Rural Surgical and Obstetrical Networks

Evaluation of network organizational characteristics

Centre for Rural Health Research, UBC

May 2022

Sechelt, BC

Summary

RHNPT SURVEY

The Rural Health Network Profile Tool (RHNPT) survey has been administered with central RSON leaders every year since 2019. The survey asks about eight key organizational aspects of networks.

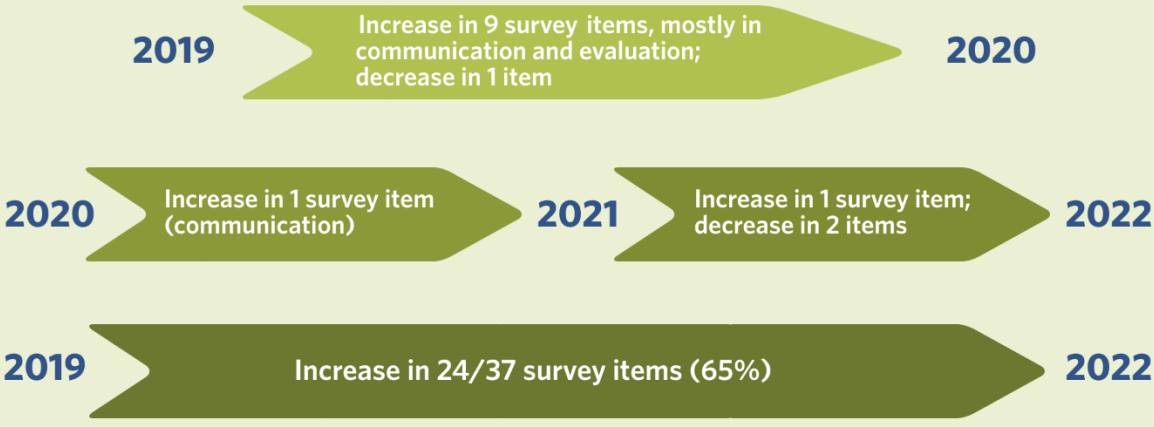
In March 2022, 21 out of 32 (66%) invited leaders completed the RHNPT survey.

RHNPT FINDINGS

2022: Average Ratings

2019 - 2022: Changes in Ratings

Statistically significant changes in ratings :



2022: Comments

Governance/Decision-making

"Any decisions that have involved me at the organizational level have felt inclusive, however I am unclear of a specific decision making structure."

Impact of RSON

"RSON has been absolutely critical to maintaining a small town functional OR and building a highly valued OR team!"

Communication

"Information is stored and shared on tech platforms but problem solving does not occur through these platforms."

Purpose

"I haven't noticed the [purpose in] writing. I feel that the mission to support sustainable rural surgery and maternity services is clear."

Planning

"I don't know the details of the strategic plan, only that there has been broad and regular consultation."

SUSTAINABILITY

Between 2020 and 2022, respondents were also asked to identify the network parts that are key for long-term success. Below are the most common answers:

- Effective communication between network members
- Buy-in and support from Health Authorities
- Maintenance of various relationships across the network
- Resources, including funding and Health Authority infrastructure
- Dedicated network administrative support at a community level
- Stable staffing and manageable workload at rural hospitals

In addition, formal resources (e.g., documents) on RSON structures and processes would likely be useful for post-RSON networks.

RSON Evaluation
Rural Surgical and Obstetrical Networks

Contact: Anshu Parajulee, Evaluation Coordinator
anshu.parajulee@ubc.ca

Contents

*Click on heading label to jump to heading section

Background

The Rural Surgical and Obstetrical Networks (RSON) has grown and evolved considerably since its formation in 2017. As part of the evaluation of network structure and function, the Centre for Rural Health Research (CRHR) at the University of British Columbia (UBC) has been implementing an annual survey with central network leaders on organizational aspects of RSON. For the first three administrations of this Rural Health Network Profile Tool (RHNPT) survey (2019-2021), the aim was to inform the growth and development of the network. The fourth and final administration of the survey, which occurred immediately before the last year of RSON (March 2022), aims to inform planning processes for the next iteration of the network. This report presents 2022 survey findings and trends in findings over four years.

Network life cycle

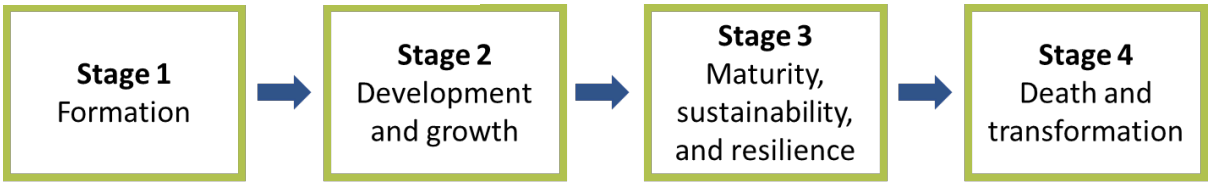
The RSON program is approaching the last stage of the network life cycle: death and transformation (Figure 1).[1] Because RSON is large and the issues it is trying to address are complex, the natural lifespan of RSON would likely have been longer if more funds had been available. Nevertheless, RSON funding will finish soon, which means network members must decide whether to continue with formal RSON-like networks. During these discussions, it may be useful for members to answer the following questions (Networks Leadership Summit IV, as cited in Popp et al.[1]):

- Has the network already maximized what it can offer?
- Can the network continue to show its added value?
- Is the network needed to sustain and strengthen rural surgical and obstetrical services?

RSON is supported by a robust network administrative organization (NAO)[2] that includes RCCbc members, pillar groups, and a clinical steering committee. This NOA in its current form cannot be financially sustained post-RSON. The network, however, may have developed and matured enough to not need an NAO to function effectively in its next iteration. Figure 2 shows RSON's governance structure, including the strength of relationships.

Over the past five years, RSON has engaged in key network processes including network learning and legitimacy building. Network members have also had time to develop and strengthen both interpersonal and inter-organizational relationships. These relationships, arguably the most important legacy of a network, will endure and can be

Figure 1. Network evolution stages



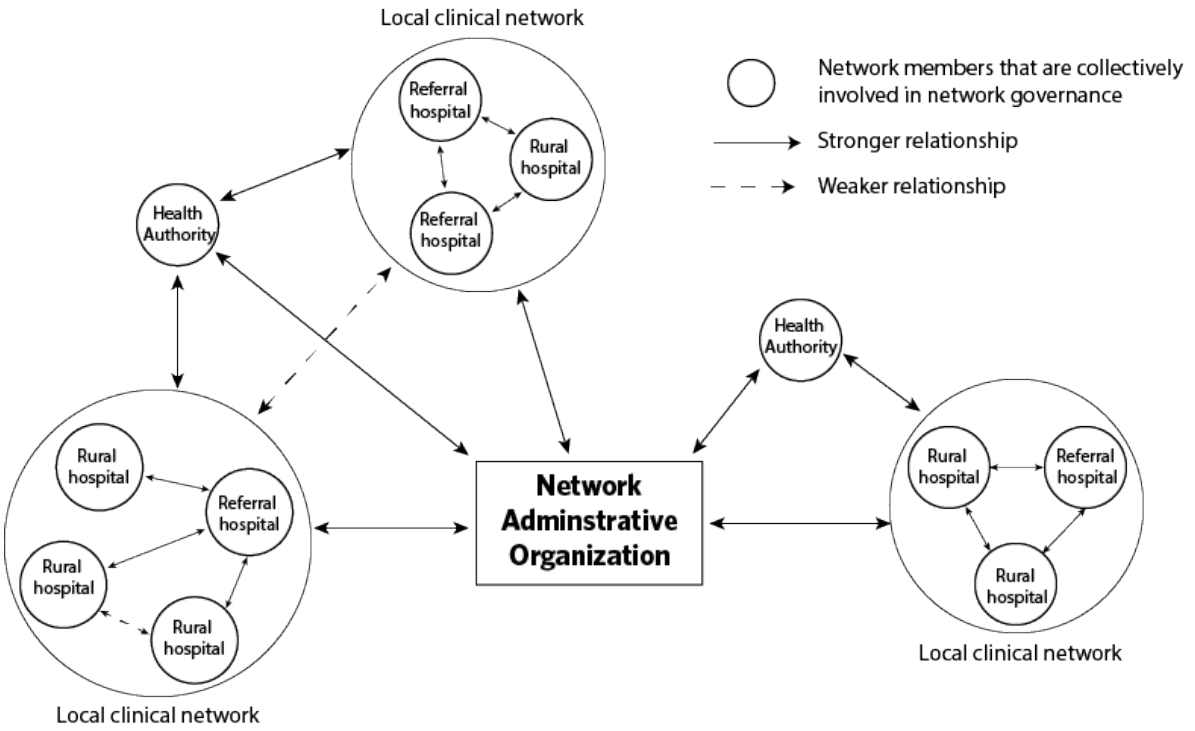


Figure 2. RSON governance structure (not all local clinical networks and Health Authorities shown)

leveraged to create new alliances and initiatives (Royce, as cited in Popp et al.[1]).

For example, during its ninth year of operations, a child and youth health network in Alberta was forced to disband in 2009 after a major re-organization of the health system in that province (Lemaire et al., as cited in Popp et al.[1]). Four years later, the relationships developed during the network, the way members worked with each other, and references to the network endured. Indeed, social capital, the "set of social connections that provide access to information, resources, support, and so on,"[3(p. 649)] is a fundamental concept in inter-organizational network research.

Below are some additional network factors that can enable a successful transition to a network without an NAO (Royce, as cited in Popp et al.[1]).

- Strategic planning processes for legacy projects and next steps
- Extensive engagement with stakeholders during the transition
- Broad communication of transition plans with network members and other key stakeholders
- Effective leveraging of expertise and relationships
- Ability to connect with new stakeholders and form new partnerships
- Continued support from the NAO during the transition

In previous administrations of the RHNPT, survey items with lower scores were related to the formalization of network structures and processes, e.g., a defined mechanism for resolving conflict. A more flexible and informal approach may have been advantageous for network growth and learning during earlier

stages of RSON, but future networks would benefit greatly from formal resources to support RSON's structure and processes, e.g., network activities, member roles.

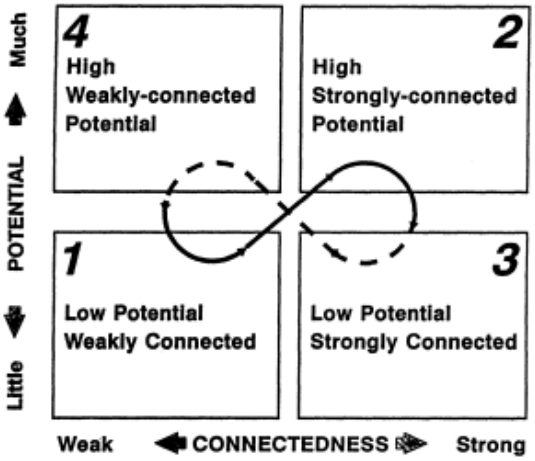
Network eco-cycle

A similar but non-linear framework for understanding network phases is the organizational eco-cycle.[4] Under this framework, a network focuses on adapting and reinventing rather than on sustaining a fixed form.[1] Figure 3 is the eco-cycle diagram created by Hurst and Zimmerman,[4] overlaid with phase names devised by Crossan and Hurst.[5] The solid front loop is the birth-maturation-decline process also present in the conventional life cycle model.[5] The dotted back loop is unique to the eco-cycle and represents the renewal process, which can only be achieved by higher-level systems.[5]

In Figure 3, 'potential' on the y-axis is a function of the number and value of possible outcomes.[4] 'Connectedness' on the x-axis depends on various properties of a system including hierarchy, density, and connectivity.[4] A highly connected system is highly articulated with well-developed activities and accompanying interactions, resulting in system elements that affect each other continuously, directly, and immediately.[4]

The death/decline of a network, during which a network breaks into smaller lower-level parts, is represented by a movement from Phase 2 (maturity) to Phase 3 (creative destruction).[4] To move to Phase 4 (re-conception), these fragments must reform into a new configuration that is weakly connected but has high potential. A movement to Phase 1 (birth) requires the conceptualization and emergence of a new network that is weakly connected and loosely structured. As the network strengthens its connectedness and defines its purpose, structure, and function, it moves to Phase 2. Phases 3 and 4 can be thought of as 'emergent' phases and Phases 2 and 1 as 'constrained' phases.[5]

Figure 3. System eco-cycle[4(p. 341)]



As a network moves from Phase 1 to Phase 2, it becomes more 'rational' and its focus shifts from innovation to efficiency and effectiveness.[4,5] Due to its limited ability to adapt, a network in Phase 2 is more vulnerable to catastrophe after sudden change, resulting in an eventual creative destruction of the network, thus starting the cycle anew.[4,5] A network can resolve the stability and flexibility/exploration paradox by using its institutional knowledge and routines to creatively explore and produce new outcomes.[5]

Though the long-term viability of a network requires pe[Re-conception] ction an[Maturity] al of a network's governance form (i.e., structures, systems, and practices), the knowledge created and the connections developed live on.[4] Factors including commitment to a mission, strong relationships, and previous accomplishments will enable the formation of a new formal network.[4] If this does not occur immediately post-RSON, then the vast informal rural surgical and obstetr[Birth] [Creative destruction] works in BC, which will exist

so long as rural communities provide these services, have the potential to form into one or more strongly connected formal networks at any time.

RHNPT Survey

The Networking for Rural Heath Project and the National Rural Health Resource Center, both based in the United States, developed the RHNPT to help rural health networks identify organizational areas of strengths and areas needing improvement.[6] The RHNPT asks about eight key aspects of network organization:

- purpose,
- governance/decision making,
- planning,
- financing,
- leadership/management,
- staffing,
- communication, and
- evaluation.

We modified the RHNPT survey to ensure that questions were relevant to the RSON program - we deleted five questions, added two questions, and changed the wording of seven questions. We also added an open ended question at the end of the survey about long-term success.

For quantitative questions, respondents were asked to rate whether RSON exhibits each of 37 organizational characteristics. Their response options are listed below.

- 'No' (score of 1)
- 'Somewhat' (score of 2, 3, or 4)
    - 2=weak somewhat
    - 3=moderate somewhat
    - 4=strong somewhat
- 'Yes' (score of 5)
- 'Don't know' (no score)

Respondents were able to add comments after each survey section and at the end of the survey. Refer to Appendix 1 for survey instructions.

Survey administration

This survey has been administered with central network leaders annually since 2019. Each year, the list of invitees has been determined in collaboration with RSON leadership at RCCbc. Individuals that were expected to be knowledgeable about all or most central organizational aspects included in the survey were invited to participate. Table 1 lists the categories of individuals invited each year. Over time, the diversity of leaders that were invited in terms of network role and geographic representation increased, corresponding with the growth of RSON.

In March 2022, 32 individuals were invited to complete the survey and had 11 business days to do so. Invitees received two email reminders after the initial invitation.

The UBC Qualtrics Survey Tool, which complies with the BC Freedom of Information and Protection to Privacy Act, was used to collect online survey responses anonymously. This survey study was implemented by CRHR at UBC and was approved by the UBC Behavioural Research Ethics Board.

Analyses

Data were analyzed using R statistical software and Microsoft Excel. The findings section shows the average rating for each survey item over four years and indicates which changes over time were statistically significant. However, because responses were not normally distributed for all survey items, statistical tests for changes are based on the distribution of responses, not the averages. Nonetheless, we are visually presenting averages rather than medians because averages allow for more nuanced comparisons between years. Also, the range of responses is 1-5, which means that averages cannot be skewed heavily by an extreme outlier. Refer to Appendix 2 for details on statistical methods.

At the end of the survey, respondents were asked to enter the factors necessary for long-term success in their network area. Their responses are summarized in this report.

Table 1. Groups invited to complete the survey by year

Group	2019	2020	2021	2022
RCCbc leadership	✓	✓	✓	✓
Pillar groups	✓	✓	✓	✓
RSON clinical steering committee	✓	✓	✓	✓
Interior Health leadership	✓	✓	✓	✓
Interior Health LCCs		✓	✓	✓
Northern Health leadership		✓	✓	✓
Northern Health LCCs*		✓	✓	✓
Vancouver Coastal Health LCCs¥			✓	✓
Vancouver Coastal Health leadership				✓

*Vanderhoof LCC first invited in 2021

¥Powell River LCC first invited in 2022

Results

Response rate

Twenty-one of 32 invited individuals (66%) completed the survey. Six respondents provided comments for the different survey sections. Fourteen respondents answered the open-ended sustainability question at the end of the survey. Table 2 lists the response rate by year. The number of repeat respondents was nine from 2020 to 2021 and 11 from 2021 to 2022.

Table 2. Response rate by year

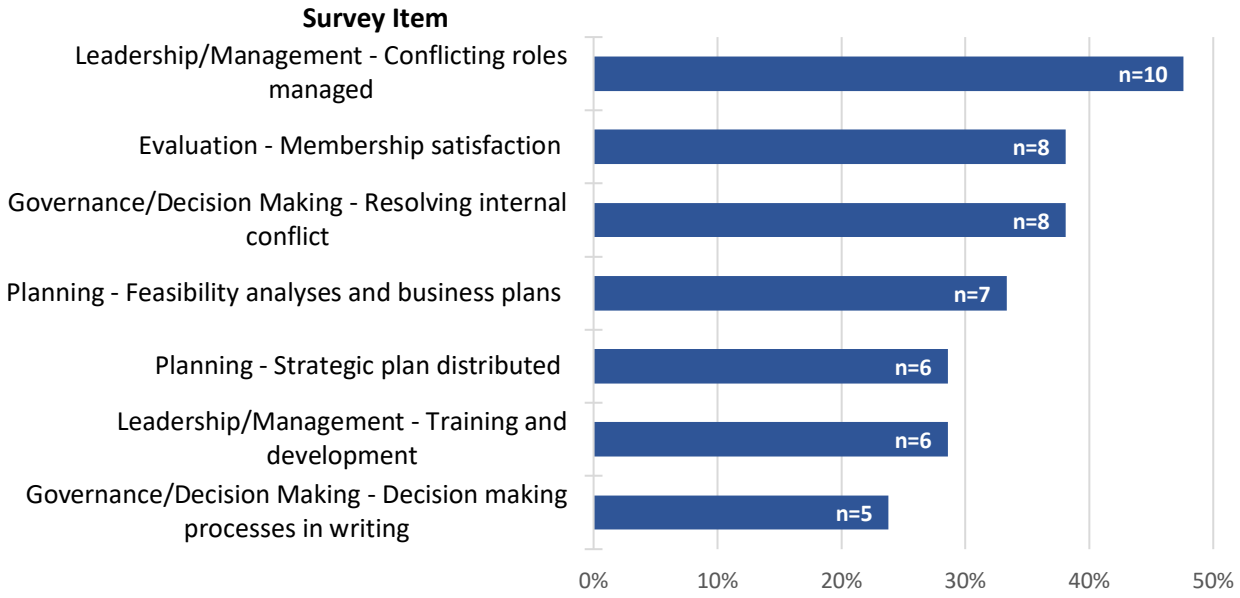
	2019	2020	2021	2022
Number invited	23	24	35	32
Number responded	15	18	23	21
Response rate (%)	65	75	66	66

'Don't know' responses

For seven survey items, more than 20% of respondents answered 'Don't know' (Figure 1). A 'Don't know' response may mean that the organizational aspect does not exist or that it does exist but a respondent is unaware of it or lacks access to it.

Refer to Appendix 3 for summary graphs of 'Don't know'/'Not applicable' responses for the other three survey years.

Figure 4. 2022 - Survey items with >20% "Don't know" responses (total number of respondents=21)



Changes over time

The greatest number of year-to-year changes occurred from 2019 to 2020: 11 survey items had a statistically significant change in rating ($p<0.05$). Few survey items had statistically significant changes from one year to the next after 2020. Nonetheless, when comparing 2019 and 2022 data, 65% of survey items had a statistically significant increase. This means that for many survey items, though smaller improvements year-to-year were not statistically significant, the overall improvement from 2019 to 2022 was.

Table 3 summarizes changes by survey section over time. Note that for many survey items, the low sample sizes were made even lower by 'Don't know' responses, which were not included in average calculations or statistical tests. Low sample sizes limit the ability to detect change.

Table 3. Statistically significant changes in responses over time

Survey section	# of survey items	2019 -> 2020	2020 -> 2021	2021 -> 2022	2019 -> 2022*
Purpose	3	-	-	-	↑ 1 item
Governance/ Decision making	6	↑ 1 item	-	↓ 1 item	↑ 4 items
Planning	6	↑↓ 1 item in each direction	-	-	↑ 1 item
Financing	4	↑ 1 item	-	-	↑ 4 items
Leadership/ Management	5	-	-	↓ 1 item	↑ 4 items
Staffing	4	-	-	-	↑ 1 item
Communicat-ion	3	↑ 2 items	↑ 1 item	-	↑ 3 items
Evaluation	6	↑ 5 items	-	↑ 1 item	↑ 6 items
Total	37	10 increases, 1 decrease	1 increase	1 increase, 2 decreases	24 increases

*Comparison of 2019 and 2022 data, i.e., first and last administration of the survey. One staffing survey item was first asked in 2020; responses to this question were compared between 2020 and 2022.

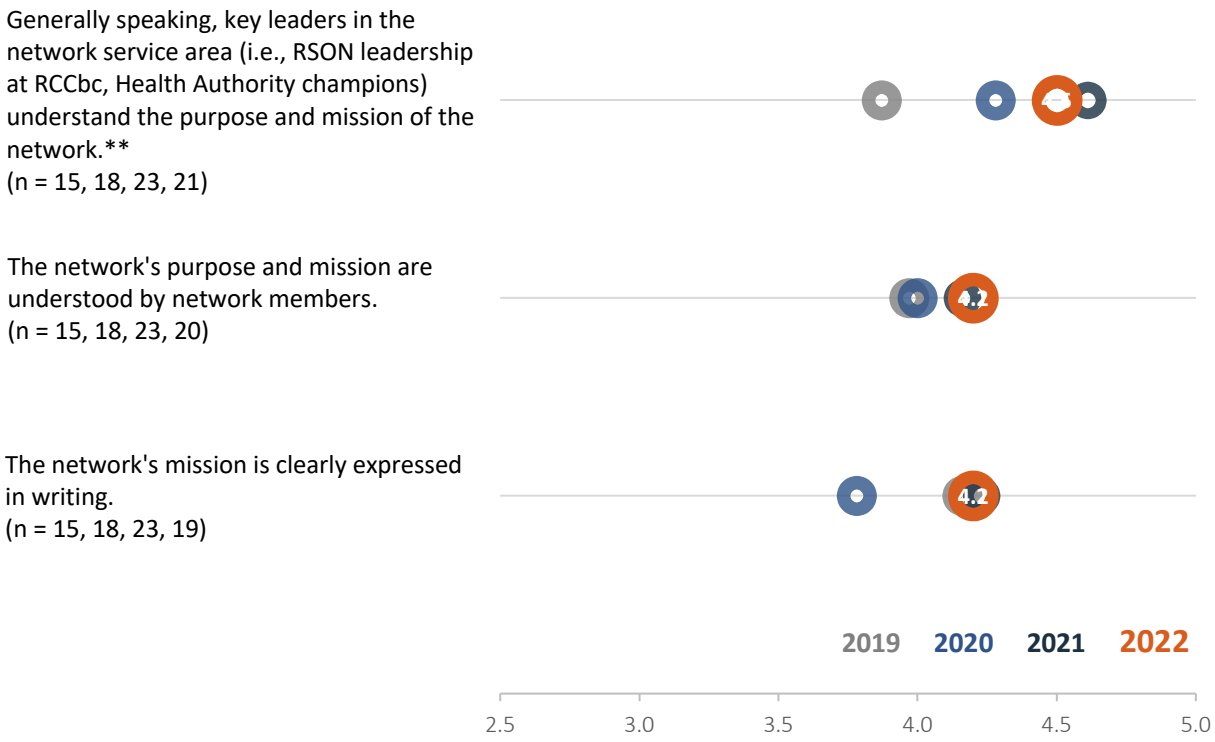
Findings by survey section

For each survey section, average ratings for survey items are presented graphically and open-ended comments are summarized narratively. Statistically significant changes are shown in graphs - changes between successive years are indicated by green arrows and changes from 2019 to 2022 are indicated by two asterisk marks (**) next to survey item labels. Note that statistical tests for significance assess change in the distribution of responses, not change in average ratings. Sample sizes for each survey year are listed in chronological order under each survey item. Refer to Appendix 4 for graphs showing the distribution of Likert scale responses for each survey item by year.

Purpose

"A clear sense of network purpose facilitates ongoing member and community support. It also helps to focus network resources on programs and activities that are most important."[6 (p5)]

Figure5. Purpose section – Average scores by year



Summary of comments (n=3)

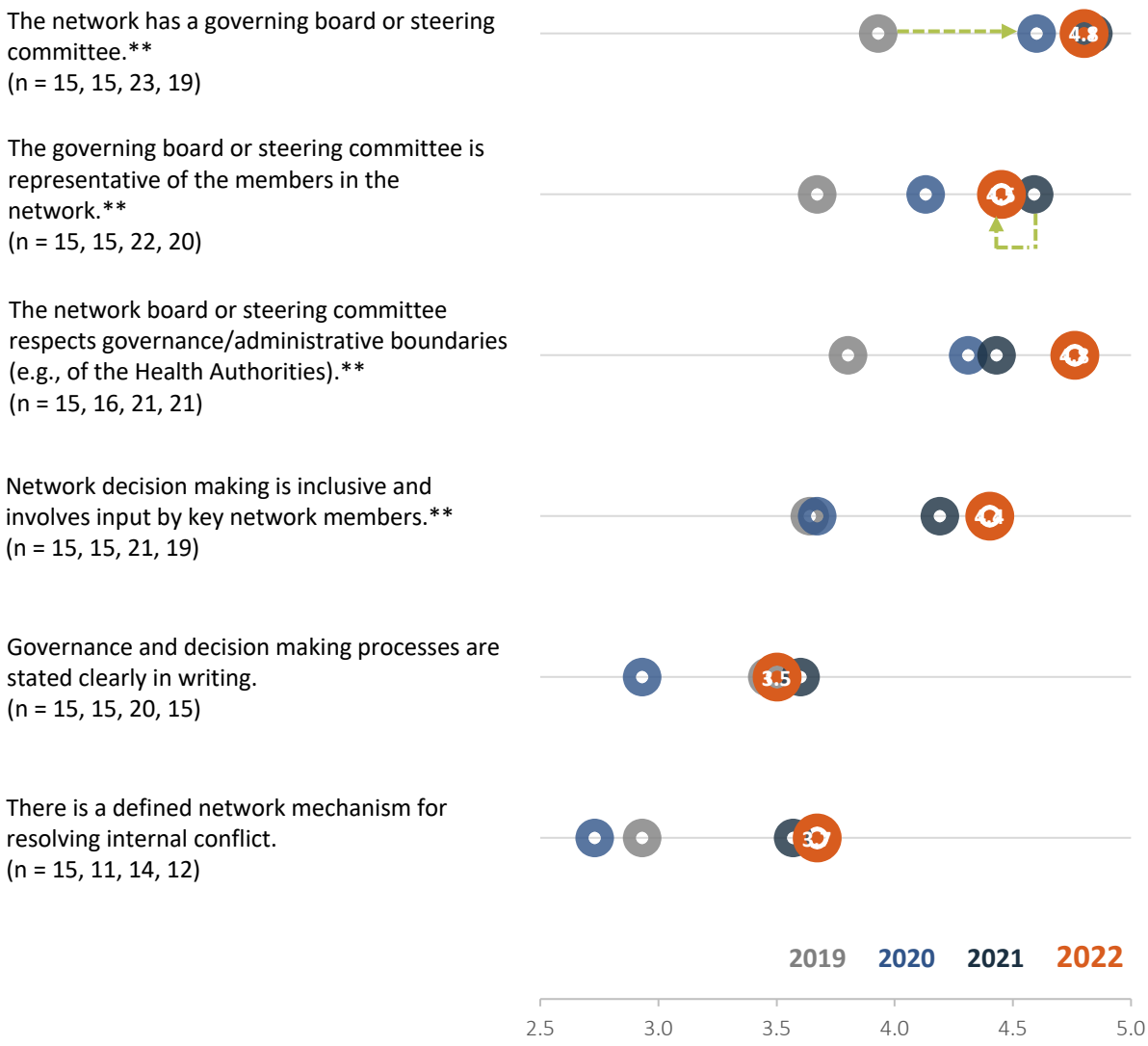
- Purpose has become clearer over time.
- Mission is clear but have not seen it in written form.
- Using RSON funding for routine activities rather than to build new skills and services.

"I feel we use the program to do regular things that should be routine but are not other wise funded. I think the leadership was assuming we would develop new systems or skills to increase our service."

Governance/Decision-making

"Well-defined, inclusive governance and decision-making processes will minimize conflict in the network and save time and resources. It will also ensure members' ownership of network products and services."[1(p6)]

Figure 6. Governance/decision-making section – Average scores by year



‡Strategic planning process includes gathering information, assessing needs, setting goals and action strategies, allocating resources, assigning responsibilities for carrying out activities, and evaluating outcomes.

Summary of comments (n=3)

- Not aware of structured/written decision-making or conflict resolution mechanisms.

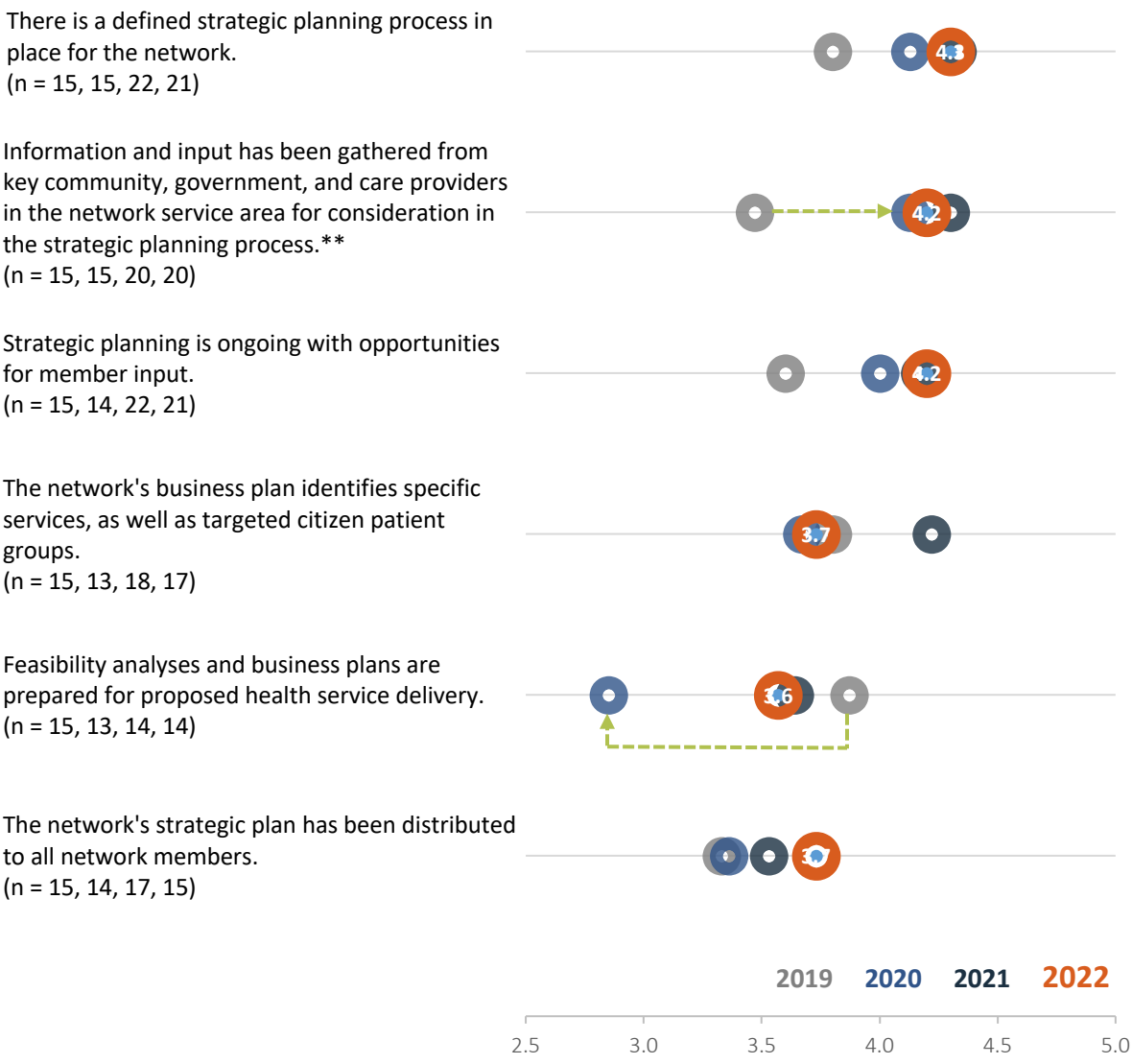
- Decision making has felt inclusive despite the absence of structure in this area.

  "Any decisions that have involved me at the organizational level have felt inclusive, however I am unclear of a specific decision making structure."

Planning

"An ongoing, inclusive strategic planning process will ensure that network decisions are timely and based on sound information. It will also enhance the quality and profitability of network products and services."1(p7)

Figure 7. Planning section – Average scores by year



Summary of comments (n=3)

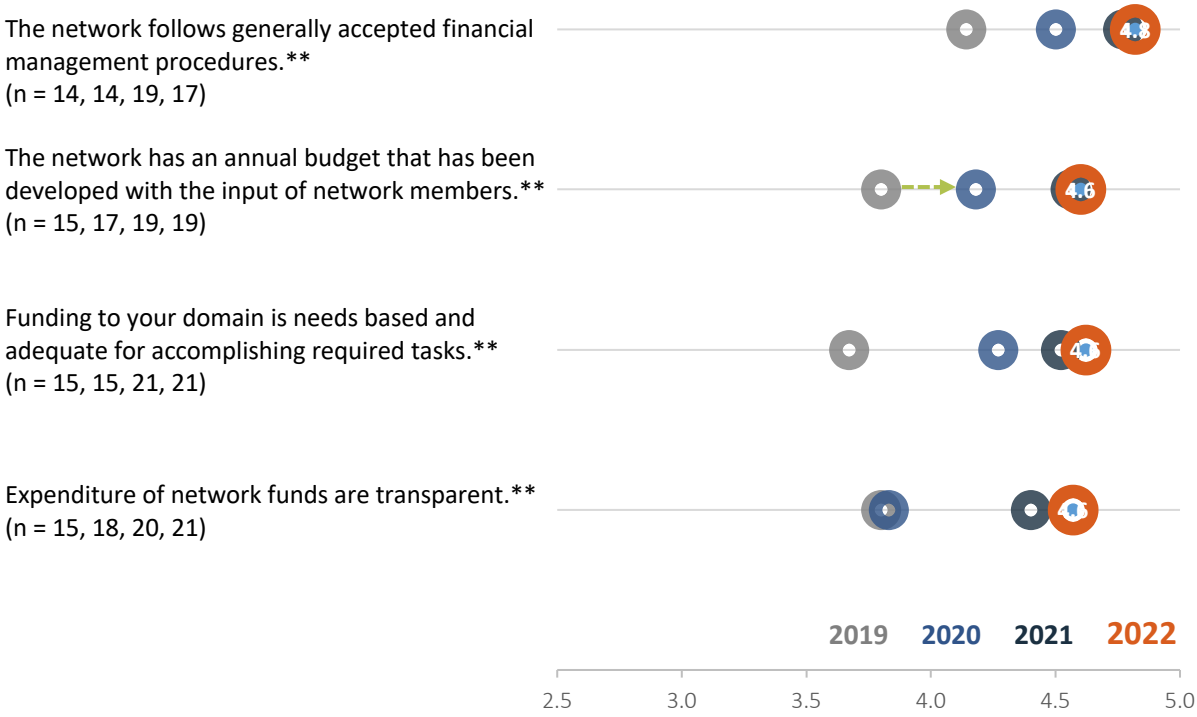
- Have not seen a business or strategic plan beyond the original RSON proposal.
- Consultation has been regular and broad across the network.

"I don't know the details of the strategic plan, only that there has been broad and regular consultation."

Financing

"A concentrated focus on building and sustaining diverse sources of network revenue will help to ensure both short- and long-term financial viability. Networks dependent of single source, limited time period funding, e.g., grants, are vulnerable to organized breakdowns at the conclusion of the funding period."[1(p8)]

Figure 8. Financing section – Average scores by year



Summary of comments (n=3)

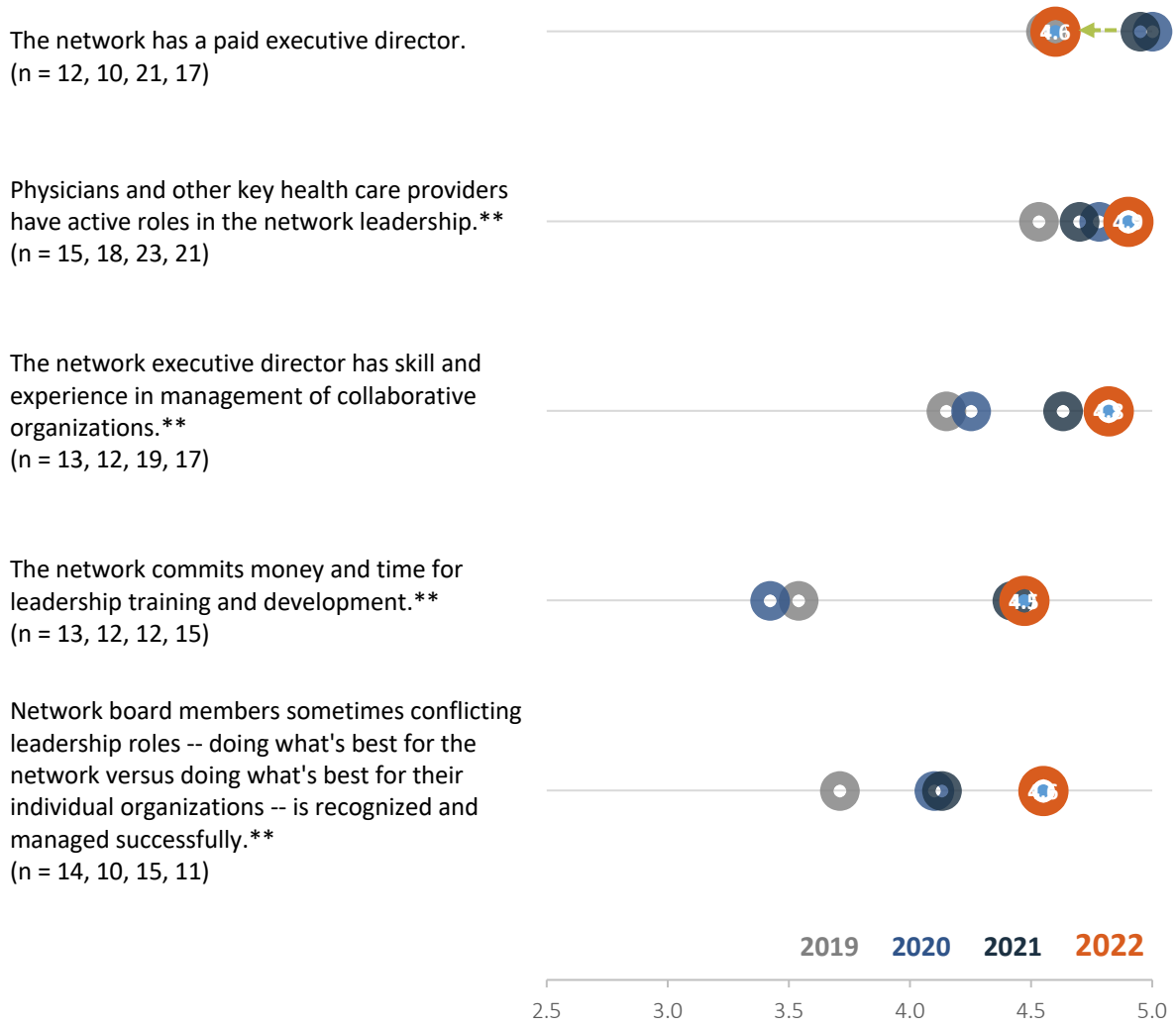
- Lack of incorporation of inflation for some funding pockets.
- Funds cannot address the most important issues. (These issues were not described.)
- A perception that only community-level budgets are flexible.

"The funds couldn't address the issues we really need to enhance our care."

Leadership

"Studies indicate that perhaps more than any other variable, strong, committed leadership is a necessary component of successful health networks. In short, enlightened leadership ensures that other crucial variables are addressed."[1(p9)]

Figure 9. Leadership section – Average scores by year



Summary of comments (n=2)

- Design of RSON is too physician-centric.
- Do not know who fills the executive director role.

Staffing

"Network staff function as the engine to carry out network goals and objectives. Even the most dedicated network members have other professional responsibilities and time commitments and can rarely volunteer significant amounts of time over extended periods. Without professional staff, networks are severely limited in what they can accomplish."[1(p10)]

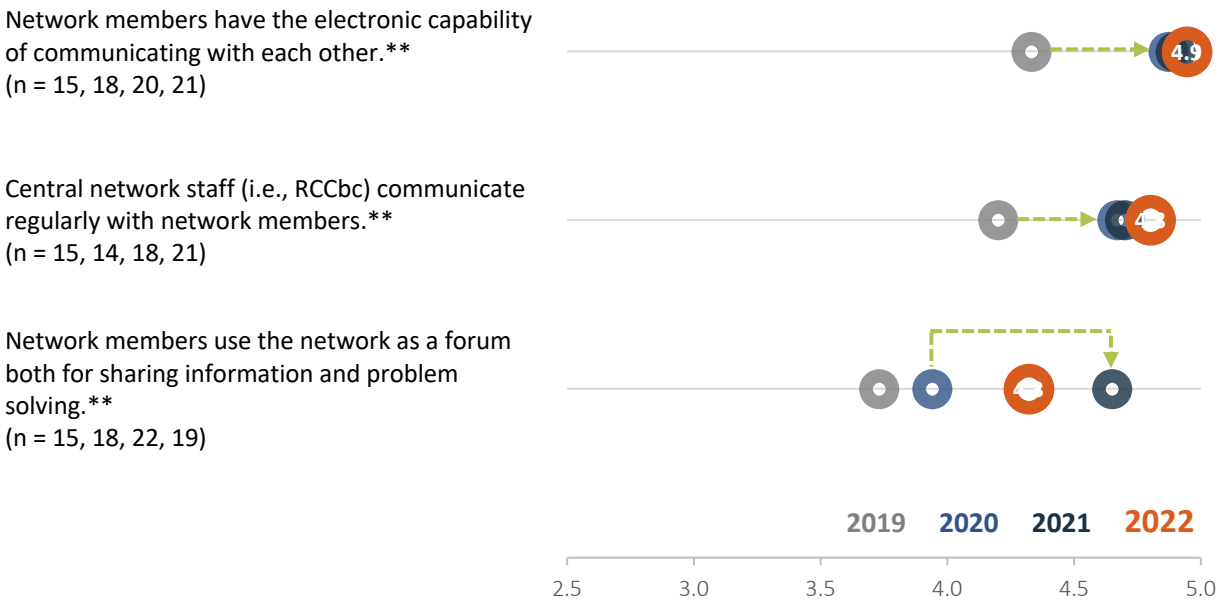
Figure 10. Staffing section – Average scores by year

No comments.

Communication

"Ongoing communication within the network using multiple methods and mediums to interact and exchange information is crucial to network successes."[1(p11)]

Figure 11. Communication section – Average scores by year



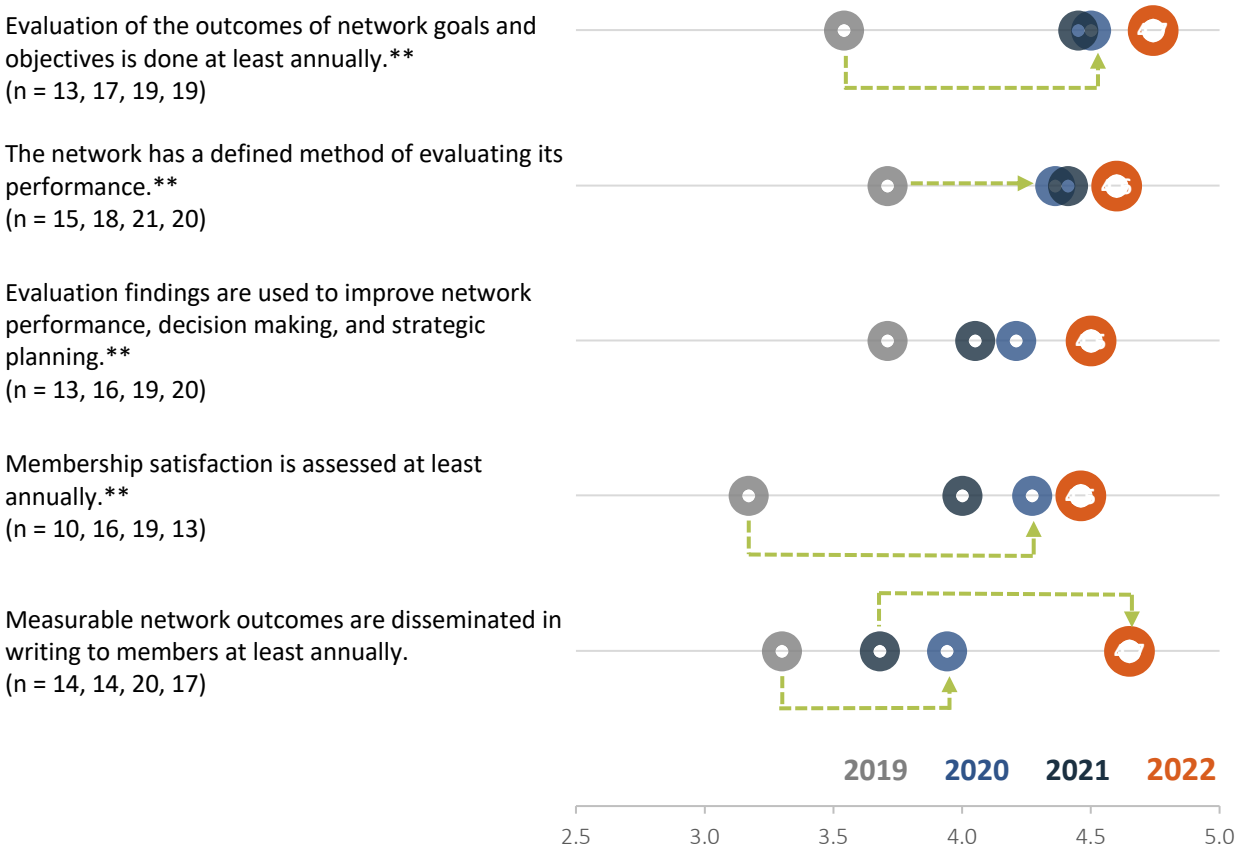
Summary of comment (n=1)

- Technological platforms are used to share information but not to problem solve.

Evaluation

"Developing and implementing multiple methods of measuring network progress and impact will produce important outcome information. This data can, in turn, be fed back into the network decision making process to improve both process and performance."[1(p12)]

Figure 12. Evaluation section – Average scores by year



Summary of comments (n=2)

- Utilization of evaluation results has been slow.
- Keen to see upcoming 'objective' quantitative outcomes.

"Slow process to actually using the results to inform network decisions."

Long-term network success

When asked to identify network parts that are key for long-term success, the most common response was administrative support. Several respondents described the crucial role of LCCs in the network and reported that clinical and administrative hospital staff do not have the capacity to take on LCC network administrative duties such as organizing regular meetings, coordinating activities, and holding members accountable. The LCC role was perceived to generally reduce the network administrative burden at both hospital and Health Authority levels. Relatedly, some respondents described how stable staffing and manageable workloads are precursors to health care provider engagement in the network.

> "[Need] Local staff to organize and coordinate activities. Physician participants enjoy participating in the network but because of their other responsibilities do not take the time to organize network events."

Like the previous year, respondents also identified funding, pillar-specific activities (e.g., clinical coaching), and effective relationships as being key to long-term network success.

> "Relationships and communication - this helps sustain what is and keeps things moving forward, especially as things change or new people onboard."

Below are the most common network parts required for long-term network success according to survey respondents, listed by survey year.

2020

- Effective communication between network members
- Strong relationships with and buy-in from HAs

2021

- Maintenance of various relationships by rural hospitals, including with other rural hospitals, regional hospitals, and RCCbc
- Resources, including funding and HA infrastructure

2022

- Dedicated network administrative support at a community level, e.g., by LCCs
- Stable staffing and manageable workload for hospital staff and physicians

Other key network parts identified over the years include autonomy during strategic planning and budgetary decision-making, and a shared understanding of network mission and values.

Other comments

In 2022, two respondents provided additional comments about (a) the benefit of RSON to rural communities and (b) the need for RSON educational activities to be part of normal operations.

> "RSON has been absolutely critical to maintaining a small town functional OR and building a highly valued OR team!"

> "The drills and education that is supported by RSON/ROAM should be funded outside of this program. Are we going to stop doing this once the program is gone?"

Discussion

Changes over time

Despite the major limitation of low sample sizes, statistical tests detected increases in ratings from 2019 to 2022 for more than half of survey items. There were a few decreases year-to-year but not none from 2019 to 2022. In 2022, only six survey items had an average rating below four out of five.

This success reflects the dedication and hard work of all network members over several years. This is even more commendable considering the constantly changing and expanding internal network environment, and the unpredictable sometimes very stressful external environment, e.g., the COVID-19 pandemic and catastrophic weather events.

Although the RHNPT survey does not ask about network impact, some respondents used comment boxes to share that RSON has been 'critical' for strengthening and sustaining rural surgical/obstetrical teams in BC.

'Don't know' responses

As more rural communities joined RSON, we invited more LCCs and Health Authority leaders, resulting in higher diversity of network leaders invited to the survey over time. We would expect these more peripheral network leaders to be less aware of RSON organizational aspects, especially in the first year of their network membership. Indeed, there were fluctuations in the number of survey items with a high proportion of 'Don't Know' responses. Interior Health and Northern Health LCCs were first invited to the survey in 2020, which was the survey year with the highest number of survey items (13) with ≥20% of 'Don't know' responses.

Network 'institutionalization'

The stability and longevity of a mature network depend in large part on established structures and processes, some of which are formalized.[1] This 'institutionalization' helps to increase member clarity on key network aspects, which in turn promotes trust and protects against conflict.[7,8] Post-RSON networks, which will likely be more decentralized due to fewer financial resources,[9] will need to rely heavily on effective relationships.

Like previous survey years, many of the survey items with a lower average rating and/or a higher frequency of 'Don't know' responses were about network institutionalization.

Communication

Institutionalization for some areas could be achieved by creating simple communication materials. For example, to increase clarity about network member roles, RSON could create a network organizational chart, share it via Microsoft Teams, and update it regularly. Descriptions of roles and responsibilities would also be helpful; a respondent from 2020 described challenges with a lack of role clarity. The network's mission and purpose could be shared in the same way.

RSON should use various communication channels to increase the likelihood of messages reaching network members. For instance, some members may not use Teams regularly. One respondent from 2021 reported that network

mission clarity is lower among frontline RSON members.

Compilation and formalization

In other areas, structures and processes are already defined, but some streamlining and formalization are required. Each year, RCCbc, pillar groups, and RSON communities could collaborate on a short high-level business/service plan that includes priorities, activities, challenges, and budgets for the coming year. This overarching plan would supplement pillar and community specific plans. A communication or graphic designer consultant could help to make plans more visually appealing and accessible, which should increase readership.

Complex organizational aspects

Formalization of more complex organizational aspects not well defined or understood, such as conflict resolution and decision making processes, will take more time and effort. The Planning survey section, which had improvement in only one out of six survey items from 2019 to 2022, has four strategic planning items. Strategic planning is a key process that links an organization's mission to its everyday activities - the goals and objectives specified during strategic planning are the basis for operational and tactical plans (i.e., business/service plans).[10,11]

Moreover, periodic strategic planning pushes organizations to adapt to an ever-changing environment, increasing long-term organizational viability.[10] Indeed, the first stages of strategic planning are to (1) gather information about external opportunities and threats, and internal strengths and weaknesses, and (2) evaluate this information from both social responsibility and organizational value perspectives.[10]

Relevant to post-RSON networks, the Community Care Alliance (CCA), a network of essential health care services in rural Colorado, recommends developing a three-year strategic plan before implementing a new network as it is difficult to do both at the same time.[12] The plan helps to keep a network grounded and prevent scope creep (i.e., uncontrolled growth) in a rapidly changing environment.[12]

Please refer to previous RHNPT reports for information on other 'complex' organizational aspects such as conflict resolution, inclusive decision making, and leadership training and development. Like rural RSON hospitals implementing continuous quality improvement projects, RSON as a network could pick one priority organizational area at a time to investigate and improve.

Network sustainability

The knowledge, connections, and infrastructure built through the RSON project can be leveraged to build and maintain post-RSON networks, but only if these networks can secure some funding and rural hospitals can maintain appropriate levels of healthcare personnel.

The Critical Access Hospital Quality Network (CAHQN) in North Dakota, established in 2007, includes all 36 hospitals in that state and is funded by a federal grant, some of which is used for a paid network director position.[13] Some CAHQNs in other states generate funds by charging hospitals a network membership fee.[13]

Conclusion

The RHNPT survey, which had consistently moderately high response rates (≥65%) over the four years of administration, indicates that RSON's organizational infrastructure is robust. What's more, numerous organizational aspects appear to be improving over time.

In managing common network tensions, RSON appears to have placed more emphasis on efficiency and flexibility than inclusivity and stability. While this approach has created some challenges, it has allowed RSON to encourage positively deviant behaviours (i.e., pushing/pulling at boundaries to innovate or bring about change) and effectively engage in system-wide learning to build a large complex network in a short period. The result is a network that is based on and responsive to the needs of network members and the broader environment.

Rural health stakeholders will be able to draw upon the rich and vast experience of RSON to build more effective post-RSON networks.

Limitations

Due to small sample sizes, there may have been changes in survey ratings over time that we could not detect. We conducted numerous statistical tests to assess for changes in responses over time, increasing the likelihood of a Type I error, i.e., false positive.

We did not start collecting unique identifiers for respondents until 2020. Thus, we were not able to match any repeat respondents between 2019 and other years.

To maintain anonymity within the small group of invitees, we did not collect any demographic data. This means that we are not able to assess how non-respondents differ from respondents, even though the perceptions and experiences of non-respondents may differ significantly from those of respondents.

References

1. Popp JK, Milward HB, MacKean G, Casebeer A, Lindstrom R. Inter-organizational networks: a critical review of the literature to inform practice. Washington, DC: IBM Center for the Business of Government; 2014.

2. Provan KG, Kenis PN. Modes of Network Governance: Structure, Management, and Effectiveness. J Public Adm Res Theory. 2007 2008;18(2):229–52.

3. Provan KG, Lemaire RH. Core concepts and key ideas for understanding public sector organizational networks: using research to inform scholarship and practice. Public Adm Rev. 2012;72(5):638–48.

4. Hurst DK, Zimmerman BJ. From Life Cycle to Ecocycle: A New Perspective on the Growth, Maturity, Destruction, and Renewal of Complex Systems. J Manag Inq. 1994;3(4):339–54.

5. Crossan MM, Hurst DK. Strategic Renewal as Improvisation: Reconciling the Tension Between Exploration and Exploitation. In: Ecology and Strategy [Internet]. Emerald Group Publishing Limited; 2006. p. 273–98. Available from: https://go.exlibris.link/Kylvrt75

6. The National Rural Health Resource Center. Rural Health Network Profile Tool [Internet]. Vol. 2019. 2000. Available from: https://www.networktools.nchn.org/uploads/2/7/8/5/27858331/rural_health_netowrk_profile_tool.pdf

7. Child J, Faulkner D, Tallman SB, Hsieh L, Online) U eCollections (University PS. Cooperative strategy: managing alliances and networks. Third. Oxford: Oxford University Press; 2019.

8. Zhong W, Su C, Peng J, Yang Z. Trust in Interorganizational Relationships: A Meta-Analytic Integration. J Manag. 2017;43(4):1050–75.

9. Raab J, Mannak RS, Cambré B. Combining Structure, Governance, and Context: A Configurational Approach to Network Effectiveness. J Public Adm Res Theory. 2015;25(2):479–511.

10. Kerzner H, Wiley Online Library, Wiley Frontlist All Obook 2019. Using the project management maturity model: strategic planning for project management [Internet]. Third;3; Using the Project Management Maturity Model. Hoboken, New Jersey: John Wiley & Sons, Inc; 2018. Chapter 1, The Need for Strategic Planning for Project Management; pp. 1–19. Available from: https://go.exlibris.link/1RTq2ly2

11. Gutterman AS, Gutterman, Business Expert Press 2021 Digital Library. Strategic Planning for Sustainability [Internet]. New York: Business Expert Press; 2020. Chapter 1, Introduction; pp. 1–24. Available from: https://go.exlibris.link/Ny4qzx8V

12. National Rural Health Resource Center. Community Care Alliance, a Western Health Care Alliance Company [Internet]. 2019 [cited 2022 May 11]. Available from: https://www.ruralcenter.org/rhi/network-ta/network-spotlights/community-care-alliance-a-western-health-care-alliance-company

13. National Rural Health Resource Center. Network Spotlight: North Dakota Critical Access Hospital Quality Network [Internet]. 2017 [cited 2022 May 11]. Available from: https://www.ruralcenter.org/rhi/network-ta/network-spotlights/network-spotlight-north-dakota-critical-access-hospital-quality

14. Fong Y, Huang Y, Lemos MP, Mcelrath MJ. Rank-based two-sample tests for paired data with missing values. Biostat Oxf Engl. 2018;19(3):281–94.

Appendix 1. Survey instructions

Note about "Don't know" response option: The original RHNPT includes a "Not applicable" response option. Starting in 2020, we replaced the "Not applicable" response option in the original RHNPT survey with a "Don't know" response option. We made this change because we deleted any RHNPT survey item deemed not to be applicable to RSON before administering the survey. We also did not want to force respondents to pick a Likert scale answer option if they were not knowledgeable about a specific area.

These are the instructions that appeared at the beginning of the survey.

- Although RSON includes many network levels, **in this survey, "rural health network" refers to the central administrative infrastructure of RSON.** Networks members at the central level include the RCCbc leadership team, pillar leads, local community coordinators, and Health Authority leadership. Please answer questions with this level of the network in mind.

- Please read each statement and select the number that best reflects your understanding of the network (RSON). If you are not able to answer a question, please select "Don't know."
- The numbering key is as follows:
    - 1 = No
    - 5 = Yes
    - DK = Don't know
    - 2, 3, or 4 should be marked if neither "yes" or "no" is entirely accurate and if the statement "somewhat" reflects the position of your network, e.g., 2 would indicate a weak position, 3 a moderate position, and 4 a relatively strong position. Numbers 2 - 4 could also be used to indicate your network's progress toward achieving an objective related to the statement. In other words, 2 might indicate "we've begun to work on it", 3 might be "we're working on it" and 4 might be "we've nearly completed it."

- Use the comment section that follows each set of statements to clarify or expand on your positions. Cite the statement number related to each comment.

- The numbers will not be totaled or used as a score.

- Be as candid as possible.

Appendix 2. Statistical methods

We used the Wilcoxon Mann-Whitney (WMW) rank sum test to compare responses for each survey item over time. We began collecting unique identifiers in 2020: respondent mother's initials with maiden last name + respondent's birth month + respondent mother's birth month. This allowed us to match repeating respondents from 2020 onward. Except for 2019 data, we used a modified WMW test for partially paired datasets to compare responses over time.[14] Although some respondents from 2019 likely completed the survey again later, comparisons involving 2019 data assumed that the samples being tested were independent

Though the graphs in the results section present averages as a summary statistic of the spread of data, the non-parametric tests we used to compare responses between years do not measure the difference in two averages. Instead, these tests evaluate whether two distributions are equal. That is, if one value is randomly selected from each of the two populations corresponding to the samples being compared (population 1 and population 2), the likelihood that the value from population 1 is greater than the value from population 2 is the same as the likelihood that the value from population 1 is less than the value from population 2. It is not appropriate to compare averages because sample sizes are small and the distribution of data for survey items are not always normal.

Appendix 3. 2019 – 2021: 'Don't know'/'Not applicable' responses

The original RHNPT survey included a "Not applicable" response option. In 2020, we decided to change this "Not applicable" response option to "Don't know."

Figure 13. 2021 - Survey items with >20% "Don't know" responses (total number of respondents=23)

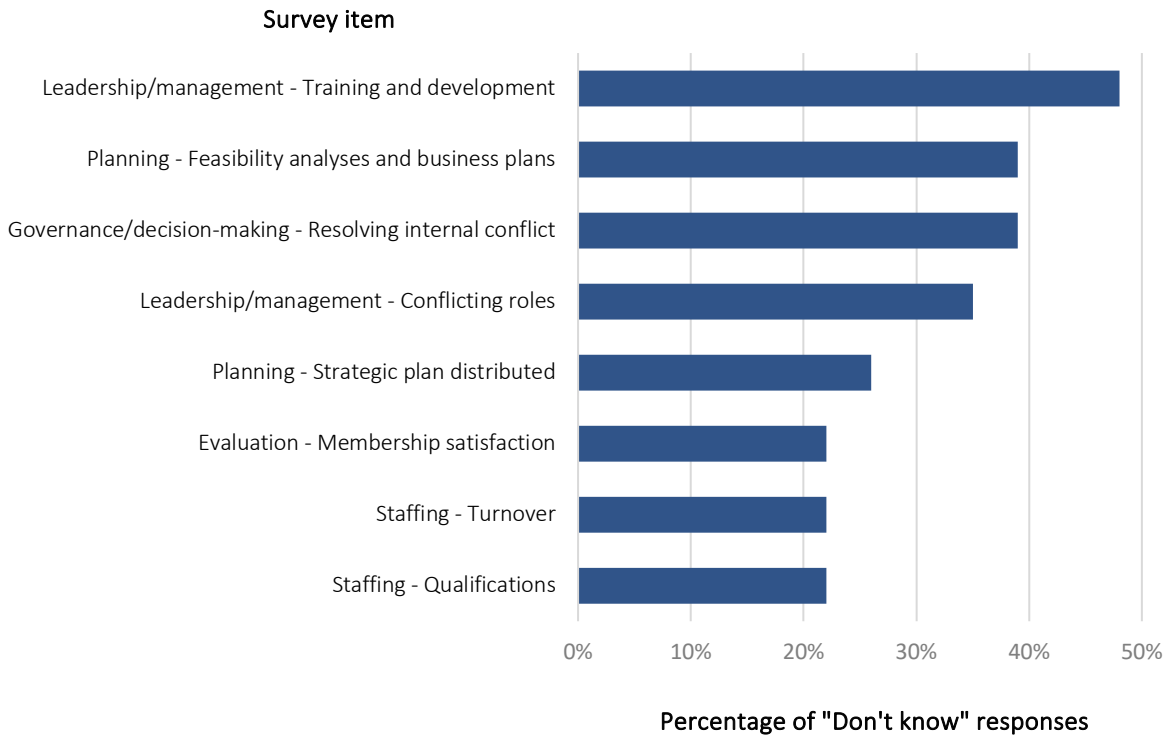


Figure 14. 2020 - Survey items with >20% “Don’t know” responses

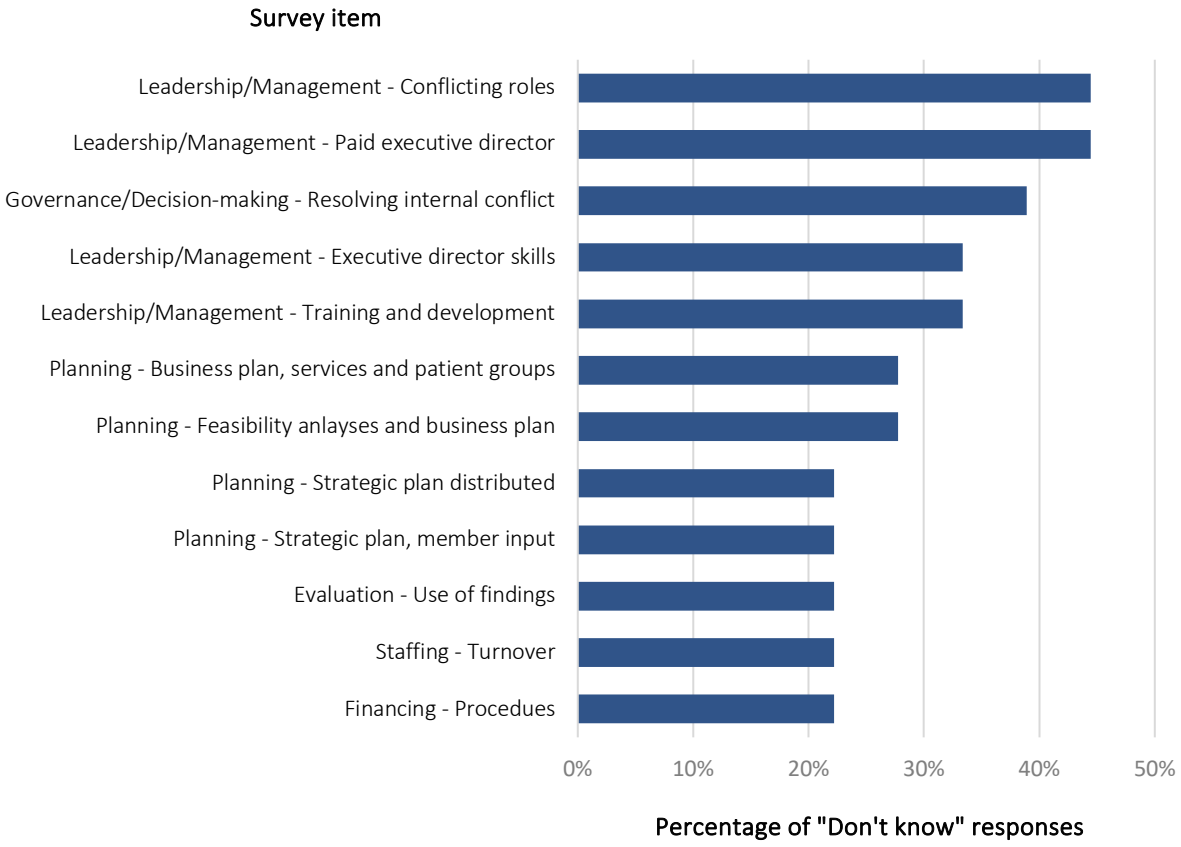
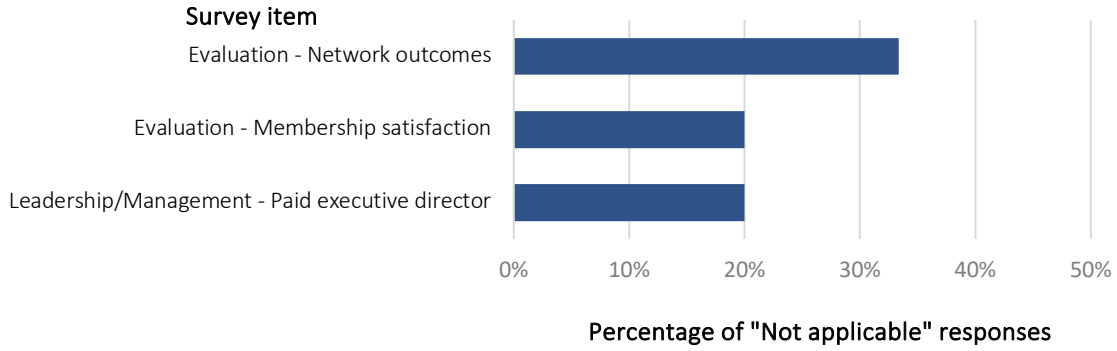
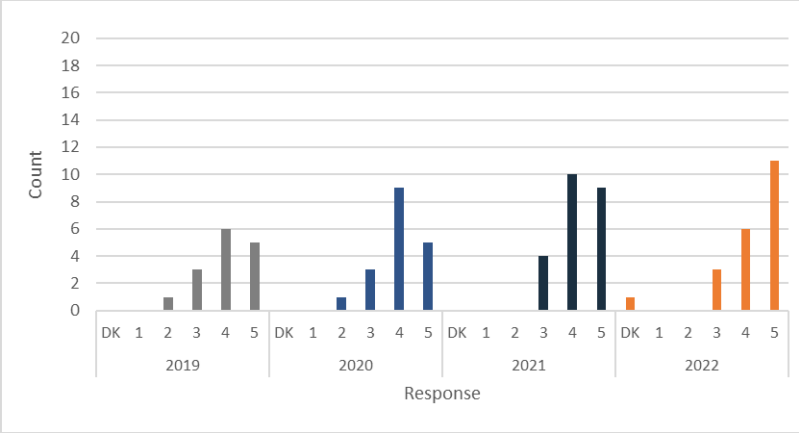


Figure 15. 2019 - Survey items with >20% “N/A” responses

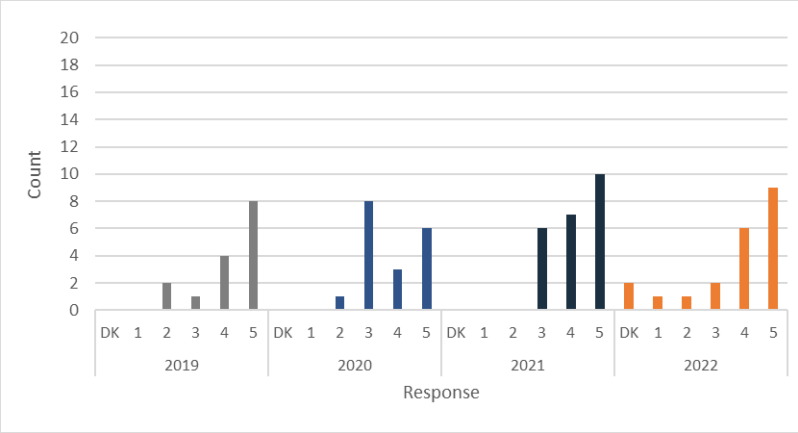


Appendix 4. Response frequencies by year

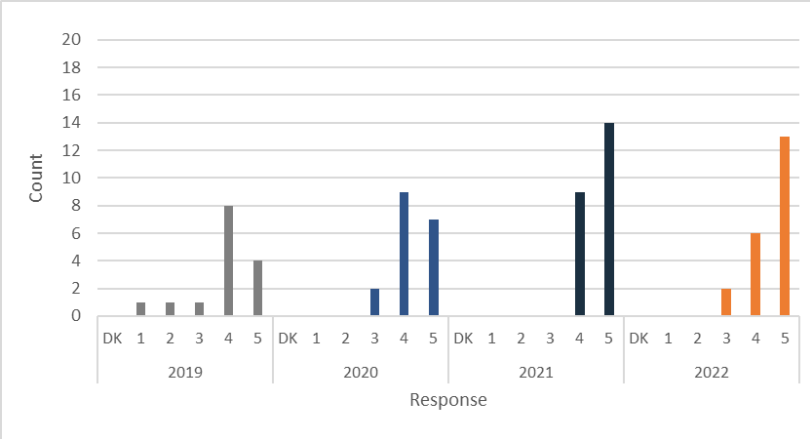
Figure 16. Purpose section survey items



16a. The network's purpose and mission are understood by network members.

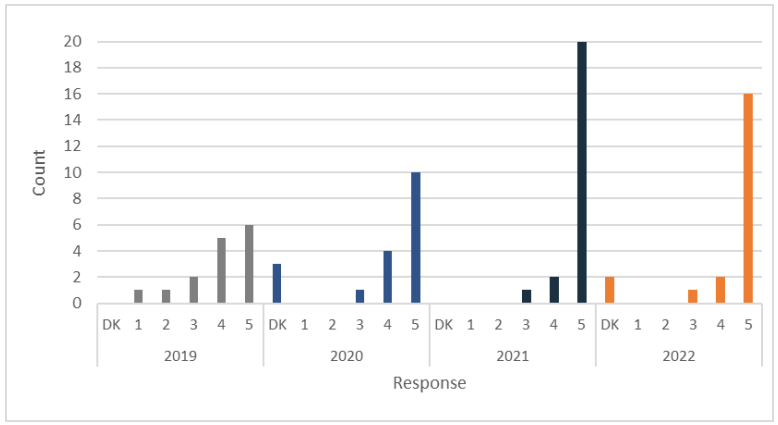


16b. The network's mission is clearly expressed in writing.

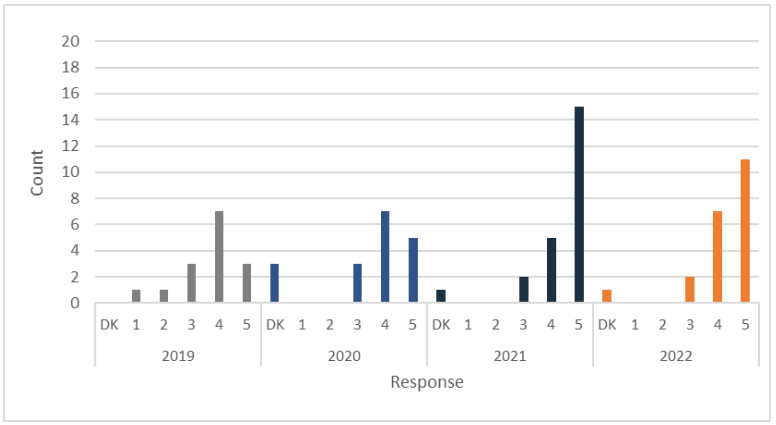


16c. (to the left) Generally speaking, key leaders in the network service area (i.e., RSON leadership at RCCbc, Health Authority champions) understand the purpose and mission of the network.

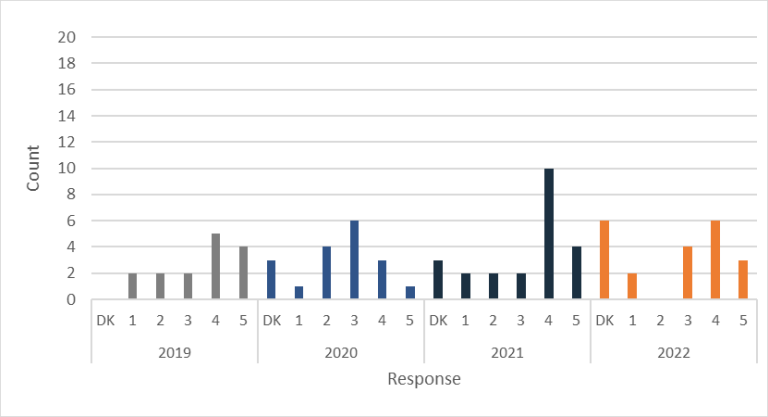
Figure 17. Governance/decision making section survey items



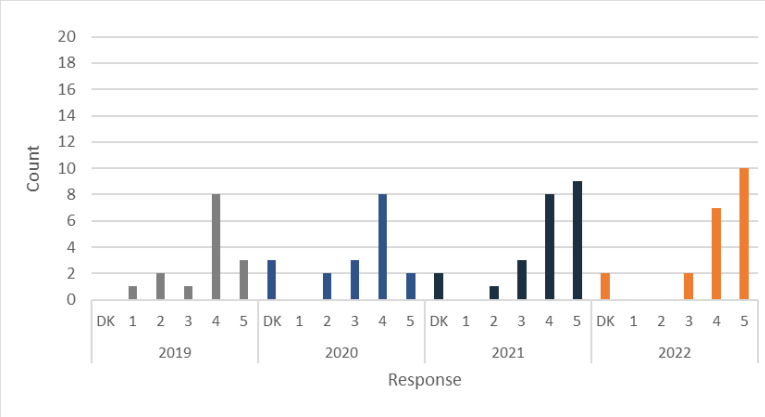
17a. The network has a governing board or steering committee.



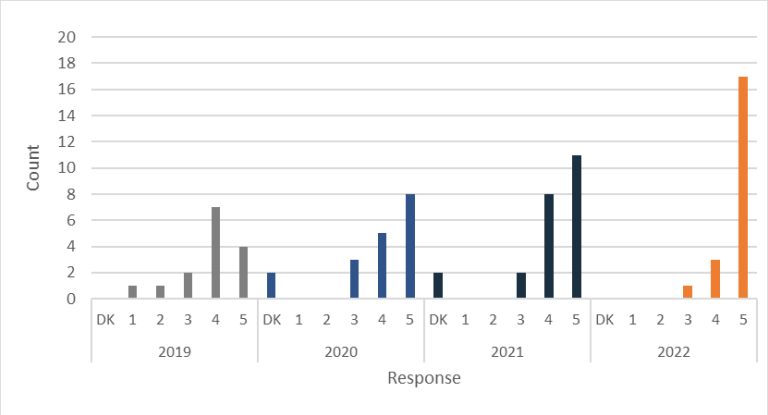
17b. The governing board or steering committee is representative of the members in the network.



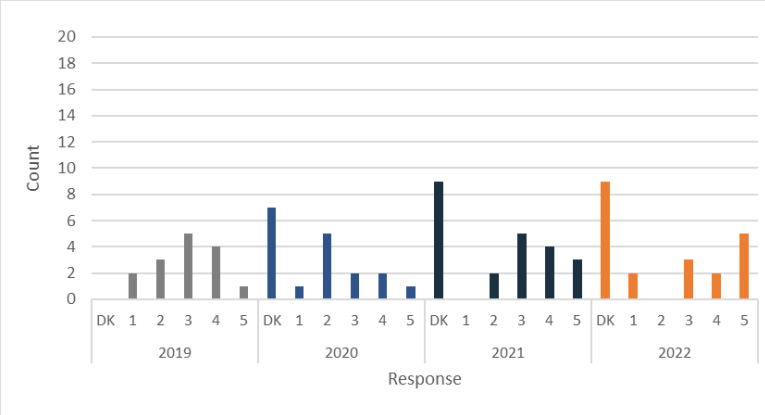
17c. Governance and decision-making processes are stated clearly in writing.



17d. Network decision making is inclusive and involves input by key network members.

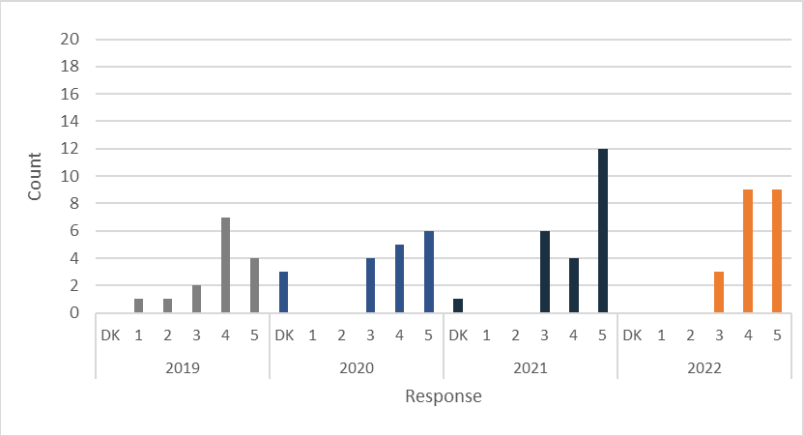


17e. The network board or steering committee respects governance/administrative boundaries (e.g., of the Health Authorities)

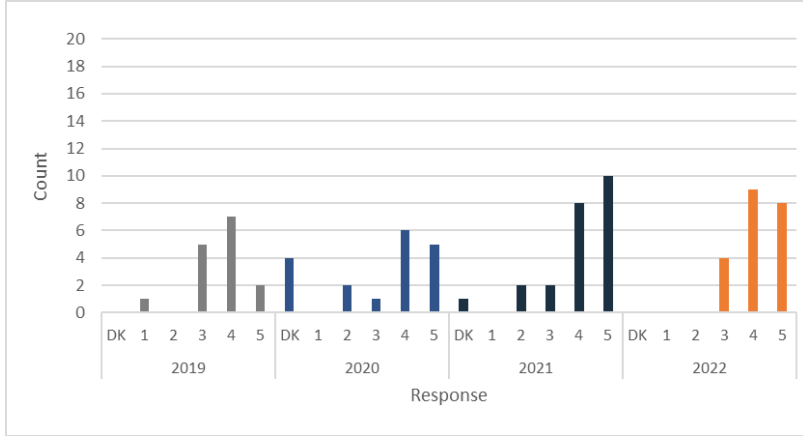


17f. There is a defined network mechanism for resolving internal conflict.

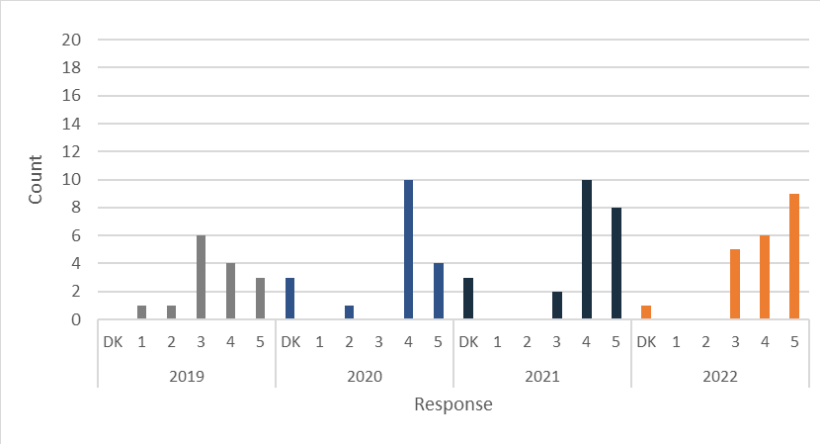
Figure 18. Planning section survey items



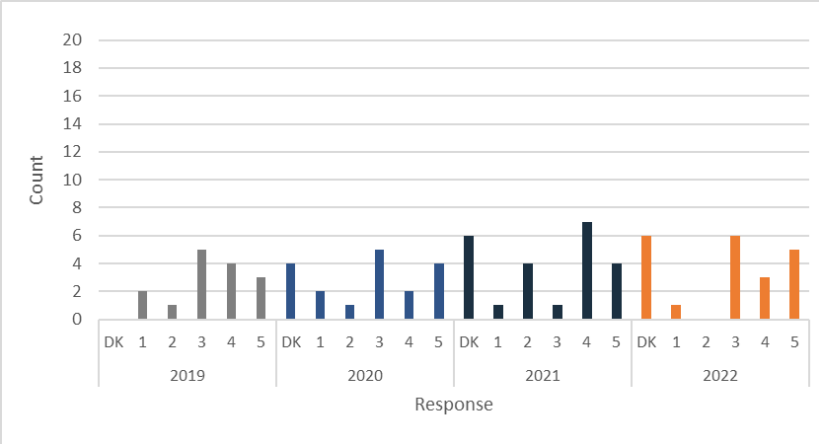
18a. There is a defined strategic planning process in place for the network that includes gathering information, assessing needs, setting goals and action strategies, allocating resources, assigning responsibilities for carrying out activities, and evaluating outcomes.



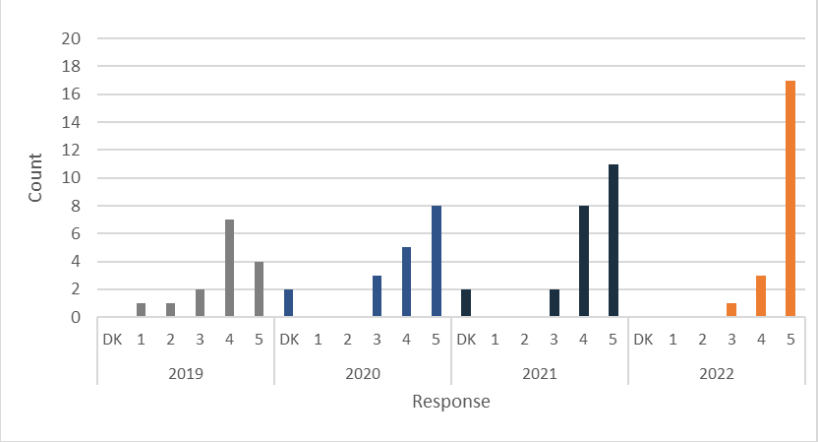
18b. Strategic planning is ongoing with opportunities for member input.



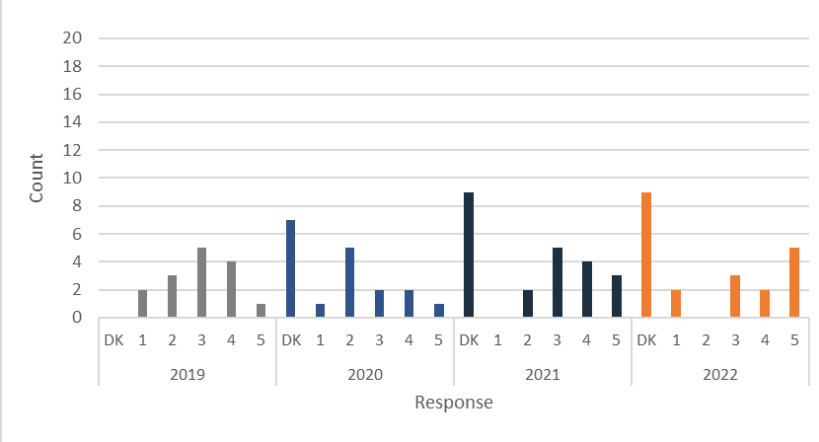
18c. Information and input has been gathered from key community, government, and care providers in the network service area for consideration in the strategic planning process.



18d. The network's strategic plan has been distributed to all network members.

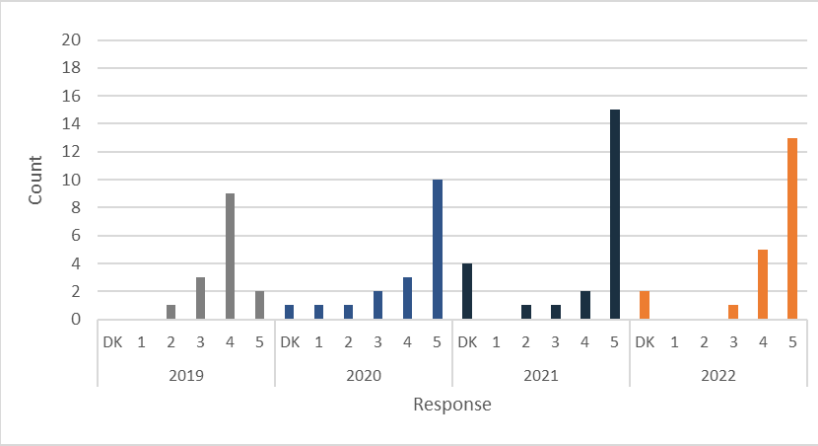


18e. Feasibility analyses and business plans are prepared for proposed health service delivery.

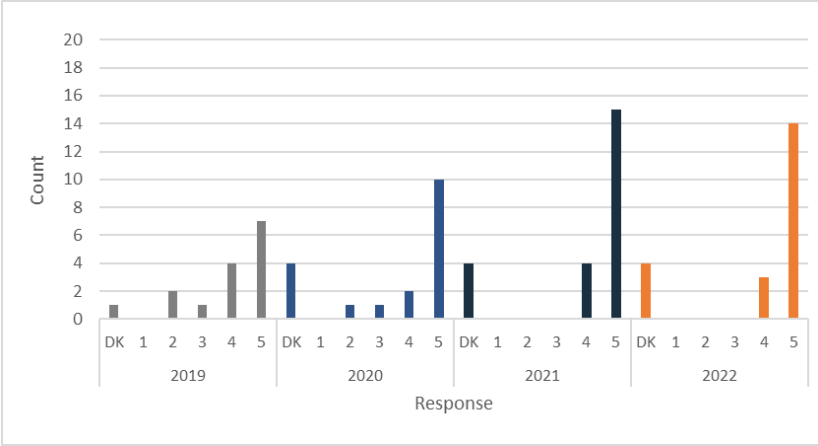


18f. The network's business plan identifies specific services, as well as targeted citizen patient groups.

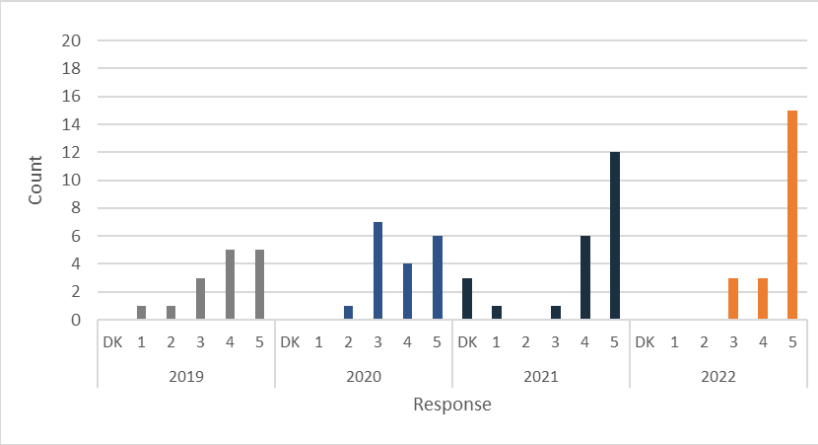
Figure 19. Financing section survey items



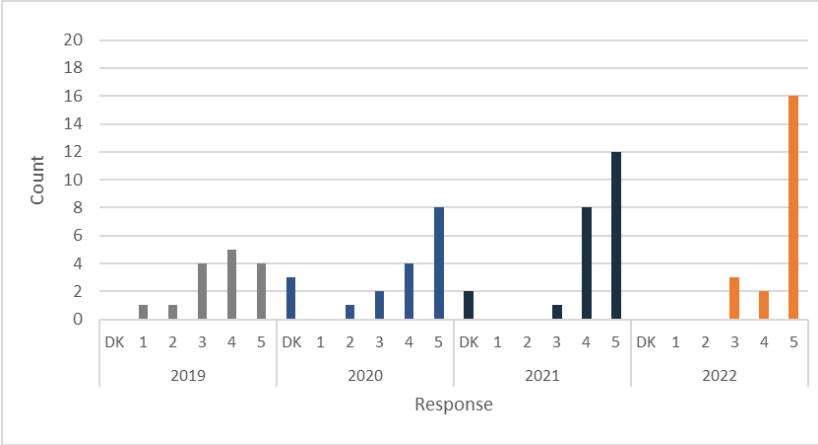
19a. The network has an annual budget that has been developed with the input of network members.



19b. The network follows generally accepted financial management procedures.

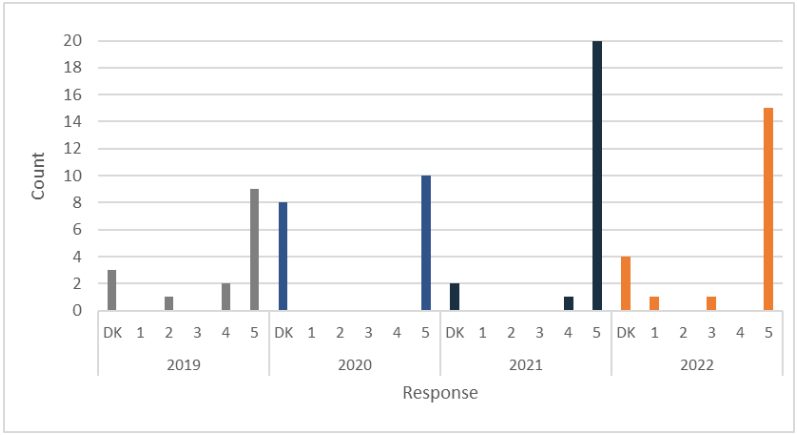


19c. Expenditure of network funds are transparent.

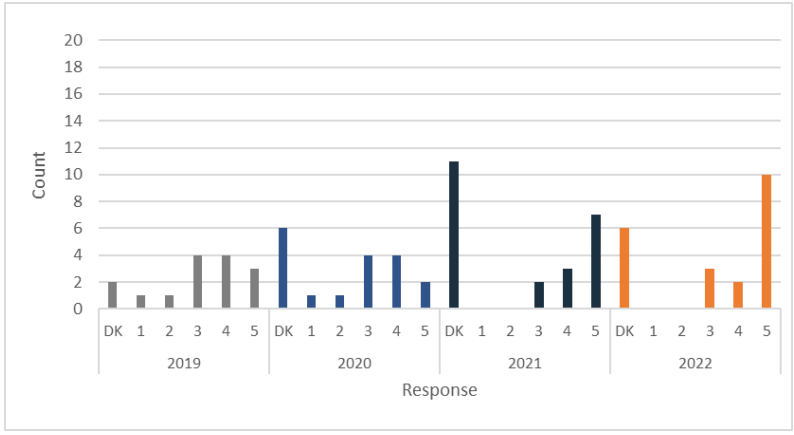


19d. Funding to your domain is needs based and adequate for accomplishing required tasks.

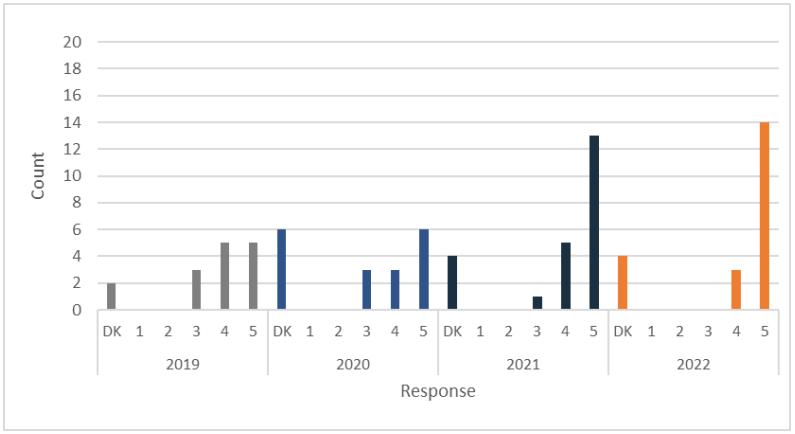
Figure 20. Leadership/Management section survey items



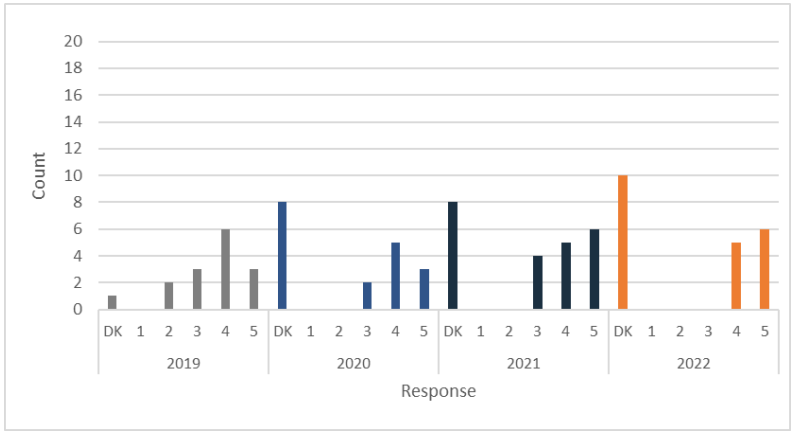
20a. The network has a paid executive director.



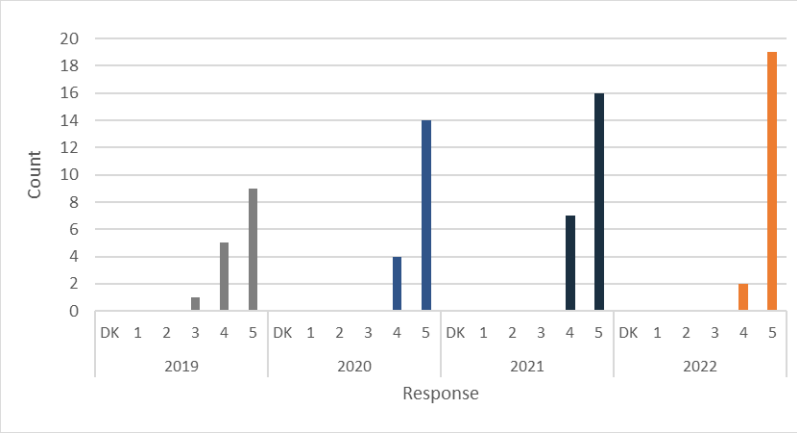
20b. The network commits money and time for leadership training and development.



20c. The network executive director has skill and experience in management of collaborative organizations.

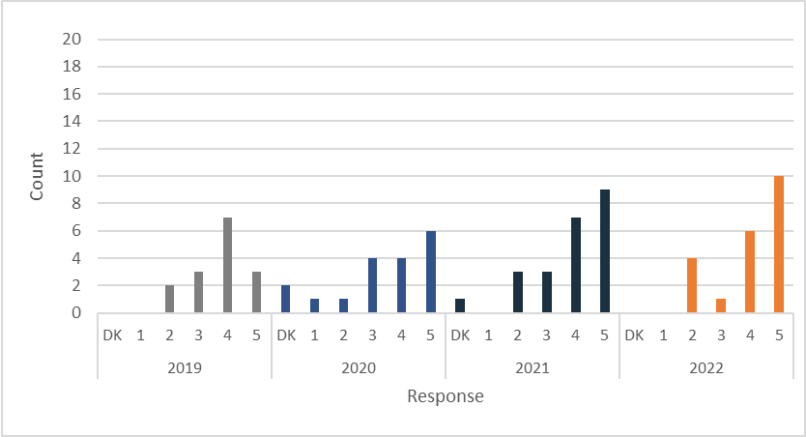


20d. Network board members' sometimes conflicting leadership roles -- doing what's best for the network versus doing what's best for their individual organizations -- is recognized and managed successfully.

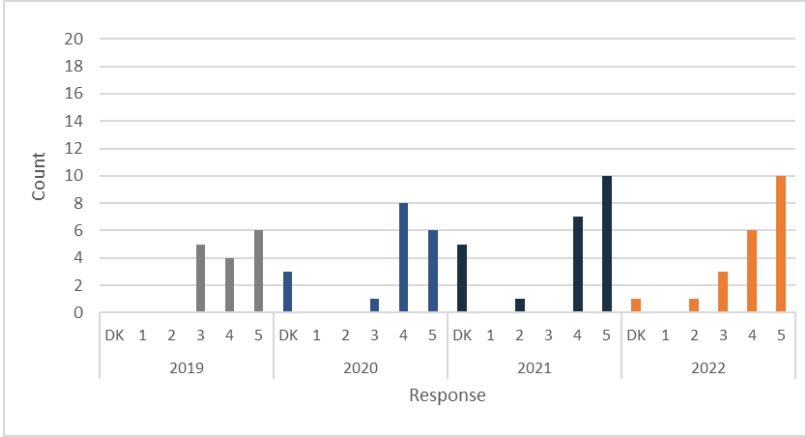


20e. Physicians and other key health care providers have active roles in the network leadership.

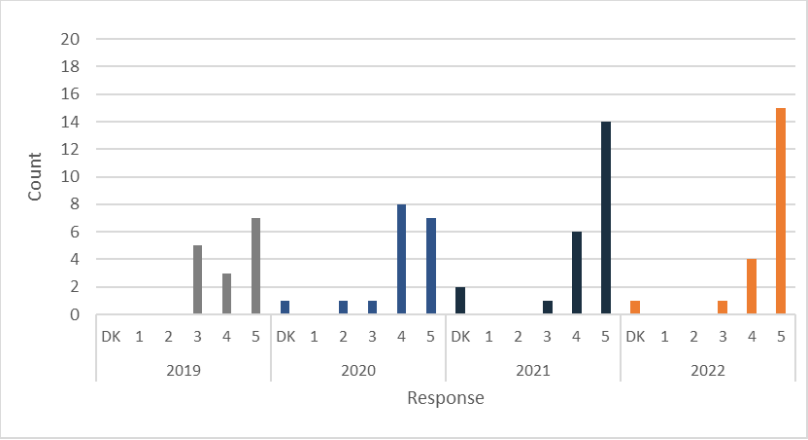
Figure 21. Staffing section survey items



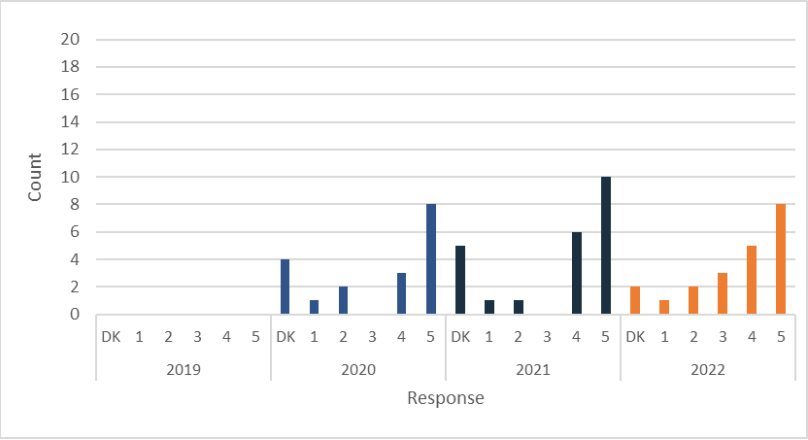
21a. Staffing levels are adequate to carry out network activities.



21b. Network staff are qualified and contain a mix of senior- and junior-level professionals.

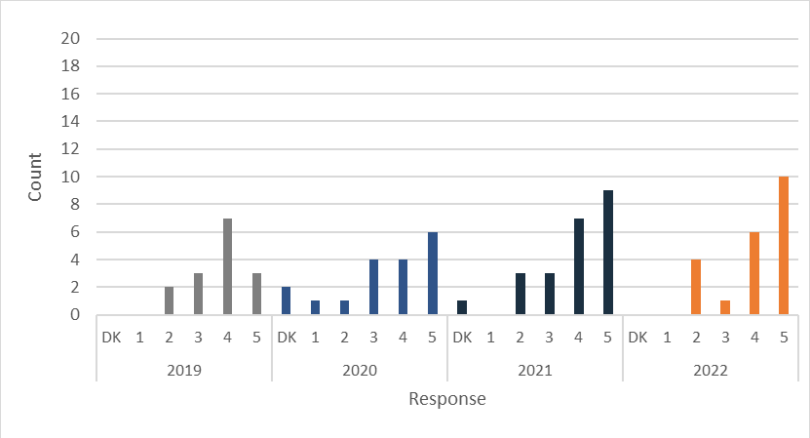


21c. Staff have the technology, equipment, and software needed to maximize productivity.

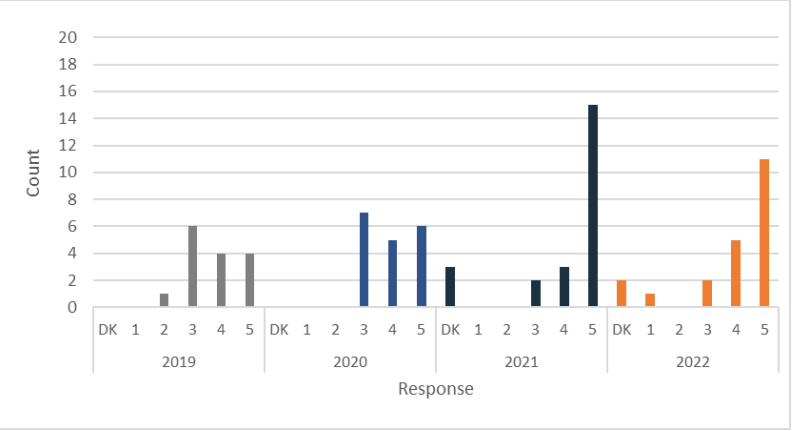


21d. Turnover of key staffing positions has been low.

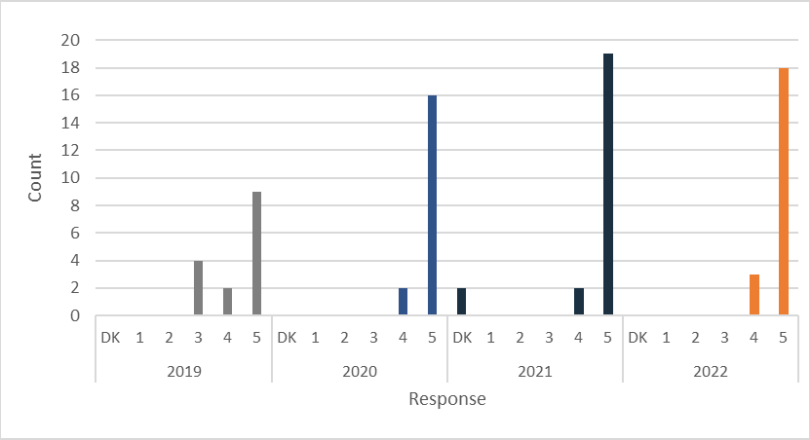
Figure 22. Communication section survey items



22a. Central network staff (i.e., RCCbc) communicate regularly with network members.

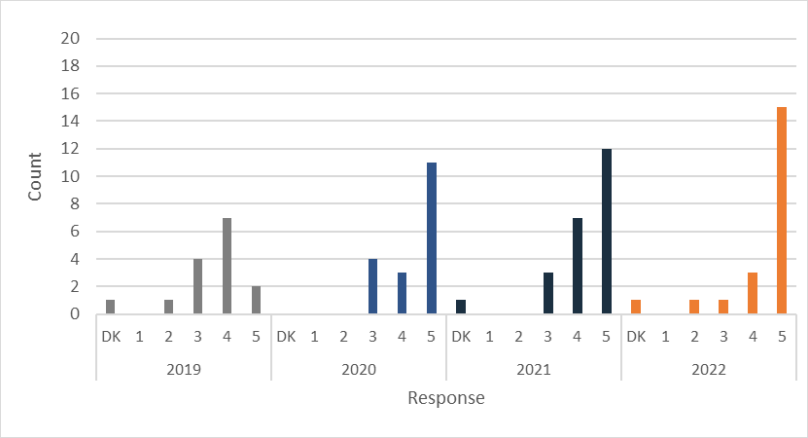


22b. Network members use the network as a forum both for sharing information and problem solving.

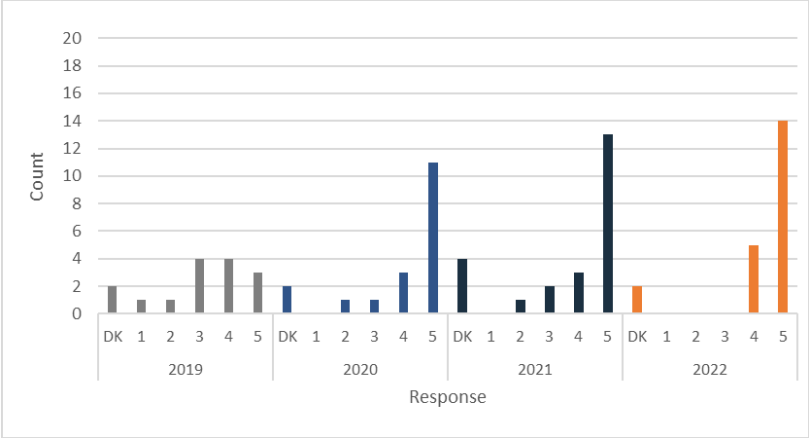


22c. Network members have the electronic capability of communicating with each other.

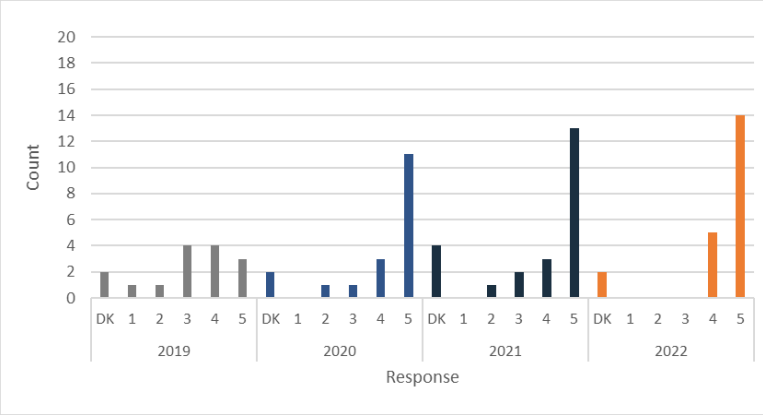
Figure 23. Evaluation section survey items



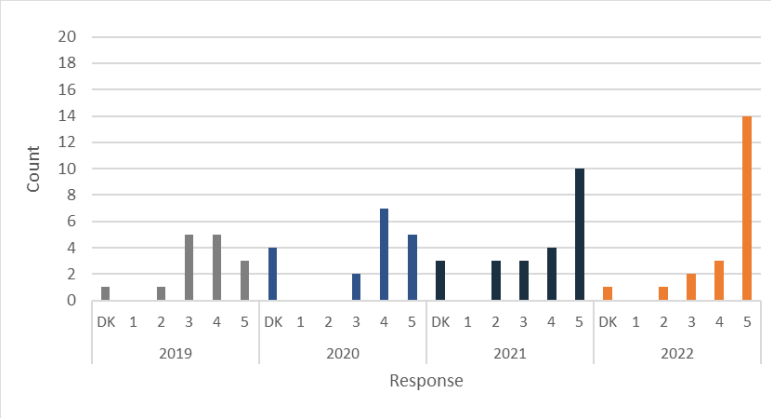
23a. The network has a defined method of evaluating its performance.



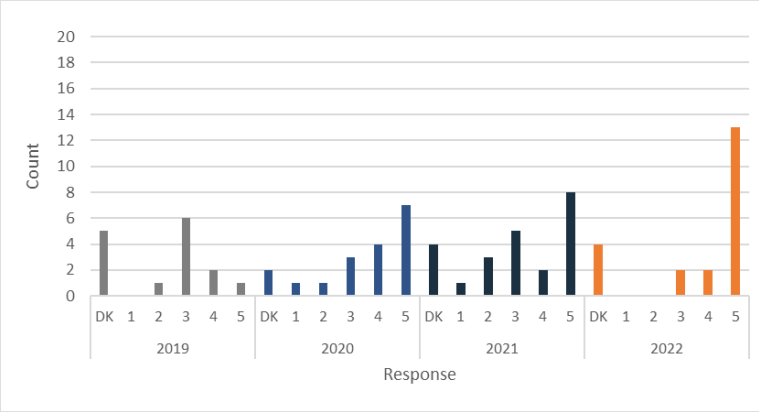
23b. Evaluation is based on the impact of the network on both its members and the communities in its service area.



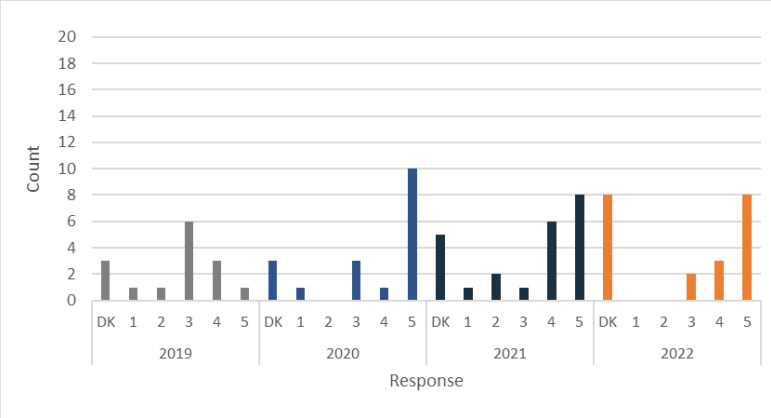
23c. Evaluation of the outcomes of network goals and objectives is done at least annually.



23d. Evaluation findings are used to improve network performance, decision making, and strategic planning.



23e. Measurable network outcomes are disseminated in writing to members at least annually.



23f. Membership satisfaction is assessed at least annually.