Research Article

Mapping the Possibilities: Using Network Analysis to Identify Opportunities for Building Nutrition Partnerships Within Diverse Low-Income Communities

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ABSTRACT

Objective: To identify communication and collaboration patterns among organizations involved in nutrition education within an ethnically diverse low-income community.

Design: A snowball sample methodology was used to identify 27 organizations involved in nutrition activities in the community. The researchers conducted an online survey and network analysis to identify communication and collaboration patterns among these organizations.

Setting: An urban neighborhood in Honolulu, HI.

Participants: Individuals responsible for nutrition activities at state, county, and nonprofit organizations.

Main Outcome Measures: Network structure, betweenness, and centralization.

Analysis: Communication was uncentralized and collaboration was limited. Collaboration was affected by differences in mission, location, and population served. Child care/youth development organizations and community health centers provided links across the community. Agencies serving different ethnic populations were poorly linked and located on the periphery of the network. Ethnic-specific churches expressed strong interest in nutrition partnership but were not identified as potential partners by other agencies in the network.

Conclusions and Implications: Limited communication between agencies serving different populations in the same community may result in missed opportunities for collaboration. Network analysis is an effective tool for identifying these gaps and helps build community capacity for improving nutrition outcomes.

Key Words: social networking, community networks, community development, community health education, Supplemental Nutrition Assistance Programs (*J Nutr Educ Behav*. 2015;47:300-307.)

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INTRODUCTION

Demographic trends suggest that the US is on the path to becoming one of the most ethnically diverse nations in the world. Between the 2000 and 2010 censuses, 5 states became majority–minority states, in which no single ethnic group was a majority.[1] States in which diversity is increasing rapidly are those where population growth is the strongest,[2] and it is in these low-income and diverse communities that obesity and diabetes rates are rising most rapidly.[3] Ethnic community agencies providing culturally and linguistically consonant services may be one of the best ways to reach these populations.[4] However, ethnic community agencies often struggle with limited access to resources outside their own communities.[5] Building collaborative networks for addressing shared nutrition concerns across diverse communities could strengthen these agencies' capacity to support behavior change.[6,7] Because community organizations link families to resources not contained within their own social networks,[8] bridges between diverse organizations may diffuse health resources and messaging across the community's social boundaries.

Within a multiethnic community, however, connections between agencies working with different populations may be weak. There are currently no data on how organizations addressing nutrition among different populations in ethnically diverse neighborhoods communicate or collaborate on nutrition issues.

Social network analysis is an emerging tool that can be used to assess the structure and characteristics of links between organizations.[9] Network analysis can uncover links between groups, map communication pathways, and identify opportunities for improving collaboration. Network studies have been used to identify communication patterns between agencies working in statewide

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tobacco prevention[10] and physical activity promotion[11] efforts, to track patterns in partnership between organizations involved in regional and international health collaborations,[12] and to assess changes in regional partnership patterns among Supplemental Nutrition Assistance Program–Education (SNAP-Ed) agencies.[13] Network analysis may prove a useful diagnostic tool for building nutrition partnerships within complex communities.

This study was conducted in a low-income, urban community in the state of Hawai'i, one that contains established Native Hawaiian, Filipino, and Samoan families intermixed with recent immigrant populations from many Pacific Island and Asian nations.[14] Within this neighborhood of 5 square miles, ethnic populations tend to be served by their own faith-based and ethnic community agencies, whereas social service, health, and governmental agencies provide services across populations. This study employed social network analysis to identify existing patterns of collaboration on nutrition issues such as food insecurity, healthy food access, nutrition education, and other primary prevention programs that address obesity, diabetes, and diet-related chronic disease risk within the community. The results should provide information on patterns of interagency connection within ethnically diverse neighborhoods and suggest paths for strengthening collaboration.

METHODS

Study Design

This study contained 2 phases: community interviews to identify key organizations for nutrition partnerships, and a network analysis to map existing communication and collaboration patterns among these organizations. This study was submitted to the University of Hawai'i's Institutional Review Board; institutional review board review determined that the study was not human subjects research, as per US Department of Health and Human Services guidelines.

A key methodological issue in network research design is whether to use a fixed list or expanding list sample.[9] In a fixed list sample the researcher defines the boundaries and components of the network.[12] A fixed list sample is often used in coalition assessment because it prompts participants to recall agencies with which they rarely link, providing data on both strong and weak links in the network. Because the network is predefined by the researcher, however, this sampling method increases the possibility of sampling bias. An expanding list sample uses a snowball methodology. This technique identifies each agency's most active connections, and because it is participant rather than researcher driven, it may reduce sampling bias. However, because participants may forget agencies with which they connect infrequently, information about weaker ties may be lost.

This study combined both methodologies. The researchers used reputational snowball sampling to identify organizations involved with nutrition activities in the community.[15,16] Sample generation began with key informants at 6 agencies known to provide nutrition education to different ethnic groups in this community. Each was interviewed about their agency's nutrition activities and then asked to identify all other agencies involved in nutrition activities in this neighborhood, along with a contact person knowledgeable about the agency's nutrition activities. Those contacts were interviewed and this process was repeated until further interviews yielded no new agency names. This generated a list of 28 agencies, providing the initial fixed list sample for the network survey. During fielding, 1 evangelical church indicated that it did not view nutrition as part of its mission; thus, it was removed from the study, which resulted in a final fixed list sample of 27 agencies.

Network Survey Procedures

Participants were contacted by phone and e-mail and were e-mailed a link to an online survey using Qualtrics survey software (Qualtrics Research Suite, Qualtrics Labs, Inc, Provo, UT, 2011). Up to 6 follow-up contacts were made to encourage survey completion, resulting in an 85% response rate.

Survey Measures

The survey asked participants to identify from a close-ended list their organization's primary activities and the populations they served, the frequency of communication and degree of collaboration between their agency and each of the other agencies in the sample, and the degree to which they felt that their agency shared goals with each of these other agencies.

Communication and collaboration questions were used to develop matrices for the network analysis. Participants were asked to identify how often their agency communicated (including meetings, phone calls, and e-mails) with each of the other agencies in the sample, using a 5-item ordinal scale that ranged from *not at all* to *once a week or more*. Participants were asked to define the relationship between their agency and each of the other agencies, using an ordinal 7-item collaboration measure adapted from the work of Slonim et al.[17]

Data Analysis

Data cleaning and resolution of missing values. Survey data were exported into SPSS (IBM SPSS Statistics for Windows, version 20.0, Armonk, NY, 2011) for cleaning and data exploration. Data on each agency's primary activities and mission were used to create a variable assigning that agency to an agency type. Agencies were grouped by type and descriptive statistics were generated showing the percentage of agencies within each agency type that engaged in each activity.

Because network measures required that each agency rate its frequency of communication and level of collaboration with every other agency, 2 responses were generated for each agency pairing and merged to create a single value representing the agency dyad. In network studies, it is common to find discrepancy in response between respondents in a dyad. Two methods are customarily used to reconcile these differences: averaging and reconstruction.[10] In this study, the authors used averaging to resolve small discrepancies. For example, if Agency A said its agency communicated with Agency B weekly (5 on the communication scale) but Agency B said its agencies communicated quarterly (3 on the communication scale), the midpoint between the responses