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An Innovative Network Approach to Coordinating a National Effort to Improve Cardiovascular Health: The Case of Million Hearts

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Abstract

Objective: To assess the structure, content, quality, and quantity of partnerships that developed in response to a national cardiovascular health initiative, Million Hearts.

Design: This study used a social network analysis (SNA) approach to assess the Million Hearts initiative network partnerships and identify potential implications for policy and practice.

Setting/Participants: The Million Hearts network comprised a core group of federal and private sector partners that participate in Million Hearts activities and align with initiative priorities. To bound the network for the SNA, we used a list of 58 organizations (74% response rate) from a previously completed qualitative analysis of Million Hearts partnerships.

Main Outcome Measures: We used the online PARTNER (Program to Analyze Record and Track Networks to Enhance Relationships—www.partnertool.net) survey to collect data on individual organizational characteristics and relational questions that asked organizations to

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identify and describe their relationships with other partners in the network. Key SNA measures include network density, centralizations, value, and trust.

Results: Our analyses show a network that is decentralized, has strong perceptions of trust and value among its members, and strong agreement on intended outcomes. Interestingly, partners report a desire and ability to contribute resources to Million Hearts; however, the perceptions between partners are that resources are not being contributed at the level they potentially could be. The majority of partners reported that being in the network helped them achieve their goals related to cardiovascular disease prevention. The largest barrier to successful activities within the network was cited as lack of targeted funding and staff to support participation in the network.

Conclusions: The Million Hearts network described in this article is unique in its membership at the national level, agreement on outcomes, its powerful information-sharing abilities that require few resources, and its decentralized structure. We identified strategies that could be implemented to strengthen the network and its activities. By examining a national-level public-private partnership formed to address a public health issue, we can identify ways to strengthen the network and provide a framework for developing other initiatives.

Keywords

cardiovascular health; cross-sector partnerships; social network analysis

The Network Approach in Public Health

One of the most promising practice-based approaches in public health is the development of interorganizational networks to attain resources and share knowledge to improve population health outcomes.¹ These partnerships are built on the understanding that poor health is caused by many different factors and that solutions must be complex and involve multiple systems.² A network approach creates an opportunity to leverage more resources, reduce costs, and create solutions for a problem that would be impossible for one organization to address on its own.³ Increasingly, “network interventions” are a useful approach for addressing complex public health issues.⁴

Although network interventions in local communities are becoming more common, regional and national network efforts to address complex health issues are relatively rare. As network efforts increase, there remains a need for guidance on how to shape, measure, and utilize these approaches strategically.⁵ Frameworks have been established to strengthen and improve networks,⁶ and methods such as social network analysis (SNA) have been used to identify the efficiency and effectiveness of these types of interorganizational network efforts, specifically focusing on the structure and management strategies as they link to outcomes of networks.⁶ A review of agenda setting for current and future systems research found that network analysis (among other systems methods) can bring new insight to dynamic and interrelated aspects of systems, specifically as a method to inform improved practice.⁷ Social network analysis was chosen as a methodological approach in this study to address these aspects of Million Hearts.

However, the availability of data and valid measures of effectiveness in cross-sector interorganizational networks is still a challenge. To better manage and strengthen networks, there is a need to build the evidence base on how networks are structured and implemented. We assessed the structure, content, quality, and quantity of partnerships that were formed within the Million Hearts initiative. Cardiovascular disease, including heart disease and stroke, accounts for more than 800 000 deaths each year.⁸ The US Department of Health and Human Services established Million Hearts, an initiative coled by the Centers for Disease Control and Prevention and the Centers for Medicare & Medicaid Services that aims to prevent 1 million heart attacks and strokes in 5 years.⁹ Million Hearts works to align cardiovascular disease prevention efforts across the United States by focusing partners on a small set of priorities selected for their impact on heart disease, stroke, and related conditions.¹⁰

Community approaches sought to eliminate artificial transfat intake and reduce sodium intake and smoking, while clinical efforts focused on the ABCS (Aspirin when appropriate, Blood pressure control, Cholesterol management, and Smoking cessation), providing direction for improving quality of care. A key strategy in achieving these targets is to coordinate the public, private, and nonprofit sectors around these shared goals. This type of coordination could scale up the adoption and dissemination of proven clinical and community strategies to prevent heart attacks and strokes through relationship building, resources and knowledge exchange, program development, data sharing, and the identification of best practices. Million Hearts works to develop strong partnerships with a variety of organizations by convening partners through regular platforms of communication and shared learning, providing support for community and clinical partners in the alignment of goals and strategies, and recognizing high performers and leaders in the field. The Million Hearts platform encourages partners to take action in cardiovascular disease prevention and work toward achieving the shared aim of the initiative. Million Hearts is a unique example of a network of organizations at the federal level, made up of national, state, local, public, and private partnerships that otherwise would not have existed.^{9,11}

We used an SNA approach to assess the Million Hearts network and discuss the implications of these findings for policy and practice. We focus specifically on several key aims: (1) assess the partnership engagement process and the level and strength of interaction among partners; (2) assess changes in activities, policies, programs, or strategies that have occurred because of Million Hearts; (3) identify facilitators and barriers of participation; and (4) compare Million Hearts with other similar networks.

Methods

In the fall of 2016, the research team launched the PARTNER (Program to Analyze, Record, and Track Networks to Enhance Relationships) SNA tool (www.partnertool.net) that includes a validated SNA survey instrument, data collection methodology, and an evaluation framework.¹² The PARTNER tool analyzes how partners are connected, how resources are exchanged, the levels of trust and perceived value among partners, and links between the outcomes and the process of collaboration. The survey was customized for this project and expanded to include additional questions. Institutional review board approval was obtained

from the Colorado Multiple Institution Review Board and the office of management and budget reviewed and approved the survey under the Paperwork Reduction Act.

Sample

The Million Hearts network comprised a core group of federal and private sector partners that regularly participate in Million Hearts activities. To identify what organizations to include in the survey (“bounding the network”), we generated a list of partners from a previously completed qualitative analysis of Million Hearts partnerships. In addition, we consulted key Centers for Disease Control and Prevention and Centers for Medicare & Medicaid Services staff with detailed knowledge of Million Hearts to identify a person from the partner organization that we believed could best answer the questions about their organization’s participation in the Million Hearts network. The resulting list included 58 organizations (with 1 representative contact person identified from each organization) that were invited to participate in the survey. Each representative from all 58 organizations was asked to respond to the survey online on behalf of his or her organizations. With multiple reminder e-mails and phone calls, the final response rate was 74%.

Measures

The SNA survey collected data on individual organizational characteristics such as type of organization, length of time participating in the network, resource contributions from the organization, outcomes (content) the network focused on, perceived level of success for accomplishing network goals, and reasons for success. The survey also contained *relational* questions that asked about the frequency (quantity) of interaction with other organizations, the quality of those interactions via perceptions of trust and organizational value for each partner organization, and the content of the interaction between network members. The relational questions allowed us to assess the structure, content, quality, and quantity of the network. Organizational relationships were indicated when a respondent picked another organization from a pre-populated list of all 57 organizations (the respondent’s own organization was not listed). Examples of these organizational descriptions and relational survey measures are listed later.

- *Demographic questions (organizational description):* Respondents noted their perceptions of the role of network members, length of time as a member, types of activities related to the initiative, changes to the organization as a result of network participation, resources contributed to the network, and role of Million Hearts in the organization’s cardiovascular disease (CVD) work.
- *Questions about the Million Hearts network:* Respondents noted their perceptions of brand effectiveness, barriers to implementation and creating a coordinated Million Hearts effort, effectiveness of strategies, and milestones achieved.
- *Relational questions:* Respondents noted all the organizations within the Million Hearts network with which their organization had an established relationship (either formal or informal) in connection with the organization’s CVD work.

Once each respondent selected their organizational partners, they were asked to respond to the following survey items:

- Description of how relationships with partners developed (specifically whether the relationship preceded Million Hearts, if Million Hearts is attributed to the relationship, and how the relationship changed because of Million Hearts)
 - Level of activity in the relationship
 - Activities partners engage in together
 - Extent of value as (a) power/influence, (b) level of involvement, and (c) resource contribution
 - Extent of trust as (a) reliable, (b) in support of the mission, and (c) open to discussion/communication
- *Open-ended questions:* Respondents noted their perceptions of the resources necessary for sustainability and suggestions for improvement.

The SNA used responses from survey items to assess measures of network density, centralization, trust, and value that are further described later.

- *Density* represents the number of connections reported between organizations. The score is presented as a percentage to describe the proportion of connections that were reported, in relation to all possible connections.
- *Centralization* represents the degree to which the network is “centralized” around a few (or many, in a decentralized network) organizations. A low score means that the network is very decentralized and that there is no obvious “hub” of just a few organizations in the network.
- *Trust* is measured with a scale that includes partners’ perceptions of whether other partners are reliable, support the network’s mission, and are open to discussion/communication. Respondents rated each partner on these dimensions, using a scale of 1 to 4: not at all, a small amount, a fair amount, or a great deal.
- *Value* is measured with a scale that includes partners’ perceptions of whether other partners have mission congruence, contribute resources, and have a time commitment to the work. Respondents rated each partner on these dimensions, using a scale of 1 to 4: not at all, a small amount, a fair amount, or a great deal.

Analysis

While not all organizations answered the survey, those that responded (74%) provided information on 57 organizations. There was 1 isolate organization that was not connected to any others, meaning they did not select any other organizations as partners and no one selected them as a partner.* Data representing the perceptions about all but the 1 isolated organization were included in the analysis.

The descriptive analysis examined the structure, content, and quality of relationships between partners in Million Hearts. The data were analyzed at the organizational, dyadic, and whole network levels. Demographic analysis was conducted at the organizational level; dyadic analysis was conducted to assess characteristics of partnerships (eg, exchange of resources, description of partnerships, and perceptions of partners between any 2 organizations), and whole network scores were aggregated across all responses into 1 measure representing the entire network.

Following a descriptive analysis, we compared measures from the Million Hearts network to other types of networks, using existing PARTNER data. As of January 2017, the PARTNER team has developed a data set of approximately 7500 networks, 13 699 organizations, and 102 524 dyads (relationships between any 2 organizations, referred to as dyads). Among these, there are data from 533 public health–related networks available in the database; from these public health networks, we identified 3 groups of networks for comparison.

- Chronic disease prevention (CDP) networks—We identified 46 CDP networks using the following search terms: cancer, heart disease, diabetes, stroke, arthritis, obesity, healthy, food, active, living, fit, eating.
- Similar-sized networks—We identified 18 public health networks that had 60 to 70 organizational network members, which is similar in size to the Million Hearts network.
- National-level networks—Finally, we utilized data from 2 national-level public health networks that are similar to Million Hearts in that they include network partners that represent national organizations, including those from the public and nonprofit sector.

Results

Aim 1: Assess the partnership engagement process and the level and strength of interaction among partners in the Million Hearts network

Network diversity

The network included a diverse array of organization types and a variety of relationship activities. Collectively, 304 partnerships were identified and described by the respondents. The partners included organizations representing federal public health research or regulatory agencies (34%); private-professional associations (31%); private health plans, systems, or practices (16%); federal public health programs or services (12%); and other private organizations (7%) representing a diverse array of organization types. Respondents reported partnerships with an average of 8 other organizations. Private-professional and federal public health research or regulation organizations had the highest average number of relationships (11 partners on average), while federal public health programs or services and private health plan, systems, or practices had the lowest average number of partnerships (5 and 3 partners

*One organization participated in the survey but did not select any partners, nor was picked by any other member. That member appears as an isolate in the network map (see Figure 1). The isolate organization was kept as a “partner” based on its active participation in Million Hearts and response in the survey which confirm active participation.

on average). Respondents reported an average duration of participation in Million Hearts of about 39 months, with responses ranging from 9 to 60 months, the result of when an organization joined the network.

Number of partnerships attributed to Million Hearts

After respondents chose their partners, they were asked a series of questions about those partnerships, including how the relationship developed. Respondents described how 287 of the 304 partnerships began; 59% of these relationships were directly attributed to Million Hearts, either as a new partnership that was developed because of participation in Million Hearts (44 relationships) or as a preexisting relationship that was improved through working with Million Hearts (126 relationships); the other 177 were not attributed to changing or developing because of Million Hearts.

Density, centralization, trust, and value

The density score was 15%, meaning that of all the possible relationships among the 58 organizations, only 15% of the possible relationships were present in the network. The Million Hearts network has a low centralization score (40%). Overall trust (71%) and value (74%) measures are relatively high, indicating that most respondents rated their partners as having “a fair amount” or a “a great deal” of trust (reliability, mission congruence, and communication) and value (power/influence, resource contribution, and time committed). Overall network averages for perceptions among partners of one another along dimensions of trust and value are depicted in Figure 1. Scores over 3 are considered “good.”^{12,13} In Figure 1, the blue bars represent value measures and the gray bars represent trust measures. Million Hearts participants reported lowest levels of trust and value for perceptions of resource contributions (with a score of 2.76 out of 4).

Aim 2: Assess changes in activities, policies, programs, or strategies that have occurred as a result of Million Hearts.

Strategies implemented

When asked what strategies have been most effective and useful in creating Million Hearts partnerships, the top 5 responses included sharing resources, exchanging information/knowledge, alignment of goals, creating strategic partnerships, and Million Hearts branding. In addition, respondents selected “disseminating information” as the most successful Million Hearts strategy, followed closely by convening strategic partnerships.

Context of partnership activities

Of the 304 partnerships, 247 reported the levels of engagement with their partners. Most partnerships (33%) were reported only as “awareness” of each other’s organization and “cooperative” (39%) (indicating relationships such as sharing information). In total, 77% of all interactions were reported as resulting in the “exchange of information and subject matter expertise.” Other outcomes resulting from partnerships were:

- developing tools and resources to share with other Million Hearts partners (24%);

- implementing new CVD programs or strategies including disseminating information and tools, engaging in awareness activities, and providing care to patients (18%);
- providing training and technical assistance for the implementation of new CVD standards of care/practice guidelines (13%);
- conducting research and research-related activities such as collecting/storing data on CVD prevention (9%);
- funding CVD research or programs (8%); and
- developing standards of care/practice guidelines for CVD measurement/reporting (7%).

These results are illustrated in Figure 2, where the network members who work together on each of these outcomes are shown (the circles represent the network members and the lines show when they indicated that outcome as a result of their relationship). From these images, we can see that conducting research, funding programs, and developing standards happened predominantly among the professional associations and the federal public health research/regulation agencies. More types of members indicated other types of outcomes (see both the bulleted list and the network maps).

Resources exchange

Partners indicated which resources they contribute to Million Hearts (Table 1). The largest number for partners distribute and share resources with one another ($n = 31$). While not the most mentioned resources contributed, this network was unique in the large proportion of members that said that they can offer facilitation/leadership ($n = 20$), paid staff ($n = 19$), and funding ($n = 15$), compared with other networks where these resources are some of the least mentioned contributions.

Aim 3: Identify facilitators and barriers of participating in Million Hearts.

Facilitators to participating in Million Hearts

When asked specifically whether the Million Hearts brand is effective in helping partners reach their CVD goals, 74% of respondents strongly agreed or agreed that Million Hearts is effective in helping partners reach their CVD goals. Another 21% of respondents said that they agreed more than disagreed with this statement. In open-ended comments, respondents stated that they enjoyed working with other Million Hearts partners and that their organization accomplished great work with Million Hearts. One respondent described this,

[Million Hearts® has] brought a lot of organizations together that don't always talk...so that the physicians and the nurse practitioners and dieticians and whoever else, are all at the same table talking about how they can each impact heart health—that no one health profession owns it.

Barriers to participation

The most frequently reported challenge experienced in participating in Million Hearts was that resources such as staff time and financial constraints inhibit their organization's ability to participate. Table 2 provides further detail about all reported barriers that partner organizations experienced. The left side of the table shows the top barriers respondents face in implementing Million Hearts in their own organizations; the right side of the table lists top barriers also reported by respondents to creating a coordinated network, which are common when bringing together a group of diverse partners.^{3,14}

Aim 4: Compare Million Hearts to other networks.

We compared Million Hearts with other networks including CDP networks (n = 46 networks), similar-sized networks (n = 18 networks), and national-level networks (n = 2). These other networks do not include Million Hearts members. In Figure 3, we show the Million Hearts scores across 6 dimensions in comparison to the 3 other groups of networks.

The response rate among organizations in the Million Hearts network was 74%, which was higher than the response rate for similar-sized networks (51%) and CDP networks (63%) but fell below the response rate of other national networks (98%). The Million Hearts score for trust (71%) was slightly lower than other CDP networks (78%), higher than networks similar in size (61%), and lower than other networks at the national level (86%). The Million Hearts network (79%) was comparable with the other 3 network types in terms of perceived value among partners (average of 61% in similar-sized networks). However, CDP networks had much higher-density scores (52%), as do other national networks (41%). The Million Hearts was relatively decentralized with a centralization score of 39%, which was lower than the centralization scores for similar-sized networks (62%), CDP networks (41%), and other national networks (63%). The Million Hearts network was very similar to other national networks on agreement among members on outcomes (96% Million Hearts vs 95% national networks) but exceeded other networks in comparison regarding agreement on outcomes (other networks scores were CDP [76%], similar-sized networks [89%]).

Discussion

The results of this SNA show that Million Hearts has been successful at bringing diverse partners together with wide variation in how members contribute and participate. Partners report a fair amount of interaction and high perceptions of trust and value, and many organizations attributed positive outcomes to the network. Relationships consisted primarily of information exchange with more resource-intensive interactions such as resource exchange and joint programming being less common. A few of these findings stand out for further discussion.

Million Hearts partners are willing to contribute funding, leadership and facilitation, and paid staff as resources, which is unique in comparison with other networks. Yet, organizations rated perceptions of other organizations' level of resource contribution lower, falling below the threshold of a "good" level. This finding demonstrates that partners report a desire and ability to contribute resources to Million Hearts; however, the perceptions

between partners are that resources are not being contributed at the level they potentially could be.

The density score (which tells us how many relationships exist in relation to all that *could* exist) of the network was low. While there is no evidence in the literature for an ideal or target density score, a sufficient number of connections are implied when partners are connected enough to achieve network goals (eg, information can be shared easily and quickly). The low density score means that there are opportunities to strengthen and build relationships between partners. However, a density score that is too high could demonstrate a network that has a lot of relationships but could decrease the ability of the network partners to develop robust relationships (too many to manage). Rather than assume that higher levels of interaction are desired, it may be more appropriate to ask whether the current levels and types of interactions in the network are sufficient to meet the goals of the network.

It is not unusual for a network that has been together for some time to be decentralized.¹⁵ This is often the case when many of the partners know each other and indicate that they have strong relationships. However, the Million Hearts network is unique in that it is both decentralized and has a low density. There are several (6) organizations that are each connected to about half of the partners but not the same partners. A strategy for integrating these disconnected parts of the network may be considered. Except for 1 isolate, the network is fully connected, which provides evidence that information could flow throughout the network if all partners exchanged information with the other members with which they have connections.

An area of strength in the network was the partners' agreement on outcomes achieved. Million Hearts had a very high (96%) level of agreement among members on which outcomes have been achieved by the network. While this is similar to other national-level networks, it is higher than the comparison groups. Agreement among network members on a number of indicators is a good gauge of whether the members are "on the same page" or not regarding that topic. In this case, there is consensus that Million Hearts has achieved certain outcomes, which is an additional way to confirm that it is reaching its outcome goals.

Findings from an SNA of Million Hearts initiative partnerships present an opportunity to inform policy and practice in the study and development of partnership networks. First, identifying successful partner activities and describing them in more detail could provide examples for other partners to emulate. These activities could be further assessed to develop a list of "best practices" for working collaboratively. Second, potential strategies to improve engagement can be considered, such as training on communication among partners, education on aligning goals, identifying funding sources, and providing specific technical assistance on finding and engaging additional partners may all be useful to network partnerships. Third, when members report a very high number of resources they are willing to contribute, yet also a perception that overall resource contribution of members is low, opportunities may exist to identify the resources available from each member and consider how to leverage these underutilized resources/skills/expertise to contribute to the network activities.

Limitations

A number of limitations exist that should be mentioned. First, setting the boundaries of this network was a subjective activity based on the expert knowledge of key stakeholders in the network. Identifying the boundaries of a network is conceptually difficult across network studies. In bounding the Million Hearts network, it is possible that partners could have been missed that should have been included. Another limitation is getting a full response rate. While our response rate (74%) is considered high for social science research, we are missing about a quarter of the network members' responses. There is no identified methodological standard for a response rate threshold, and we believe that this study meets the field's standards for considering our findings reliable and results valid. Finally, we report only descriptive results of this network at one point in time. While we were able to utilize a large data set to compare some of the findings to other networks, these data are largely cross-sectional, in what is a dynamic set of interorganizational relationships.

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Implications for Policy & Practice

- A great strength of an SNA is recording perceptions from partners on different dimensions of how well the network is meeting its goals, expectations from partners, and feedback on governance structures. Reviewing network goals could help set expectations for levels of participation for network partners and make it easier for leadership to assess progress toward these goals. A thorough review may also help address partners' confusion around how the aims of the network are distinct but aligned with their organization's current work, as well as how to "operationalize" network projects. Furthermore, being explicit about network leadership and governance (who is responsible for what and how are decisions made) could lead to new and innovative opportunities.
- By examining a national-level public-private partnership formed to address a public health issue, we can identify ways to strengthen the network and provide a framework for developing other initiatives. The analysis of facilitators and barriers to successful partnership and collaboration can help other projects get off the ground and work together effectively from inception through completion.

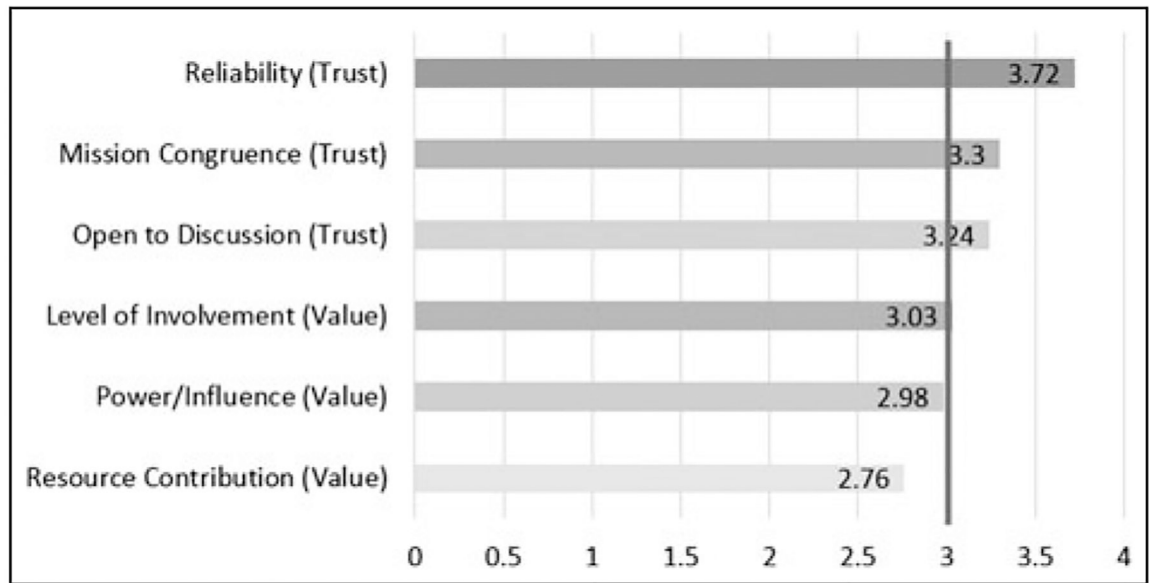


FIGURE 1.
Overall Measures of Trust and Value

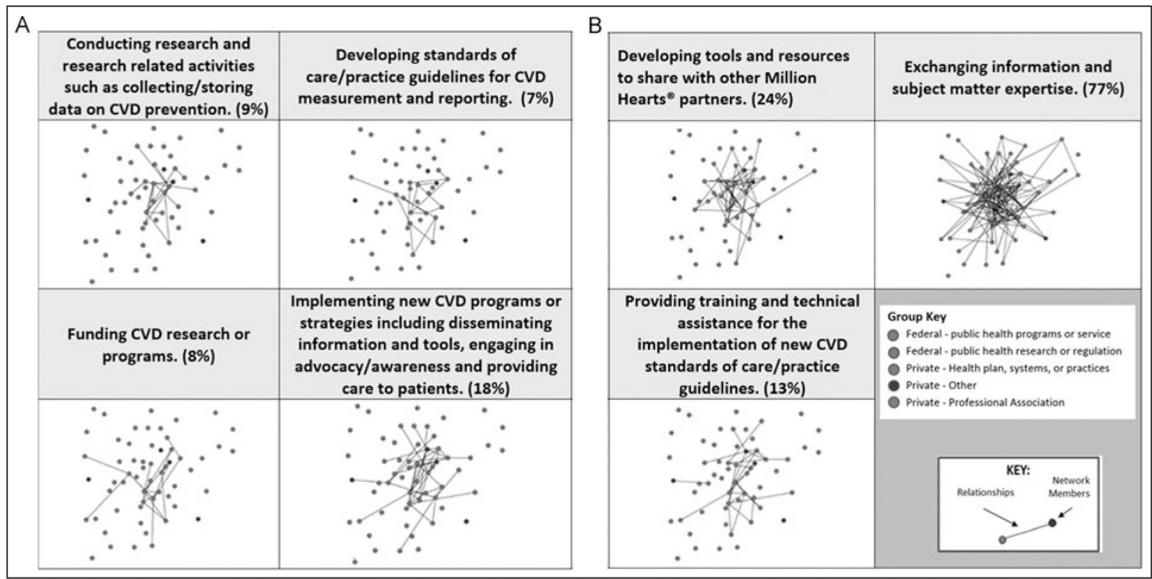


FIGURE 2. Relationships Among Members of Million Hearts, Showing Activities That Members Engage in Together Abbreviation: CVD, cardiovascular disease.

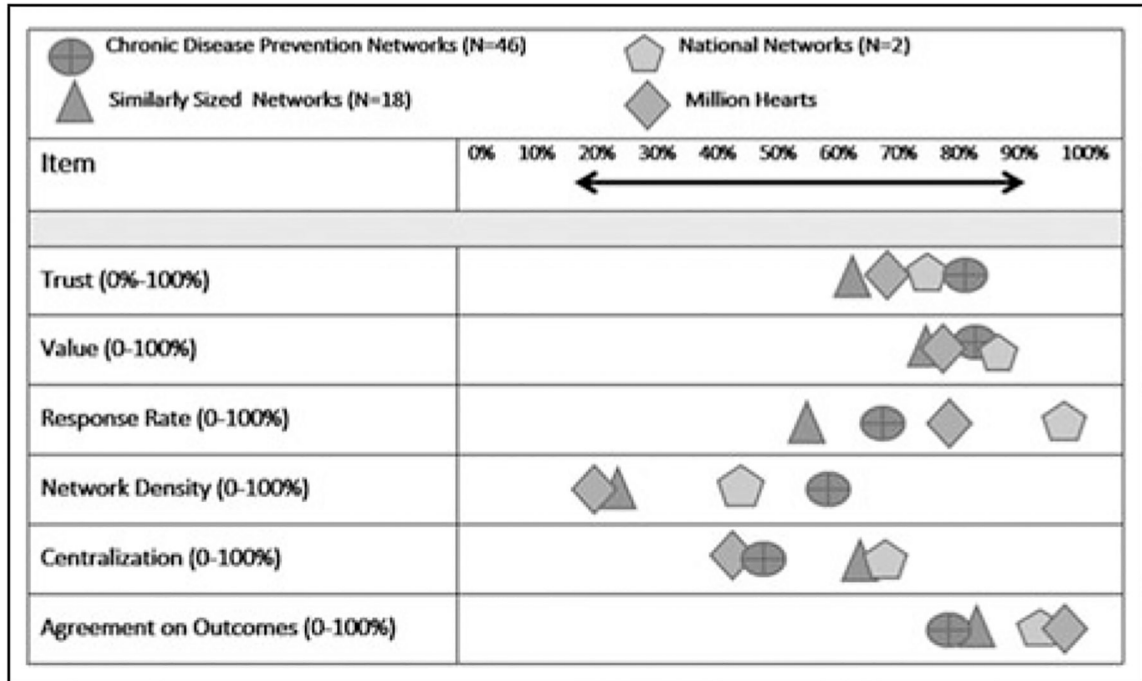


FIGURE 3.
Data Comparing Million Hearts Across Other Types of Networks

TABLE 1**Resources That Partners Contribute to Million Hearts**

	Number of Responses
Distribution of resources	31 (6)%
Communication/Public relations	29 (6)%
Connections to health care providers/practices	28 (6)%
Tools, materials, and protocols to promote CVD prevention strategies	27 (6)%
Connections to specific patient populations	26 (5)%
Connections to other types of stakeholders in the community	26 (5)%
Info/Feedback	26 (5)%
Expertise in CVD	24 (5)%
Support/commitment from my organization to form partnerships	24 (5)%
Messaging around CVD prevention strategies	22 (5)%
Advocacy	21 (4)%
Data resources including data sets, collection, and analysis	21 (4)%
Facilitation/Leadership	20 (4)%
Networking skills	19 (4)%
Paid staff to work on CVD prevention strategies	19 (4)%
Expertise in topics other than CVD	18 (4)%
Training on Million Hearts-related topics (eg, ABCS)	17 (4)%
Funding for CVD prevention strategies	15 (3)%
Development of CVD prevention programs and materials	14 (3)%
In-kind resources (eg, meeting space)	13 (3)%
Connections to othertypes of consumers	12 (2)%
IT/Web resources (eg, server space, social media)	12 (2)%
Other resources that can be leveraged to achieve Million Hearts goals	11 (2)%
Volunteers and volunteer staff	7 (1)%

Abbreviations: ABCS, Aspirin when appropriate, Blood pressure control, Cholesterol management, and Smoking cessation; CVD, cardiovascular disease.

TABLE 2

Barriers Related to Participating in Million Hearts

<ul style="list-style-type: none"> • The top barriers to <i>implementing</i> Million Hearts priorities within our organization include: • Lack of funding to implement Million Hearts • Clarity on how Million Hearts is distinct from our existing strategies • Understanding how to “operationalize” Million Hearts projects • Bureaucracy • The complexity of clinical aspects of Million Hearts 	<ul style="list-style-type: none"> • The top barriers to <i>creating a coordinated</i> Million Hearts effort include: • Competing priorities of partners • Difficulty in bringing stakeholders together (time, geographic barriers, etc) • Different perspectives of partners • Lack of resources to coordinate across stakeholder groups
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