activity are close relations of pioneer MH. Of the 141 households who first participated in migration activities in 1991 to present, 123 (87 percent) have direct ties with pioneer MH, of which majority (68 out of 123 or 55 percent) are directly linked via first or second-degree relations. The graph is evident of inter- and intra-generational tendencies of international migration. There is a passing on of migration behavior from older generation (red node) to the next (circle) and to most recent generations (blue square node). Some of these sets of nodes have been encircled for easier reference.

[16] Note that MH refers to all household with migration experience while current MH refer only to those who participated in labor migration in 2015-2016.

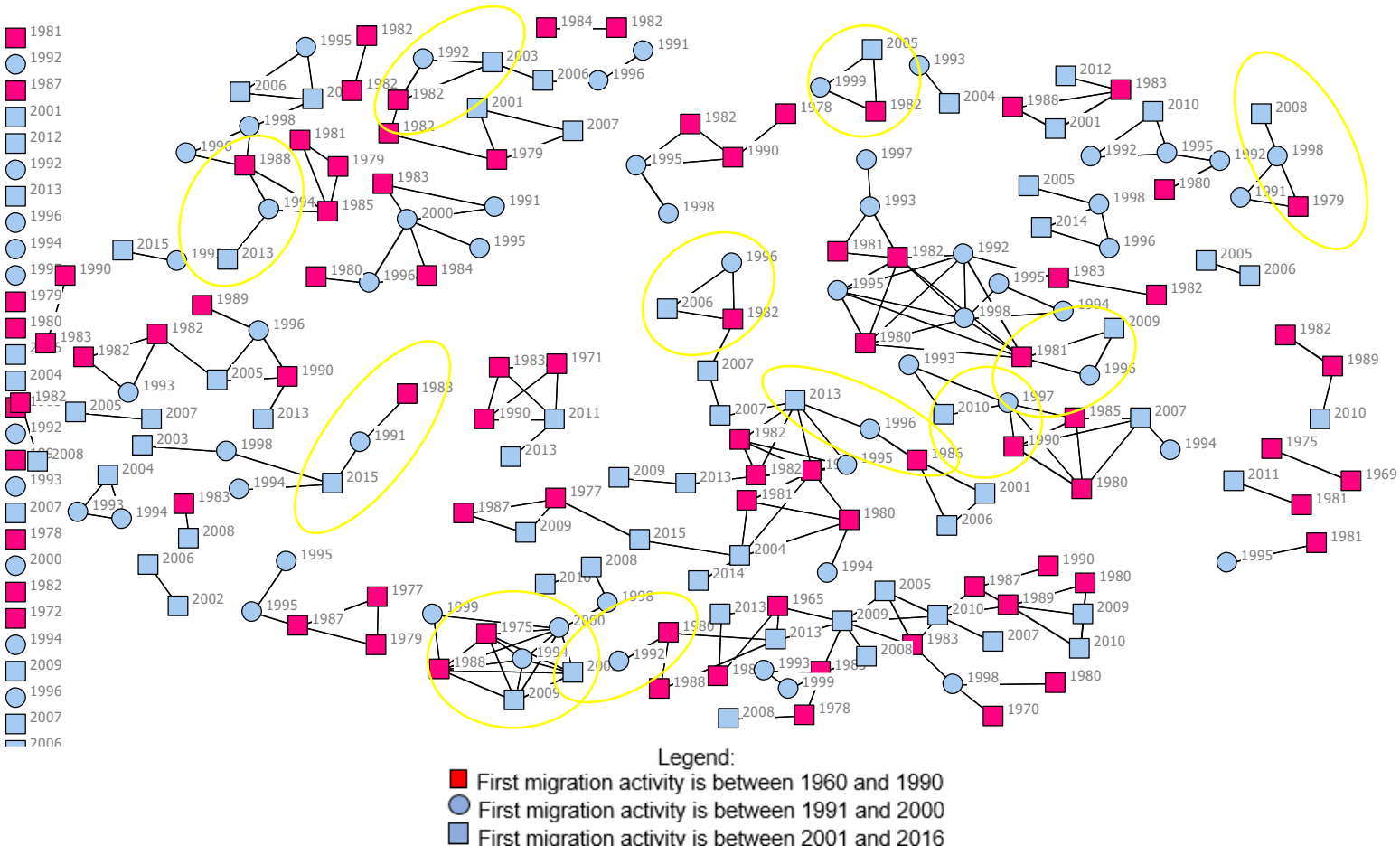

Figure 5.18. Close familial ties of households with migration history only by type of migrant household

The graph below is a subset of the abovementioned close family network. It refers to that of the main component (the blue-colored large component in Figure 5.4) and seeks to illustrate more clearly the close kin relationship among the migrant households belonging to the main component. Several observations can be made from this graph. First, most pioneer migrants are close relatives of one another – an evidence that in the early days, pioneers have helped their close kin in their migration plans as reflected in the interviews with pioneer migrants. Note that Figure 4.19 does not show a fully-connected network because the ties shown are only for first-degree and second-degree. However, all nodes are connected if we include the other kinship ties because they constitute a component. Therefore, we conclude that all the pioneer MHs in the village's biggest family sub-network are related to each other either by blood or marriage.

Second, as mentioned earlier, more recent migrants are either children or siblings of pioneer migrants attesting to the inter-generational tendency of international migration. This is one evidence that migration activities diffused to other segments of the community via the network mechanism. The resources that pioneer and other previous migrants have obtained in their migration are likely to have financed the subsequent migration of their children or siblings. The younger generations have witnessed first-hand, have potentially benefitted from the gains of international migration through the experience of the older generations and formulated their migration aspirations based on the perceived benefits of migration.

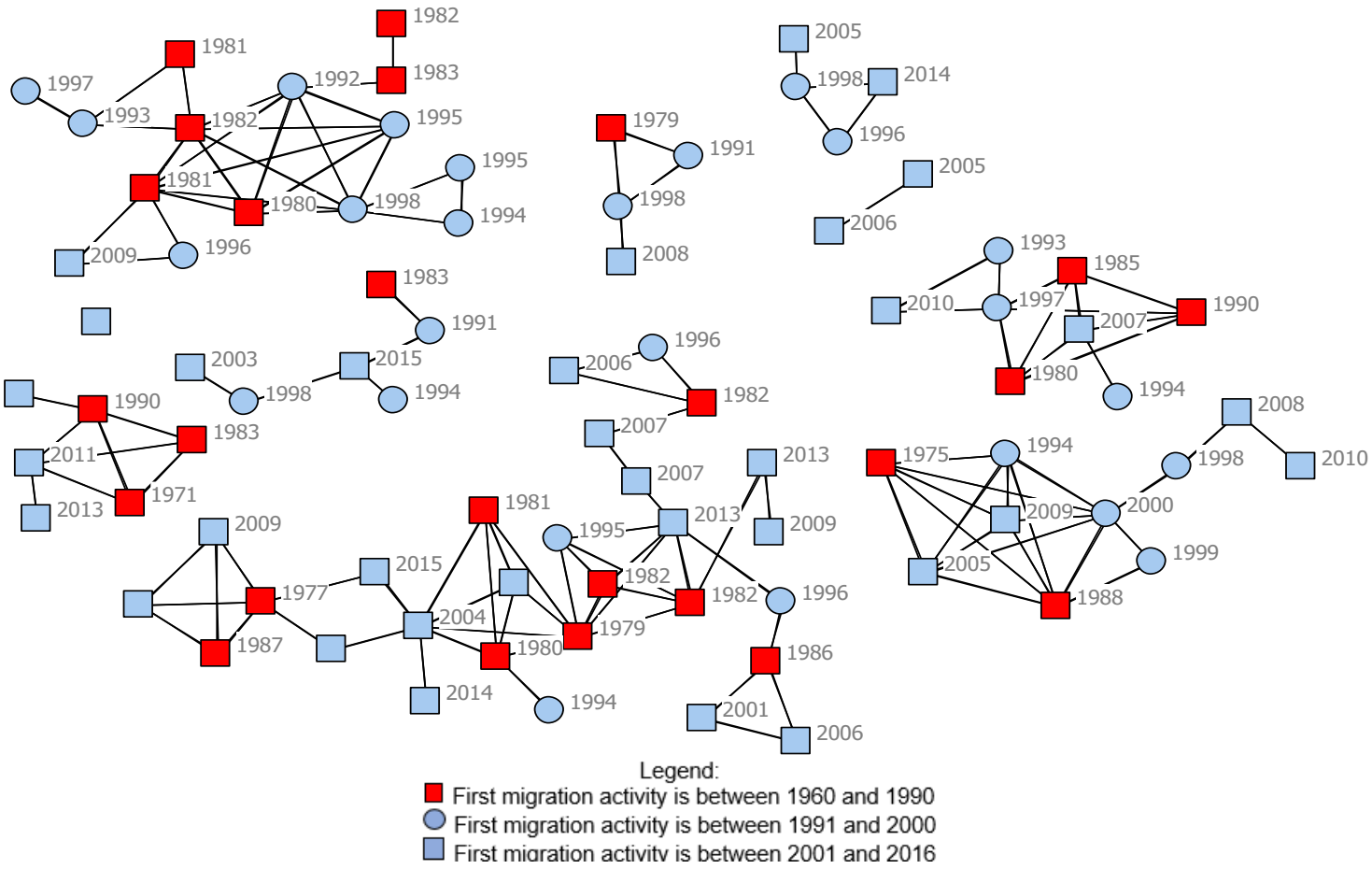

Figure 5.19. Close familial ties of households with migration history only by type of migrant household, main component only

5.9. The diffusion of migration activities among friendship ties

In the foregoing discussion, the focus is on the diffusion of migration behavior across households that are linked by close family ties with one another. But based on the social network analysis, it is also likely that migration behavior has spread across households via friendship ties. Interview[17] with a pioneer migrant who played the role of recruiter/trainer likewise shows that when foreign employers demanded more work, they enlisted people from their community – starting with their friends and neighbors – then to those in neighboring villages. Weaker ties (like friends, neighbors, community members) have a role in international migration as these are also sources of information/job recommendations and credit.[18] This can be gleaned from the friendship networks among pioneer migrant households. For instance, household #180 first participated in international labor migration in 1978. All of its nine (9) close friends are migrant households where eight (8) were pioneer migrant households. Of the eight pioneer MH that #180 is linked to, six (6) participated in international migration in the period 1978 to 1983 (see Figure 5.20). It is highly probable that migration activities have spread not only among close family ties but also among weaker community ties.

Based on the findings of a paper that is linked with this study on the role of pioneer migrants, I argue that migration had diffused via weaker friendship/community ties in the past because migration cost then was relatively low, and the demand was high. These conditions work in unison with the pioneer migrant's strategic position in the social sphere and direct role in the recruitment and training processes.

[17] Please refer to a paper linked to this study titled "Probing into the migration culture…"

[18] Close family ties are also sources of information and job recommendations as well as credit but the primary type of support they provide is (non-credit) financial assistance/grant.

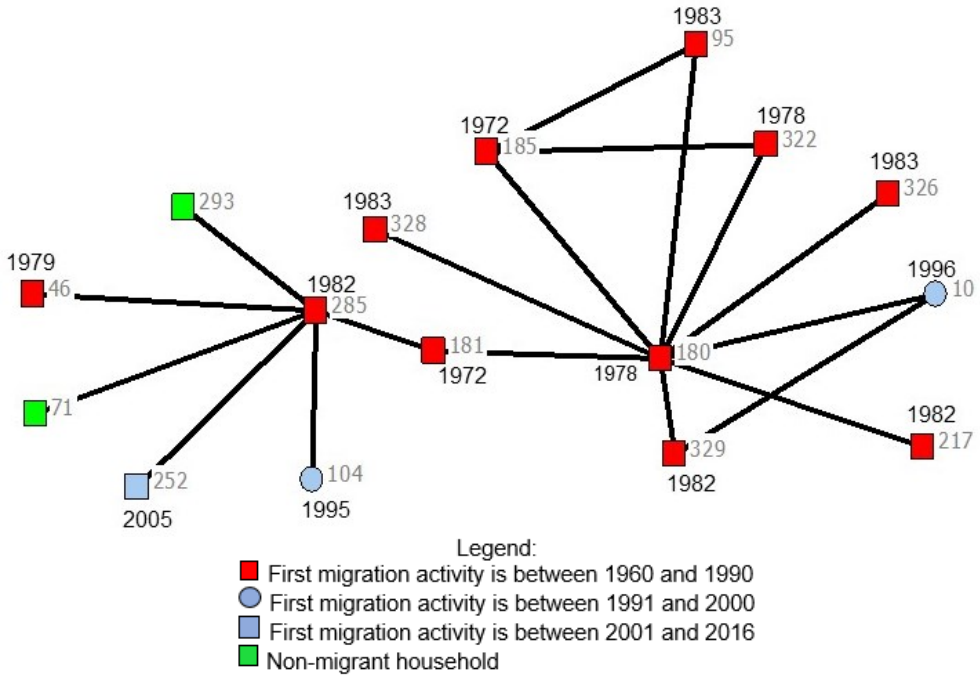

Figure 5.20. Selected ego networks of pioneer migrants (friendship ties)

The friendship links[19] among pioneer migrant households are also shown in Figure 5.21 below. Such ties between pioneer migrants and more recent migrants are also evident suggesting that presence of a flow of information and other types of support from pioneer to recent cohorts. It may also indicate the 'emulation' or mimicking of migration activities via increased awareness of the benefits that others have gained from migration.

[19] The argument against the possibility that relationships were built due to migration activities is that many of the friendships reported by respondents are long-standing ones, mostly present since childhood.

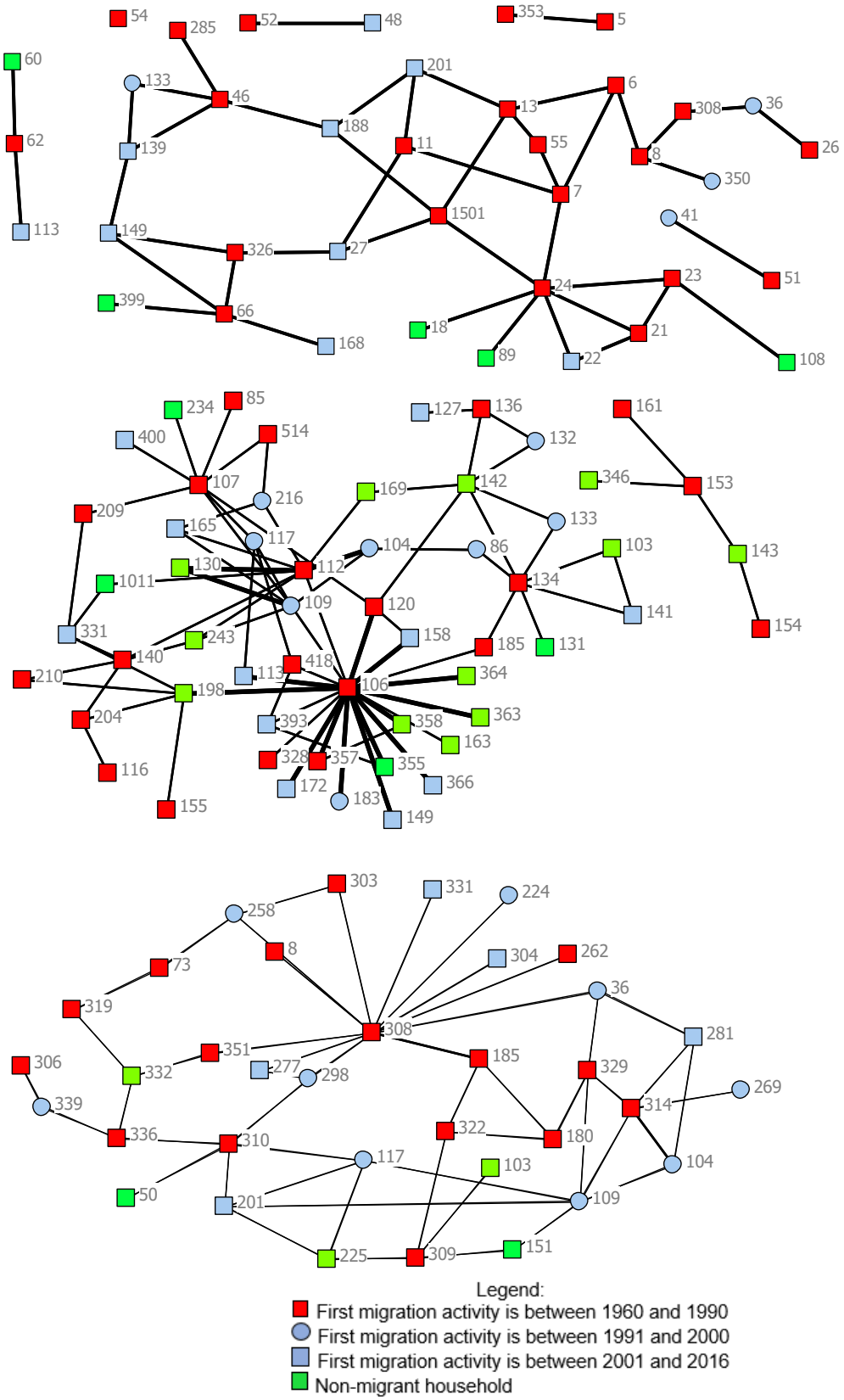

Figure 5.21. Selected ego networks, other pioneer migrants (friendship ties)

5.10. Network mechanism

To illustrate the actual mechanism of the relationship between network and international migration, Figure 5.22 shows the flow of migration-related support amongst the different households. The directed links point to whom the support was given. The color of the edge or line corresponds to the type of support (i.e. red for financial; green for job recommendation or information, yellow for assistance with housing at destination, and blue for others). The isolated nodes on the left side of the graph are households that neither provided nor received inter-household support.

The role of pioneer migrants in the migration of more recent migrants is evident in the directed graph. The node sequence –  (red square, circle and blue square) indicates that there is transfer of resources from pioneer migrants (in red; initial migration is up to 1990) to more recent migrants (in circle, initial migration is between 1991-2000) and then to the most recent pool of migrants (in blue square, initial migration is 2001 to 2016). The following patterns which are also evident from the graph clearly show that prior migration financed current migration activities:

1. 
2. 

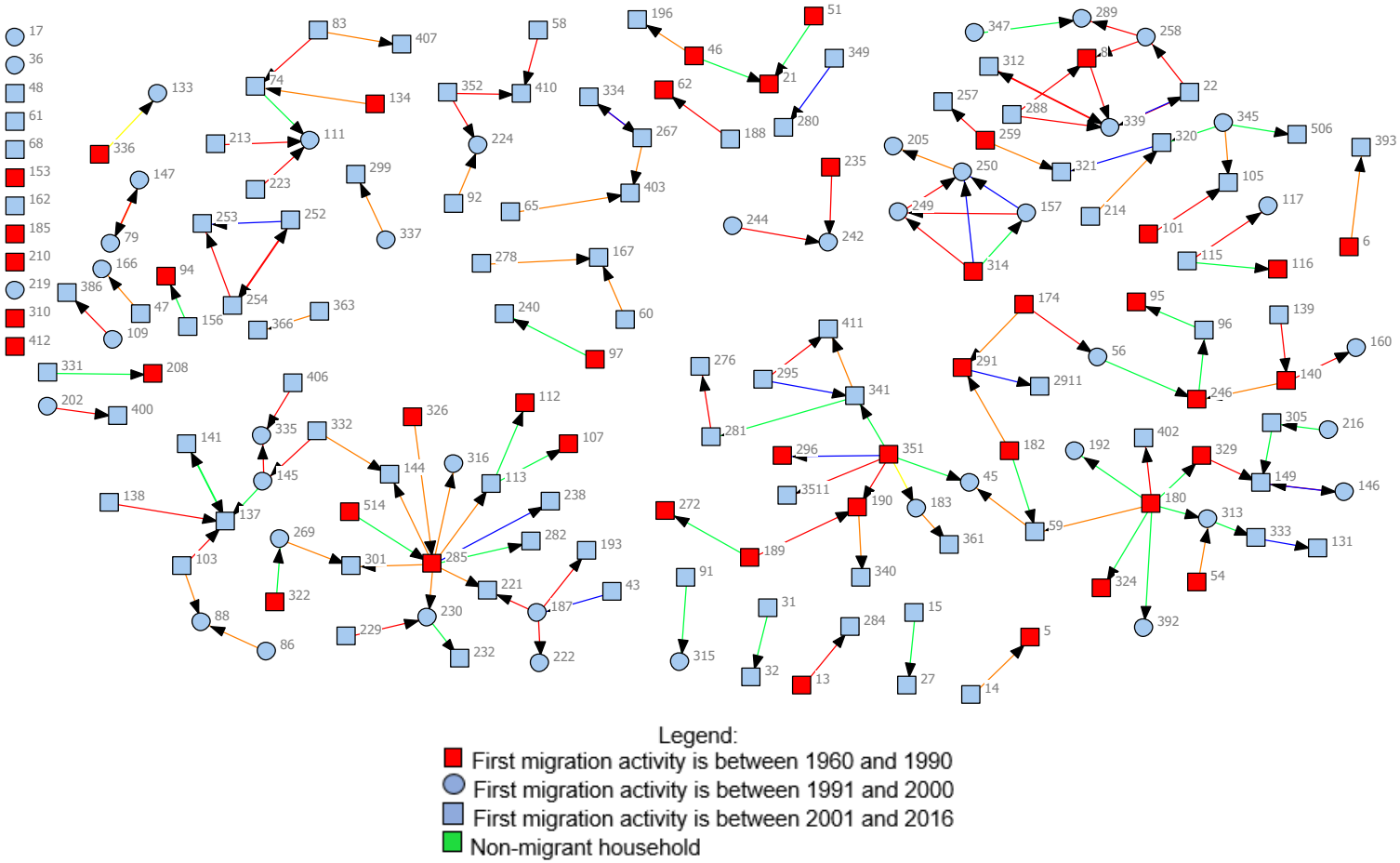

Figure 5.22. The flow of migration-related support among households

To take a few examples, we obtained the ego networks of a couple of pioneer migrant households. Pioneer migrant #180 has provided support to the migration of not only recent migrants (see circle and square nodes) but also other pioneer migrants (see Figure 5.23). It had the role of a recruiter or 'head hunter' in the past; taking in people from the village to work in the company he worked for abroad and even providing them skills training prior to deployment. In the graph, most of the arrows emanating from 180 are green in color – and these are all job recommendations. Most of the households who received job recommendations from #180 are more distant relatives and non-relatives; those which got financial support or credit in addition to job information and recommendation are relatively closer family members.

Meanwhile, pioneer #285 has provided mostly credit to recent migrants. This household is known in the community as a reliable source of non-interest credit. Those who received such help are mostly non-relatives with no direct connection. In its own initial migration, #285 had also received support from another pioneer migrant. At least 21 other pioneer migrant households have also extended support to recent migrants (i.e. 134, 336, 322, 13, 190, 351, 291, 174, 246, 329, 54, 6, 314, 101, 8, 235, 46, 97, 259, 140, and 182).

Likewise, there is also a flow of support from earlier, but non- pioneer, migrants (i.e. in circle nodes with initial migration between 1991 and 2000) to more recent ones (i.e. square nodes with initial migration of 2001 to 2016). This is illustrated by the node sequence -  . There are also instances where the households of more recent migrants have supported either the earlier migration activities or the more recent (second-generation) migration of pioneer migrant households. Such is the case of households #96, 188, 91, 406, 22, 258, 288, 312, 56, 115, 113, and 229. The graph also illustrates to some extent the importance of having a diverse network. Take household #137 in Figure 5.23 which obtained financial support from household #103 and 138 and job information/recommendation from 145 and 141.

The preceding discussion clearly illustrates the mechanisms of social networks. Earlier migration activities become sources of migration capital for recent migration activities. In these transfer of resources, whether it is information, job recommendation, assistance with visa, or financial support, roughly three-fourths are mediated by family ties, mostly very close ones.

Interestingly, pioneer migrants also have had some help in their own migration whether in the past or in recent times. This attests to the importance of community network at the origin during the initial development of migration streams and to some extent, the circular nature of migration. For instance, an interview with a well-known pioneer migrant in the area reveals that since the recruitment fees in the early 1980s were relatively low and there was high demand for construction and other production workers in oil refineries in the Middle East, he was able to bring in people from his community, many of whom are family friends and neighbors. In this case, weaker friendship and community ties play a significant role. To illustrate this, we obtain the friendship network of the said pioneer migrant's household and found that almost all its friends are also pioneer migrant households (see Figure 5.20 above).

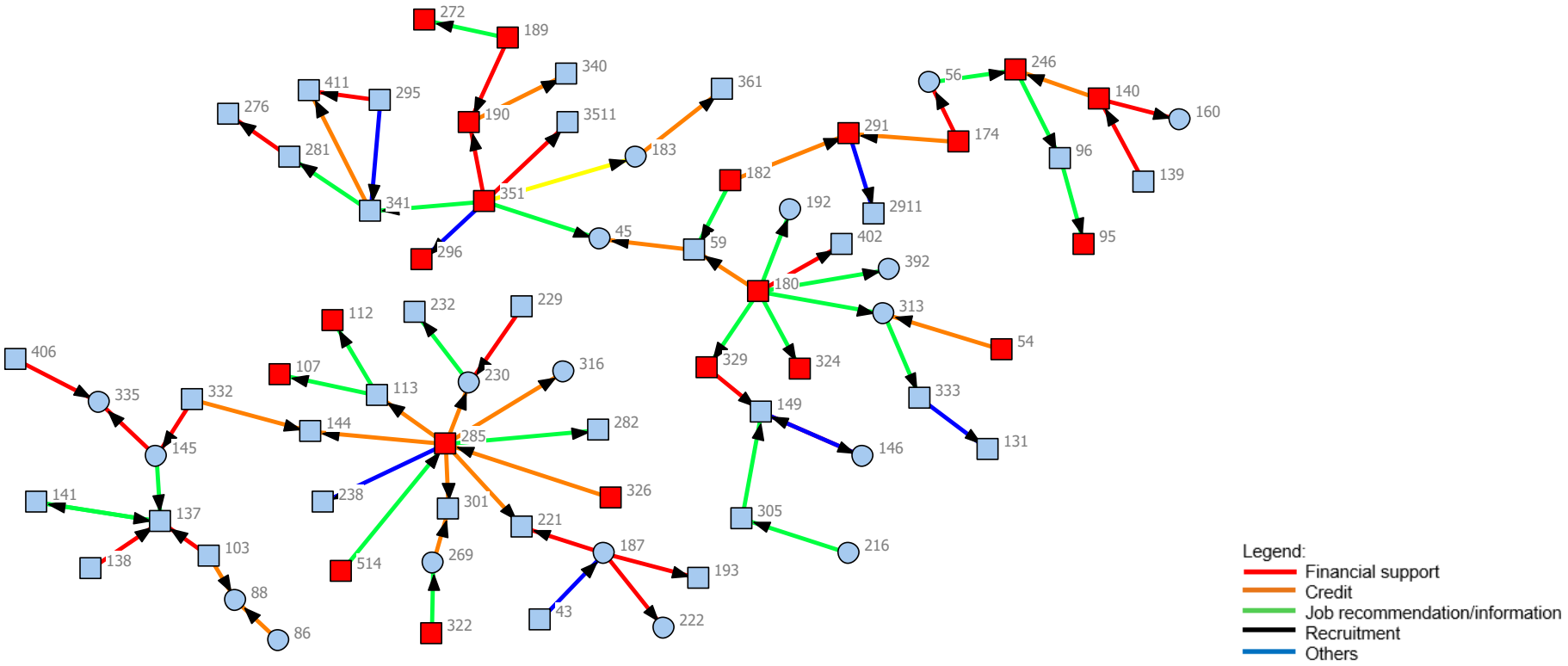

Figure 5.23. The flow of migration-related support among households, selected ego networks

How HH#180 influenced migration of others in a direct way is illustrated in Figure 5.24. It provided information/job recommendation in five, relatively weaker relations (refer to green lines); while it provided financial support in addition to job information/recommendation to its closest tie, and credit to another family tie. Moreover, at least one pioneer migrant household has assumed the role of credit-provider in the area. HH#285 is shown to provide mostly credit in the migration activities of nine (9) households; it has no direct relation to eight of them. This attests to the presence and importance of not only direct but also indirect community ties.

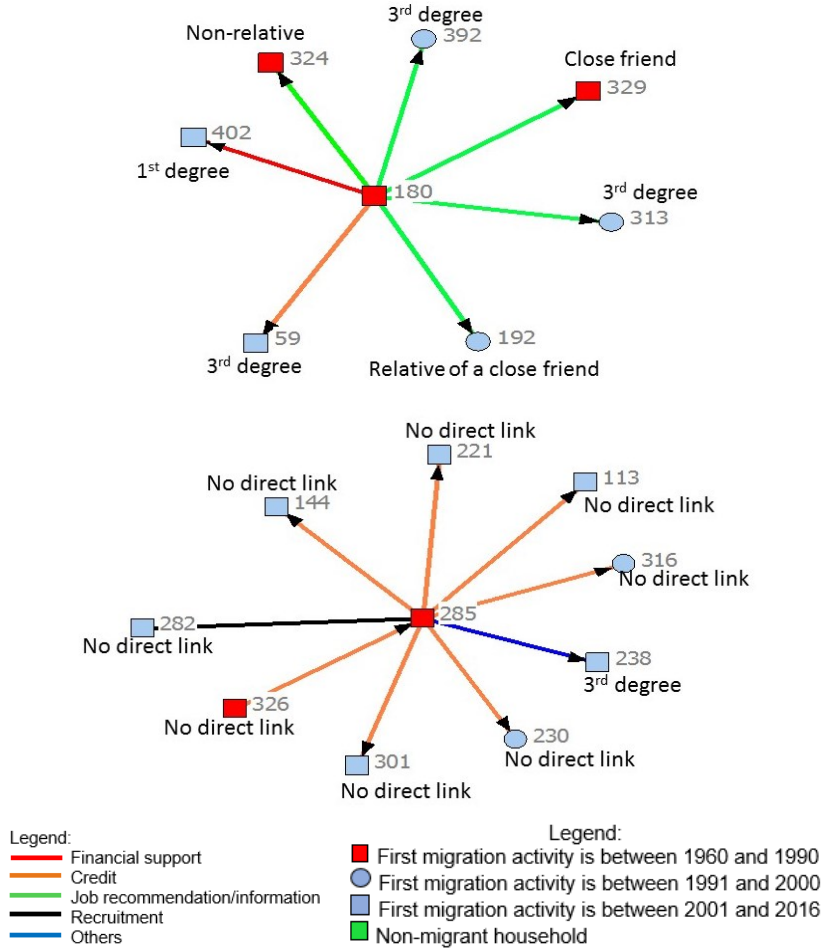

Figure 5.24. The flow of migration-related support among households, ego networks of households #180 and #285

6. Summary and Conclusion

In this paper, I presented an unconventional approach in the analysis of migration networks and its influence in the diffusion of migration by examining the structure of social networks along with the history of migration in a labor-sending rural village in the Philippines. I augment the scholarship on perpetuation of migration through such socio-historical perspective which is rarely applied in migrant network research. This study likewise contributed to the limited body of

knowledge that looks at the role of pioneer migrants. While past works have studied the characteristics of pioneer migrants, this paper showed the importance of their position in the social network and the actual mechanism by which they improve the likelihood of others to migrate.

Migration prevalence in Camachile village is high with current migration activities involving mostly second and third generations of the rural inhabitants. In the sample, seven out of ten households have at least one member with international migration experience. The recent migration activities happen in a social context characterized by relatively short average geodesic distance and low fragmentation allowing the typical household to reach other households without much difficulty. Although the network density is quite low relative to the possible number of connections, much of the households (save for some isolates) comprise one giant component with a high average degree. Such network connectivity can be partly attributed to how dwellings are assembled in the community – being neatly and compactly arranged in blocks providing opportunities for encounters, giving rise to weak, but useful, bridging ties amongst households.

In such a connected network, it is theorized that the circulation of information and resources, including migration-related ones, is much easier as opposed to a more segregated network where there are fewer connections between closed groups. Indeed, the network graph showing migration status illustrates that migration activities are widespread where no families currently possess sole monopoly of international labor migration.

My investigation of the diffusion of migration behavior shows that the role of pioneer migrants is undeniable. Households with more recent migration activities are close social circles of pioneer migrant households (within first to second degree of consanguinity or affinity) which clearly illustrates the inter-generational tendency of migration. Moreover, the directed graphs of migration-related support clearly illustrate how households that engage in migration much earlier has supported, through various means, the recent migration of others. The network position of pioneer migrants is also likely to have influenced the spread of migration activities in the area since the pioneer migrants' households occupy strategic positions within the social network. Because of this and the short average geodesic distance of the village network, they were able to spread migration-related information not only to their close kin but also to weaker relations and indirect relations.

In fact, the current diffused characteristic of international migration in the village is likely to have been a function of the initial social configuration of pioneer migrants in the area. The network graphs show that many pioneer migrants are directly linked to one another. For instance, almost all the friends of a well-known pioneer migrant who had the role of a key recruiter in the past are also pioneer migrants. Pioneer migration therefore was not monopolized by a few families. Rather, it was well-distributed across the social sphere. One possible factor that have facilitated such distribution is the relatively low cost of migration during that time combined with high demand for foreign labor. As mentioned earlier, the migrant-turned-recruiter brought in mostly kin and other relatives during the initial wave of recruitment but as more people were needed, he took people from his community and other neighboring communities – resulting to network expansion. Individuals who were friends and neighbors with the pioneer migrant/recruiter were the ones who benefited from this call for more workers. They become part of the pool of pioneer migrants in the area. Eventually, the pioneer migrants became the source of information and resources for

subsequent migration activities. Many households (which are not necessarily linked by blood or marriage relations with one another) have participated in migration right from the start – leading to the diffusion of migration in many segments of the village.

Through time, labor migration became a popular source of livelihood resulting to a greater competition among prospective workers. Although, the international labor market continued to expand as more countries opened their doors to foreign workers, countries like the Philippines continued to produce a large supply of workers. Likewise, the country's regulatory framework became more complex. Intermediaries or recruiters proliferated. These conditions, among others, have resulted to an international migration infrastructure that is less affordable. Hence, the presence of migrant close kin became an important factor that encourages subsequent migration of those with keen intentions.

Conditions such as tighter competition[20], greater migration restrictions, inefficiency of the recruitment industry, or other administrative blunders would result to people's greater reliance on their close kin as these have greater altruistic motives to provide support. Furthermore, I argue that migration diffusion in the migrant-sending village is attributable not to network size alone but to the combined effects of – 1) network structure, 2) relative position of pioneer migrants within the web of social relations and their direct role in recruitment, 3) efficiency of migration infrastructure that lowers the cost of migration, and 4) macro-economic conditions that dictate the demand for foreign labor.

While the approach in this study is purely descriptive, several hypotheses which can be formally tested have emerged. First, one's relative position in the social network in a context of high migration prevalence determines the migration-related social capital that can be accessed. The more central the position, the greater the potential social capital, holding other factors constant. Second, the presence of direct and closer/stronger connection to pioneer and other earlier migrants or returnees increases one's chance of being influenced to migrate either through greater awareness of the benefits of migration or improved capacity to migrate. Lastly, strong and weak ties differ in their migration-related resource endowments and thus may have varying influence on migration likelihood.

[20] The current trends in the Middle East particularly in Saudi Arabia where 'Saudization' of jobs is slowly taking effect, greater competition will likely drive prices up.

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Appendix 1. Site Selection and Survey Logistics

A1.1. Selection of the study area

One of the criteria in selecting Camachile, the study area, is the presence of an existing micro dataset that contains household- and individual-level information on migration activities. The municipality of Orion where Camachile is possesses a Community-based Monitoring System (CBMS) database from which such information can be obtained. The intention is to choose the village in Orion that has a high migration incidence. In 2012, 30 percent of households in Camachile have at least one international migrant member. It is important to select a case where there is a significant amount of migration activities since one of the objectives is to examine the diffusion of migration behavior within the boundary of the village. The CBMS, designed to inform poverty-related initiatives, is a local government-owned census of the socio-economic profiles of households and individuals living within the locality. Using the CBMS was also convenient because it contains prior data on economic and demographic aspects allowing for the primary data collection to be focused mainly on gathering more detailed information about migration history and intentions, social networks, and other relevant information. In addition to high migration incidence, the other requirement is that the study area must be a rural village because social network structures are best analyzed in rural settings as opposed to urban areas where there is more heterogeneity and may have less social interaction among the households. Meanwhile, Bataan, where Camachile is located, is located north of Manila; its proximity to the country capital makes it a feasible site for fieldwork.

A1.2. Field survey logistics

To ensure the success of the field research, we sought the approval of the village council of Camachile in addition to the approval and recommendation from the Municipal Planning and Development Office of the Municipality of Orion, the government unit tasked to implement the CBMS in the locality. The MPDO also recommended experienced CBMS enumerators from the area to assist us in the data collection. The village council likewise provided the necessary support in terms of logistics and security. The enumerators recommended by the MPDO, who are also Barangay Health Workers residing in the village, became part of the field research team and were trained as enumerators. Three other experienced researchers, all from the Philippine Institute for Development Studies (PIDS) were tapped to conduct the field survey.

All enumerators were trained on the survey questionnaires in late January and early February, 2016. On the 5th of February, the instruments were pilot-tested to ten (10) respondents in the study area. The main problem encountered during the pilot-test was that the interview time was too long. Adjustments in the format and sequence were necessary to shorten the interview time and save significant resources. One of the key adjustments made were for the module on social networks. Instead of showing a list of all the households in the village (with the household head as the identifier) to ask the respondents to name all the close relations they have from the list including the nature of their relationship, we just let them enumerate all their close relations starting with the first degree down to the fourth degree of consanguinity and affinity as well as their close friends of at least 10 years. Although they may miss some people through this method, it provided us a

way to gather the relationships that matter since we also ask information about their interactions with their relations. Recording the name (to whom they are related), the nature of relation (i.e. cousins, siblings) next to the name, and ticking off the kind of interactions the respondent has with the kin in a compact format has trimmed down the interview time significantly.

Moreover, adjustments were made in the module for collecting migration history. Instead of separating the section for current migrant from the former ones, a single table was constructed for listing the migration activities of all members. The enumerator just had to list the name of each migrant member, his or her period of overseas work (e.g. 1985-2001, or 2003-present) for each country of destination, followed by the assigned job with the corresponding monthly earnings. From this, one can already distinguish the current migrants from the former ones.

The survey enumeration proper was conducted by a team of six (3 PIDS research staff, 2 local CBMS enumerators, and myself) on February 8 to 13, 2016. The team is split into 2 groups such that each group comprised of 1 local BHW serving both as a guide and enumerator and 2 researchers. The local enumerator first introduced us to the residents to whom we conducted the face-to-face interview before she goes her own way to interview nearby households. Being BHWs in the area, the local enumerators know all the residents in Camachile and having them introduce us to people granted us legitimacy which is very important so that we can carry out the interviews successfully. The interviewees are mostly household heads and/or their spouses who are knowledgeable of the family's/household's basic profile, migration history, and social relations. In cases where the head and spouse were not available, their adult children were interviewed instead. Out of the 366 households, we have initially covered around 250 households within the 6-day period. Under my supervision, the local enumerators continued the interviews in the weeks that followed and were able to interview around 50 more households.

After the enumeration of around 300 households, the list of households obtained from the 2009 and 2012 CBMS database of Camachile was examined against the list of actual interviewees. Some issues arise due to the splitting of households through the years. There were several survey respondents who still included members that already got married and are therefore already considered separate units from theirs. Because these new household units would have to be interviewed as well, it was necessary to redeploy the local enumerators to cover all of them. Confusion also arose from the typo errors in the CBMS database with respect to first names and even years of birth. This led to problems in merging the interview data with the available CBMS data as well as in comparing which ones have already been covered and which ones are yet to be interviewed.

Likewise, the study originally targeted households that have longitudinal information in the CBMS data leading to a shorter list of interviewees. Hence, some respondents in the 2009 CBMS that were not included in the 2012 CBMS were not listed in our list of interviewees. However, because the entire social network structure of the village needs to be analyzed regardless of the presence of longitudinal information, we revised our list to include such households leading to the redeployment of enumerators once more. In August 2016, the local enumerators interviewed 65 more households bringing the total of households covered to 365.

A1.3. Limitations

As in many data collection activities of the same nature, problems may arise due to recall errors. Household members responding to questions on behalf of other members may unknowingly provide incorrect information. However, the presence of a prior database i.e. the CBMS helped in the triangulation of some information such as the timeline of a member's migration activity since the CBMS contains information on migrant workers. Moreover, the lay-out of the questionnaire made it easier to collect information on migration history, for example, by simply asking the respondent to provide the chronology of migration activities from the first to the most recent. For each period of overseas work, information on the destination, job title, and estimate of monthly earnings were also collected.

We likewise had challenges at first in the mapping of social relations among residents within the village as most people were born and grew up in the village and they claim to know and are friends or acquaintances with basically all the other people living in the village. The problem was lessened by focusing only on close relations (by blood and marriage) and those who people interact with in various ways as well as long-term friendship ties.