

The reach and flow of health information in two Aboriginal communities: a social network analysis

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Abstract. The aim of the present paper was to explore how social networks enable dissemination of health information within two Aboriginal communities in New South Wales. The study design was modelled on a social network analysis socio-centric model. Data collection was conducted primarily by Aboriginal community members who were trained as community researchers. Participants reported on their patterns of interaction and who they provided or received health information from, and awareness of the *Aboriginal Enhancement of the Get Healthy Information and Coaching Service*. In total, 122 participants across two sites participated in the study. Aboriginal Community Controlled Health Services (ACCHSs) and Aboriginal Community Controlled Health Organisations (ACCHOs) were cited as the main provider of health information in both sites. Between-ness, degree and closeness centrality showed that certain community members, ACCHS and ACCHO within the two communities in the present study were considerable enablers [actors] in enhancing the reach and flow of health information to their respective Aboriginal community. There is potential for future health-promotion activities to be increasingly targeted and effective in terms of reach and influence, if guided by local Aboriginal organisations and by key Aboriginal community members within and across family networks and communities.

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Introduction

The Aboriginal population of New South Wales (NSW) has significantly poorer health outcomes than does the non-Aboriginal NSW population. Chronic disease is an area where the disparity remains the highest, which can largely be attributed to social determinants and, consequently, poor lifestyle behaviour (Centre for Epidemiology and Evidence 2012). It is therefore of high importance to address this disparity for not only the social justice of health equity, but also for the economic rationale of reducing health care costs from chronic disease management and high hospital admission rates for the Aboriginal population (Ong *et al.* 2009).

The *Get Healthy Information and Coaching Service* (GHS) is a free and confidential telephone-based service that provides information and ongoing support to NSW adults in relation to healthy eating, physical activity and weight management (O'Hara *et al.* 2012).

In January 2013, the GHS funded the Aboriginal Health & Medical Research Council of NSW (AH&MRC) to encourage

Aboriginal Community Controlled Health Services (ACCHSs) or Organisations (ACCHOs), to promote the *Aboriginal Enhancement of the Get Healthy Information and Coaching Service* and increase referrals into the GHS. Although there are several options for evaluating health-promotion strategies, there has been little research on the reach of Aboriginal health programs. Aboriginal community networks, particularly in an urban setting, can be dispersed over vast geographical areas, with the strength of the network based on kinship and established community relationships and associations (Holmes *et al.* 2002). The role of families in Aboriginal health has been documented and will be further explored in the present paper (Tsey *et al.* 2005).

The purpose of the present study was to explore how social networks enable dissemination of health information within communities and to understand awareness of the GHS following promotion by the ACCHS. Social network analysis (SNA) is a method of mapping and analysing this network and is, therefore, useful in determining the reach and effectiveness of promotions,

What is known about the topic?

- Aboriginal Community Controlled Health Organisations are ideally positioned to facilitate access to health information and education within the Aboriginal community.

What does this paper add?

- Aboriginal community members are a strong conduit for facilitating the transmission of health information and education to other Aboriginal community members.

social marketing and the connections that exist among people in a community (Freeman 2004).

Methods*Social network analysis*

Individuals are connected to one another in numerous ways. These patterns of connection form a social space often referred to as a network. Social network analysis investigates the social construct of a group of people and organisations and how the relationships function among these groups.

The design of the study was a SNA socio-centric model to analyse the network of the defined study population. A socio-centric model of analysis looks at all relationships in a single bounded community (Hawe *et al.* 2004). The patterns of interaction were explored to explain the flow and reach of health information including GHS Aboriginal Strategy and to investigate where the concentration of power lies or, in other words, who are the main providers of this information.

Interpreting social network maps

A primary use of network maps in SNA is to identify the influential and important people in a network. The network maps in the present study illustrate the relationships among individuals in the chosen population group (Wasserman and Galaskiewicz 1994).

The primary measures used in the study to explore the interactions among community members are all related to centrality. Centrality tells us who and how important the individual is in the network. The three centrality measures used to analyse the network are degree, between-ness and closeness (Borgatti 2005).

All three centrality measures were explored to understand how health information flows and reaches those within the network.

Degree centrality measures the number of ties that an actor (community members) has with other actors and is interpreted in terms of the immediate contact for receiving information through the network or the information flowing through the network (Borgatti 2005).

Between-ness centrality is a measure of how often a node intersects a path between two direct nodes. The greater the between-ness centrality the more control that actor has in passing and sharing information. This reflects the 'bridging role' that the actor has in communicating knowledge and the power over which they can control the spread of information (Borgatti 2005).

Closeness centrality determines how closely linked an actor in the network is to everyone else within the network and can be regarded as a measure of how long it will take to spread information sequentially among actors. The smaller the score, the closer the actor is to all other actors in the network, thus illustrating how quickly an actor can interact and communicate with others in the network (Borgatti 2005).

Statistical analysis

Ucinet, ver. 6 (S. P. Borgatti, M. G. Everett and L. C. Freeman, Analytic Technologies, Harvard, MA, USA), and Netdraw, ver. 2.138 (S. P. Borgatti, Analytic Technologies, Lexington, KY, USA), were used to compute and analyse the data and network maps.

Ethics approval

The study was approved by the AH&MRC Ethics Committee, project number 926/13.

Site selection

The AH&MRC facilitated the recruitment of sites by offering an expression of interest to the 24 ACCHSs who had participated in promoting the GHS Aboriginal Strategy to 55 communities. Of those, two sites expressed interest in and were recruited for the present study.

Community researchers

Conducting research in Aboriginal community requires sensitivity, to ensure no harm is done to the community and that they benefit from the outcomes of the research (Dunbar and Scrimgeour 2006). Therefore, Aboriginal community members were recruited to be researchers through the participating ACCHS for a 2-week full time contract, which they could spread over a 1-month period.

One-day training on the research methodology and study procedures was provided before the researchers commenced data collection by an Aboriginal researcher with experience in working and training community researchers in other projects.

Recruitment

The community researchers or the ACCHS selected the first six (Site 1) or 10 (Site 2) people to be interviewed from their involvement in the direct marketing of the GHS through the respective ACCHS. These community members were the starting points in both sites.

Given that recruitment was respondent driven, community members could participate in the study only if they had been referred by another respondent and met the inclusion criteria. To be eligible, participants needed to be Aboriginal, 18 years of age or over, be contactable within the data-collection period and live in either of the two nominated sites.

During the interview, respondents were asked to provide the contact details of all individuals who they received and provided health information. They then became the next point of contact and were invited to participate in the study.

This process continued until the network was exhausted or when an end point was reached. End points were classified as when a respondent provided no more referrals, nominated an

Aboriginal Health Worker, ACCHS/ACCHO/general practitioner, nominated an individual who was outside of the inclusion criteria or if the data-collection period ended.

Research question

Interview questions were structured and included the following areas of investigation:

- (1) Who the respondent receives health information from?
- (2) Who the respondent provides health information to?
- (3) Has the respondent heard about the GHS and, if so, who is the source of information?
- (4) Interest in joining the GHS (only asked if yes to Question 3)?
- (5) Nomination of further network members (respondents) identified in Questions 1–3.

Results

A total of 122 participants across the two sites participated in the study. Of the 122 participants, 20% ($n=24$) of community members had heard of the GHS.

Site one

Site one had a total of 92 participants in the network. Recruitment started with six initial respondents who were part of the *Aboriginal Enhancement of the Get Healthy Information and Coaching Service*.

There was a total of eight participants in the network who had heard of the GHS.

Degree centrality

Health services reported at Site 1 included the ACCHS, ACCHO and GPs. The ACCHO ranked the highest degree centrality of 23, followed by the ACCHS, with a degree centrality of 21 (Fig. 1). As ‘central actors’, they had the most ties to other actors (community members), implying that the ACCHO and ACCHS were the dominant sources of information. GP degree centrality was much lower, measuring at eight, demonstrating that the GPs cited by the respondents were the least common sources of health information if compared with the ACCHO or ACCHS in this cohort.

Although health information was mainly sourced from the ACCHO and ACCHS, the influence of the information was greatest among family members. This was seen where a community member had a degree centrality of seven (circled above), which demonstrated the member’s importance in dispersing health information in this network.

Between-ness centrality

There were nine community members with a between-ness centrality greater than 100, with the highest (within the network) being 411. This demonstrated that there were several community members who played an important role in passing on health information (Fig. 2).

Many of these central actors being part of family networks are important conduits of health information within the family, and also act as bridges to other family networks within the community.

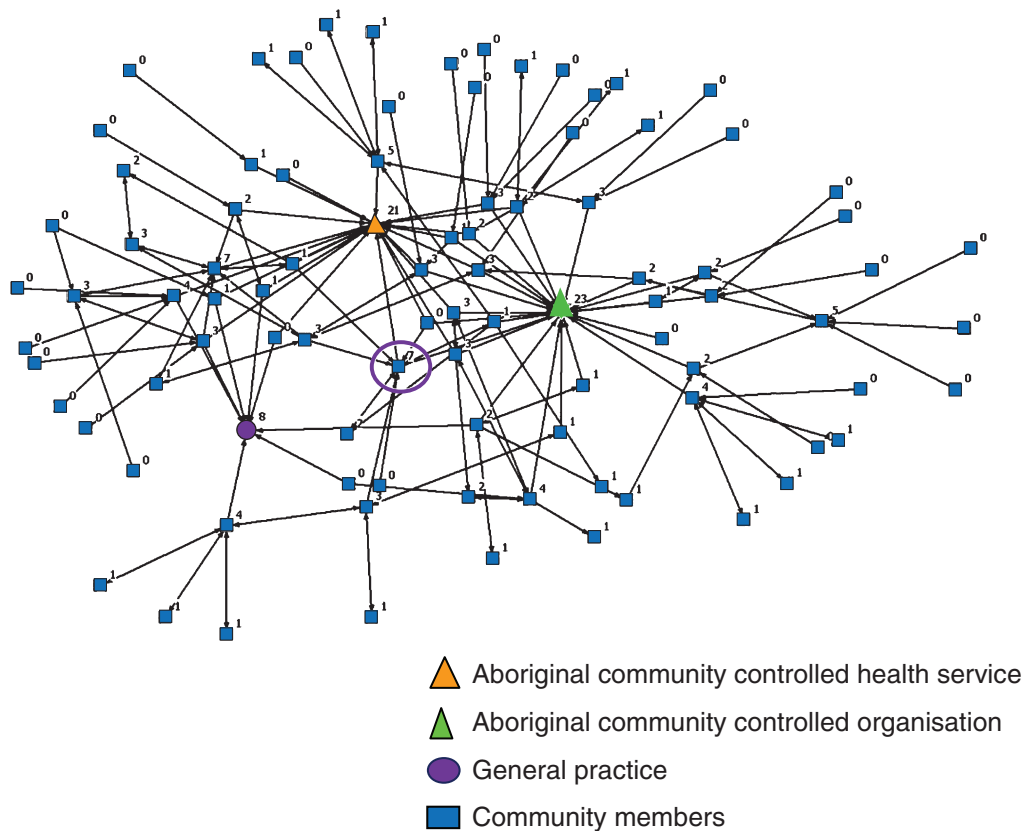


Fig. 1. Site one network map measuring degree centrality.

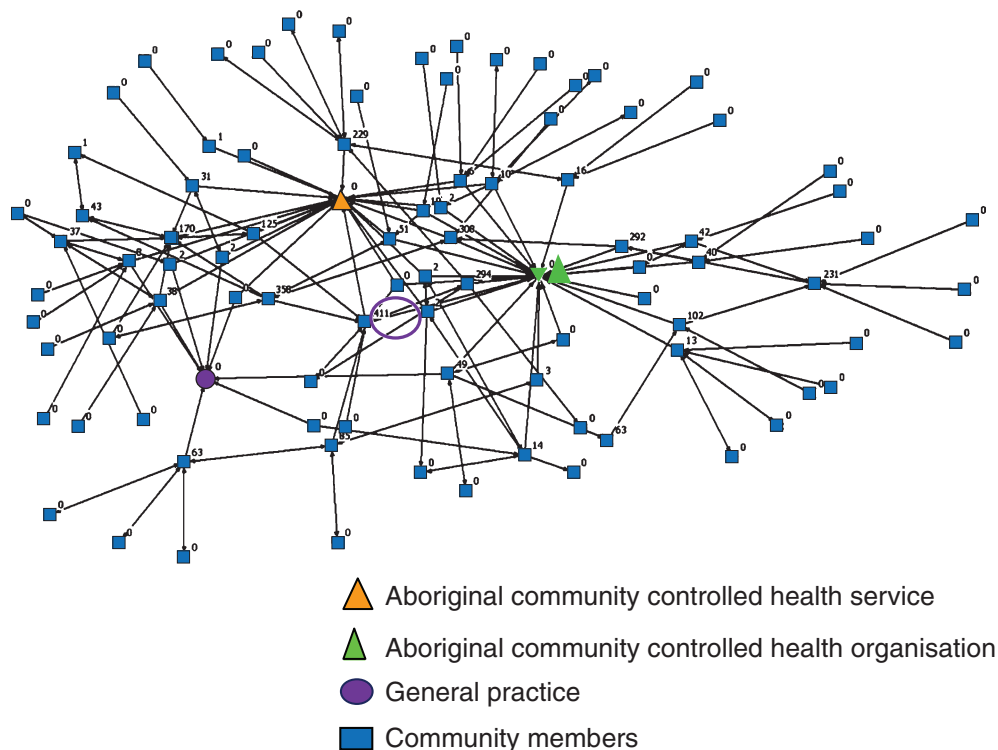


Fig. 2. Site one network map measuring between-ness centrality.

Closeness centrality

The closeness of the SNA map demonstrated that community members were most closely inter-related in the network. This map demonstrated that there were two primary community members who were the main connectors in the network. Most scores were over 7000; however, these community members had scores of 280 and 646 (Fig. 3). This means that the lower score of the community member requires 280 ties (arrows) to be connected to all the nodes in the network and, therefore, this community member is important in diffusing information in the network.

Twenty-six community members had heard about the GHS. Most had heard of the GHS from the ACCHO, followed by the ACCHS and from community members. Of these, three members had heard about the GHS from the GP.

Site two

Site two had a total of 30 participants in the network. This network began with 10 initial respondents who had been identified by the ACCHS as being exposed to the promotion of the *Aboriginal Enhancement of the Get Healthy Information and Coaching Service* project.

Degree centrality

As seen in Fig. 4, the ACCHS had the highest degree centrality of 26 and, as a ‘central actor’, had the most ties to other actors, inferring that the ACCHS was the main source of health information for the majority of the chosen population group. GPs had a low degree centrality of two. Actors lying on the

periphery of the network receive their information from a community member for whom the ACCHS is the main provider of health information. Subsequently, these peripheral actors have lesser amount of direct contact with the ACCHS.

Although the main source for health information was the ACCHS, the community members themselves can be seen dispersing information among themselves. This is more notable in the actors lying on the inner circle of the network.

There were also a couple of key community members who received information from the ACCHS (circled node in Fig. 4) and communicated this information to several others in their social network.

Between-ness centrality

Between-ness centrality measures the passing on of health information (Fig. 5). Because the ACCHS or GP were not asked about receiving information, they were not able to demonstrate passing on information, resulting in both the ACCHS and GP having a between-ness centrality of zero.

There were two prominent community members with high scores of between-ness centrality of 12 and 8 (circled in Fig. 5) who played an important role in transmitting information among other community members. They can play a role in the flow of information in the community network, as well as in who receives the information.

Closeness centrality

At Site 2, the closeness centrality of peripheral actors was generally similar and smaller in all peripheral actors (those

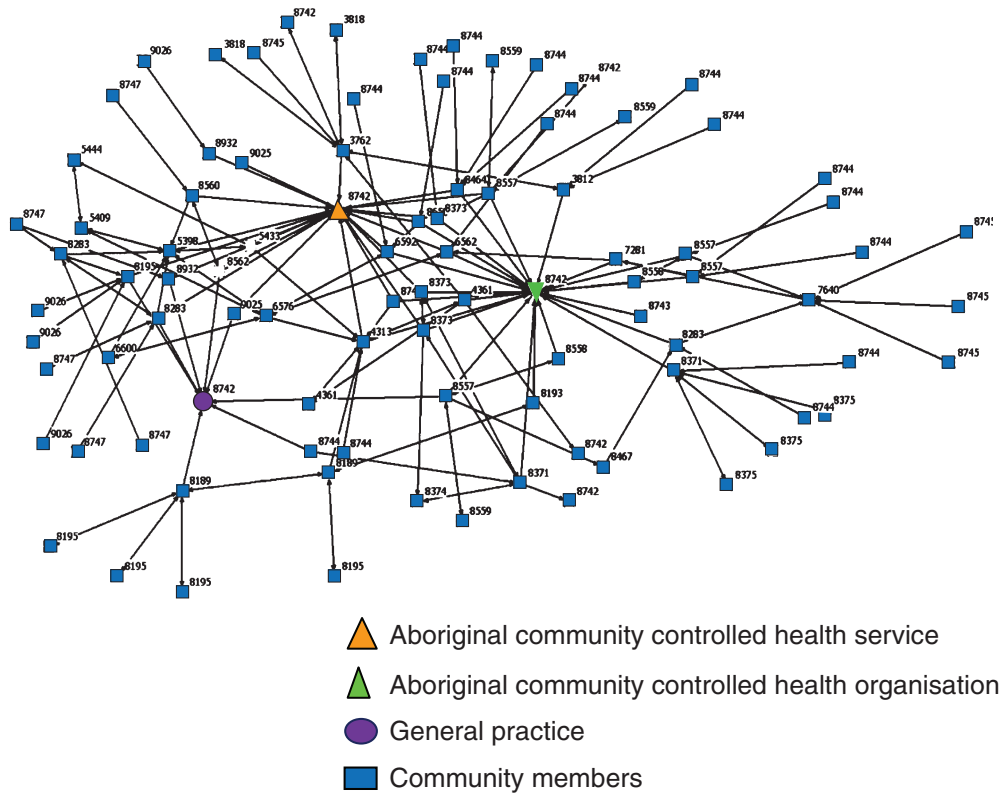


Fig. 3. Site one network map measuring closeness centrality.

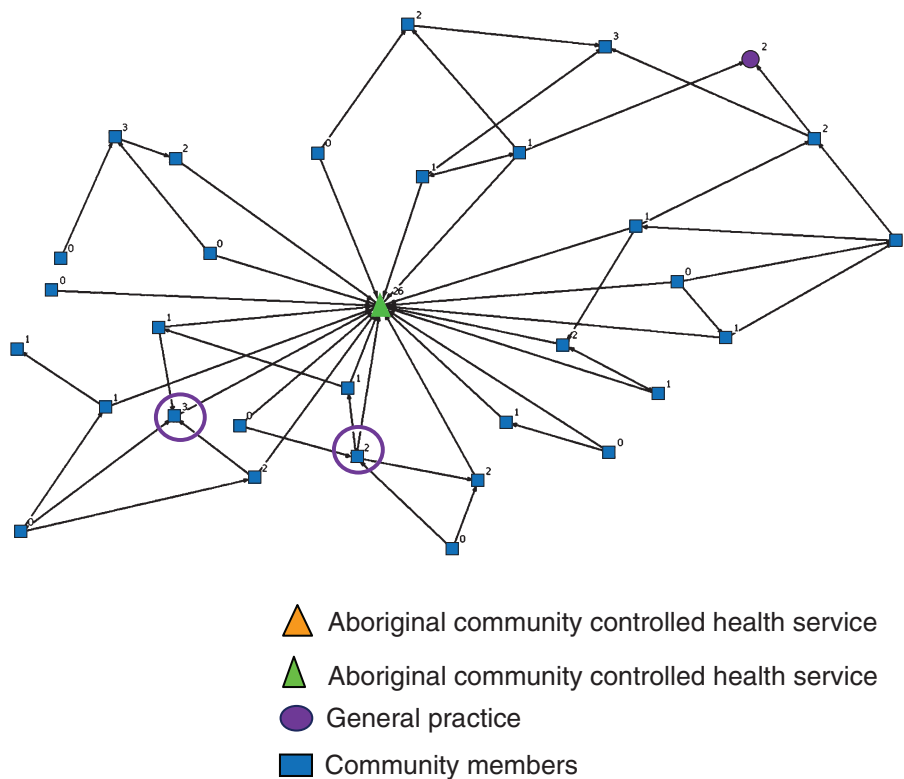


Fig. 4. Site two network map measuring degree centrality.

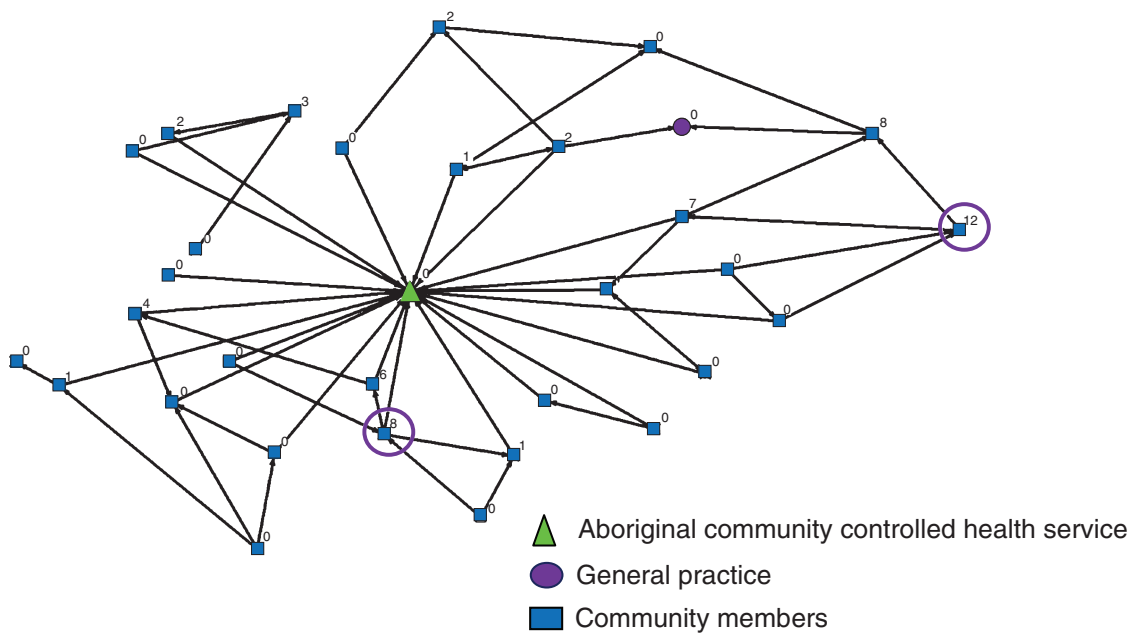


Fig. 5. Site two network map measuring between-ness centrality.

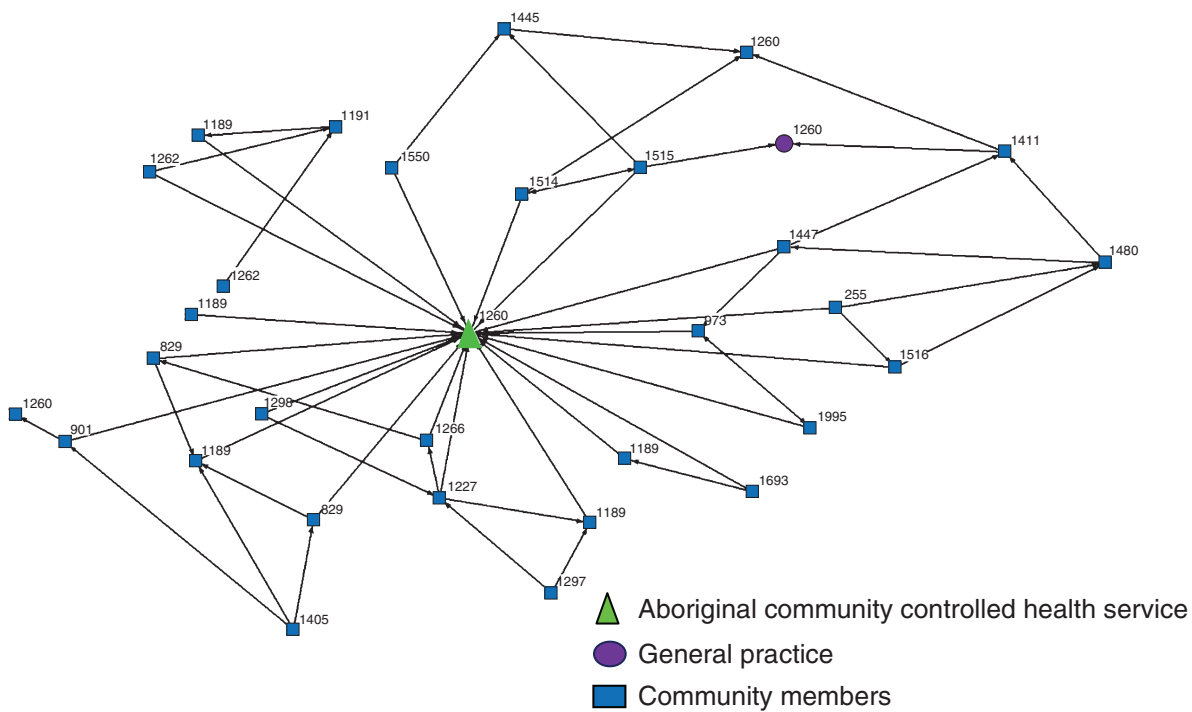


Fig. 6. Site two network map measuring closeness centrality.

lying on the outside of the network) (Fig. 6). In this small sample of community members, all actors were generally close to one another and could therefore rapidly communicate information without going to too many intermediate sources.

A majority of the community members (13) had heard about the GHS directly from the ACCHS, with the exception of three

who had heard about the GHS also from other GPs or from other community members.

The ACCHS played a key role in disseminating information on the GHS and was reliant on community members to continue to further communicate that knowledge to their family and friends. Other sources of GHS information, although not as

prevalent, included hearing about GHS from a GP or health professional.

Discussion

At both sites, the ACCHS and ACCHO were the main providers of information for the community members, despite the availability of obtaining health information from several sources within the community. This affirms the importance of the ACCHS and ACCHO as central providers of health information. The role of GPs did not emerge strongly within the two study sites as a primary source of health information.

In addition, findings reinforce the ability of Aboriginal communities to effectively diffuse information within their social networks through the strong kinship and connectedness they share with other community members (Brough *et al.* 2004). As a result, both sites show the potential of community members to widely share information within a network and the pivotal role they can play in future promotion of health activities, including the GHS.

The analysis also points to the importance of family ties in facilitating when and how information is provided to another individual through social networks (White and Jorion 1996).

There are key individuals who obtain health information directly from the ACCHS or ACCHO and communicate this to their family or friends. These individuals can be seen as the 'messengers of health information' and, because of their proximity with one another, have the ability to facilitate the spread after obtaining it from the ACCHS or ACCHO.

Health programs geared at Aboriginal communities can potentially speed up the diffusion of information and increase cost effectiveness of health-promotion activities by identifying which community members have strong ties and involving them as advocates to promote health messages. This could further build community capacity; however, it would require individual negotiation to work with community members (Rowley *et al.* 2000).

Training local community members as community researchers allowed them to bring their knowledge of the community and utilise their connections and existing relationships within the network, which increased engagement and participation within the study. By adopting this approach, the capacity of Aboriginal communities is enhanced and greater employment and work force-development opportunities may be provided (Couzos *et al.* 2005).

There were some limitations to the study, including the inability to capture some of the other sources of health information, such as the internet. The regularity of giving or receiving health information was also not explored nor was the speed at which health information was conveyed.

Although the present study did not provide all the answers on the reach and flow of health information in Aboriginal communities, it did provide a useful tool for visualising how the community operates and reinforced the strong kinship of

Aboriginal communities. Social network analysis can provide a new paradigm for planning and disseminating health information within various networks and settings. In addition, social networking analysis is able to document the strong links and ties, and transfer of information within local Aboriginal communities.

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