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## **Why wage earners hunt: food sharing, social structure, and influence in an arctic mixed economy**

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# Current Anthropology

## Why Wage-Earners Hunt: Food Sharing, Social Structure, and Influence in an Arctic Mixed Economy --Manuscript Draft--

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# **Why Wage-Earners Hunt: Food Sharing, Social Structure, and Influence in an Arctic Mixed Economy**

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## **Abstract**

Food sharing has been a central focus of research in human behavioral ecology and anthropology more broadly. Studies of food sharing have typically focused either on the individual's motivations to share or the social formations and value systems that sharing produces. Here, we employ social network analysis to do both; investigating how strategic economic decisions, such as decisions about sharing, are embedded in and feed back onto social structure. This research is based on a questionnaire conducted with 110 Inuit households during twelve months of ethnographic fieldwork in Kangiqsujaq, Nunavik, Canada. In Kangiqsujaq, traditional Inuit resource harvesting and sharing practices co-exist with and depend upon opportunities and constraints in the cash economy. Food sharing in Kangiqsujaq emerges as a complex social, political, and economic phenomenon that accomplishes different objectives for actors based on their social position. The network approach adopted in this research highlights the conjugate role of individual decisions and structural constraints in broader processes of social and cultural change. In the mixed economy of Kangiqsujaq, food-sharing, social structure, and political influence are intimately connected. The results suggest that economic and political inequality in the settlement is reinforced by the social structures produced through sharing.

In Kangiqsujaq, a small Inuit village in the Eastern Canadian Arctic, harvesting and sharing of traditional country foods, such as seal, arctic char, and beluga, are a major part of everyday life. Food sharing occurs both as communal meals and as gifts of country foods exchanged between family, friends, and neighbors. However, harvesting country foods is a costly endeavor in terms of time, energy, and money (Smith 1991). In the contemporary mixed cash/subsistence economies of Canadian Arctic settlements, harvesting requires snowmobiles, guns, gasoline, and a wide range of other equipment, whose purchase and maintenance depend on money earned through wage labor. Given these costs, why do wage-earning Inuit continue to spend their hard-earned money on harvesting and sharing of country foods? Why do Inuit not simply eat cheaper purchased foods, or focus only on filling their own freezers with country food? And, as is often the case for productive harvesters, when their freezers are already full, why do they acquire surpluses of country food and give them away, instead of setting the money used for hunting aside for the future?

This question of why people should expend time and energy to acquire resources only to give them away to others has been a longtime focus of study in anthropology. Within the subfield of human behavioral ecology (HBE), researchers have identified a number of mechanisms that can motivate individuals to share with others, such as kin selection, tolerated theft, reciprocal altruism, and costly signaling (Gurven 2004; Jaeggi and Gurven 2013a; Winterhalder 1997). Some sharing can be explained by inclusive fitness (Hamilton 1964, 1970), when individuals provision their kin (Gurven 2004; Hooper et al. 2015; Koster and Leckie 2014). In some cases, allowing others access to a resource may be less costly than trying to prevent needy individuals from taking it (Blurton Jones 1984). Often, sharing may foster long-term relationships of mutual aid and assistance (e.g., Hill and Kaplan 1993; Jaeggi and Gurven 2013b;

Jaeggi et al. 2016). Some studies have suggested that sharing food with others could be driven by the potential reputational benefits of provisioning others, as a person may acquire a reputation for hunting skill, generosity, and/or commitment to the group (e.g., Bliege Bird, Smith and Bird 2001; Bliege Bird and Bird 2008; Gurven et al. 2000). In many cases, these various mechanisms appear to be operating in concert, although their relative importance may change between cultures, between resources, and even between individuals within a group (Gurven 2004).

What this body of work fundamentally demonstrates is that while sharing food is certainly an economic transaction, it is also a social interaction. The close association of exchange and social relationships is, of course, a foundational observation within anthropology: exchange relationships—whether of ceremonial goods, livestock, or foodstuffs—reveal how individuals orient themselves to one another, situating them in the larger social structure of their community (Mauss 1923). Economic anthropologists have often focused not on the individual returns to sharing, but on how forms of exchange are related to the operation of broader systems of social and political relationships (Kent 1993; Peterson 1993; Price 1975; Testart 1987), and on the production of value and meaning (Appadurai 1986; Bourdieu 1980; Graeber 2001). As any particular exchange is simultaneously the product of an individual's motivations (which will often be based on economic need), as well as of the social formations and value systems in which they operate, a full explanation of any exchange system requires a clear understanding of both (Coleman 1986; Irons 1979). How are individual transactions shaped by the larger structure in which they are situated? And how does that exchange in turn influence the evolution of the social system? Are the benefits of food sharing equally shared, or do some stand to gain more (or less) from these exchange relationships? In the case of food sharing in Kangiqsujaq, what is the role of traditional food exchange when economic life in the settlement depends on cash? While

questions such as these may have been implicitly asked within the literature on food sharing, they have not yet been rigorously addressed, in part because the methods needed to answer them have only recently been developed. Advances in social network analysis, however, now make such questions empirically answerable.

Social network analysis refers to a set of methods designed for the analysis of relational data. Relational data represent connections between agents, and are inherently different from most social science data because relations cannot be reduced to an attribute of any one agent (Wasserman and Faust 1994). As such, social network analysis is the set of methods most appropriate for the study of social structure (Scott 2000). Borgatti et al. (2009) argue that the fundamental insight of social network analysis is the idea that explanations for an individual's behaviors and personal outcomes may be found by examining their position in the network structure. For large, complex data sets, quantitative graph theoretic tools provide precise methods of comparing the properties of a graph and of the individuals represented in it (Wasserman and Faust 1994). Such tools and the relational perspective that they imply allow social scientists to study the individual as both shaped by social structural forces and also agentfully shaping those same structural realities (Coleman 1986). Network ideas have long been implicitly part of HBE research on food sharing specifically (e.g., Hames 2000; Kaplan and Hill 1985) and support relationships and exchange more generally (e.g., Macfarlan et al. 2013; Wiessner 1982). Recently, human behavioral ecologists have begun to apply network analysis techniques to explore and explain relational data (e.g., Alvard 2003; Dombrowski et al. 2013; Kasper and Borgerhoff Mulder 2015; Koster 2011; Lyle and Smith 2014; Nolin 2010, 2012; Ziker and Schnegg 2005). Nevertheless, these studies have largely focused on the individual and the dyad, rather than the overall structure and feedbacks therein.

Here, we employ network analysis to investigate the relationship between food sharing and socioeconomic status in Kangiqsujuaq. We first examine the question of why Inuit share country food, situating household sharing strategies in the broader context of the mixed cash/subsistence economy (cf. Gurven et al. 2015; Kasper and Borgerhoff Mulder 2015; Scelza et al. 2014; Ziker et al. 2016). As we will show, country food sharing in Kangiqsujuaq serves multiple purposes for different households, based in large part on their relative socioeconomic status. We then explore the collective consequences of these sharing strategies for patterns of inequality in the settlement. Those who are able to afford the high cost of harvest production are able to embed themselves in the sharing network and reap not only material, but also social and political benefits. Perhaps counterintuitively, we suggest that the dynamics of sharing may actually be contributing to inequality within Kangiqsujuaq, a conclusion that is consistent with historical evidence of social differentiation among Inuit (e.g., Hervé 2015; Pryor and Graburn 1980; Stevenson 1997; Woollett 2007). These results demonstrate that a network approach allows us to not only identify the factors that shape household involvement in country food sharing in Kangiqsujuaq, but also the aggregate social results of those actions.

## **Study Area**

Kangiqsujuaq is a settlement of roughly 800 people located in a large bay on the west coast of Hudson Strait in Nunavik, Canada. All but a half dozen of the village's permanent residents are Inuit. The village is nestled in a valley between steep hills, near excellent hunting territories for a wide range of animals. The village is accessible only by plane, although it is possible to drive snowmobiles or boats to neighboring villages (roughly 175 km away) depending on the season. Most imported goods are brought to the settlement by sealift during the



summer months. Small quantities of perishable goods, mainly fruits and vegetables, arrive by plane on a roughly weekly basis.

Nunavik is a region unique in Canada for having its own regional government within a province (Quebec): the Kativik Regional Government (KRG), which was created as a part of the James Bay and Northern Quebec Agreement (JBNQA) in 1975. Nearly all Nunavimmiut live in KRG social housing, paying a monthly rent that includes water, sewage, electricity, and heating for the use of a home (mostly duplex units) owned by the housing board. Nunavik also has a land claims organization, Makivik Corporation, which is responsible for administration of the lands covered by the lands claims agreement. Many Kangiqsuarmiut hold local elected positions with KRG or Makivik.

At Kangiqsuuaq, as throughout Nunavik, Inuit began to settle around trading posts and missions in the early part of the 20th century. Inuit settlement in the Canadian Arctic was a complex process that involved both the active manipulation of social and economic conditions by Inuit as well as the policies of the Canadian federal government, which discouraged settlement until after the Second World War (Damas 2002; Duhaime 1983). In Nunavik, nearly all families had moved to settlements by the early 1960s. Over the past few decades, the importance of formalized education, wage labor, and new forms of recreation have steadily increased throughout the Canadian North. Today, the most common form of employment in Kangiqsuuaq is public sector wage work, which includes jobs at the school, daycare, and nursing station, administrative positions at the local KRG and Makivik offices, and maintenance work. Private sector employment is limited, and includes jobs at the general stores as well as fly-in fly-out jobs at a nickel mine in the region; however, few Inuit find work at the mine to be an attractive option. Unemployment rates are very high, but few individuals qualify for welfare

payments. Seniors qualify for various support payments, as do women supporting minors. Inuit households also receive occasional payments from mining royalties. Even with subsidies on housing and many food items and commodities, the need to import foods and other goods means that the cost of living in Nunavik is extremely high relative to southern parts of Canada (Kativik Regional Government 2016). The combination of the high cost of food and high unemployment means that poverty and food insecurity are serious social problems in the region, as they are elsewhere in the Canadian Arctic (Council of Canadian Academies 2014). In 2013–2014, 20% of Kangiqsujuaq had low food security and 21% had very low food security (Ready 2016, cf. Lawn and Harvey 2004).

Traditional or “country” foods, such as seal, beluga, arctic char, caribou, and ptarmigan, continue to constitute an important part of the diet in Kangiqsujuaq. Duhaime et al. (2002) reported that 12.3% of all calories consumed by Nunavimmiut came from country foods, representing 58% of total meat intake. Lawn and Harvey (2004) obtained a similar figure for women in Kangiqsujuaq (11.1%) based on a 24-hour recall study. Harvesting of country foods (hunting, fishing, and gathering) remains an important economic activity for many households in Kangiqsujuaq; the livelihoods of most households involve negotiating their participation in wage labor and in traditional harvesting activities.

Relying on country food is not a simple alternative to wage labor, however. Modern Inuit harvesting relies on a wide array of purchased goods, including major investments such as snowmobiles, all-terrain vehicles (ATVs), and watercraft, as well as recurring expenses for supplies such as gasoline and ammunition. Inuit harvest participation is therefore mediated by access to cash and other materials (both personally-held resources and those accessed through social networks) as well as by the harvester’s knowledge and ability (Collings 2011; Langdon

1991; Wenzel 2000). Harvesting country foods consequently entails sizable investments of time, money, and energy. Hunting is therefore not a solitary endeavor; households coordinate their resources and effort in order to support their harvest production.

Country food continues to be shared widely in Kangiqsujuaq as well as in other Inuit settlements (Bodenhorn 2000; Collings 2011; Harder and Wenzel 2012; Hovelsrud-Broda 2000; Kishigami 2000). Country and purchased foods are not substitutable in this respect: although purchased foods may be included in shared meals and are occasionally given to needy households, usually upon demand, they are not “shared” in the way that country foods are, that is, given deliberately as gifts and distributed widely. Although there is a small “black market” trade in country food, selling country food to individuals is prohibited by the JBNQA. Although the prohibition is not strictly enforced, many Nunavimmiut strongly disapprove of the practice of selling country food precisely because it undermines sharing, believing that traditional foods should be free to all despite the costs of modern harvest production (Gombay 2010). Nunavimmiut are allowed to sell harvested foods to the local Hunter Support Program, a government program that purchases food from hunters and makes the food freely available to the community. However, the program’s budget is relatively limited, and its operation can be sporadic and unpredictable. Consequently, access to country food continues to be primarily mediated by harvesting participation and social relations rather than by markets or formal institutions. In addition to shares given (or asked for) directly between households, country food is also occasionally shared over the local FM radio. This most often occurs when a household has had an unusually large harvest, generally of arctic char. In this case, a household member will call the radio to announce that anyone who wishes can stop by to collect a share; dozens of people often respond.

Given the costs associated with modern harvest production (Smith 1991), why do Inuit continue to pursue and share country foods? Food transfers may involve the creation of social and symbolic value as well as the fulfillment of economic needs (Bourdieu 1980; Graeber 2001). Numerous scholars have suggested that the persistence of traditional subsistence activities in Inuit communities despite their integration into broader industrialized economies, a pattern now commonly referred to as a “mixed” economy (Wolfe and Walker 1987), is related to the social importance of sharing country food for Inuit (Bodenhorn 2000; Collings 2011; Hovelsrud-Broda 2000). Wenzel (1995, 2000) has argued that the mixed cash/subsistence economic system that characterizes modern Inuit settlements is fundamentally a social economy, not a market economy, because Inuit economic decisions are often driven by investments in social relationships, rather than by the accumulation of material wealth or cash. Through our modeling of the flows of food, we are able to investigate not only the economic but also the social value of these resources. We study the economic and social benefits that Inuit households derive from their investment in sharing country food, specifically through a network approach that allows us extend dyadic exchange to the broader social structure of the community. In particular, we link information on the sharing of country food with information on social status to explore the political economy of country food sharing in Kangiqsujuaq.

## **Methods**

### *Fieldwork*

The fieldwork for this research was conducted between September 2013 and July 2014 by the first author. This article focuses on a household questionnaire, which gathered data on household demographics, employment, income, hunting participation, food sharing, and food security from

a large, representative sample of households in the settlement. Portions of the survey were adapted from instruments used in a previous study of food security in Kangiqsujuaq (Lawn and Harvey 2004) and in harvest studies by the Alaska Department of Fish and Game (e.g., Kukkonen and Zimpelman 2012), with the help of Kangiqsujuarmit who pretested the survey. In total, 110 of 146 Inuit households in the settlement (75.3%) were surveyed. The population sampled in the household survey shows the same age (Kolmogorov-Smirnov test:  $D = 0.04$ ,  $p = .72$ ) and sex ( $\chi^2 = 0.05$ ,  $p = .82$ ) distributions as the 2011 census data for Kangiqsujuaq (Statistics Canada 2012). Households are defined as people living together in a single dwelling, but household composition is highly variable, from multigenerational families (in one case, 4 generations), to single women with children (representing 35% of households), to men living alone. In general, interviews were conducted with the head of the household by the first author and a local translator or research assistant. 35% of interviews were conducted in Inuktitut, and the rest in English. 55% (60/110) of respondents were women. Respondents were asked to provide information covering the previous 12 months. The study was approved by the Kangiqsujuaq Northern Village and by the Stanford Institutional Review Board.

### *Data*

In the analyses reported in this article, we draw on the following data sources:

Country Food Sharing Network: As part of the household survey, household heads were asked to free-list their most important country food sharing partners, both who they gave to and received from. From these reports, we create a network representing the sharing of country food among households. For every pair of households, if either one reported in the survey that they shared food with the other (giving or receiving), we record a tie representing that flow of food,

following Nolin (2008, 2010). Although households that did not participate in the study were named, only households who completed the survey are included in the analysis, because of the need for complete data in the network analyses. This network consists of 110 households (nodes), and captures 57% of all theoretically possible ties within the village and 75% of all theoretically possible ties within the survey sample. In this in-sample network, households give and receive food from 4.55 other households, however, there is substantial variation between households in how much they give and receive (out-degree s.d. = 4.57; in-degree s.d. = 3.10). 4.2% of all possible ties between households in the sample are realized, of which 37.6% are reciprocated.

Household Food Security Assessment: Households also answered a set of questions evaluating their food security, the results of which are reduced here to a binary variable categorizing households as food secure or food insecure. Households designated as food insecure experienced at least one episode of food shortage that resulted in a reduction in food intake by adults in the household (cutting or skipping meals), in the twelve months preceding the assessment. 38% of households in the sample are food insecure according to this metric. The indicator of food security used here is a measure of poverty not directly associated with harvest production or with country food shares received (Ready 2016).

Household Socioeconomic Attributes: The household survey also included questions on household demographics, recent employment history, harvest production (including harvests of beluga, ringed seal, caribou, and geese), income and other socioeconomic indicators. The monthly incomes of household heads over the twelve months preceding the interview are summed in order to obtain a total one-year income for the household, including any reported pensions or government benefits. For most analyses, harvest production is tallied in kilocalories

using data from Smith (1991), and then categorized into three groups: low-producers (households that did not harvest any of four species mentioned in the survey), mid-producers (those who did some harvesting), and super-producers. Super-producers are defined as households in the top 30% of harvests (BurnSilver et al. 2016, Wolfe 1987), and harvested approximately 80% of all calories represented in the harvest data. Households also indicated whether they gave away country food over the local FM radio in the past year, a variable we refer to as “FM giving.” A separate variable also indicates households headed by single females. These are usually young single parent households, but the category also includes some mature households headed by elderly women. Variables representing workplace affiliation (e.g., the school, the coop) were also created using the employment data. Workplaces are referred to by letter (A, B, etc.) in order to protect the anonymity of respondents.

Kinship Data: Kinship relationships were gathered along with the sharing network data and supplemented by interviews with informants and genealogical data obtained from the Avataq Cultural Institute. Ties between parents/children and siblings are used here to define whether households are “close kin,” including both biological and adoptive relations. A second broader kinship term is also included, dividing the population into 16 kinship groups, each primarily associated with one or two common local family names, ranging in size from four to twenty households (mean = 10.7, s.d. = 4.8), with some overlap between groups because households may belong to more than one cluster. One household was an isolate. This household-by-group matrix was then used to create a kinship group network.<sup>1</sup>

Political Appointments: Records of the composition of a local elected council from 1980 to 2014 were gathered from publicly available sources. Membership on this council is determined by the popular vote obtained by candidates who present themselves for election.

Living individuals who have been elected to the council have been linked to households represented in the survey sample to create a variable indicating whether a household includes someone who was ever on the council. We call this “historic council membership.” Household membership in several other elected community positions during fieldwork in 2013–2014 is also considered, which we call “2013 council membership.”

### *Data analysis*

To describe the sharing network structure, we develop an Exponential Random Graph Model (ERGM) of the network using a range of household-level and relationship attributes. The aim of using an ERGM is to identify the individual (node-level) and group structural (network-level) forces that best predict the overall structure of the observed network, represented in Figure 1. The model coefficients in an ERGM are analogous to the coefficients in a logistic regression, where the response is the probability of a tie between two nodes.<sup>2</sup> All network analyses were conducted in R (R Development Core Team 2012) using the statnet suite of packages (Handcock et al. 2003). We also present regressions to further investigate some of the patterns identified in the ERGM. Regression analyses use the MASS package (Venables and Ripley 2002) in R.<sup>3</sup>

## **Results**

### *ERGM results*

The results of the ERGM are shown in Table 1. The model presented here<sup>4</sup> includes measures of household kinship and proximity, harvest production, economic status and food security, employment status, demographic characteristics, and a number of structural control variables.<sup>5</sup>



The ERGM confirms that households with greater resource availability are more likely to give country food than households with fewer resources. The model also shows that households tend to share with kin and neighbors. The effect of close kinship on the probability of a tie is the strongest effect in the model (odds-ratio 21.16). The effect of belonging to the same kin group, while also significant, is much less but still considerable (odds-ratio 3.56). Close kin ties were subtracted from the kin group network, so these are exclusive categories in the ERGM. The probability of a sharing tie between households decreases with increasing distance between them. As some houses are as far as one kilometer apart, while the coefficient for distance is small, it has a large impact on the probability of a sharing tie between households in different parts of the settlement. For example, immediate neighbors are 1.63 times more likely to exchange food than households that are 500m apart. We considered that individuals working together might also be more likely to share with each other, but workplace homophily was not significant; instead, households with individuals working at two particular institutions are associated with significantly greater out-degree. Not surprisingly, these are workplaces associated with desirable jobs with good pay, good benefits, and good working hours.

Single female-headed households and elders are preferred targets of giving. However, more direct measures of household need, whether food insecurity, low harvest production, or household size, are not significant predictors of incoming ties. Owning more hunting vehicles also has a small negative effect on in-degree. Because owning more hunting vehicles is associated with higher income and harvest production, households with more vehicles tend to have higher out-degree to begin with, so this covariate simply reflects that these households are more likely than others to support one-way outgoing ties.

Although neither food security nor harvest production alone were found to be significant predictors of incoming ties, the model does find different probabilities of sharing ties between households with certain socioeconomic profiles, as measured by the interaction of household food security and harvest production. Food-insecure super-households (“I-Super”) have a strong tendency for sharing with food-secure non-hunters (“S-Low”). In other words, these cash-poor hunters prefer to give to cash-rich non-hunters. Although we do not have complete exchange network data for other currencies, this pattern likely reflects exchanges across currencies between these types of households. Unemployed hunters, especially young men, often share with more affluent non-hunting households (usually relatives) and receive cash, gas, or other goods in exchange. Food-insecure super-households are the least common household type ( $n = 9$  or 8.2% of households), which is not surprising given the high cost of harvesting.

Food-secure super-households (“S-Super”) have a higher probability of sharing with other food-secure households and/or super-households than with households that are food insecure *and* lower harvest. In fact, food-secure super-households have the strongest affiliation with other food-secure super-households, which may represent generalized reciprocity among this relatively restricted group ( $n = 20$  households). This pattern is also suggested in Figure 1 and confirms the importance of ties between cooperators (cf. Apicella et al. 2012; Lyle and Smith 2014). The second group that food-secure super-households are most likely to share with are non-harvesting food secure households. This may also represent trade, as suggested for food-insecure super-households, however, this is less certain because food-secure super-households tend to finance their own hunting efforts. Finally, low- and mid-production food-insecure households (“I-Low” and “I-Mid”) tend to have sharing ties with each other. Mid-production

food-insecure households give to fewer food-secure non-hunters (“I-Mid” to “S-Low”), who, as mentioned above, are frequently the targets of super-households.

Reciprocity has a sizable effect in the model, second only to the effect of close kinship. A household is nearly five times more likely to share with another household if they receive food from that household. The strength of this term suggests that contingent reciprocity is an important determinant of the structure of the sharing network, because the model also includes several terms that control for homophilous behaviors (e.g., sharing among kin and super households), which could induce generalized reciprocity among subgroups within the network.<sup>6</sup>

Several examples of the ERGM predictions are worked through in Figure 2, which shows the probability of ties between households with different socioeconomic characteristics. These examples clearly show the strong effects of kinship and reciprocity, but also highlight the relative disadvantage of low production, food-insecure households, particularly if they are not female-headed. Although the effects of several variables (such as income and giving food over the FM) are not illustrated in Figure 2, the effect of these variables exaggerate the basic patterns shown because of the positive correlations between high income, high harvest productivity, and food security. In summary, the ERGM results provide evidence for contingent reciprocity, along with suggestive evidence of trade. Nevertheless, 62% of ties are unreciprocated, and high income, high harvest households maintain a large number of one-way ties towards low income, low harvest households that are unlikely to be able to reciprocate in kind or otherwise. These patterns suggest that, while sharing widely is clearly associated with high socioeconomic status, there might be other pathways between these traits that motivate wealthy households to share.

*Sharing & political influence*

To further unpack the positive associations between country food sharing and affluence in Kangiqsujuaq, we investigate whether food sharing may operate as a signal of commitment to the community (cf. Bird and Bliege Bird 2010; Bliege Bird and Power 2015). In particular, we hypothesize that sharing country food widely is linked to people's ability to access positions of community leadership. To examine this hypothesis, we perform logistic regressions on two variables that are indicators of individual prominence and leadership in Kangiqsujuaq: (1) 2013–2014 elected council memberships; and, (2) historical council membership (1980–2012). The left panel of Table 2 shows the regression results for the 2013 council memberships. Sharing network out-degree was not retained in the model; however, giving country food nevertheless emerges as an important correlate of recent election: the strongest predictor in the model of whether a household includes someone who was a member of an elected local council in 2013–2014 was whether that household had given away food over the FM radio in the past 12 months (odds-ratio = 24.34). The number of hunting vehicles owned by a household is also correlated with recent election. Importantly, ownership of hunting vehicles is not only a reflection of household income over a longer term than 12-month income, but it is also a visible signal of a commitment to using disposable income to support country food harvesting. Finally, membership on the historic council is also an important predictor of the 2013 councils, which reflects continuity in tenure of elected positions for households, even across different local councils. Figure 3 visually summarizes some of the patterns observed in the regression for 2013 council membership, and clearly shows the increased involvement of council members' households in sharing, as well as their increased economic status. Although council membership is clearly correlated with numerous indicators of sharing participation and socioeconomic status,

not all of these were retained in the stepwise regression analysis because of strong collinearity between many of these variables.

The right panel of Table 2 shows the regression results for the historical council data. Interpreting this regression requires caution because the temporality of the data is collapsed in the binary variable representing election, and characteristics of households may have changed substantially if the individuals were on the council 20–30 years ago rather than within the past few years. Therefore, it is not clear whether the predictors in the model reflect the reasons why individuals get elected, or effects that occur after election. Nevertheless, the regression provides suggestive results regarding the types of households that have participated in local political life over the past 30 years. As in the model for current councils, ownership of hunting vehicles is a strong correlate of historic council membership. The importance of this factor in both the historical and current council models suggests that high income—combined with a commitment to harvesting—are characteristics of local council members both before and after election. Further, sharing network out-degree has a significant effect in the model, suggesting that individuals who have been members of the council tend to come from households that are heavily invested in the sharing economy. Mean household age is also significant, although this is essentially a control variable that accounts for the fact that older persons have a greater chance of ever having been on the council.

These results provide strong evidence for why affluent households in Kangiqsujaq support one-way sharing ties to low-resource households in addition to engaging in supportive reciprocal sharing relationships. Households that are more heavily invested in the sharing economy—and households that engage in food distributions over the FM radio—are more likely to have members who have been elected to local council(s). Holding a council position has both

direct and indirect social and economic benefits, including monetary compensation (roughly Can\$700/month for the municipal council) as well as influence in important community affairs, such as major construction projects and community programs.

## **Discussion**

The ERGM and regression analyses suggest that while sharing of country food is driven by reciprocity, trade, and wealth, sharing is itself a predictor of the political success and influence of wealthy households. In the discussion, we delve into the connections between generosity, influence, and affluence in the settlement and consider how these patterns might articulate with processes of cultural, social, and economic change. Namely, we explore how traditional food sharing may contribute to economic and political inequality in the contemporary mixed economy. Finally, we discuss the implications of these results for how, as anthropologists, we can better negotiate the gap between models of individual economic decision making and the real constraints imposed by social structure.

### *Sharing and economic strategies*

In late September 2013, Jaani, a hunter in his late 40s, went on an overnight ATV hunt with his two young adult sons and a couple of their friends. They returned home with over 130 Arctic char and two small caribou. One of the friends took six fish from the catch, and Jaani brought the rest home. He kept the caribou, but called the FM radio to give away the fish, inviting anyone who wanted some to come to the shack behind the house and take it. Jaani did not pay attention to who came to get fish that weekend. Too many people dropped by, and he could not be there to observe everyone who came by to collect a share. He was not concerned

with the details of the distribution beyond that it had been widely shared. Jaani's wife, though, had paid closer attention. Besides the close family members who dropped by regularly and were always given shares, more distant relatives and some unrelated men and women also showed up to claim a share on this occasion. Most of these distant relatives and others were from households with demonstrable food need, who did not hunt much themselves and were unlikely to be able to reciprocate the shares they received. Another hunter or two, friends of the family, also stopped by for a social visit and grabbed a fish or two on their way out because they did not have any fresh fish at home.

About a week or so after this event, another hunter, Naalak, an Inuk in his late 30s, caught a harp seal while out on his canoe looking for caribou. Because most Kangiqsujuarmiut do not consider harp seals to be good to eat, Naalak skinned the animal for its pelt and gave all the meat to a friend of his, Pitsiulaq, who owns a dog team. A week or so later, Pitsiulaq caught seven caribou. On his return, Pitsiulaq gave Naalak a generous share of fresh caribou meat, which was a welcome surprise to Naalak, who had been caribou hunting several times in the past few weeks but had not encountered any. Around the same time, Alaku, a married woman in her fifties, was asked to collect some mussels by a friend in exchange for Can\$40. She collected mussels for this same woman a few more times before freeze-up in early December; each time she received cash payments.

This small glimpse of day-to-day country food exchange in Kangiqsujuuaq illustrates the main findings reported above: country food sharing has multiple social and economic functions in the mixed economy. Households who give away their harvests can benefit from reciprocity, trade, and/or enhanced reputations, not to mention the contribution of sharing to Inuit social well-being (Condon et al. 1995; Nuttall 1992; Searles 2002). Moreover, the analyses suggest that

both the extent of engagement in sharing and the particular rewards derived from it differ between households. As the examples above show, super-households, such as those to which Jaani, Naalak, and Pitsiulaq belong, engage in directed reciprocity, especially with each other, but also sometimes participate in broadcast sharing of large food surpluses. These broadcast sharing events are linked to social status, as measured by local election results. Not coincidentally, both Jaani and his wife—as well as Naalak and Pitsiulaq—hold prominent white-collar public services positions in the community, which allows them to afford substantial outlays for equipment and hunting supplies, even though the food they harvest is often given away without expectation of return.

In contrast, Alaku is also member of a super-household; but her husband is unemployed, and both she and her adult children who live at home have only low-paid, part-time work. Thus, her family regularly attempts to parlay their harvesting activities into additional income. They have mixed success in doing so for a number of reasons, including the high cost and uncertainty of harvesting, the unreliability of the Hunter Support Program, which only sometimes has money to purchase food from hunters, and the unwillingness of many Kangiqsujuarmit to pay for country food outright (cf. Gombay 2010). Alaku's household experienced shortages of store food at times when Alaku was not able to work enough hours at her job. Undoubtedly, however, their harvesting gives them a considerable economic advantage over non-hunting households with similar employment patterns: not only do they produce a lot of food themselves, but other super-households share with Alaku's family quite often. Together, Alaku and her husband have at least 21 adult siblings (biological and adopted) living in the settlement, which also greatly contributes to their advantageous position in the sharing network.



In Kangiqsujaq, we find that there are multiple motivations and strategies that may lead households to pursue and share country food. As others have recognized (e.g., Gurven 2004; Nolin 2010, 2012), it is not a question of one mechanism (for example, kin selection or reciprocity) explaining food sharing to the exclusion of others, but rather a question of the relative importance of multiple mechanisms, all of which are likely acting to some extent. Here, we further stress that particular mechanisms may be more or less relevant in explaining the sharing behavior of households in different socioeconomic positions, as well as in different cultural and ecological settings (e.g., Koster 2011; Ziker and Schnegg 2005). For example, high harvest but food-insecure households focus on attempting to convert country food into other material resources, such as cash. In contrast, for high-income, high-harvest households, increased participation in sharing, and giving away food in particular ways (for example, over the FM radio) is associated with political success in the settlement. Country food sharing serves multiple purposes for households, both economic and social.

### *Sharing, inequality, and the persistence of the mixed economy*

Contrary to other mixed economies where wealthy households have been observed to divest from sharing networks (e.g., Kasper and Borgerhoff Mulder 2015), our analyses demonstrate that the benefits of giving away food are concentrated among high income and high harvest households, because these households are able to give the most (cf. Gurven et al. 2015). Households that give more also have more reciprocal ties. We stress though, that this is a mixed economy that has developed over more than a century of trade and increasing market integration, not a recent transition, and that country food today is a small—although nutritionally important—component of Inuit diets. The question we ask is why does sharing persist at all?

And why are wealthy households more, rather than less, invested in sharing than poorer households? We find that generosity with country food provides important reputational benefits that have consequences in the political arena and that are also likely to be important in securing employment, favors, and other forms of social and economic assistance.

This distribution of the benefits of sharing has important social and economic ramifications, thanks to the links between affluence, influence, and generosity (Figure 3). Given the dependence of harvesting on the cash economy, these linkages could produce positive feedbacks (generosity leads to access to influential positions which improves access to resources which enable generosity) and create lasting differences in economic and relational wealth between households and between kin groups. The existence of such trends is suggested in Figure 4, which shows the kinship network positions of living individuals in both council datasets. Many of the council members come from dense clusters within the kinship graph. Many are also closely related: of the twenty-five individuals in the historical council sample, there are four parent-child pairs, five husband-wife pairs, and three groups of siblings, not to mention relationships between cousins and in-laws.

Just as these connections between generosity, influence, and affluence can lead to a compounding of the benefits for better-situated households, it can similarly lead to a compounding of the economic and social disadvantage of households without these traits. Low-income, low-harvest households in Kangiqsujuaq have few means to build reciprocal sharing ties, and even less to engage in signaling through wide distributions of food. Many employed persons in Kangiqsujuaq readily express how much they value their jobs. These sentiments reflect the importance of employment for living a full life in the settlement, which means being able to give country food away as well as receive it. Low-income, low-harvest households in

general are unable to participate fully in the traditional economy because they are unable to give (in kind or otherwise).

These data suggest that Kangiqsujuaq is characterized by relatively high levels of inequality (Figure 5), particularly when it comes to harvesting. Sharing does redistribute resources in the settlement, but not sufficiently to create equal opportunities for all. On the contrary, giving food creates obligations (for example, to reciprocate in kind, to pay for gas next week) that benefit those with the resources required to be generous. These results resonate with studies of the relationship between group leadership and cooperation (Glowacki and von Rueden 2015; Hooper et al. 2010; Powers and Lehmann 2014), and provide support for recent anthropological research on the evolution of inequality (Borgerhoff Mulder et al. 2009; Bowles et al. 2010; Mattison et al. 2016).

In possibly the only major work on socioeconomic inequality among Inuit, Mitchell (1996) argues that Canadian Inuit today are characterized by two social classes: “the native corporate elite,” and others whom she characterizes as “simple commodity producers.” Using extensive historical evidence, Mitchell argues that the process of contact, sedentarization, community organization, and land claims settlements led to the gradual emergence of Inuit leaders among those who interfaced with whalers, traders, and eventually, Canadian government officials. These “corporate elite” enjoy economic and political advantage as a result of their collaboration with outside capitalists. This model provides an interesting perspective on the role of capitalist and colonial influences in shaping Inuit nationalism and in providing the substrate for an emergent class structure. However, although the results presented here also suggest that Inuit settlements are characterized by substantial social and economic inequality, the corporate elite model cannot explain the persistence of the mixed economy in its current form, in which

local affluent households—not the most marginalized households—are the most engaged in subsistence production (see also BurnSilver et al. 2016). In other words, an analysis that focuses exclusively on “top-down structures” (i.e., the role of the Canadian state) in influencing economic and political development in Arctic settlements, does not make sufficient room for “bottom-up structures” resulting from interactions between Inuit themselves.

Hervé (2015) provides key insight into these bottom-up structures by identifying the interactional nature of power and influence among Inuit. She argues that persons who accumulate material resources, social relations, and knowledge are obligated to assist others, but are also listened to, and thus, power among Inuit is produced by wealth (Hervé 2015: 365). This conclusion is supported by the analysis presented here, which links traditional food sharing (specifically, giving away food) with political success and socioeconomic status. However, the influence of individuals depends on the cooperation of others, and Inuit leaders are only recognized as such when they take into account the needs of others (Hervé 2015: 332; Oosten 1986). Differences in wealth and power come with substantial obligations and responsibilities.

Despite the omnipresent rhetoric of equality, Inuit are decidedly non-egalitarian, and this is not simply a result of settlement and colonial influence (Hervé 2015). Early explorers and ethnographers (e.g., Hawkes 1916; Stefansson 1913) may have had difficulty detecting Inuit sociopolitical organization because of its informal nature. Later ethnographers, historians, and archaeologists paid more attention to variability in Inuit social structures and suggested status differentials or incipient social inequality among several groups, driven by differences in hunting skill and the need for leaders in cooperative hunting (Damas 1969; Friesen 1999; Morrison 1994; Savelle and Wenzel 2003; Spencer 1959; Stevenson 1997). Prior to settlement, material and social inequality may have been kept in check among Nunavimmiut and other Eastern Arctic

Inuit by resource limitation, mobility, and the need for cooperation over the long-term. The results presented here provide quantitative evidence of inequality among Inuit, and show that in the settlement context inequality is, perhaps surprisingly, driven in part by the redistribution of country food. The strong effect of reciprocity, particularly among food-secure super-households, means that much country food sharing is often among those who are already relatively well-situated. However, the strong obligation to share with kin means that those individuals with the resources to share *beyond* their kin groups (particularly over the radio) are uniquely able to signal a commitment to the entire community, not just their own relatives. Through such acts, affluent households are able to justify their privileged access to a much broader range of resources (e.g., gas subsidies for hunters, political and public service positions). Acts of generosity by politically-connected individuals extend to other spheres as well, in major gift distributions that take place during community events sponsored by local organizations. These distributions include prizes for games, raffles, and “candy drops” in which organizers literally shower attendees with free candy, toiletries, and household supplies ranging from feather dusters to rifle cases. These “candy drops” are reminiscent of historical harvest celebration events reported in Alaska (Fienup-Riordan 1983). Tellingly, the forms of broadcast giving that take place in Nunavik today are tied up with political office and wealth. While these patterns linking generosity and leadership reflect long-term continuities in Inuit social relations, transformations brought about by Euro-Canadian institutions, population growth, and settlement have dramatically altered the social and economic consequences of country food sharing.

This model of Inuit food sharing simultaneously explains the persistence of the mixed economy among Inuit and relatively high levels of socioeconomic inequality. Harvesting persists in Inuit settlements because Inuit economic life is inseparable from complex obligations that

integrate kinship, politics, economics and sociality. Similar arguments have been made about Inuit sharing in Nunavut, the Inuvialuit Settlement Region, Alaska, and Greenland (Bodenhorn 2000, Collings 2011, Hovelsrud-Broda 2000, Wenzel 2000); however, we expand our argument to show how the intertwining of economic and social life has consequences for socioeconomic inequality at the settlement level. The mixed economy persists because food sharing is a strategy by which privilege is expressed and maintained by those who give. In sum, Inuit food sharing is nothing less than Inuit social structure.

Store and country food are clearly not substitutable for Inuit, because the currency of foraging (and sharing) among Inuit is not simply calories. Although the dietary contributions of harvested and shared food are important for most Inuit households, country food also represents a fundamental means by which Inuit negotiate relationships with one another, and Inuit today reap economic, political, and social rewards from harvesting and sharing. The fact that food exchanges have dietary benefits to receivers in addition to the socio-political benefits to givers means that although the returns are variable, households on both ends of the spectrum have an incentive to participate in the system. Inuit society continues to be characterized not just by a foraging ideology, but by a social structure that is reinforced by foraging and sharing. Consequently, this research supports other work identifying the behavioral basis of ideology, beliefs, and values (Bourdieu 1977; Dahl 2000; Wenzel 2009). Although Inuit society has transformed dramatically over the past decades, the changes that have occurred have not eliminated the social structural contexts that allow a subsistence economy to be reproduced.

### *Sharing & levels of analysis*

Multiple mechanisms foster country food sharing in Kangiqsujuaq, and these patterns, notably the linkage of generosity and political influence, help explain the continuation of the mixed economy in the settlement, despite the substantial investments necessary for contemporary hunting and harvesting. In conclusion, we suggest that the theoretical and analytic perspective adopted in this study (the merging of human behavioral ecological models with a network approach to analyzing behavior), offers a means to reconcile the roles of structure and agency in the study of socioeconomic decision-making, by providing a connection between individual decisions and group-level patterning. The network analyses demonstrate how the ability of households to participate in different sharing strategies is affected by their economic status, and also shows that the benefits to their actions are shaped by structural factors such as kinship. Of particular significance is that the network framework reveals variability in the socioeconomic strategies available to households in Kangiqsujuaq. Food sharing among Inuit does not have a single function; rather it emerges as a complex social, political, and economic phenomenon that accomplishes different goals for actors based on their social position.

By incorporating social structure into the analysis of “cooperative” behavior, this approach addresses theoretical and methodological gaps between sociocultural anthropology and human behavioral ecology. A major distinction between human behavioral ecology and much of the rest of contemporary anthropology is HBE’s micro-level focus on individual trade-offs and decisions, rather than a top-down interest in macro-structures such as state institutions (Smith 1991). Scaling up from individual behaviors to population-level patterns is one of the biggest challenges in biology (Krause et al. 2007; Levins and Lewontin 1980; Sutherland 1996), and is perhaps one of the major challenges in the behavioral sciences generally (e.g., Coleman 1986). Although human behavioral ecologists recognize the existence of a feedback loop between

micro- and macro-scales of analysis (Irons 1979; Mace 2014; Nettle et al. 2013), behavioral decision models in HBE have not been thoroughly integrated with structural approaches (Gray 2000; Winterhalder and Smith 2000). Our results indicate the promise of network analysis tools to assist with such integration. However, while our analyses help us illuminate how broader socioeconomic patterns are linked to household decisions, the cross-sectional nature of our data means that we are unable to fully disentangle the chains of causality. We believe that the causal arrow in this case likely goes both ways: wealth enables greater harvesting and greater sharing, but sharing in turn may help sustain wealth due to the links to political influence. In the future, longitudinal network analyses will have the potential to help anthropologists more clearly unravel the complex dynamics of sharing and inequality.

Despite the limitations of our cross-sectional approach, this study provides suggestive results regarding the conjugate role of individual decisions and social structure in broader processes of social and cultural change. Food sharing among Inuit redistributes wealth, but the act of redistribution is in itself a way to create and to legitimate inequality because it reinforces patterns of social distinction in the settlement. A network approach, which treats interactions as the basis for social structure and allows the analysis of economic decisions to be situated within that social structure, thus offers particularly useful tools for challenging the “fruitless assumption that culture comes from culture” (Steward 1955: 36). Specifically, this research supports classic anthropological arguments about exchange as a “total social fact” (Mauss 1923) that permeates cultural institutions and transcends economic, political, and social spheres (Malinowski 1920; Sahlins 1963; Weiner 1992; Wiessner 2002), while simultaneously being compatible with evolutionary ecological approaches that give primacy to microeconomic trade-offs as drivers of human behavior.



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## **Endnotes**

<sup>1</sup>To create a variable representing kinship ties extending beyond parent/child and sibling relationships, a secondary kinship network was created by, first of all, creating supra-household level kinship clusters based on the parent-sibling ties represented in the close kin network. These sibling groups were then linked to the sibling groups of their parents, and where possible, the parents of their parents. The resulting kinship groups should include, minimally, relationships to cousins, aunts/uncles, and grandparents/grandchildren. Some households with only more distant kin ties in the community were assigned to kinship groups based on their last names.

<sup>2</sup>In exponential random graph modeling, simulated networks are created in a manner analogous to flipping a coin with different weights, based on the predictors in the model, for all the possible edges in the network. The distribution of simulated network properties are then compared to the empirical network to assess whether the predictors in the model are able to replicate the observed network structures. Unlike traditional statistical methods, ERGMs can account for non-independence of social relations. Harris (2014) and articles in Handcock et al. (2008) provide good overviews of the logic of ERG modeling and of model fitting procedures.

<sup>3</sup>The magnitude, standard errors, significance and confidence intervals of regression coefficients were considered as well as model AIC (using the function stepAIC) to determine which variables to include in the final models

presented here. Regression diagnostics were examined for all models presented; adjustments to the models, such as removing outliers and transformation of the variables, are noted wherever they were required.

<sup>4</sup>The ERGM presented here is the model with (a) the minimum number of control parameters needed to generate random networks with comparable structure (i.e., number of edges, degree distribution, and shared partnerships); and, (b) the lowest AIC obtained for a model with those control parameters and the set of predictor variables considered.

<sup>5</sup>Variables considered in the model building process include: kinship, the physical distance between households, harvest production, ownership of hunting vehicles, household annual income, giving of food over the radio, household food security, age of the oldest household member, whether the household was headed by a single female, the size of the household, the workplaces of people in the household, if a household member had ever been elected to the municipal council, and whether a member of the household was currently a member of an elected village council. The effect of each of these terms on both giving and receiving for households was considered in the model fitting procedure, as well as the effect of shared group membership (homophily) where relevant. For example, homophily was examined among super-households to assess whether generalized reciprocity might operate within this sub-group of households. In addition, a variable representing the combination of a household's harvest production level (Low, Middle, or Super) and food security status (Secure/Insecure) is used to represent different strategies of engagement in the cash and subsistence economies. Three terms (edges, in-degree(0) and GWESP) are included in the model as control parameters. The geometrically-weighted edgewise shared partnerships (GWESP) model term is included to control for transitivity in the network (Hunter and Handcock 2006; Hunter 2008). The reciprocity terms models the likelihood of a tie in one direction, given that a tie already exists in the other direction.

<sup>6</sup>To assess whether contingency might occur only within certain groups, terms for reciprocity for kin groups and harvest production groups were also examined. However, this analysis revealed that a global model term for reciprocity was a more parsimonious explanation of network structures. Although the model therefore suggests that contingency is important for all sharing ties, this conclusion is affected by the limitations of current implementations of ERG modeling. The mutual model term in the package *ergm* (Handcock et al. 2003) can calculate reciprocity within groups based on node-level covariates but terms for reciprocity based on network covariates cannot be included independently.

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Table 1: Summary of ERGM of country food sharing

Model parameter	Term type	Coef.	S.E.	Odd-ratio	p-value
Edges (intercept)	Control term	-7.202	.328	.001	<.001
In-degree(0)	Control term	-1.690	.725	.184	.020
Close kinship	Edge covariate <sup>b</sup>	3.052	.146	21.165	<.001
Kin groups	Edge covariate	1.269	.130	3.557	<.001
Distance (m)	Edge covariate	-.001	.000	.999	<.001
Harvest production (Mid)	Node out-factor <sup>c</sup>	.511	.164	1.666	.002
Harvest production (Super)	Node out-factor	.858	.208	2.359	<.001
Hunting vehicles	Node out-covariate <sup>c</sup>	.051	.028	1.052	.070
Annual income (per \$10000)	Node out-covariate	.057	.021	1.059	.006
FM giving	Node out-factor	.228	.114	1.256	.045
Food security	Node out-factor	-.347	.154	.707	.025
Workplace A	Node out-factor	.476	.151	1.610	.002
Workplace B	Node out-factor	.340	.110	1.405	.002
Hunting vehicles	Node in-covariate <sup>c</sup>	-.100	.029	.905	<.001
Age oldest HH member	Node in-covariate	.037	.004	1.038	<.001
Single female-headed	Node in-factor <sup>c</sup>	.536	.119	1.709	<.001
I-Low to I-Mid <sup>a</sup>	Node attribute mixing <sup>d</sup>	.777	.442	2.174	.079
I-Mid to I-Low	Node attribute mixing	.969	.355	2.635	.006
I-Mid to S-Low	Node attribute mixing	-2.454	.030	.086	<.001
I-Super to S-Low	Node attribute mixing	.999	.370	2.716	.007
S-Super to I-Super	Node attribute mixing	.675	.360	1.965	.061
S-Super to S-Low	Node attribute mixing	.805	.248	2.237	.001
S-Super to S-Mid	Node attribute mixing	.663	.236	1.940	.005
S-Super to S-Super	Node attribute mixing	.988	.252	2.686	<.001
Reciprocity	Dyadic dependence <sup>e</sup>	1.577	.217	4.841	<.001
GWESP (alpha=0.1)	Dyadic dependence	.571	.089	1.770	<.001

Null deviance = 16622, df = 11990

Residual deviance = 2613, df = 11964

Log-likelihood = -1306.268

AIC = 2664.537

<sup>a</sup> I = food insecure, S = food secure, Low/Mid/Super refers to household harvest production levels

<sup>b</sup> Edge covariates are terms describing the nature of the relationship between two households, for example, the distance in meters between two households.

<sup>c</sup> Node in-/out- terms reflect the impact of household-level attributes on tie formation. Out/in refer to terms that affect outgoing ties (giving) vs. incoming ties (receiving). Covariates are numeric predictors while factors are categorical.

<sup>d</sup> Node attribute mixing terms model the probability of ties between households with specific combinations of attributes.

<sup>e</sup> Dyadic dependence terms model the effect of ties on other ties. Reciprocity refers to the increased probability of a mutual tie. GWESP, Geometrically-Weighted Edgewise Shared Partnerships, models the increased likelihood of two households having a tie if they have a partner in common.



Table 2: Logistic regression results for historic council membership and 2013 council memberships

Model parameter	2013 councils					Historical council				
	Retained?	Odds-ratio	Coef.	S.E.	p-value	Retained?	Odds-ratio	Coef.	S.E.	p-value
Intercept	Yes	<0.001	-7.708	1.915	<0.001	Yes	<0.001	-16.747	4.171	<0.001
Sharing network out-degree <sup>a</sup>	No	—	—	—	—	Yes	4.970	1.604	0.684	0.019
Super-HH <sup>b</sup> (0/1)	No	—	—	—	—	No	—	—	—	—
Harvesting HH (0/1)	No	—	—	—	—	No	—	—	—	—
Food secure (0/1)	No	—	—	—	—	No	—	—	—	—
HH income per \$10 000 <sup>a</sup>	No	—	—	—	—	No	—	—	—	—
# hunt vehicles <sup>a</sup>	Yes	11.355	2.430	0.983	0.013	Yes	4.893	1.588	0.753	0.035
Mean HH age <sup>a</sup>	No	—	—	—	—	Yes	20.346	3.013	1.003	0.003
Single-female headed (0/1)	No	—	—	—	—	No	—	—	—	—
HH size <sup>a</sup>	No	—	—	—	—	No	—	—	—	—
FM giving (0/1)	Yes	24.336	3.192	0.978	0.001	No	—	—	—	—
Historic council member (0/1)	Yes	8.209	2.105	0.922	0.022	N/A	—	—	—	—
# of other HH with close kin	No	—	—	—	—	No	—	—	—	—
Kinship group size	No	—	—	—	—	No	—	—	—	—
Null deviance = 87.333, df= 108					Null deviance = 103.907, df= 108					
Residual deviance = 43.129, df= 105					Residual deviance = 62.113, df= 105					
Model vs. null deviance: $\chi^2 = 44.204$ , p < 0.001					Model vs. null deviance: $\chi^2 = 41.369$ , p < 0.001					

<sup>a</sup> These variables that were log-transformed ( $\log(x+1)$ ) in the model.

<sup>b</sup> HH = household.

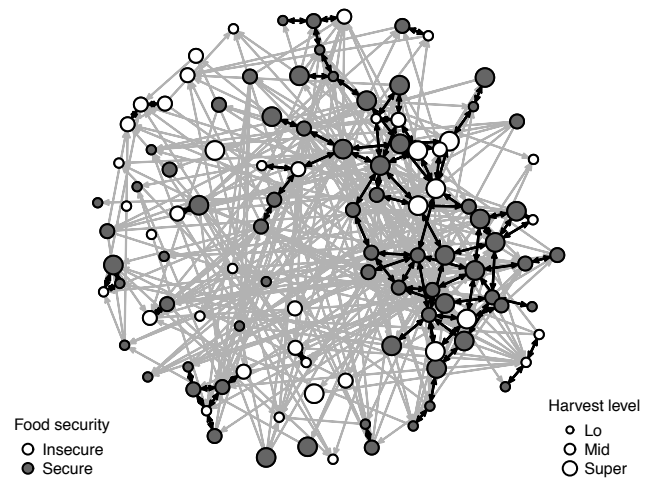
Figure 1: Kangiqsujuaq country food sharing network. Households color-coded by food security status, nodes sized by harvest production level (Low/Mid/Super). One-way ties shown in grey, reciprocal ties in black.

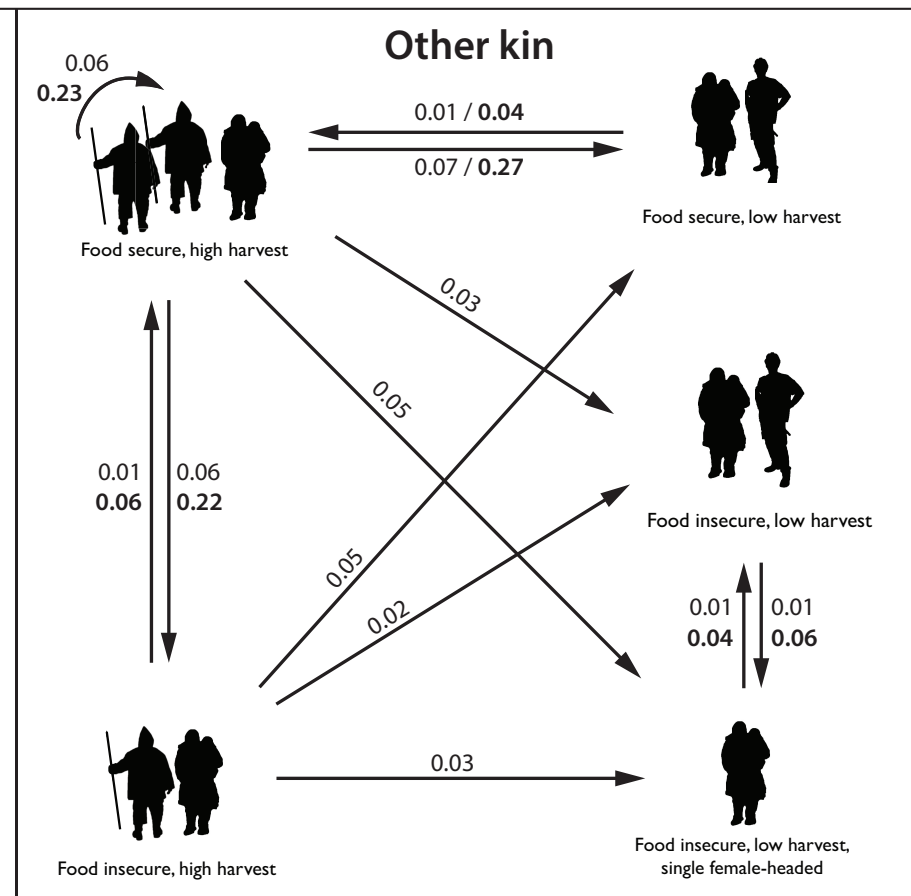
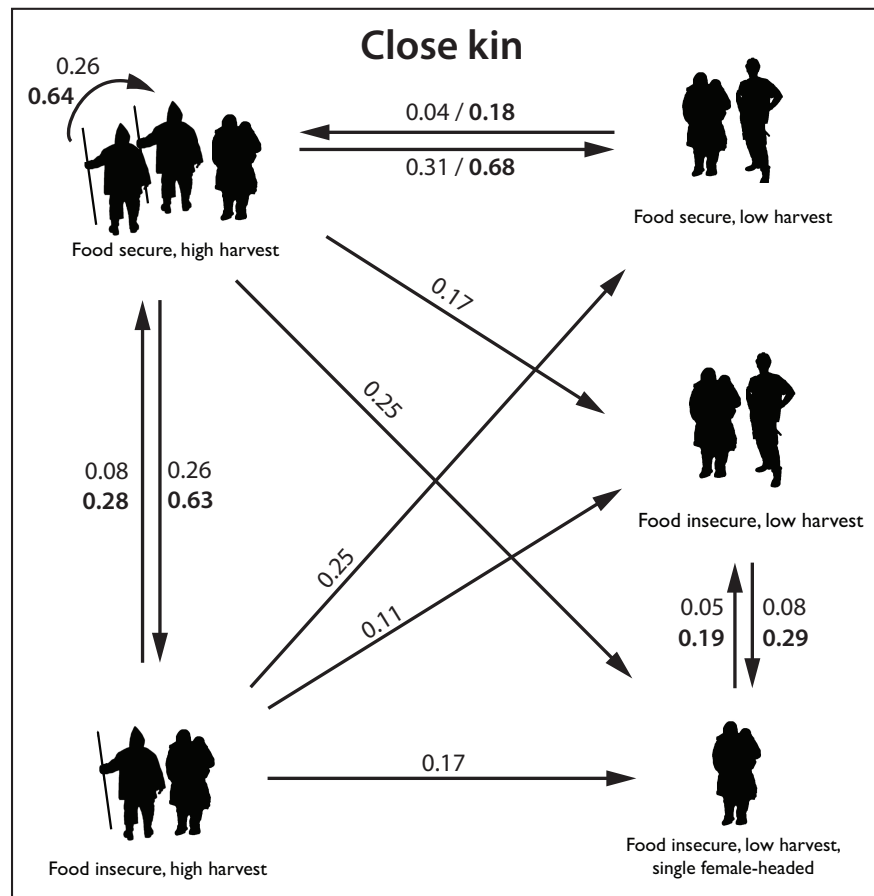
Figure 2: Examples of ERGM tie probabilities between different household types. Distance between households, household income, age of the eldest household member, FM giving, and workplace are held constant in these examples, which show only the effects of close vs. distant kinship, food security, harvest production and hunting vehicle ownership, and single female household heads. Households were assigned the median number of hunting vehicles for their demographic (5 for food-secure super-households, 2 for food-insecure super-households, and 1 for the other groups shown). Bold numbers indicate the effects of reciprocity on the probability of a tie: if  $a \rightarrow b$  is completed, then  $b \rightarrow a$  has an enhanced probability.

Figure 3: Characteristics of Kangiqsujuaq 2013-2014 council members and non-members

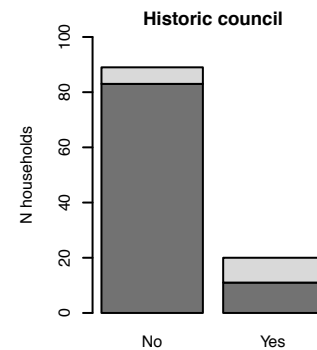
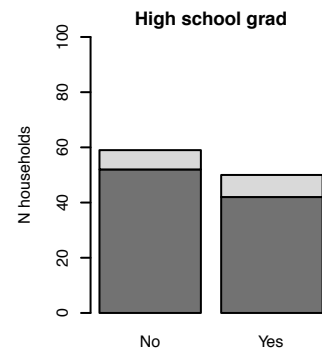
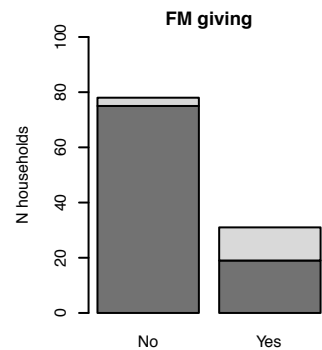
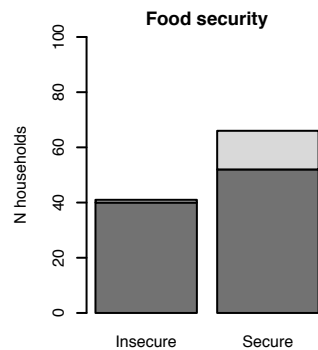
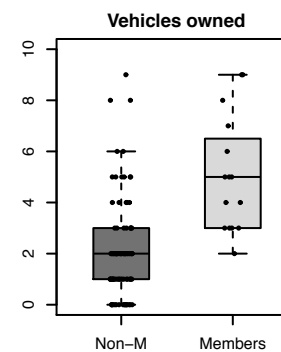
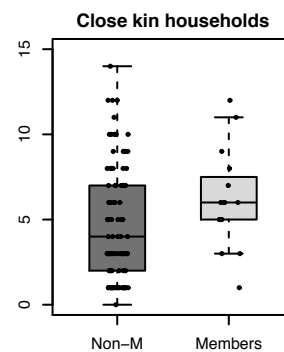
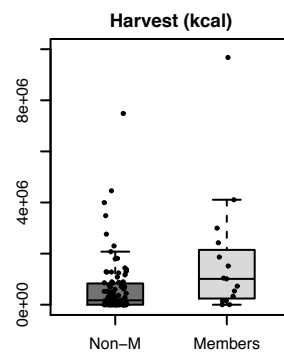
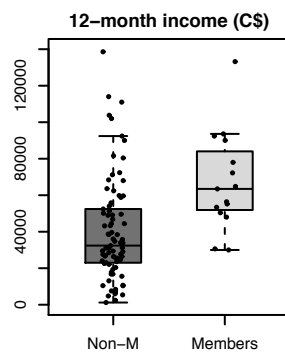
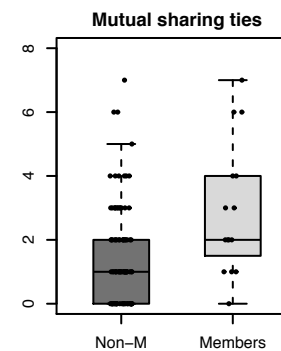
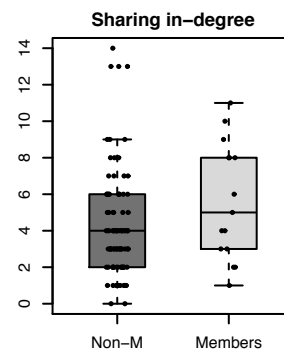
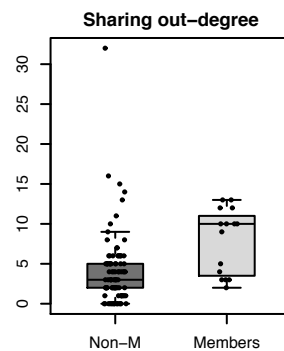
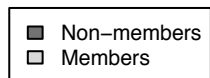
Figure 4: Kinship network positions of past and present local council members. Black nodes are council members. Nodes in (a) sized by total length of tenure of household members on the council, in (b) by number of 2013 council positions held by household members.

Figure 5: Lorenz curves showing the distribution of several forms of wealth in Kangiqsujuaq.  $G$  = Gini coefficient. Although almost all households participate in some harvesting, the harvest curves refer to the household's take of four important food species (ringed seal, geese, beluga, and caribou).

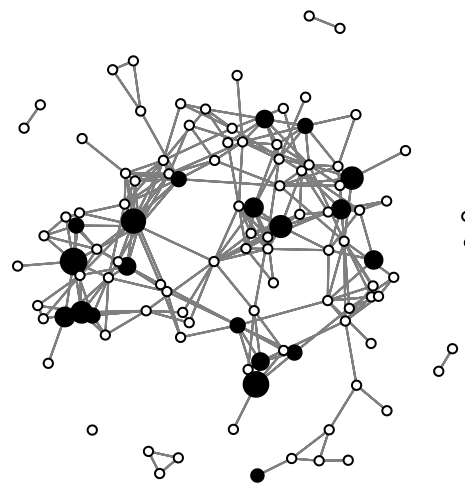




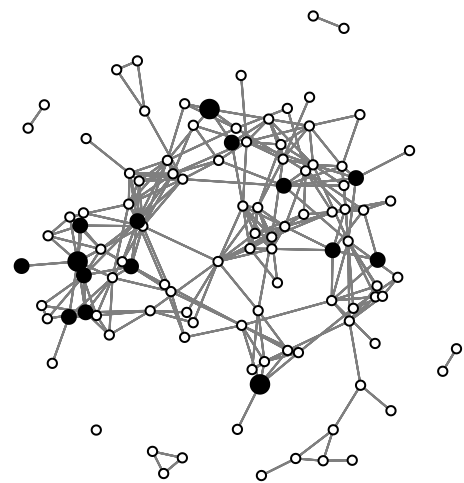
## 2013 councils



**(a) Historical council**



**(b) 2013 councils**



### Inequality across economic indicators in Kangiqsujuaq

