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Building Rural Health Research Capacity: Protocol for a Realist Review

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Complete List of Authors:	Young, Christina; Memorial University of Newfoundland, Centre for Rural Health Studies, Faculty of Medicine; Carbonear Institute for Rural Reach and Innovation by the Sea Patey, Christopher; Memorial University of Newfoundland, Faculty of Medicine; Carbonear Institute for Rural Reach and Innovation by the Sea, Norman, Paul; Carbonear General Hospital; Carbonear Institute for Rural Reach and Innovation by the Sea Geetha Manukumar, Aswathy; Memorial University of Newfoundland, Centre for Rural Health Studies, Faculty of Medicine Carson, Dean; Umea University, Department of Epidemiology and Global Health Swab, Michelle; Memorial University of Newfoundland, Health Sciences Library Asghari, Shabnam; Memorial University of Newfoundland, Centre for Rural Health Studies, Faculty of Medicine
Keywords:	Research Design, Health Education, Capacity Building

Building Rural Health Research Capacity: Protocol for a Realist Review

Authors

Dr. Christina Young[1,2]

h95cmy@mun.ca

Dr. Christopher Patey[2, 3]

Christopher.Patey@med.mun.ca

Paul Norman[2]

paulnorman83@gmail.com

Aswathy Geetha Manukumar[1]

ageethamanuk@mun.ca

Dr. Dean Carson[4]

dean.carson@umu.se

Michelle Swab[5]

mswab@mun.ca

Dr. Shabnam Asghari (corresponding author)[1]

Shabnam.Asghari@med.mun.ca

[1]Centre for Rural Health Studies, Faculty of Medicine, Memorial University of Newfoundland, 300 Prince Philip Drive, St. John's, NL, Canada, A1B 3V6
[2]Carbonear Institute for Rural Reach and Innovation by the Sea, Carbonear, Canada
[3]Discipline of Family Medicine, Faculty of Medicine, Memorial University of Newfoundland
[4]Department of Epidemiology and Global Health, Umeå University
[5]Health Sciences Library, Memorial University of Newfoundland

Abstract

Introduction: While individuals living in rural areas often have poorer health outcomes and reduced access to healthcare services compared to those in urban areas, there is a disproportionate gap in research examining rural health issues and identifying solutions to healthcare challenges. This is likely due to the numerous barriers to conducting rural health research, including the centralization of research in urban areas and limited trained personnel and resources to conduct research in rural communities. This realist review aims to identify articles focused on building rural health research capacity and develop an evidence-based framework to be used by researchers, clinicians, and policymakers to improve rural health services and well-being for rural populations.

Methods and analysis: We will conduct a realist review using the following steps: (1) develop a search strategy, (2) conduct article screening and study selection, (3) perform data extraction, quality appraisal, and synthesis, (4) engage stakeholders for feedback on our findings, and (5) report our findings and engage in knowledge translation. The literature search will include the databases Ovid MEDLINE, Embase, CINAHL Plus, APA PsycINFO, ERIC, and Scopus. Studies will be screened by title and abstract and full text by two research team members and included based on their relevance to rural health research capacity building. We will also search the grey literature to identify rural health research centres, networks, or training programs that have not been described in the academic literature. Two research team members will extract relevant data from included studies and perform a qualitative analysis based on guidelines for realist reviews.

Ethics and dissemination: This review does not require ethical approval as it draws on secondary data that is publicly available. The findings will be disseminated at academic conferences, published in peer-reviewed journals, and summarized in a lay report for individuals interested in developing strategies, programs, or policies to improve rural health research. The results will inform individuals developing rural health research training programs, establishing rural research centres, or others interested in building rural health research capacity.

PROSPERO registration number: CRD42023444072

Strengths and Limitations:

- To our knowledge, this is the first review that examines the factors associated with rural health research capacity building
- This review will address a gap in understanding regarding the best strategies, programs, and policies to employ to improve the quality of rural health research and inform the structure and delivery of healthcare services in rural areas
- The findings will offer guidance for researchers, policymakers, and healthcare providers to build rural health research capacity
- A limitation is that this review will only consider articles published in English, which may mean that relevant research published in other languages is excluded

Introduction

Health research disproportionately focuses on issues faced in urban areas, with limited research examining the needs of rural populations [1-2]. However, rural residents often have poorer health outcomes and reduced access to healthcare services compared to their urban counterparts [3-4]. Despite these challenges, there is a disproportionate gap in research examining rural health issues and offering tailored solutions to improve rural healthcare and overall community well-being [5]. Findings from health research conducted in urban areas, especially about the implementation of specific programs and policies, are often difficult to translate to rural areas due to the distinct contextual factors in each locale [2].

In rural areas, there is often limited capacity for conducting high-quality research because of a lack of rural-related research training and available academic personnel [6]. Networks of rural health researchers are often small and disconnected, requiring more significant opportunities for collaboration and strategies for developing rural research capacity [7]. As well, urban researchers often design research projects based on urban biases and “drop in” to rural areas to quickly gather research data, without meaningfully engaging with or understanding the local

context [3]. Nevertheless, existing research suggests that rural communities can develop and sustain health service innovation to address their own needs [8].

To address these issues, many policies and programs have been initiated to improve rural health research capacity, aiming to improve the health and well-being of rural communities. Existing research regarding rural health research capacity building suggests that concentrated investment in training is required to improve research capacity and identify local needs to target research projects appropriately [9]. Much of this training has been focused on building research competency among healthcare professionals working in rural areas, who typically lack specific research expertise [6, 10].

In fact, numerous rural research training programs focus on developing research skills among rural physicians or other healthcare workers with an interest in exploring concerns arising in their practice [11-12], including the 6-for-6 program at Memorial University of Newfoundland, Canada [12], the Master of Medical Studies program at the Northern Ontario School of Medicine in Canada, and the Rural Research Capacity Building Programme in New South Wales, Australia [13]. While many healthcare professionals have an interest in conducting rural health research relevant to their practice, their demanding careers often make it challenging to continue this work long-term, especially in the absence of stronger support enjoyed by those with greater access to university resources typically concentrated in urban areas [11, 14].

Many rural health research centres have been created to strengthen the capacity for conducting rural health research, taking on several different forms. One such model is dedicated rural health research centres within universities (e.g., Centre for Rural Health Studies at Memorial University of Newfoundland, Centre for Rural Health Research at the University of British Columbia, and Center of Excellence in Rural Health at the University of Kentucky). Others are research centres physically located in rural areas but affiliated with specific universities (e.g., Flinders University Rural Clinical School in Australia). Also, community-based research centres without a direct university affiliation combine support for rural health research to improve the health and well-being of their immediate communities (e.g., Gateway Centre of Excellence in Rural Health in Ontario, Canada and the Carbonear Institute for Rural Reach and Innovation by the Sea in Carbonear, Canada). Governments have also established rural research centres, such as the Centre for Rural Medicine in Sweden, to engage stakeholders to identify solutions to rural health issues [15]. Additionally, many rural health research networks have been created to improve researcher collaboration, including the Canadian Rural Health Research Society [16] and the Rural Health Services Research Network of British Columbia, Canada.

While some studies have examined the success of individual initiatives, to our knowledge there is presently no comprehensive review of the strategies employed to build rural health research capacity. Therefore, we are conducting a realist review to identify the strategies, programs, and policies that improve rural health research capacity. A realist review is an appropriate framework to address this gap in the literature, as initiatives aimed at building research capacity must consider local contexts and the mechanisms by which policies and programs function [10].

Methods and analysis

Realist reviews examine “what works, for whom, and in what circumstances” [17]. This approach draws on principles of realist philosophy, which suggests that a real world exists separately from human perception that can be imperfectly understood through analysis of underlying mechanisms [18-19]. Compared to more traditional systematic reviews, realist reviews go beyond evaluating efficacy to understand why an intervention was effective, given

the complexity involved in implementing policies and programs [20-21]. Realist reviews assume that a theory or hypothesis underlies the design and implementation of policies, programs, and interventions, and consider the interplay between mechanisms, contexts, and outcomes [20]. The main outcome of this study will be the development of a framework identifying the contexts and mechanisms that build rural health research capacity.

The review is registered in the PROSPERO database (registration number CRD42023444072) and our protocol will be reported based on the guidelines in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) (see Additional file 1 for PRISMA-P checklist). Our methods are guided by the steps to conducting realist reviews as outlined by Pawson et al. [20] and our presentation of findings will adhere to the RAMESES II reporting standards for realist evaluations [22]. The process for conducting a realist review typically involves a literature review, data extraction, analysis, and a quality assessment. Realist reviews also include the development of a program theory – a description of how a program should be structured and a hypothesis about how it will work [20].

Research Questions

This review will seek to answer the following research questions:

1. What strategies and models (e.g., degree programs, university-based research centres, government research and development units, independent research centres, conferences, and research networks) currently exist to build capacity in rural health research?
    a. Are some strategies or models more effective than others? In what contexts?
2. What activities and processes contribute to a sustainable rural research capacity-building program? In what contexts?
    a. What infrastructure is required for a sustainable rural health research capacity-building program? In what contexts?
3. What strategies are used for developing rural health researchers?
    a. What factors facilitate collaboration in research and support research careers in rural areas?
    b. What skills and competencies are necessary for being a rural health researcher?

The steps for gathering and analyzing data to answer these questions are outlined below.

Search Strategy

Realist reviews draw on various data sources, including quantitative, qualitative, and mixed-methods studies, as well as grey literature [23]. The review will include any English-language studies (qualitative, quantitative, and mixed methods), commentaries, and editorials that focus on building rural health research capacity. We will consider studies that self-identify as having a rural focus, with the concept of “rural” defined by the study authors themselves. There is no restriction for articles based on country, region, or population.

Our research team includes academics, clinicians, experts in rural health research capacity building, and a medical librarian. Search terms were identified by the research team and refined by a medical librarian, and include variations of the terms “research,” “capacity building,” and “rural” (see Additional file 2 for sample search strategy). Databases include (since inception) Ovid MEDLINE, Embase, CINAHL Plus, APA PsycINFO, ERIC, and Scopus. A separate search

of the same databases was also designed to identify relevant theories or frameworks related to research capacity building, to assist in developing the program theory, using variations of the terms “research,” “capacity building,” “theory,” and “framework” (see Additional file 3 for sample search strategy). A preliminary search suggests that several conceptual frameworks describe research capacity building [6, 24-26]. Once articles have been screened and identified for inclusion in the review, we will conduct backward and forward searches to identify additional relevant articles. Hand searches will also be performed if the team determines it is necessary based on the quality and quantity of articles identified. Finally, a grey literature search will be conducted using the Google search engine, to identify existing rural health research centres, training programs, conferences, and research networks that are not described in the academic literature but whose operation is relevant to the scope of the review.

Screening and Study Selection

All articles will be stored and managed in Covidence for title and abstract and full-text screening. Two members of the research team will independently screen the articles by title and abstract. Disagreements will be resolved through a meeting between the two reviewers. If the reviewers are at an impasse, a third reviewer will determine whether an article should be included or excluded. Articles will be excluded if they are published in a language other than English and if they are deemed irrelevant to the scope of the review. The full text of articles included after the title and abstract screening will be evaluated in the same manner. At this stage, each reviewer will also indicate the reason for excluding each article.

Data Extraction, Quality Appraisal, and Synthesis

The research team will develop a unique Excel file to extract relevant data from included articles. This tool will gather data regarding the study characteristics (e.g., full citation including author(s), title, journal, and publication data, study objective(s), country, and participants) and the strategies or interventions employed to build rural health research capacity (e.g., description of the intervention, contextual factors, evaluation method(s), evidence of efficacy). The tool will also include a quality appraisal of each included article. Realist reviews evaluate the quality of an included study based on its applicability to the review, considering both the article’s relevance – the extent to which the research provides insight into the concept being examined – and its rigour – whether the researcher’s conclusions can be considered sound based on their methodology [20]. We will incorporate quality appraisal into the extraction tool where each reviewer will rank the overall relevance and rigour as low, medium, or high, adding any additional comments to support their ranking. To test the extraction tool, two reviewers will extract data from five articles and then meet to compare their results and adjust the tool as needed. As with the screening process, two members of the research team will extract data from each article and meet to resolve any disagreements or inconsistencies. If the disagreement is unresolved, a final decision will be made by a third reviewer.

Extracted data will be analyzed using qualitative analysis software through a process of coding the data into categories and then identifying dominant themes, concepts, or frameworks. The analysis will identify what works, for whom, and in what circumstances related to the study’s aim – building rural health research capacity. The synthesis will ultimately conclude with the development of a program theory or framework regarding the contexts and mechanisms that lead to improved health research capacity in rural areas.

Patient and public involvement

Once our team has identified comprehensive findings, we will seek feedback from relevant knowledge users through surveys or brief interviews to interpret findings, evaluate the research, and identify topics for future research [27]. Stakeholders are commonly included in realist reviews to ensure that findings resonate with experts working and practising in the area under review [21]. Knowledge users will include rural health researchers, rural healthcare providers interested in conducting research, students interested in specializing in rural health research, and rural community members, including healthcare service users. The insights provided by knowledge users will be integrated into the existing findings, adding improved reliability and trustworthiness, especially if our review is limited in identifying relevant articles.

Ethics and dissemination

This review does not require ethical approval as it draws on secondary data that is publicly available. The findings from this review will be presented at academic conferences, published in peer-reviewed journals, and summarized in a lay report for use by those interested in building rural health research capacity. The results will guide individuals developing relevant training programs, establishing rural research centres, or others interested in building rural health research capacity. Members of our team will also draw on the findings to aid in developing rural health research programs locally, nationally, and internationally.

References

1. Barclay L, Phillips A, Lyle D. Rural and remote health research: does the investment match the need? Aust J Rural Health. 2018;26(2):74-79.
2. Rourke J, & Bradbury-Squires D. Rural research: Let's make it happen! Can J Rural Med. 2022;27(3):116–117.
3. Stewart R. Enough seagulls! Rural and remote communities need local researchers living, walking and talking with locals. Med J Aust. 2020;213(11):514-515.
4. Subedi R, Greenberg TL, Roshanafshar S. Does geography matter in mortality? An analysis of potentially avoidable mortality by remoteness index in Canada. Ottawa, ON: Statistics Canada; 2019.
5. Kulig J, Minore B, Stewart N. Capacity building in rural health research: a Canadian perspective. Rural Remote Health. 2004;4(274).
6. Cooke J. A framework to evaluate research capacity building in health care. BMC Family Practice. 2005;6(1):1-11.
7. Macleod M, Dosman JA, Kulig JC, Medves JM. The development of the Canadian Rural Health Research Society: Creating capacity through connection. Rural Remote Health. 2007;7(1):622.
8. Carson D, Preston R, Hurtig AK. Innovation in rural health services requires local actors and local action. Public Health Rev. 2022;43(1604921).
9. Schmidt D, Duncanson K, Webster E, Saurman E, Lyle D. (2022). Critical realist exploration of long-term outcomes, impacts and skill development from an Australian Rural Research Capacity Building Programme: A qualitative study. BMJ Open. 2022;12(12).
10. Shee AW, Quilliam C, Corboy D, Glenister K, McKinstry C, Beauchamp A, Alston L, Maybery D, Aras D, McNamara K. What shapes research and research capacity building in rural health services? Context matters. Aust J Rural Health. 2022;30(3):410-421.
11. McCarthy P, Bethune C, Fitzgerald S, et al. Needs assessment for development of 6for6: Longitudinal research skills program tailored to rural and remote family physicians. Can Fam Physician. 2016;62(2):e80-e88.

12. Walsh A, Heeley T, Furlong B, Bethune C, Graham W, Asghari S. Rural health research capacity building: An anchored solution. Rural Remote Health. 2021;21(2):6162.
13. Webster E, Thomas M, Ong N, Cutler L. Rural research capacity building program: capacity building outcomes. Aust J Prim Health. 2011;17(1):107-113.
14. Asghari S, Heeley T, Bethune C, et al. Evaluation plan of the 6for6 research skills program for rural and remote physicians. Eval Program Plann. 2021;87:101933.
15. Hodge H, Carson D, Berggren P, Strasser R. From Lancelot to Lapland: Implications of engaged rural universities. In: University partnerships for international development. Bingley, UK: Emerald Group Publishing Limited; 2016. p. 123-139.
16. Macleod ML, Dosman JA, Kulig JC, Medves JM. The development of the Canadian Rural Health Research Society: Creating capacity through connection. Rural Remote Health. 2007;7(1):622.
17. Palm R, Hochmuth A. What works, for whom and under what circumstances? Using realist methodology to evaluate complex interventions in nursing: A scoping review. Int J Nurs Stud. 2020;109:103601.
18. Greenhalgh T, Wong G, Jagosh J, et al. Protocol – the RAMESE II study: Developing guidance and reporting standards for realist evaluation. BMJ Open. 2015;5:e008567.
19. Wong G, Westhorp G, Pawson R, Greenhalgh T. Realist synthesis: Realist training materials. https://www.ramesesproject.org/media/Realist_reviews_training_materials.pdf
20. Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review – A new method of systematic review designed for complex policy interventions. J Health Serv Res Policy. 2005;10 Suppl 1:21-34.
21. Rycroft-Malone J, McCormack B, Hutchinson AM, et al. Realist synthesis: illustrating the method for implementation research. Implement Sci. 2012;7:33.
22. Wong G, Westhorp G, Manzano A et al. RAMESES II reporting standards for realist evaluations. BMC Med. 2016;14(96).
23. CADTH. https://www.cadth.ca/sites/default/files/attachments/2021-10/realist-review-explainer-e_0.pdf
24. Bilardi D, Rapa E, Bernays S, et al. Measuring research capacity development in healthcare workers: A systematic review. BMJ Open. 2021;11:e046796.
25. Farmer, E, Weston K. A conceptual model for capacity building in Australian primary health care research. Aus Fam Phys. 2002;31(12):1139-1142.
26. Matus, J., Walker, A. & Mickan, S. Research capacity building frameworks for allied health professionals – A systematic review. BMC Health Serv Res. 2018;18(716).
27. Concannon TW, Grant S, Welch V, Petkovic J, Selby J, Crowe S, Synnot A, Greer-Smith R, Mayo-Wilson E, Tambor E, Tugwell P. Multi stakeholder engagement (MuSE) consortium: Practical guidance for involving stakeholders in health research. J Gen Intern Med. 2019;34(3):458-463.

Authors' contributions

CY developed the design of the review and drafted the protocol. MS developed the search strategy. All authors are involved in developing the concept and providing feedback throughout the review. All authors have read and approved the final manuscript.

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Competing interests

There are no competing interests associated with this manuscript.

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	p. 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	p. 1-2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	p. 2-3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	p. 4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	p. 5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	p. 4-5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	See supplements
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	p. 5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	p. 5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	p. 4-5
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	p. 5
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	p. 5
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	N/A
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	N/A
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	N/A
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	p. 5
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	N/A

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	p. 5
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	N/A
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	N/A
Study characteristics	17	Cite each included study and present its characteristics.	N/A
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	N/A
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	N/A
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	N/A
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	N/A
	23b	Discuss any limitations of the evidence included in the review.	N/A
	23c	Discuss any limitations of the review processes used.	N/A
	23d	Discuss implications of the results for practice, policy, and future research.	p. 6
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	p. 2
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	N/A
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	p. 8
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	p. 7
Competing interests	26	Declare any competing interests of review authors.	p. 7-8
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	N/A

PRISMA 2020 Checklist

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

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Authors

Dr. Christina Young[1,2]

h95cmy@mun.ca

Dr. Christopher Patey[2, 3]

Christopher.Patey@med.mun.ca

Paul Norman[2]

paulnorman83@gmail.com

Aswathy Geetha Manukumar[1]

ageethamanuk@mun.ca

Dr. Dean Carson[4]

dean.carson@umu.se

Michelle Swab[5]

mswab@mun.ca

Dr. Shabnam Asghari (corresponding author)[1]

sasghari@mun.ca

[1]Centre for Rural Health Studies, Faculty of Medicine, Memorial University of Newfoundland, 300 Prince Philip Drive, St. John's, NL, Canada, A1B 3V6
[2]Carbonear Institute for Rural Reach and Innovation by the Sea, Carbonear, Canada
[3]Discipline of Family Medicine, Faculty of Medicine, Memorial University of Newfoundland
[4]Department of Epidemiology and Global Health, Umeå University
[5]Health Sciences Library, Memorial University of Newfoundland

Abstract

Introduction: While individuals living in rural areas often have poorer health outcomes and reduced access to healthcare services compared to those in urban areas, there is a disproportionate gap in research examining rural health issues and identifying solutions to healthcare challenges. This is likely due to the numerous barriers to conducting rural health research, including the centralization of research in urban areas and limited trained personnel and resources to conduct research in rural communities. This realist review aims to identify articles focused on building rural health research capacity and develop an evidence-based framework to be used by researchers, clinicians, and policymakers to improve rural health services and well-being for rural populations.

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Ethics and dissemination: This review does not require ethical approval as it draws on secondary data that is publicly available. The findings will be disseminated at academic conferences, published in peer-reviewed journals, and summarized in a lay report for individuals interested in developing strategies, programs, or policies to improve rural health research. The results will inform individuals developing rural health research training programs, establishing rural research centres, or others interested in building rural health research capacity.

PROSPERO registration number: CRD42023444072

Strengths and limitations of the study:

- Draws on a realist approach to identify strategies for building rural health research capacity
- Data will be analyzed using qualitative methods to develop a framework that will inform researchers, clinicians, and policy makers
- Includes original research, commentaries, and editorials
- Excludes articles not published in English

Introduction

Health research disproportionately focuses on issues faced in urban areas, with limited research examining the needs of rural populations [1-2]. However, rural residents often have poorer health outcomes and reduced access to healthcare services compared to their urban counterparts [3-4]. Despite these challenges, there is a disproportionate gap in research examining rural health issues and offering tailored solutions to improve rural healthcare and overall community well-being [5]. Findings from health research conducted in urban areas, especially about the implementation of specific programs and policies, are often difficult to translate to rural areas due to the distinct contextual factors in each locale [2].

In rural areas, there is often limited capacity for conducting high-quality research because of a lack of rural-related research training and available academic personnel [6]. Networks of rural health researchers are often small and disconnected, requiring more significant opportunities for collaboration and strategies for developing rural research capacity [7]. As well, urban researchers often design research projects based on urban biases and “drop in” to rural areas to quickly gather research data, without meaningfully engaging with or understanding the local

context [3]. Nevertheless, existing research suggests that rural communities can develop and sustain health service innovation to address their own needs [8].

To address these issues, many policies and programs have been initiated to improve rural health research capacity, aiming to improve the health and well-being of rural communities. Existing research regarding rural health research capacity building suggests that concentrated investment in training is required to improve research capacity and identify local needs to target research projects appropriately [9]. Much of this training has been focused on building research competency among healthcare professionals working in rural areas, who typically lack specific research expertise [6, 10]. The existing literature predominantly describes rural health research capacity-building initiatives in Australia, Canada, the United States, and Nordic countries.

Numerous rural research training programs focus on developing research skills among rural physicians or other healthcare workers with an interest in exploring concerns arising in their practice [11-12], including the 6-for-6 program at Memorial University of Newfoundland, Canada [12], the Master of Medical Studies program at the Northern Ontario School of Medicine in Canada, and the Rural Research Capacity Building Programme in New South Wales, Australia [13]. While many healthcare professionals have an interest in conducting rural health research relevant to their practice, their demanding careers often make it challenging to continue this work long-term, especially in the absence of stronger support enjoyed by those with greater access to university resources typically concentrated in urban areas [11, 14].

Many rural health research centres have been created to strengthen the capacity for conducting rural health research, taking on several different forms. One such model is dedicated rural health research centres within universities (e.g., Centre for Rural Health Studies at Memorial University of Newfoundland, Centre for Rural Health Research at the University of British Columbia, and Center of Excellence in Rural Health at the University of Kentucky). Others are research centres physically located in rural areas but affiliated with specific universities (e.g., Flinders University Rural Clinical School in Australia). Also, community-based research centres without a direct university affiliation combine support for rural health research to improve the health and well-being of their immediate communities (e.g., Gateway Centre of Excellence in Rural Health in Ontario, Canada and the Carbonear Institute for Rural Reach and Innovation by the Sea in Carbonear, Canada). Governments have also established rural research centres, such as the Centre for Rural Medicine in Sweden, to engage stakeholders to identify solutions to rural health issues [15]. Additionally, many rural health research networks have been created to improve researcher collaboration, including the Canadian Rural Health Research Society [16] and the Rural Health Services Research Network of British Columbia, Canada.

While some studies have examined the success of individual initiatives, to our knowledge there are no comprehensive reviews of the strategies employed to build rural health research capacity. Therefore, we are conducting a realist review to identify the strategies, programs, and policies that improve rural health research capacity. A realist review is an appropriate framework to address this gap in the literature, as initiatives aimed at building research capacity must consider local contexts and the mechanisms by which policies and programs function [10].

Methods and analysis

Realist reviews examine “what works, for whom, and in what circumstances” [17]. This approach draws on principles of realist philosophy, which suggests that a real world exists separately from human perception that can be imperfectly understood through analysis of underlying mechanisms [18-19]. Compared to more traditional systematic reviews, realist

reviews go beyond evaluating efficacy to understand *why* an intervention was effective, given the complexity involved in implementing policies and programs [20-21]. Realist reviews assume that a theory or hypothesis underlies the design and implementation of policies, programs, and interventions, and consider the interplay between mechanisms, contexts, and outcomes [20]. Following Duddy and Wong [22], we determined that a realist framework is appropriate for this review since we seek to identify real-world strategies for building rural health research capacity, recognising that the success of an intervention is often context dependent. The main outcome of this study will be the development of a framework identifying the contexts and mechanisms that build rural health research capacity.

The review is registered in the PROSPERO database (registration number CRD42023444072) and our protocol will be reported based on the guidelines in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) (see Additional file 1 for PRISMA-P checklist). Our methods are guided by the steps to conducting realist reviews as outlined by Pawson et al. [20] and our presentation of findings will adhere to the RAMESES II reporting standards for realist evaluations [23]. The process for conducting a realist review typically involves a literature review, data extraction, analysis, and a quality assessment. Realist reviews also include the development of a program theory – a description of how a program should be structured and a hypothesis about how it will work [20].

Research Questions

This review will seek to answer the following research questions:

1. What strategies and models (e.g., degree programs, university-based research centres, government research and development units, independent research centres, conferences, and research networks) currently exist to build capacity in rural health research?
    a. Are some strategies or models more effective than others? In what contexts?
2. What activities and processes contribute to a sustainable rural research capacity-building program? In what contexts?
    a. What infrastructure is required for a sustainable rural health research capacity-building program? In what contexts?
3. What strategies are used for developing rural health researchers?
    a. What factors facilitate collaboration in research and support research careers in rural areas?
    b. What skills and competencies are necessary for being a rural health researcher?

The steps for gathering and analyzing data to answer these questions are outlined below.

Search Strategy

Realist reviews draw on various data sources, including quantitative, qualitative, and mixed-methods studies, as well as grey literature [24]. The review will include any English-language studies (qualitative, quantitative, and mixed methods), commentaries, and editorials that focus on building rural health research capacity. We will consider studies that self-identify as having a rural focus, with the concept of “rural” defined by the study authors themselves. There is no restriction for articles based on country, region, or population.

Our research team includes academics, clinicians, experts in rural health research capacity building, and a medical librarian. Search terms were identified by the research team and refined by a medical librarian, and include variations of the terms “research,” “capacity building,” and “rural” (see additional file 2). Databases include (since inception) Ovid MEDLINE, Embase, CINAHL Plus, APA PsycINFO, ERIC, and Scopus. A separate search of the same databases was also designed to identify relevant theories or frameworks related to research capacity building, to assist in developing the program theory, using variations of the terms “research,” “capacity building,” “theory,” and “framework” (see additional file 3). A preliminary search suggests that several conceptual frameworks describe research capacity building [6, 25-27]. Once articles have been screened and identified for inclusion in the review, we will conduct backward and forward searches to identify additional relevant articles. Hand searches will also be performed if the team determines it is necessary based on the quality and quantity of articles identified. Finally, a grey literature search will be conducted using the Google search engine, to identify existing rural health research centres, training programs, conferences, and research networks that are not described in the academic literature but whose operation is relevant to the scope of the review.

Screening and Study Selection

All articles will be stored and managed in Covidence for title and abstract and full-text screening. Two members of the research team will independently screen the articles by title and abstract. Disagreements will be resolved through a meeting between the two reviewers. If the reviewers are at an impasse, a third reviewer will determine whether an article should be included or excluded. Articles will be excluded if they are published in a language other than English and if they are deemed irrelevant to the scope of the review. The full text of articles included after the title and abstract screening will be evaluated in the same manner. At this stage, each reviewer will also indicate the reason for excluding each article.

Data Extraction, Quality Appraisal, and Synthesis

The research team will develop a unique Excel file to extract relevant data from included articles. This tool will gather data regarding the study characteristics (e.g., full citation including author(s), title, journal, and publication data, study objective(s), country, and participants) and the strategies or interventions employed to build rural health research capacity (e.g., description of the intervention, contextual factors, evaluation method(s), evidence of efficacy). The tool will also include a quality appraisal of each included article. Realist reviews evaluate the quality of an included study based on its applicability to the review, considering both the article’s relevance – the extent to which the research provides insight into the concept being examined – and its rigour – whether the researcher’s conclusions can be considered sound based on their methodology [20]. We will incorporate quality appraisal into the extraction tool where each reviewer will rank the overall relevance and rigour as low, medium, or high, adding any additional comments to support their ranking. To test the extraction tool, two reviewers will extract data from five articles and then meet to compare their results and adjust the tool as needed. As with the screening process, two members of the research team will extract data from each article and meet to resolve any disagreements or inconsistencies. If the disagreement is unresolved, a final decision will be made by a third reviewer.

Extracted data will be analyzed using qualitative analysis software through a process of coding the data into categories and then identifying dominant themes, concepts, or frameworks. The analysis will identify what works, for whom, and in what circumstances related to the study’s aim – building rural health research capacity. The synthesis will ultimately conclude with the

development of a program theory or framework regarding the contexts and mechanisms that lead to improved health research capacity in rural areas.

Patient and public involvement

Once our team has identified comprehensive findings, we will seek feedback from relevant knowledge users through surveys or brief interviews to interpret findings, evaluate the research, and identify topics for future research [28]. Stakeholders are commonly included in realist reviews to ensure that findings resonate with experts working and practising in the area under review [21]. Knowledge users will include rural health researchers, rural healthcare providers interested in conducting research, students interested in specializing in rural health research, and rural community members, including healthcare service users. The insights provided by knowledge users will be integrated into the existing findings, adding improved reliability and trustworthiness, especially if our review is limited in identifying relevant articles.

Ethics and dissemination

This review does not require ethical approval as it draws on secondary data that is publicly available. The findings from this review will be presented at academic conferences, published in peer-reviewed journals, and summarized in a lay report for use by those interested in building rural health research capacity. The results will guide individuals developing relevant training programs, establishing rural research centres, or others interested in building rural health research capacity. Members of our team will also draw on the findings to aid in developing rural health research programs locally, nationally, and internationally.

References

1. Barclay L, Phillips A, Lyle D. Rural and remote health research: does the investment match the need? Aust J Rural Health. 2018;26(2):74-79.
2. Rourke J, & Bradbury-Squires D. Rural research: Let's make it happen! Can J Rural Med. 2022;27(3):116–117.
3. Stewart R. Enough seagulls! Rural and remote communities need local researchers living, walking and talking with locals. Med J Aust. 2020;213(11):514-515.
4. Subedi R, Greenberg TL, Roshanafshar S. Does geography matter in mortality? An analysis of potentially avoidable mortality by remoteness index in Canada. Ottawa, ON: Statistics Canada; 2019.
5. Kulig J, Minore B, Stewart N. Capacity building in rural health research: a Canadian perspective. Rural Remote Health. 2004;4(274).
6. Cooke J. A framework to evaluate research capacity building in health care. BMC Family Practice. 2005;6(1):1-11.
7. Macleod M, Dosman JA, Kulig JC, Medves JM. The development of the Canadian Rural Health Research Society: Creating capacity through connection. Rural Remote Health. 2007;7(1):622.
8. Carson D, Preston R, Hurtig AK. Innovation in rural health services requires local actors and local action. Public Health Rev. 2022;43(1604921).
9. Schmidt D, Duncanson K, Webster E, Saurman E, Lyle D. (2022). Critical realist exploration of long-term outcomes, impacts and skill development from an Australian Rural Research Capacity Building Programme: A qualitative study. BMJ Open. 2022;12(12).

10. Shee AW, Quilliam C, Corboy D, Glenister K, McKinstry C, Beauchamp A, Alston L, Maybery D, Aras D, McNamara K. What shapes research and research capacity building in rural health services? Context matters. Aust J Rural Health. 2022;30(3):410-421.
11. McCarthy P, Bethune C, Fitzgerald S, et al. Needs assessment for development of 6for6: Longitudinal research skills program tailored to rural and remote family physicians. Can Fam Physician. 2016;62(2):e80-e88.
12. Walsh A, Heeley T, Furlong B, Bethune C, Graham W, Asghari S. Rural health research capacity building: An anchored solution. Rural Remote Health. 2021;21(2):6162.
13. Webster E, Thomas M, Ong N, Cutler L. Rural research capacity building program: capacity building outcomes. Aust J Prim Health. 2011;17(1):107-113.
14. Asghari S, Heeley T, Bethune C, et al. Evaluation plan of the 6for6 research skills program for rural and remote physicians. Eval Program Plann. 2021;87:101933.
15. Hodge H, Carson D, Berggren P, Strasser R. From Lancelot to Lapland: Implications of engaged rural universities. In: University partnerships for international development. Bingley, UK: Emerald Group Publishing Limited; 2016. p. 123-139.
16. Macleod ML, Dosman JA, Kulig JC, Medves JM. The development of the Canadian Rural Health Research Society: Creating capacity through connection. Rural Remote Health. 2007;7(1):622.
17. Palm R, Hochmuth A. What works, for whom and under what circumstances? Using realist methodology to evaluate complex interventions in nursing: A scoping review. Int J Nurs Stud. 2020;109:103601.
18. Greenhalgh T, Wong G, Jagosh J, et al. Protocol – the RAMESE II study: Developing guidance and reporting standards for realist evaluation. BMJ Open. 2015;5:e008567.
19. Wong G, Westhorp G, Pawson R, Greenhalgh T. Realist synthesis: Realist training materials. https://www.ramesesproject.org/media/Realist_reviews_training_materials.pdf
20. Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review – A new method of systematic review designed for complex policy interventions. J Health Serv Res Policy. 2005;10 Suppl 1:21-34.
21. Rycroft-Malone J, McCormack B, Hutchinson AM, et al. Realist synthesis: illustrating the method for implementation research. Implement Sci. 2012;7:33.
22. Duddy C, Wong G. Grand rounds in methodology: when are realist reviews useful, and what does a 'good' realist review look like? BMJ Qual Saf. 2023;32(3):173-80.
23. Wong G, Westhorp G, Manzano A et al. RAMESES II reporting standards for realist evaluations. BMC Med. 2016;14(96).
24. CADTH. https://www.cadth.ca/sites/default/files/attachments/2021-10/realist-review-explainer-e_0.pdf
25. Bilardi D, Rapa E, Bernays S, et al. Measuring research capacity development in healthcare workers: A systematic review. BMJ Open. 2021;11:e046796.
26. Farmer, E, Weston K. A conceptual model for capacity building in Australian primary health care research. Aus Fam Phys. 2002;31(12):1139-1142.
27. Matus, J., Walker, A. & Mickan, S. Research capacity building frameworks for allied health professionals – A systematic review. BMC Health Serv Res. 2018;18(716).
28. Concannon TW, Grant S, Welch V, Petkovic J, Selby J, Crowe S, Synnot A, Greer-Smith R, Mayo-Wilson E, Tambor E, Tugwell P. Multi stakeholder engagement (MuSE) consortium: Practical guidance for involving stakeholders in health research. J Gen Intern Med. 2019;34(3):458-463.

Contributors

SA is the corresponding author and guarantor. CY designed the review and drafted the protocol. MS developed the search strategy. All authors are involved in developing the concept and providing feedback throughout the review. All authors read and approved the final manuscript.

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Competing interests

There are no competing interests associated with this manuscript.

Supplementary Information

Additional file 1: PRISMA-P Checklist
Additional file 2: Search strategy for rural health research capacity building
Additional file 3: Search strategy for research capacity theories or frameworks

PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item
ADMINISTRATIVE INFORMATION		
Title:		
Identification	1a	Identify the report as a protocol of a systematic review **p.1, line 3**
Update	1b	If the protocol is for an update of a previous systematic review, identify as such **N/A**
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number **p. 2, line 27**
Authors:		
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author **p. 1, lines 7-43**
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review **p. 8, lines 3-7**
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments **N/A**
Support:		
Sources	5a	Indicate sources of financial or other support for the review **N/A**
Sponsor	5b	Provide name for the review funder and/or sponsor **N/A**
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol **N/A**
INTRODUCTION		
Rationale	6	Describe the rationale for the review in the context of what is already known **p. 3, line 41-p. 3, line 50**
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO) **p. 4, lines 25-44**
METHODS		
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review **p. 4, line 47-p.5, line 20**
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage **p. 5, lines 6-19**
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated **Provided as supplemental files**
Study records:		
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review **p. 5, lines 23-31**

Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis) **p. 5, lines 24-51**
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators **p. 5, line 33-p.6, line 5**
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications **p. 5, lines 36-40**
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale **p. 5, line 54-p.6, line 5**
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis **N/A**
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised **N/A**
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ) **N/A**
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression) **N/A**
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned **p. 5, line 53-p. 6, line5**
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies) **N/A**
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE) **p. 5, lines 45-47**

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily <1946 to May 02, 2023>

Search Strategy:

1 (Research Personnel/ or (research or researcher?).ti.) and (Capacity Building/ or Cooperative Behavior/ or Program Development/ or Program Evaluation/ or Staff Development/ or exp Education, Professional/ or Research Personnel/ed or Curriculum/ or Mentors/ or Congresses as Topic/) (21664)

2 ((research or researcher?) and capacity).ti. (1473)

3 (research and (capacity adj1 (build* or develop* or improve? or improving or strengthen* or create? or creating))).ab,kf. (4246)

4 (researcher? and (capacity adj1 (build* or develop* or improve? or improving or strengthen* or create? or creating))).ab,kf. (1108)

5 (research adj1 (network? or collaborative? or collaboration or centre? or center? or institute? or conference? or degree? or program? or course? or module? or workshop? or 'community of practice' or 'community of practise')).ti. (9663)

6 (researcher? and (network? or collaborative? or collaboration or centre? or center? or institute? or conference? or degree? or program? or course? or module? or workshop? or 'community of practice' or 'community of practise')).ti. (573)

7 (research adj1 (skill* or competenc* or train? or training or educat* or mentor* or support?)).ti,ab,kf. (17001)

8 (researcher? adj1 (skill* or competenc* or train? or training or educat* or mentor* or support?)).ti,ab,kf. (1678)

9 or/1-8 (49917)

10 Hospitals, Rural/ (5218)

11 Rural Health/ (23906)

12 rural health services/ or rural nursing/ (14053)

13 Rural Population/ (68971)

14 rural.ti,ab,kf,jw. (179923)

15 or/10-14 (205717)

16 9 and 15 (887)

EMBASE via embase.com, 3 May 2023

No.	Query	Results
#1	(research:ti OR researcher$:ti) AND ('capacity building'/de OR 'program development'/de OR 'program evaluation'/exp OR 'curriculum'/de OR 'curriculum development'/de OR 'education program'/exp OR 'in service training'/de OR 'medical education'/exp OR 'mentoring'/de OR 'mentor'/de)	18065
#2	(research:ti OR researcher$:ti) AND capacity:ti	1672
#3	research:ab,kw AND ((capacity NEAR/1 (build* OR develop* OR improve$ OR improving OR strengthen* OR create$ OR creating)):ab,kw)	5254
#4	researcher$:ab,kw AND ((capacity NEAR/1 (build* OR develop* OR improve$ OR improving OR strengthen* OR create$ OR creating)):ab,kw)	1326
#5	(research NEAR/1 (network$ OR collaborative$ OR collaboration OR centre$ OR center$ OR institute$ OR conference$ OR degree$ OR program$ OR course$ OR module$ OR workshop$ OR 'community of practice' OR	11772

	'community of practise')):ti	
#6	researcher?:ti AND (network$:ti OR collaborative$:ti OR collaboration:ti OR centre$:ti OR center$:ti OR institute$:ti OR conference$:ti OR degree$:ti OR program$:ti OR course$:ti OR module$:ti OR workshop$:ti OR 'community of practice':ti OR 'community of practise':ti)	563
#7	(research NEAR/1 (skill* OR competenc* OR train$ OR training OR educat* OR mentor* OR support$)):ti,ab,kw	23574
#8	(researcher$ NEAR/1 (skill* OR competenc* OR train$ OR training OR educat* OR mentor* OR support$)):ti,ab,kw	1851
#9	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8	56046
#10	'rural health care'/exp OR 'rural hospital'/de OR 'rural population'/de OR 'rural area'/de	134758
#11	rural:ti,ab,kw,jt	214519
#12	#10 OR #11	243879
#13	#9 AND #12	1026

CINAHL Plus with Full Text via EBSCOhost, 3 May 2023

#	Query	Results
S1	(MH "Research Personnel+" OR TI research OR TI researcher#) AND (MH "Program Development+" OR MH "Staff Development" OR MH "Mentorship" OR MH "Education, Health Sciences+" OR MH "Research Personnel+/ED" OR MH "Curriculum" OR MH "Congresses and Conferences")	18,659
S2	TI (research OR researcher#) AND TI capacity	947
S3	AB research AND AB (capacity N1 (build* OR develop* OR improve# OR improving OR strengthen* OR create# OR creating))	3,011
S4	AB researcher# AND AB (capacity N1 (build* OR develop* OR improve# OR improving OR strengthen* OR create# OR creating))	764
S5	TI research N1 (network# OR collaborative# OR collaboration OR centre# OR center# OR institute# OR conference# OR degree# OR program# OR course# OR module# or workshop# OR "community of practice" OR "community of practise")	6,882
S6	TI researcher# N1 (network# OR collaborative# OR collaboration OR centre# OR center# OR institute# OR conference# OR degree# OR program# OR course# OR module# OR workshop# OR "community of practice" OR "community of practise")	92
S7	TI (research N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR AB (research N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#))	22,000
S8	TI (researcher# N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR AB (researcher# N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#))	2,257
S9	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8	47,957
S10	MH "Rural Health Personnel" OR MH "Rural Health Centers" OR MH "Hospitals, Rural" OR MH "Rural Population" OR MH "Rural Health Services" OR MH "Rural Health Nursing" OR MH "Rural Areas" OR MH "Rural Health"	52,624
S11	TI rural OR AB rural OR SO rural	71,185
S12	S10 OR S11	84,305

S13	S9 AND S12	925

APA PsycInfo via EBSCOhost, 3 May 2023

#	Query	Results
S1	TI (research OR researcher#) AND TI capacity	427
S2	AB research AND AB (capacity N1 (build* OR develop* OR improve# OR improving OR strengthen* OR create# OR creating))	3,499
S3	AB researcher# AND AB (capacity N1 (build* OR develop* OR improve# OR improving OR strengthen* OR create# OR creating))	852
S4	TI research N1 (network# OR collaborative# OR collaboration OR centre# OR center# OR institute# OR conference# OR degree# OR program# OR course# OR module# OR workshop# OR "community of practice" OR "community of practise")	2,787
S5	TI researcher# N1 (network# OR collaborative# OR collaboration OR centre# OR center# OR institute# OR conference# OR degree# OR program# OR course# OR module# OR workshop# OR "community of practice" OR "community of practise")	68
S6	TI (research N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR AB (research N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#))	36,099
S7	TI (researcher# N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR AB (researcher# N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#))	7,246
S8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	48,619
S9	DE "Rural Environments" OR DE "Rural Health" OR TI rural OR AB rural OR SO rural	52,814
S10	S8 AND S9	754
S11	health OR medicine OR medical OR physician* OR doctor* OR nurs* OR pharmac* OR dental OR dentist* OR clinical	2,486,466
S12	S10 AND S11	393

ERIC via EBSCOhost, 3 May 2023

#	Query	Results
S1	(TI research OR TI researcher#) AND (TI capacity OR DE "Capacity Building")	432
S2	AB research AND AB (capacity N1 (build* OR develop* OR improve# OR improving OR strengthen* OR create# OR creating))	2,367
S3	AB researcher# AND AB (capacity N1 (build* OR develop* OR improve# OR improving OR strengthen* OR create# OR creating))	503
S4	TI research N1 (network# OR collaborative# OR collaboration OR centre# OR center# OR institute# OR conference# OR degree# OR program# OR course# OR module# OR workshop# OR "community of practice" or "community of practise")	4,181
S5	TI researcher# N1 (network# OR collaborative# OR collaboration OR centre# OR center# OR institute# OR conference# OR degree# OR program# OR course# OR module# OR workshop# OR "community of practice" OR "community of practise")	91

S6	TI (research N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR AB (research N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR DE "Research Skills" OR DE "Research Training"	43,499
S7	TI (researcher# N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#)) OR AB (researcher# N1 (skill* OR competenc* OR train# OR training OR mentor* OR educat* OR support#))	8,251
S8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	55,354
S9	DE "Rural Areas" OR DE "Rural Education" OR DE "Rural Environment" OR DE "Rural Population" OR TI rural OR AB rural OR SO rural	40,719
S10	S8 AND S9	1,392
S11	health OR medicine OR medical OR physician* OR doctor* OR nurs* OR pharmac* OR dental OR dentist* OR clinical	208,863
S12	S10 AND S11	254

Scopus, 3 May 2023

((TITLE((research OR researcher OR researchers) AND capacity)) OR (ABS(research AND (capacity W/1 (build* OR develop* OR improve OR improves OR improving OR strengthen OR strengthens OR strengthening OR create OR creates OR creating)))) OR (ABS((researcher OR researchers) AND (capacity W/1 (build* OR develop* OR improve OR improves OR improving OR strengthen OR strengthens OR strengthening OR create OR creates OR creating)))) OR (TITLE(research W/1 (network OR networks OR collaborative OR collaboratives OR collaboration OR centre OR centres OR center OR centers OR institute OR institutes OR conference OR conferences OR degree OR degrees OR program OR programs OR programme OR programmes OR course OR courses OR module OR modules OR workshop OR workshops OR "community of practice" OR "community of practise"))) OR (TITLE((researcher OR researchers) AND (network OR networks OR collaborative OR collaboratives OR collaboration OR centre OR centres OR center OR centers OR institute OR institutes OR conference OR conferences OR degree OR degrees OR program OR programs OR programme OR programmes OR course OR courses OR module OR modules OR workshop OR workshops OR "community of practice" OR "community of practise"))) OR (TITLE-ABS(research W/1 (skill* OR competenc* OR train$ OR training OR educat* OR mentor* OR support OR supports))) OR (TITLE-ABS((researcher OR researchers) W/1 (skill* OR competenc* OR train$ OR training OR educat* OR mentor* OR support OR supports)))) AND (TITLE-ABS(rural) OR SRCTITLE(rural)) AND (TITLE-ABS(health OR medicine OR medical OR physician* OR doctor* OR nurs* OR pharmac* OR dental OR dentist* OR clinical)) – **1237 results**

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily <1946 to May 02, 2023>
Search Strategy:
1 (Research Personnel/ or (research or researcher?).ti.) and (Capacity Building/ or capacity.ti.) (1825)
2 (model? or framework?).ti. or Models, Theoretical/ (806581)
3 1 and 2 (102)

EMBASE via embase.com, 3 May 2023

No.	Query	Results
#1	(researcher*:ti OR research:ti) AND ('capacity building'/exp OR capacity:ti)	2318
#2	model$:ti OR framework$:ti OR 'theoretical model'/exp	940783
#3	#1 AND #2	141

CINAHL Plus via EBSCOost, 3 May 2023

#	Query	Results
S1	(MH "Research Personnel+" OR TI research OR TI researcher#) AND TI capacity	973
S2	TI Model# OR TI framework# OR MH "Models, Theoretical" OR MH "Nursing Models, Theoretical" OR MH "Conceptual Framework"	212,721
S3	S1 AND S2	80

APA PsycInfo via EBSCOhost, 3 May 2023

#	Query	Results
S1	TI (research OR researcher#) AND TI capacity	427
S2	TI model# or TI framework# OR DE "Models"	198,622
S3	S1 AND S2	20

ERIC via EBSCOhost, 3 May 2023

#	Query	Results
S1	(TI research OR TI researcher#) AND (TI capacity OR DE “Capacity Building”)	432
S2	TI model# or TI framework# OR DE “Models”	113,030
S3	S1 AND S2	37

Scopus, 3 May 2023
TITLE((research OR researcher OR researchers) AND capacity) AND TITLE(model OR models OR framework OR frameworks) – **66 results**