Household food sharing is an important part of current smallholder food systems. However, we do not currently understand the full social network of food sharing in a village and how infrastructure connectivity shapes these networks. To this end, we evaluate the full network structure of two villages in Zambia: one within biking distance to a food market on a tarmac road, the other within walking distance to a food market off a tarmac road. Both villages are fairly isolated (one off a tarmac road by less than 10 kilometers, the other off a tarmac road by approximately 25 kilometers) and consist of roughly 50 households. The seasonal food, maize, livestock, non-food, and labor sharing practices from the agricultural year 2017-2018 were analyzed via household surveys. The impact of a household’s network properties on its Food Consumption Score (FCS), Household Dietary Diversity Score (HDDS), and Reduced Coping Strategy Index (rCSI) were determined to see how access to a sharing network impacts household food security. Our study shows that the presence of a household sharing network increases household food security by increasing the households’ FCS and HDDS scores and decreasing the need for rCSI strategies (other than borrowing food from a neighbor). Additionally, we show that the classic gravity model of trade is applicable at the household level, which means that prediction of household food sharing can be accomplished with household income and distance variables. To our knowledge, this is the first study that determines the applicability of the gravity model of trade for the household level. These results highlight the important and efficient role that food sharing may play in future food security strategies and indicate a powerful tool to predict household level food sharing.