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Project Report

Network Analysis of the

Public Health Services and Systems Research Community

October 2010

LICOS Laboratory for Informatics, Complexity, and Organizational Study

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Executive Summary

In 2009 the Robert Wood Johnson Foundation (RWJF) requested a study of the Public Health Services and Systems Research (PHSSR) community. The impetus was the explosive growth observed in the Public Health Services Research Interest Group (PHSR-IG) at AcademyHealth since 2004. This date corresponds to the start of a ten year commitment by RWJF to support the field of PHSSR. This study, undertaken at the mid-point of the PHSSR initiative, aims to describe the emergence of the field: the growth and composition of its membership, interactions among members, their professional activities, and the emerging needs of the community. The broad objective for RWJF is to gain actionable knowledge for developing programs and fostering coordination of activities for the PHSSR community.

The study was conducted by LICOS at the Department of Biomedical Informatics (DBMI), Columbia University. An online survey comprised of 27 questions was developed in collaboration with representatives of AcademyHealth and RWJF. An invitation to complete the survey was sent to 2067 email addresses gathered from records of participants in PHSSR activities sponsored by RWJF, and the PHSR-IG member list from AcademyHealth. The overall response rate was 41%, after excluding undeliverable emails. This report profiles 652 survey respondents who explicitly identified themselves as PHSSR community members. Throughout this report these 652 respondents are referred to as **PHSSR community members**. The report includes a descriptive analysis of their expertise and research needs, and network analyses of their affiliations and scholarship. A brief examination of ninety survey respondents who **did not** identify themselves as involved in the PHSSR community is also presented.

Key findings

- Just over half of PHSSR community members are affiliated with academia. About 20% are affiliated with federal, state or local public health practice. About 18% have joint appointments in an academic and a public health institution

- 53% of PHSSR community members joined in 2004 or later. They are earlier in their careers than those involved prior to 2004. Those newcomers more senior in their careers were attracted by two RWJF initiatives: Accreditation and Public Health Practice-based Networks.

- Overall, newcomers to the field are less informed regarding the PHSSR work of their colleagues, even when they have PHSSR funding or have published on PHSSR topics

- Although 48% of the PHSSR community has expertise in Quality Improvement and Outcome Evaluation, this topic ranks high among areas in which community members want more access to expertise and mentoring

- The nucleus of the PHSSR community is a subgroup of 133 productive and engaged individuals. They are funded, published, active at national meetings, and share material resources, such as data, time, and funds, with prominent PHSSR groups (e.g. NACCHO)

Key findings continued

- Well over half the proposals submitted by community members to Federal funding agencies in the past three years did not primarily address PHSSR topics.

- RWJF has influenced the growth of the PHSSR community. Since 2004 the Foundation has provided research funding for 1.5 times as many newcomers to the field than it provided to those involved in PHSSR before 2004.

- Sharing of resources, a hallmark of maturity in a community of practice, is pursued by about a third of community members.

- RWJF leads the field with authority. PHSSR community members consider RWJF on a par with the indexed literature as a definitive source of information on PHSSR.

- Health services researchers, who study health topics affecting populations (e.g. obesity, chronic illness) from both a *clinical* and *population* perspective, identify with the PHSSR community.

- AcademyHealth is well positioned to broaden the PHSSR base due to the affinity health services researchers have with PHSSR.

- Translating research to public health practice is the chief difficulty identified by PHSSR community members.

- Concepts such as assurance, productivity, strategy, and sustainability occur with low frequency in the published work of PHSSR community members.

The findings suggest several future actions for RWJF or other parties interested in developing the field. These are summarized below and explained further in the *Recommendations* section of the report.

Recommendations for future directions

- A guide to PHSSR history and resources may help those entering the field build on the substantial problem solving and foundational work already accomplished by the PHSSR community.

- A mechanism for consultation or access to experts, particularly on the topics of Quality Improvement and Outcome Evaluation, would be of value to PHSSR community members.

- AcademyHealth is well positioned to broaden the PHSSR base—but this may not be a supportable approach in the absence of dedicated funding streams for PHSSR.

Recommendations for future directions continued

- Health services researchers affiliated with AcademyHealth and interested in PHSSR may be a potential source of new ideas and expertise for the community, and a resource for training and mentoring on health services research methods.

- There is a small sub group within the community with expertise that bridges health services research, public health practice, and PHSSR. Coordinated career opportunities to develop this mix of expertise may be a way for stakeholders to promote growth of the field.

- Public health practitioners are only 20% of the PHSSR community. Support for practitioners to attend PHSSR research meetings may increase their participation in the community.

- Multiple strategies are needed to establish funding resources for PHSSR.

- A research agenda is needed to systematically focus on gaps in knowledge and to guide the development of data and other resources that can support rigorous inquiry.

- Research that addresses concepts of assurance, productivity, strategy, and sustainability may help to balance the focus of inquiry in the field.

- Growth and sustainability for this emerging field will depend on translation of PHSSR into practice, a chief barrier for the community.

Introduction

Public Health Services and Systems Research (PHSSR) is an emerging discipline that examines the organization, financing, and delivery of public health services and the impact of these activities on population health. RWJF has had a pivotal role in the growth of the field, stemming from a public health systems research portfolio that has included support for a PHSSR interest group, grants to researchers, support for several conferences, and the establishment of a research center at the University of Kentucky. There are indications of explosive growth in the discipline since RWJF's initial investment in the field, with expansion of membership in the PHSSR Interest Group at AcademyHealth from 65 to over 1700 between 2004 and 2008.

The purpose of this study is to describe the emergence of the field of PHSSR, including: 1) Growth and composition of the membership; 2) Interaction among members and their professional activities relative to RWJF initiatives; 3) Emerging needs of the PHSSR community. The results will help the RWJF public health team understand the dynamics involved in the PHSSR community's growth to guide programmatic decisions to coordinate growth in the field. The results also will help the RWJF public health team, and the staff of AcademyHealth, gain insights regarding related groups that could be involved, thereby fostering growth of the PHSSR community.

The research questions that we focus on in this study

- Who are the researchers, practitioners and policy makers engaged in PHSSR?

- What is their expertise, what are their sources of funding, how can we measure their productivity and collaboration, and what challenges do they face?

- What distinguishes members that joined before and after 2004?

- Who are the most productive and engaged members in the PHSSR community?

- How has collaboration in publications change over time?

- What gaps in PHSSR-related topics are apparent in the community's publications?

Study Design and Data Collection

1. Survey Description

This study evaluated the growth of PHSSR as a community of practice. Anthropologist Jean Lave coined the term *community of practice* to describe a network of connections among people with an identity defined by a shared domain of interest. Communities of practice are among the most important structures of any scientific field. This study examined the extent to which individuals involved in PHSSR interact to generate a shared repertoire of ideas, commitments and memory that contribute to both the community and the practice.

The investigators designed the study in collaboration with the study's stakeholders, the Public Health Team at RWJF, and managers of the Public Health Systems Research Interest Group (PHSR-IG) at AcademyHealth. The development of the survey was an iterative process. We used conference calls and pilot testing to develop the survey questions over a period of about four months. The survey consisted of 27 items that took twenty minutes or less to complete. The questions captured aspects both of community and of practice to gain insight into PHSSR in terms of the composition and characteristics of its members, if and how members leverage their experience, and the degree to which there is exchange of information and collaboration taking place across organizations. The survey included demographic questions, items related to respondents' expertise and interests in PHSSR, their access to mentors/experts, the size of their professional network, participation in network activities, publishing, and funding sources

2. Data Collection

The research team employed primary data collection, secondary data collection, and data integration to describe the interactions between RWJF activities and the emergence of the field of PHSSR.

Primary Data Collection was carried out with an online survey using Network Genie® survey software. Prior to fielding the survey, the stakeholders and three PHSSR community members pilot tested the survey and provided feedback on content, clarity and length.   We used these data to describe the PHSSR community and to visualize relationships in the community using network analysis methods.

Secondary Data Collection was done to analyze the scholarly productivity of the community. We retrieved Medline bibliographic data matched to survey respondent names.

Data Integration was done to merge the list of potential survey respondents who were identified from the membership and conference attendance lists of stakeholders and professional organizations working in PHSSR. A merged list of 2625 emails was compiled from these sources. After updating, de-duplication, and verification of emails a dataset of 2067 unique email addresses resulted.

Table 1. **Sources of potential respondent emails**

Source of emails	Count of addresses obtained
AcademyHealth PHSR-IG membership roster	1498
Finance Roundtable, 2008 American Public Health Association	155
Keeneland Conferences attendees 2008 and 2009	394
Public Health Practice-Based Research Network	57
Robert Wood Johnson Foundation grantees	70
1st author of ≥ 2 publications after 1988 from UK bibliography	51
University of Kentucky PHSSR blog	348
Yale PHSSR Conference	52

Survey procedures A pre-announcement was sent to 2067 e-mail addresses approximately one month prior to the planned survey date. This message invited recipients to participate in the upcoming survey and described its purpose. The email was signed by the principal investigator, a representative from RWJF, and a representative from AcademyHealth.

The survey was fielded from January 26 through March 9, 2010. The link to the survey was sent to 2067 potential respondents. To obtain the best possible response rate, the team sent five weekly reminders to potential respondents during the six-week period allotted for survey completion. In addition twelve randomly selected respondents (two each week) received one-year AcademyHealth memberships worth $175 each as incentives for participation in the study.

Data Analysis

1. Statistical Analysis

Descriptive statistics and statistical tests were performed on the data from the survey responses using the statistical software package SPSS version 17.0. The statistical tests conducted in this analysis include Student's T-test, ANOVA, Pearson's Chi-square test and Fisher's exact test. Results of these analyses are found in Sections 1, 2 and 4.

2. Network Analysis

Three types of networks were created from the responses to survey questions. The first network examines the degree of collaboration in the community. This was done by visualizing the number of personal ties community members had in terms of citing PHSSR colleagues' work, discussing innovative ideas with colleagues or working directly with colleagues on PHSSR projects. The second network examines the pattern of shared meeting attendance by visualizing relationships between community members and six meetings that are significant to the community. The third network examines productivity and engagement in the community in terms of publications, funding, sharing of resources, and presenting PHSSR at meetings. These networks are described in Section 3.

3. Authorship/Co-Authorship Network Analysis

Authorship/co-authorship network data collection We queried the Medline database to identify scholarly articles written by the selected study participants to get publication information for the authorship/co-authorship network analysis. To account for the problem of ambiguous names, we used ReCiter, a computational search algorithm for matching bibliographic data, developed by researchers at LICOS. To construct the author-publication networks we used Sciologer software.

After obtaining a list of articles written by the selected study participants, we used a combination of network analysis and visualization to characterize the PHSSR community. Network analysis is based on a simple model of nodes and links. In our network, authors and article titles were nodes. A link was placed between authors and their co-authors, as well as between authors and the articles they wrote. We used a network layout that is force-directed, such that nodes that are linked are drawn closer together in space. The result is a network partitioned into visually identifiable groups.

Three types of networks were created using this approach: A network showing collaboration among the nucleus of most productive and engaged members of the community; a series of networks showing the change in collaboration within the community over time; and, finally, a network of journals and authors.

To label the networks, we identified commonly-occurring terms appearing in the article abstracts. The principal investigator, who is a public health expert, reviewed this list of terms in an iterative process, to produce a controlled list of PHSSR-related terms. This list was used to label the concepts appearing in the overall network and in the publication histories. The journal network was labeled with journal names. The resulting networks are described in Section 5.

4. Semantic Analysis

The abstracts and titles of 3155 articles were found, using the ReCiter search algorithm, for the most productive and engaged members at the nucleus of the PHSSR community. Automap text analysis software, developed at Carnegie Mellon University, extracted approximately 28,000 concepts from this text. This list was reduced to 1198 concepts in 123 categories by removing non-informative terms, mapping semantically equivalent terms to each other, and through harmonization using expert opinion. To determine if there were distinct conceptual areas of research conducted within the 133 member nucleus of the PHSSR community, we grouped concepts into interconnected subsets. To do this we used a computational algorithm (the Girvan Newman algorithm) that identified author/concept groups with more ties between them than would be expected to occur randomly. The algorithm identified six groups of author/concepts. These results are presented in Section 6.

Results

Survey Response Rate Invitations to complete the survey were sent to 2067 individual email addresses. Of these, 232 emails were undeliverable and 20 respondents opted out of the survey. There were 742 respondents, yielding a response rate of 41%. Of the 742 responses to Question 1: A*pproximately when did you begin your involvement in PHSS,* there were 90 (12%) responses indicating: *I do not consider myself a member of the PHSSR community.*

The PHSSR Community This report contains the analysis of 652 survey respondents who explicitly identified themselves as PHSSR community members. Throughout the remainder of this report these 652 respondents are referred to as **PHSSR community members.**   A brief examination of the ninety survey respondents who explicitly *did not* identify themselves as involved in the PHSSR community is presented in Section 4.

Over half of PHSSR community members became involved in the community in 2004 or after.

The main reasons for involvement are service to public health or employment in public health.

The majority of community members are white, over 50, and hold a master's or higher degree.

More than half are from academia and 20% are from PH practice.

About half of the PHSSR community members have expertise in Health Policy Management and in Quality Improvement/Outcome Evaluation.

About 40% want more access to experts in Economics, Quality Improvement/Outcome Evaluation, and Informatics. About 23% specifically want a mentor in Quality Improvement/Outcome Evaluation, and Health Policy Management.

RWJF and CDC are the main funding sources for PHSSR.

In the past three years well over half of proposals submitted to Federal funding agencies included PHSSR as a secondary, rather than primary focus.

 A pattern of success in publishing suggests a scholarly audience exists for PHSSR.

The most commonly used PHSSR assets are data from surveys of state and local health departments and local boards of health.

Half of the PHSSR community members attend APHA annual meetings; 40% attend AcademyHealth annual meetings; 24% attend the Keeneland Conference.

About 19% have collaborated with NACCHO, but only 10% have collaborated with ASTHO.

The main RWJF initiatives that community members engage with are the PHSSR Call for Proposals (20%), Accreditation/Quality Improvement (19%) and Practice-based Research Networks (17%).

1.1 Demographic Information

When did PHSSR community members become involved in PHSSR?

More than half (52%) of the 652 self-identified PHSSR community members joined the community in 2004 or after. Only 20% joined the community before 1993, and 25% joined between 1994 and 2003 (Figure 1).

Figure 1. **Time became Involved in PHSSR**

Not sure	3%
before 1988	12%
1988-1993	8%
1994-2000	14%
2001-2003	11%
2004 or after	52%
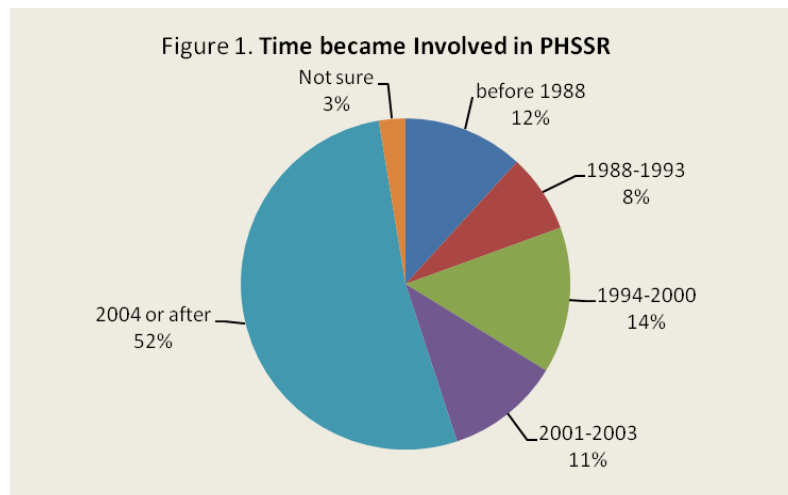
What factors attracted the respondents to the field of PHSSR?

Among the 652 self-identified PHSSR community members, the top reasons that attracted them were service to public health and employment in public health. About a quarter were asked by a colleague or mentor to join a project (Figure 2).

Figure 2. **Reasons for joining PHSSR**

Wanted to be of service to public health	48%
Motivated by employment in public health	45%
Asked by a colleague or mentor to join a project	25%
Asked by a public health organization to do a project	15%
Found a funding source	15%
Stimulated by a publication	14%

There were a total of 241 narrative responses detailing other reasons people joined the PHSSR community. Of these, fifty-one people (21%) joined the group because they hoped to make a difference. Forty-eight people (20%) said that the community aligned with their professional interests. Forty-one people (17%) joined because they felt the field was interesting, exciting and fulfilling. Another 46 (19%) joined because of their work or a research question of interest. Twenty-four (10%) joined the community as a result of student coursework.

Why did survey respondents join the PHSR-IG?

Out of 652 self-identified PHSSR community members, 328 are members of AcademyHealth Public Health Systems Research Interest Group (PHSR IG). Most of them joined the IG because it is a forum for learning about emerging research (73%) and for networking and professional support (63%)(Figure 3).

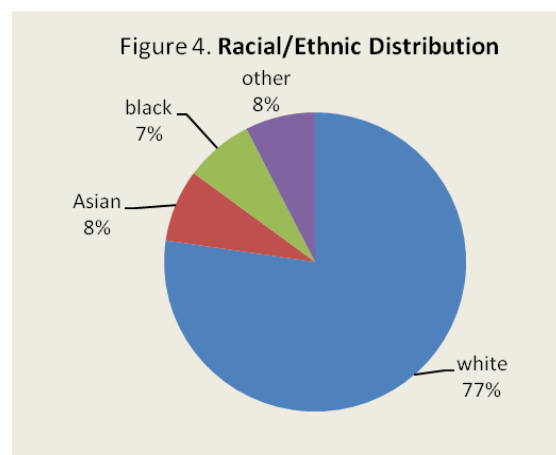Figure 3. **Reasons for joining the PHSR IG**

A forum for learning about emerging research	73%
Networking and professional support	63%
A forum to learn about evidence for improving practice	47%
A forum for presenting my work	34%
Training	26%
Curious about PHSSR	25%
Access to funding or schoolarship opportunities	25%
Have to select an IG when I joined AcademyHealth	14%
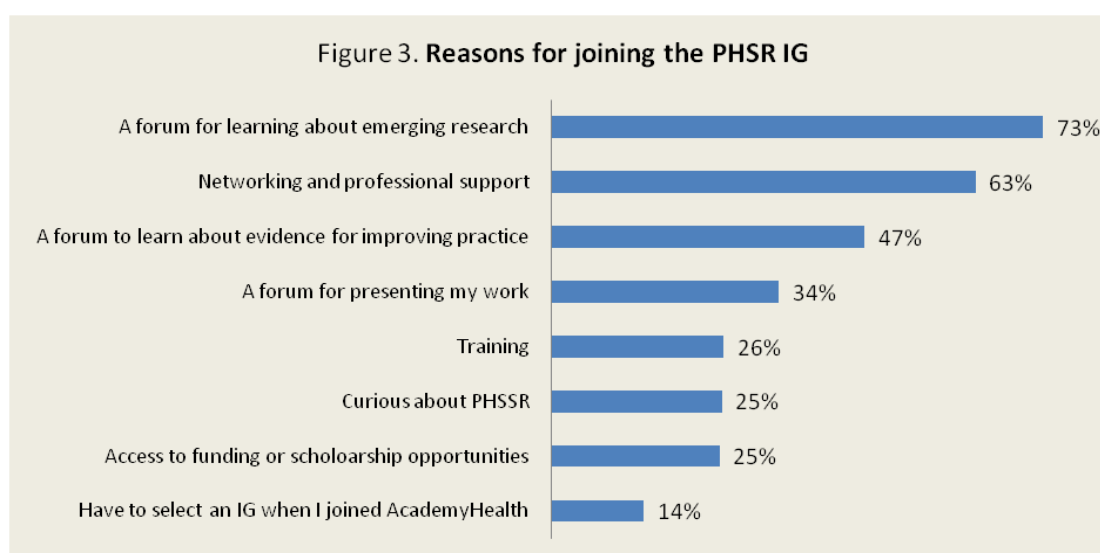
There were a total of 51 narrative responses that gave reasons respondents joined the IG. Of these, 41 were substantive. Ten people (24%) said they joined the IG to connect with other professionals who share an interest in PHSSR, nine (22%) joined the group because they hope to make a difference or advance the field, and five (12%) indicated that they joined the group to attend conferences and gain information about the field.

What are the age, gender and race/ethnicity of PHSSR community members?

Of the 652 self-identified PHSSR community members, 59% were female and 41% were male; 55% were under 50 years old and 45% were over 50 (Figure 3). The majority identified themselves as white (Figure 4).

Figure 3. **Age Distribution**

over 65
6%

20-35
22%

51-65
39%

36-50
33%

Figure 4. **Racial/Ethnic Distribution**

other
8%

black
7%

Asian
8%

white
77%
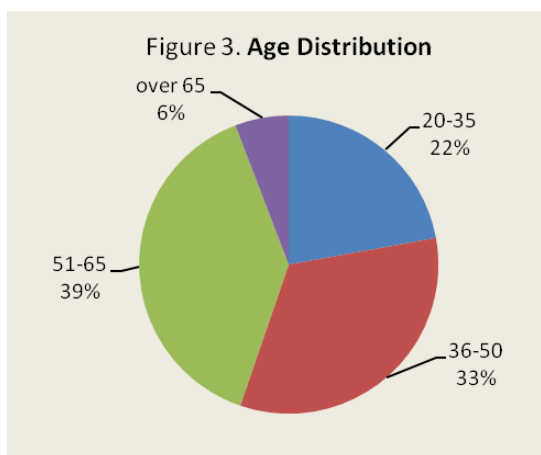
What are the highest levels of education of PHSSR community members?

The vast majority of survey respondents (91%) hold a postgraduate degree, and more than half (58%) hold a doctoral degree (Figure 5). Forty percent hold a MPH degree.

Figure 5. **Education**

Graduate
student
6%

Bachelor's
3%

Master's
33%

Doctoral
58%
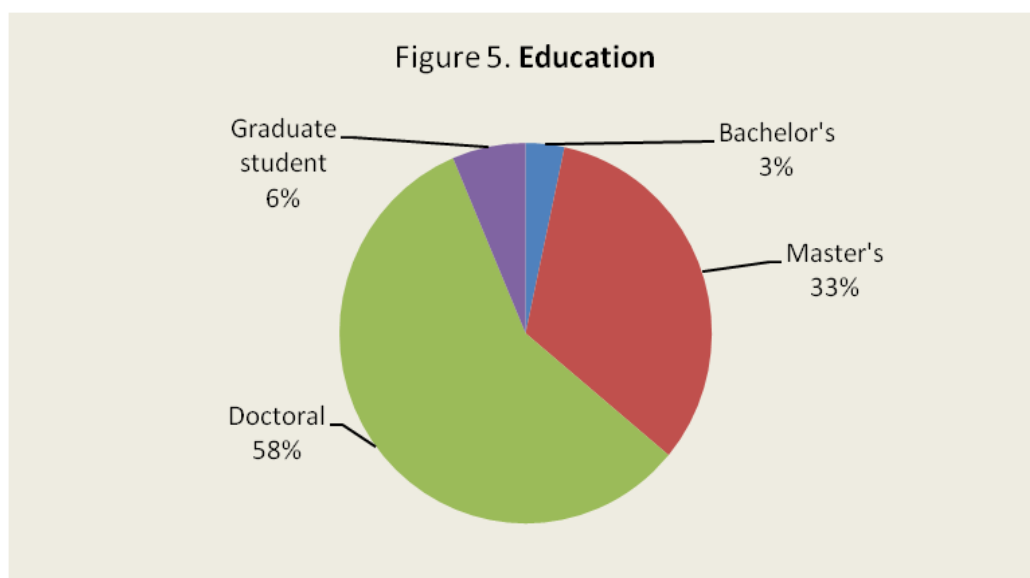
What are the organizational affiliations of PHSSR community members?

About half of the self-identified PHSSR community members are from academia, 20% are from federal, state, or local public health practice, and 11% are from associations or non-profit organizations. About 18% had a variety of other affiliations such as health organizations, health insurer, or non-health organizations (Figure 6).

Figure 6. **Organizational Affiliation**
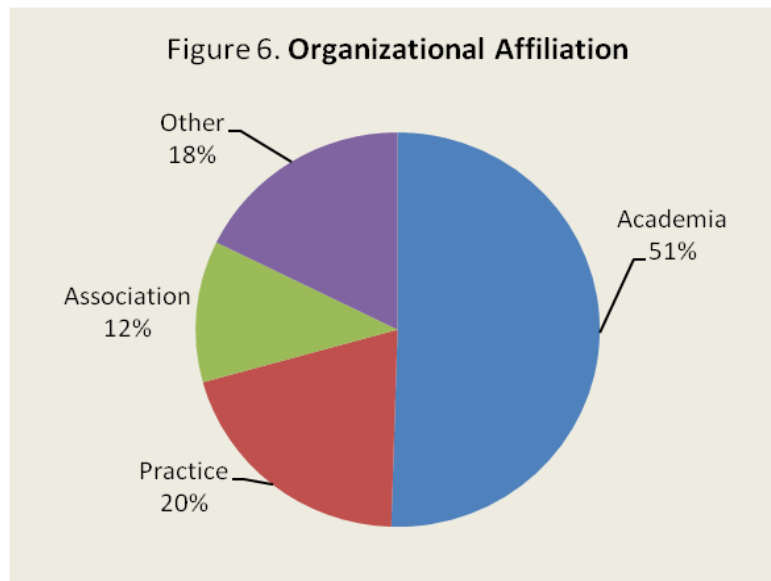
About 18% of PHSSR community members report a joint appointment in both an academic and a public health organization.

1.2 Expertise and mentoring

In what areas do PHSSR community members have expertise?

We defined an expert as a person with a high degree of skill in, or knowledge of, a certain subject. We asked the respondents about 13 areas of expertise in the survey. The top areas in which PHSSR community members self-declared expertise are Health Policy Management (52%), Quality Improvement/Outcome Evaluation (48%), Social and Behavioral Sciences (44%) and Public Health Practice (43%) (Figure 7).

Figure 7. **Expertise**

Health Policy Management	52%
QI Evaluation	48%
Social and Behavioral Sciences	44%
Public Health Practice	43%
Epidemiology	30%
Health Sciences	29%
Education	27%
Biostatistics	25%
Economics/Finance	24%
Clinical Services Research	23%
Law and Regulation	17%
Informatics	12%
Environmental Health Sciences	8%
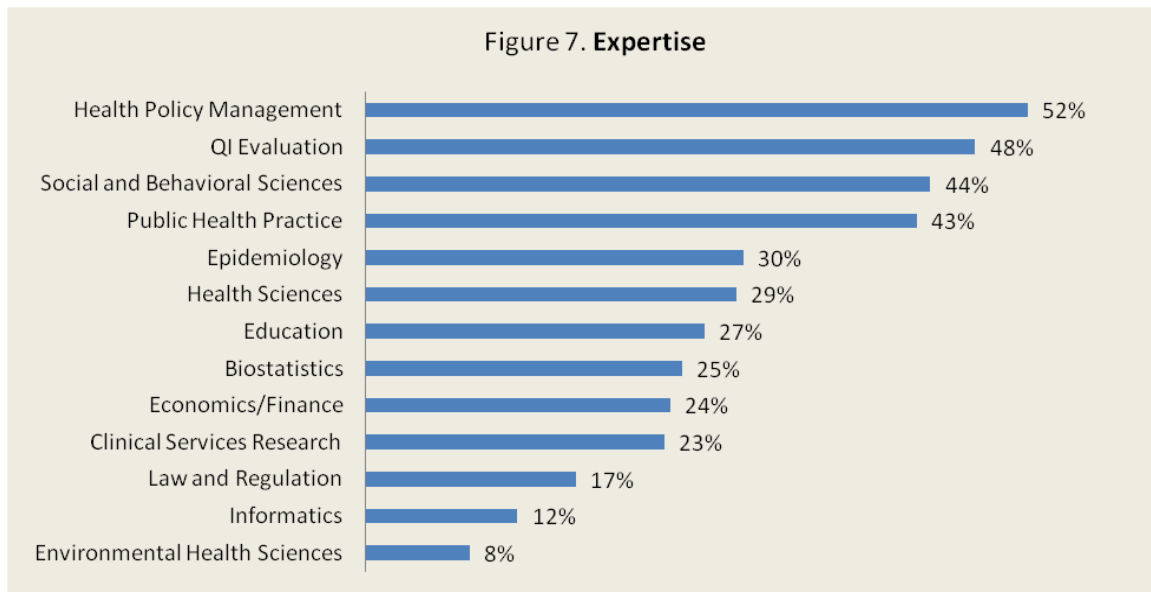
In what fields do PHSSR community members want mentorship?

We defined a mentor as an experienced person who acts as a teacher or trusted counselor to stimulate professional development. The top three fields in which PHSSR community members would like a mentor were QI evaluation (23%), Health Policy Management (23%) and Public Health Practice (18%) (Figure 8).

Figure 8. **Areas where mentors are wanted**

QI Evaluation	23%
Health Policy Management	23%
Public Health Practice	18%
Social and Behavioral Sciences	13%
Economics/Finance	12%
Biostatistics/Epidemiology	11%
Clinical Services Research	9%
Law and Regulation	9%
Informatics	8%
Health Sciences	8%
Education	7%
Environmental Health Sciences	4%
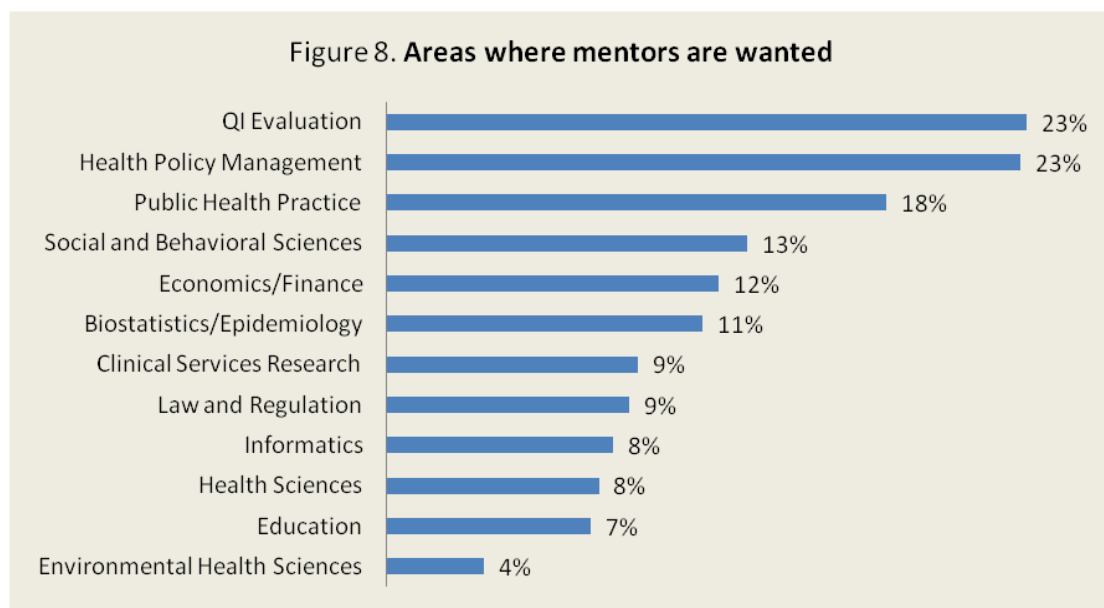
In what fields do PHSSR community members want more access to experts?

The top areas in which PHSSR community members want access to experts are Economics/Finance (about 39%), closely followed by Quality Improvement/Outcome Evaluation (also about 39%), and Informatics (38%) (Figure 9).

Figure 9. **Areas where Access to Experts is wanted**

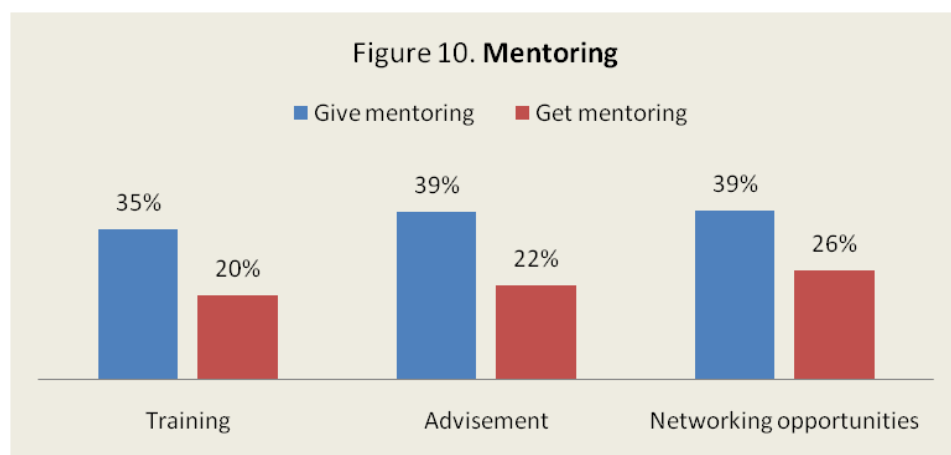| Area	Percent
Economics/Finance	39%
QI Evaluation	39%
Informatics	38%
Biostatistics/Epidemiology	37%
Health Policy Management	37%
Law and Regulation	36%
Public Health Practice	36%
Social and Behavioral Sciences	35%
Clinical Services Research	29%
Education	27%
Health Sciences	25%
Environmental Health Sciences	21%
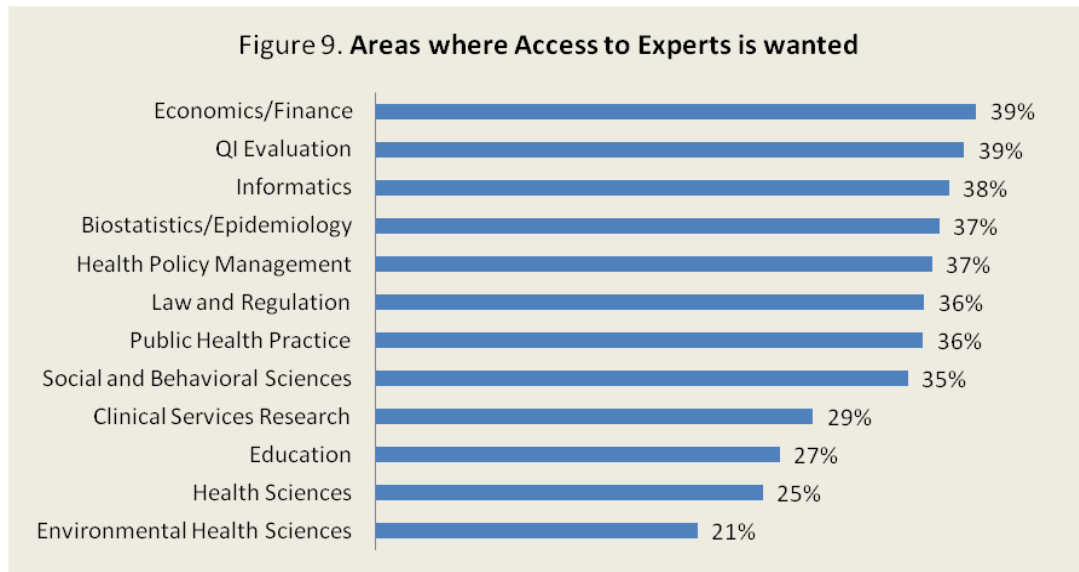
Do PHSSR community members give or receive mentoring?

Overall, 46% of PHSSR community members report that they have mentored others and 29% report that they themselves were mentored during the past year. There is a fairly uniform pattern across three types of mentoring: training, advisement, and networking opportunities (Figure 10).

Figure 10. **Mentoring**

Give mentoring   Get mentoring

	Give mentoring	Get mentoring
Training	35%	20%
Advisement	39%	22%
Networking opportunities	39%	26%

What proportion of PHSSR community members collaborate directly with PHSSR colleagues?

In the past calendar year (2009), 47% of PHSSR community members personally visited colleagues to collaborate on PHSSR, such as to consult on a project, serve on an advisory board, or similar activities.

How extensive are the personal networks between the PHSSR community members?

The personal networks between PHSSR community members and others involved in PHSSR was determined by three types of relationships: the number of people whose work he/she understands well enough to **cite** in a manuscript; the number of people he/she has **discussed innovative ideas** with in regard to PHSSR; and the number of people he/she has **worked with** on a PHSSR project. The largest proportion of PHSSR community members (between 40% and 50%) report personal networks of 0-4 people (Figure 11). However when network of 5-10 people are combined with networks of 11-25 people, the picture changes. About 42% of the community could cite the work of between 5 and 25 colleagues, 47% discuss PHSSR and 37% have worked with networks of that size. Few in the community have networks between 26-50 people. Individuals with the largest personal networks (over 50) were nearly all program staff that coordinate PHSSR activities for key groups such as AcademyHealth, RWJF, and University of Kentucky. Figure 23 on page 30 displays these results as a network visualization.
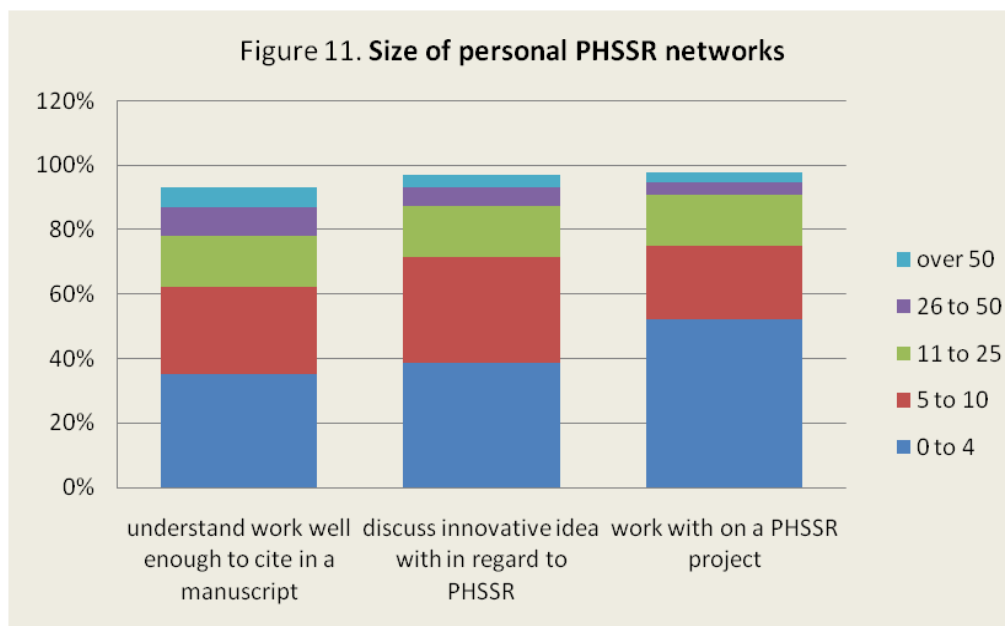
Figure 11. **Size of personal PHSSR networks**

PHSSR community members consider RWJF on a par with the indexed literature as a definitive source of information on PHSSR. In fact, the source of expertise that PHSSR community members considered most definitive (complete and conclusive) was RWJF (71%), closely followed by indexed literature (70%), government agencies (CDC, HRSA, NIH, AHRQ or similar) (68%), and colleagues in the PH research community (68%) (Figure 12).

Figure 12. **Definitive Sources of Expertise on PHSSR**

Source	Percentage
RWJF	71%
Indexed literature	70%
Government agencies	68%
Colleagues in the PH research community	67%
A professional organization representing Public Health	53%
Colleagues in the PH practice community	48%
Non-indexed Grey literature	26%

1.3 Funding and publication

What are the funding sources of PHSSR community members?

Survey respondents were asked if they had received funding for PHSSR from any of eight organizations: Agency for Healthcare Research and Quality (AHRQ), Centers for Disease Control and Prevention (CDC), Centers for Medicare & Medicaid Services (CMS), Health Services and Resources Administration (HRSA), National Institutes of Health (NIH), National Science Foundation (NSF), Robert Wood Johnson Foundation (RWJF), and Veterans Health Administration (VHA). **PHSSR community members received funding from one or more of these eight organizations 298 times during the past three years.** More than one-third (36%) of these were funds from RWJF, and 27% were from CDC (Figure 13).

Figure 13. **Funding sources past 3 years**
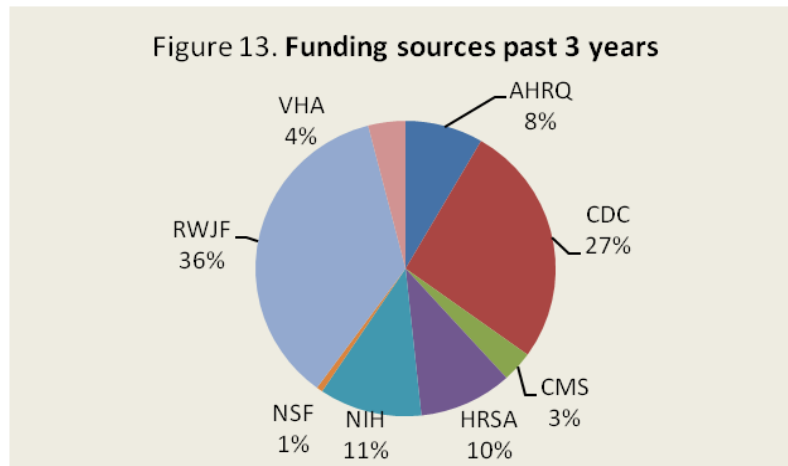
A total of 310 proposals were submitted to eight organizations during the past three years, either specifically on a PHSSR topic, or on another topic that included a PHSSR question in the proposal. About 28% of these proposals were submitted to RWJF and 24% to NIH, followed by NIH and HRSA. Well **over half the proposals submitted by community members to Federal agencies did not primarily address PHSSR**, but instead included a PHSSR question in a broader study. These results illustrate how PHSSR community members "get around" lack of dedicated federal funding for the field (Figure 14).

Figure 14. **Proposals submitted past 3 years**
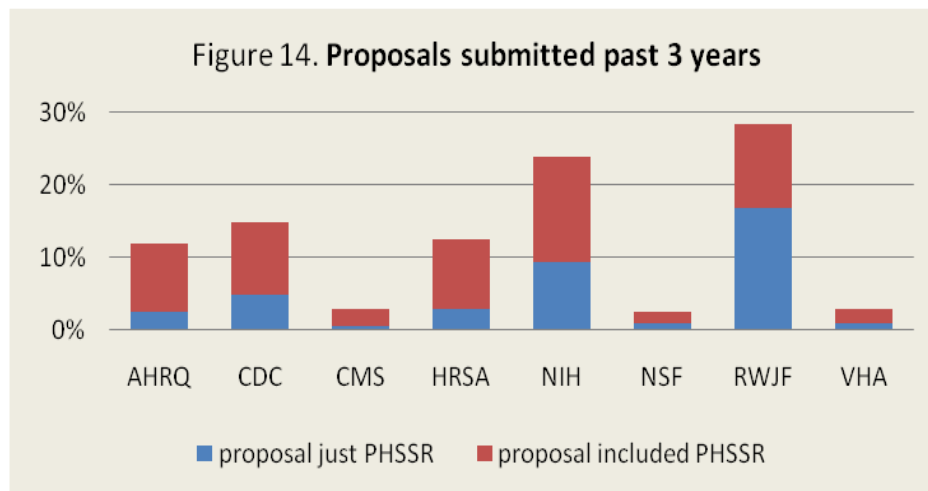
In addition there were 108 open text responses specifying other sources that have supplied funding for PHSSR. These are listed in Table 2. Thirty-six responses (33%) reported funding from foundations or similar sources such as nonprofit, for-profit, and global health organizations. Of these four responses reported funding from pharmaceutical companies, five from professional organizations and three from insurance companies. There were 25 responses (23%) reporting funding from a variety of Federal programs. Several responses reported funding from the Center for Public Health Services and Systems Research at the University of Kentucky. Of the remaining responses, six received funding from within organizations where they are employed, and nine received funding from State governments. There were four responses too vague to categorize.

Table 2. **Other sources of funding for PHSSR**

Foundations and Similar Sources	Federal Government Programs
Blue Cross Blue Shield of Michigan Foundation	Corporation for National & Community Service
The California Endowment	US Agency for International Development
The California HealthCare Foundation	US Department of Agriculture
Commonwealth fund	US Department of Department of Defense
State conversion foundation	US Department of Department of Education
The Duke Foundation	US Department of Health & Human Services
Fahs Beck Fund	Indian Health Service
Flinn Foundation	Maternal and Child Health Bureau
Florida Association of Health Systems	National Center for Research Resources,
Gates Foundation	Clinical and Translational Science Awards
Global Health and Security Initiative at NTI	National Institute on Aging
Google Foundation	National Institute on Disability and
Greenwall Foundation	Rehabilitation Research
Health Care Georgia	National Institute on Drug Abuse
Health Foundation of Greater Cincinnati	Office of Minority Health
IBM Endowment	Office of Public Health and Science
Kate B. Reynolds Charitable Trust	Substance Abuse and Mental Health Services
Kellogg Foundation	Administration
Nathan Cummings Foundation	US Department of Defense
National Patient Safety Foundation	Joint Forces Command
Missouri Foundation for Health	Joint Irregular Warfare Center
National Patient Safety Foundation	Military Cancer Institute
Pfizer Foundation	
Pfizer MAP	
Pharmaceutical Company	
Retirement Research Foundation	
St Luke's Foundation, Cleveland, OH	
State health foundation	
State of North Carolina	
UniHealth Foundation	
Weinberg Foundation	

How successful are PHSSR community members' in publishing on PHSSR topics?

During the past three years about 32% of PHSSR community members had at least one publication as a first author (manuscripts accepted as first author) and 40% had co-authored at least one publication

(manuscripts accepted as co-author). The majority reported between one and three publications. The proportion of manuscripts accepted as either first or co-author was close to the proportion of manuscripts submitted, suggesting a high success rate (Figure 15).
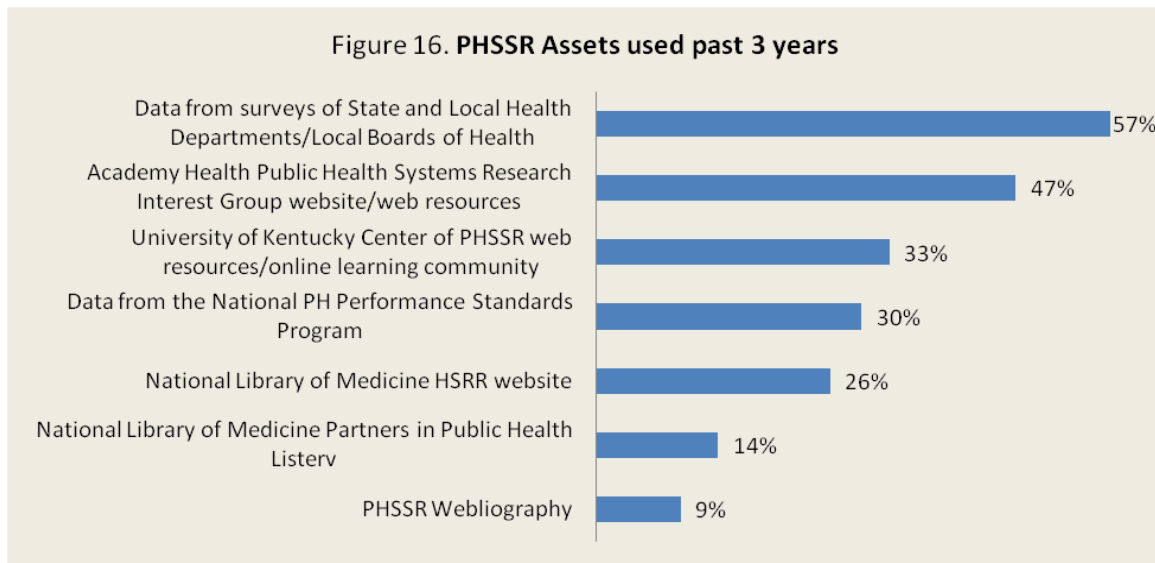

Figure 15. **Manuscripts on PHSSR Topics past 3 years**
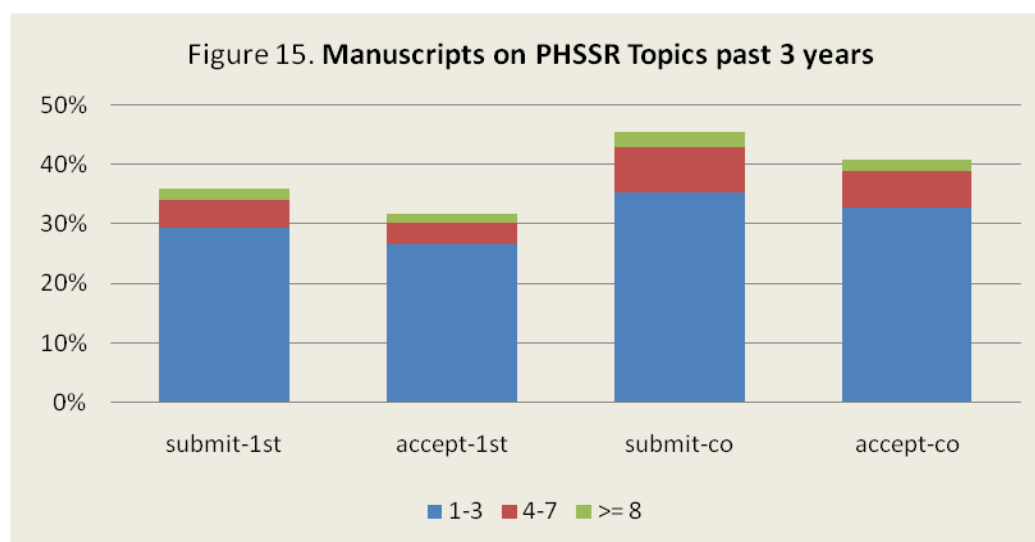
Do PHSSR community members publish Grey Literature?

Grey literature is information, such as reports, white papers, standards, and protocols that is not indexed or controlled by commercial publishing. It can be produced by government, academia, or business. Grey literature is an important source of documentation in the PH practice community. Examples are emergency response plans, programmatic evaluations, community assessments and other similar products that document public health activities and processes. About 49% of PHSSR community members produced or contributed to grey literature publications during the past three years.
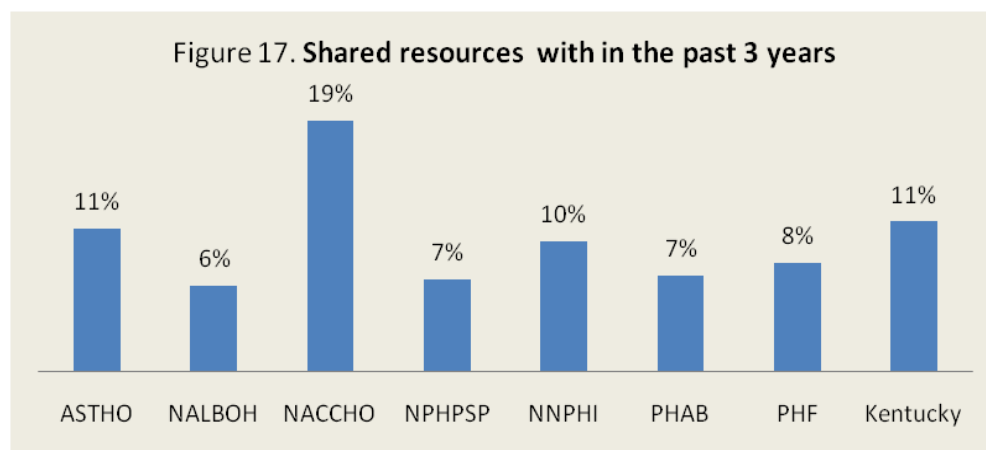
1.4 Activities and collaboration

What PHSSR assets do community members use?

The PHSSR assets most commonly used by community members in the past three years are data from surveys of state and local health departments/local boards of health (57%) and the AcademyHealth Public Health Systems Research Interest Group website/web resources (47%) (Figure 16).

Figure 16. PHSSR Assets used past 3 years

Asset	Percentage
Data from surveys of State and Local Health Departments/Local Boards of Health	57%
Academy Health Public Health Systems Research Interest Group website/web resources	47%
University of Kentucky Center of PHSSR web resources/online learning community	33%
Data from the National PH Performance Standards Program	30%
National Library of Medicine HSRR website	26%
National Library of Medicine Partners in Public Health Listerv	14%
PHSSR Webliography	9%

To what degree do PHSSR community members collaborate by sharing resources?

Mature collaboration in a community of practice can be gauged by the degree resources are shared. We defined resource sharing as sharing data, personnel time and/or financial interaction, with eight prominent public health groups: Association of State and Territorial Health Officials (ASTHO), National Association of Local Boards of Health (NALBOH), National Association of City and County Health Officials (NACCHO), National Public Health Performance Standards Program (NPHPSP), National Network of Public Health Institutes (NNPHI), Public Health Accreditation Board (PHAB), Public Health Foundation (PHF), and the University of Kentucky Center for PHSSR (Kentucky). Resource sharing is not widespread in the PHSSR community. During the past three years, the **top groups that community members shared resources with were NACCHO (19%), Kentucky (11%) and ASTHO (11%).** These figures include both financial and non-financial interaction. Less than 10% of respondents shared resources with other groups (Figure 17).

Figure 17. Shared resources with in the past 3 years

Group	Percentage
ASTHO	11%
NALBOH	6%
NACCHO	19%
NPHPSP	7%
NNPHI	10%
PHAB	7%
PHF	8%
Kentucky	11%

23

What professional meetings do PHSSR community members attend?

The attendance at seven professional meetings during the past three years was surveyed: AcademyHealth Annual Research Meeting (ARM), American Public Health Association Annual Meeting (APHA), Association of State and Territorial Health Officials Annual Meeting (ASTHO), Keeneland Public Health Services and Systems Research Annual Conference (Keeneland), National Association of County and City Health Officials Annual Conference (NACCHO), National Association of Local Boards of Health Annual Conference (NALBOH) and Public Health Information Networking Annual Conference (PHIN). **About half (49%) of PHSSR community members attended APHA during the past 3 years**, 40% attended ARM, and 24% attended Keeneland. Five percent or fewer of PHSSR community members attended NALBOH or PHIN (Figure 18).
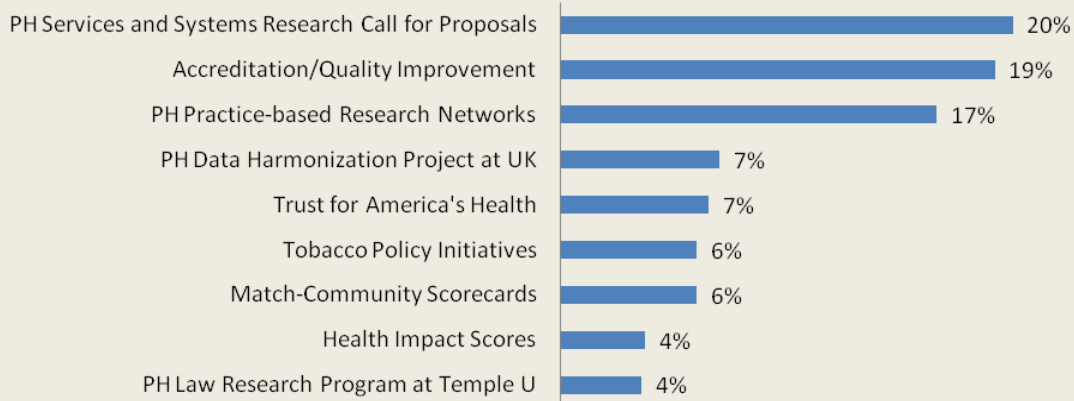

Figure 18. **Meetings attended past 3 years**
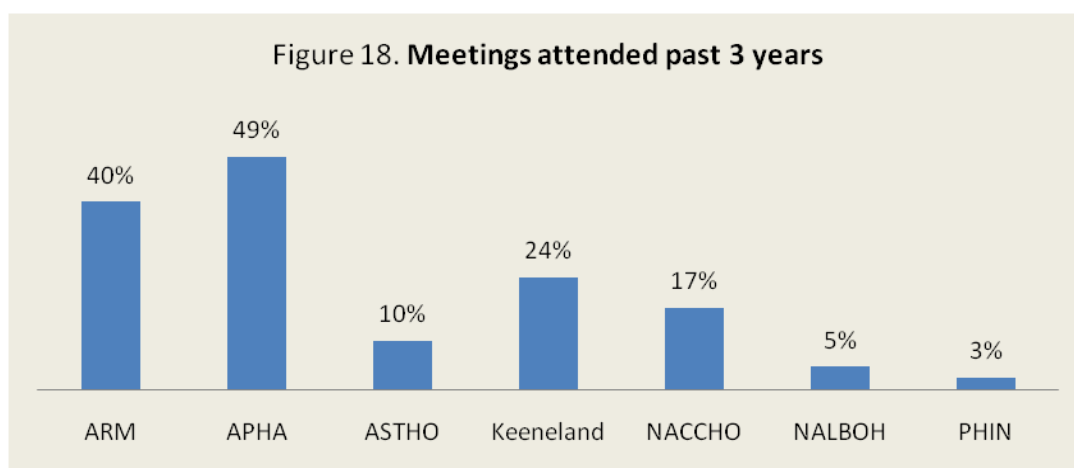
There were 228 open text responses identifying 167 other meetings that community members attended in the past three years, sponsored by a diversity of organizations. These are listed in Appendix II.

How do PHSSR community members interact with RWJF programs?

Among nine RWJF PHSSR programs, the three that generated the most community interaction were *PH Services and Systems Research Call for Proposals* (20%), followed by *Accreditation/Quality Improvement* (19%), and *PH Practice-based Research Networks* (17%). Less than 7% of members had interaction with six other RWJF programs (Figure 19).

Figure 19. Interaction with RWJF Programs

Program	Percentage
PH Services and Systems Research Call for Proposals	20%
Accreditation/Quality Improvement	19%
PH Practice-based Research Networks	17%
PH Data Harmonization Project at UK	7%
Trust for America's Health	7%
Tobacco Policy Initiatives	6%
Match-Community Scorecards	6%
Health Impact Scores	4%
PH Law Research Program at Temple U	4%

1.5 Barriers

What barriers do PHSSR community members face relating to involvement in PHSSR?

Since funding is a known barrier it was not included in the choices for this question. The chief barriers were translating research into public health practice (32%) and finding appropriate data (27%). About 20% of community members experienced barriers in initiating collaborations with governmental public health agencies, explaining PHSSR to colleagues or supervisors, meeting organization workload or performance expectations, and identifying appropriate collaborators (Figure 20).

Figure 20. Barriers Relating to Involvement in PHSSR

Barrier	Percentage
Translating research to public health practice	32%
Finding appropriate data source	27%
Initiating collaborations with governmental public health agencies (federal, state and local)	20%
Explaining PHSSR to my colleagues or supervisors	20%
Meeting my organization workload or performance expectations	19%
Identifying potential collaborators with the necessary knowledge and/or skills	18%
Identifying unique researchable questions	15%
Meeting my institutions' academic promotion or tenure criteria	13%
Initiating collaborations with non-governmental public health partners (e.g. community-based organizations)	13%

There were 90 open text responses that described **other barriers related to involvement in PHSSR**. Several of these response repeated issues addressed by the survey question. There were 34 responses (38%) that indicated obtaining funding for PHSSR was the most difficult task. There were 19 responses (21%) that indicated initiating and maintaining collaborations are the most difficult aspects of being involved in PHSSR. Eleven responses (12%) cited time management and job expectations. Six responses (7%) cited research design issues. The remaining 20 text responses addressed a variety of barriers that included translating research findings into practice, attending meetings, publishing, and promoting PHSSR.

1.6 General Comments from the Survey Respondents

At the end of the survey respondents were presented with an open text field for sharing any general thoughts or suggestions regarding PHSSR. There were 95 open text comments. These included comments on the survey itself (n = 18), funding (n = 22), education and training (n = 12), PHSSR as a discipline (n = 21), involvement in PHSSR (n = 9), collaboration (n=4), and communication (n = 2). A few comments overlapped categories. The open text comments are summarized below.

Comments related to **funding** focused on adequate and sustained funding from government and foundations to support the growth and development of the field, appreciation for RWJF's generous support of projects in this area, the difficulty in obtaining funding, and the need for funding junior investigators and students.

Comments about **education and training** expressed a need for additional education and training, learning about additional methodologies for PHSSR, and a suggestion for bi-directional multidisciplinary training.

Comments on **PHSSR as a discipline** included remarks about the need for solid research, with strong theoretical foundations and methodological underpinnings.

Responses that fell into a category of **involvement** reflected appreciation for being asked to participate in the survey, and new students commenting on their involvement or desire to become involved. This category included comments on the survey that expressed support and appreciation for the opportunity to participate.

Comments reflected a desire for more **collaboration**. Respondents' suggestions as to what would increase and promote collaboration are: an online forum, international collaboration, and breaking down disciplinary silos, although there were no suggestions on how to accomplish this.

With regard to **communication,** respondents wanted to increase dissemination of PHSSR findings and translation of research results into practice level interventions. They advocated dissemination of findings to the public.

Section 2: Comparison of PHSSR community members who joined before and after 2004

The year 2004 was a natural dividing line in terms of growth in PHSSR community. That is, 293 of the 652 PHSSR community members began their involvement in PHSSR before 2004 (denoted as the early group) and 342 began in 2004 or after (denoted as the later group). Seventeen respondents considered themselves to be community members, but were not sure when their participation began.

The odds of having an MPH and coming from public health practice were about the same in the two groups. However, there are several **significant differences between the early and later groups**.

In the early group, members are over three times more likely to be over 50 years of age than the later group, and over three times more likely to hold a terminal degree. Early members are more likely to have joined the PHSSR community because they wanted to be of service to public health. They are more likely to have joint appointments in both a public health and an academic organization, and more than twice as likely to have PHSSR publications, either as first or co-author (Table 1).

Table 3. **Characteristics of PHSSR community members who joined before 2004**

Characteristic	Odds Ratio*
Age>50	3.3
Terminal degree (doctorate)	3.5
Want to be of service to public health	1.4
Have joint appt in academia and PH	1.7
Publication (first or co-author)	2.5

* All significant at 0.05 level

In the later group, the odds of being female are almost twice as high as in the early group. These members are twice as likely to have joined the PHSSR community as the result of being asked by a colleague. Members in the later group are more likely to have joined the PHSR-IG for training, or simply due to curiosity (Table 2).

Table 4. **Characteristics of PHSSR community members who joined after 2004**

Characteristic	Odds Ratio*
Female	1.7
Asked by a colleague to join a project	2.2
Joined PHSR-IG for training	1.6
Joined because curious about PHSSR	1.8

* All significant at 0.05 level

2.1 Funding patterns

The proportions of PHSSR community members who received funding from any of the eight key organizations during the past three years were not significantly different in the two groups. However, among the community members that have been funded *at least once*, those in the early group have been funded 1.6 times on average while those in the later group have been funded 1.3 times on average. This represents a significant difference (p=0.007).

Seven of the eight organizations have provided more funding to the early group. The exception is **RWJF, which has provided more funding opportunities to those who joined PHSSR in 2004 or later** (Figure 21).

Figure 21. **Funding sources**
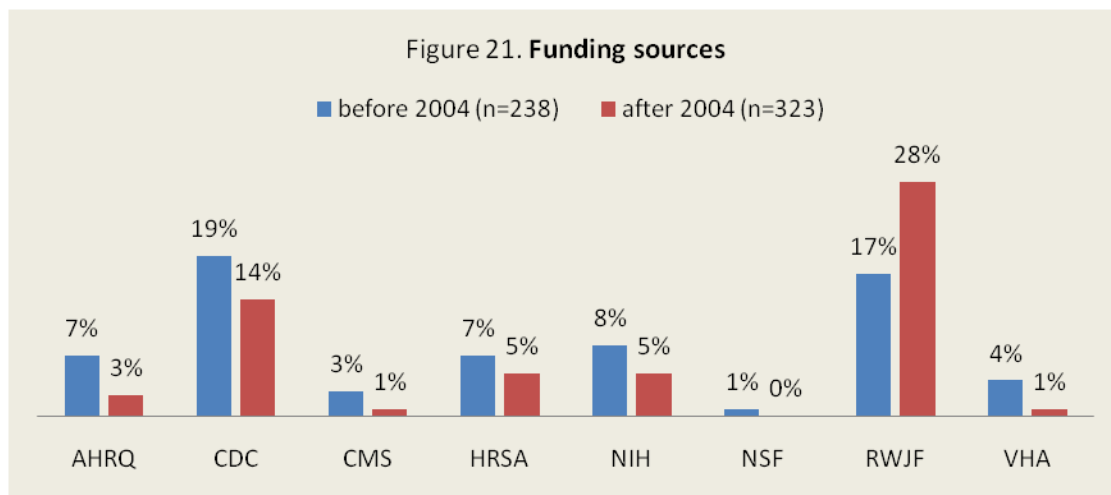
2.2 Ability to cite colleagues' PHSSR work

Overall, PHSSR community members who are funded or published are able to cite significantly more of their colleagues' work than those who are not funded or published. However, funded or published people who joined after 2004 are able to cite significantly less of their colleagues' work. These comparisons both were significant at p < .001. This finding suggests that productive **newcomers to the field may not be aware of substantial problem solving and foundational work already accomplished by the PHSSR community.**

Section 3: Networks in the PHSSR Community

We used network analysis to assess the strength of relationships members have to the PHSSR community. In the network diagrams that follow nodes represent community members or an activity, such as attendance at a meeting, or publication of PHSSR work. Relationships between nodes (i.e. between community members and their activities) are represented as a line, or link, that joins them. Nodes that have no links joining them do not have the relationship(s) in question.

3.1 Collaboration

To assess the degree of collaboration that exists in the PHSSR community we examined personal networks within in the community. We asked each community member for the number of other community members whose work they could **cite**, with how many community members they **discussed ideas**, and the number of community members with whom they have actually **worked**.

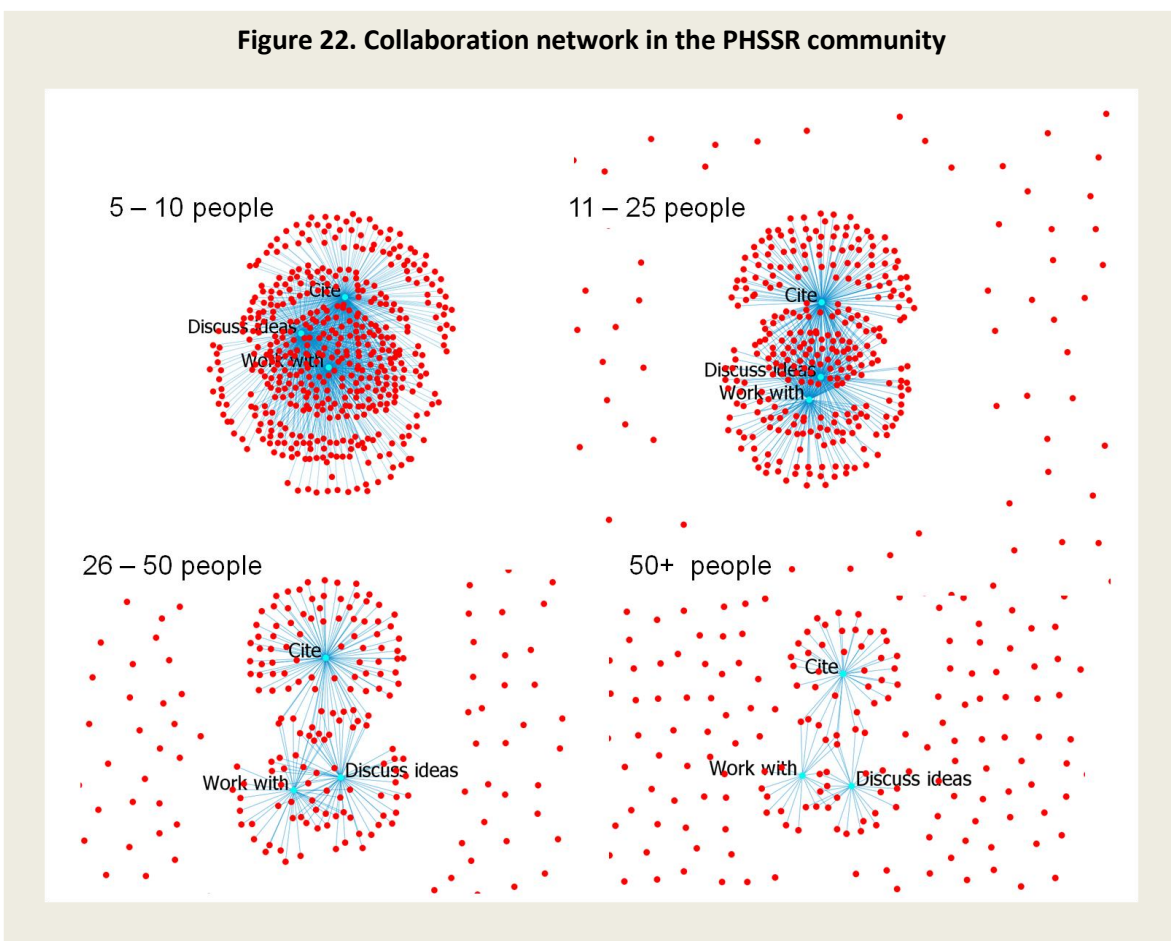**Figure 22. Collaboration network in the PHSSR community**

Figure 22 shows that, **for the purpose of PHSSR,** most **community members have personal networks of between 5 and 25 people.** As would be expected, the number of people communiy members can cite is greater than the number with whom they actively collaborate through discussion or work. These results are fully described on page 18 and in Figure 11.

There are smaller groups of members that discuss ideas and work with 26-50 people. A very small number of community members discuss ideas and work with 50 or more people. These are individuals who coordinate meetings and programs for AcademyHealth, RWJF, or other groups active in PHSSR. **Program coodinators are in an excellent position to keep information flowing in the PHSSR community**, due to the many ties they have with its members.

3.2 Shared meeting attendance

The network visualization in Figure 23 examines the attendance of PHSSR community members at six relevant meetings during the past three years. These results are described on page 25, and in Figure 18.

Figure 23. **Shared meeting attendance featuring a subgroup within the PHSSR community that attends ARM but not meetings more associated with public health**
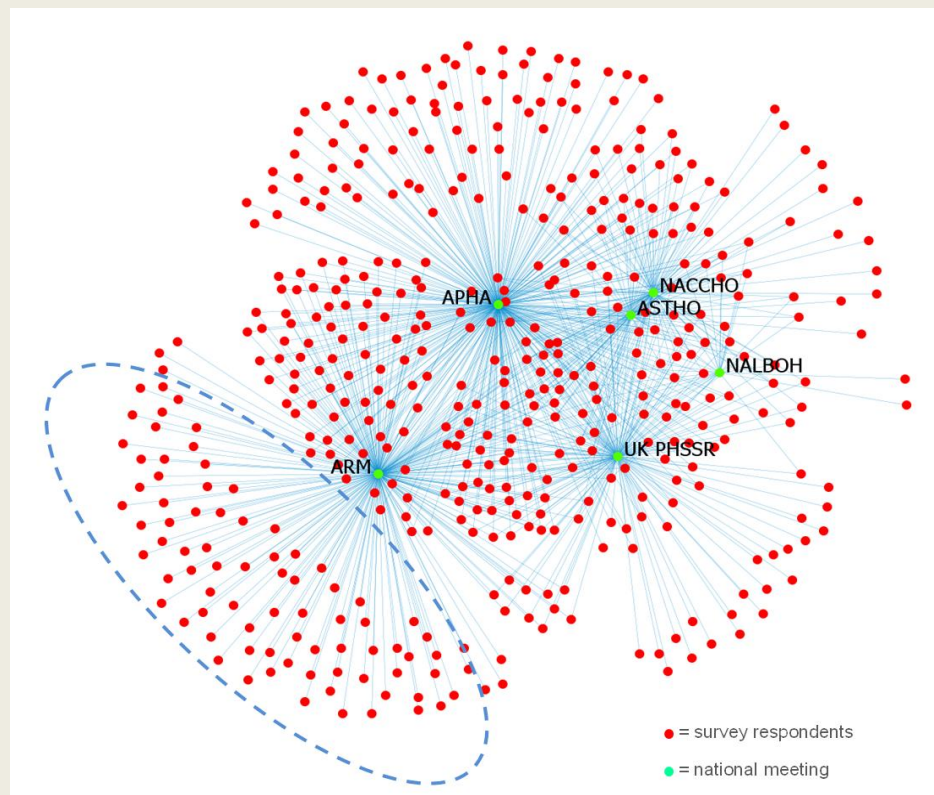
Key: **ARM** = AcademyHealth Annual Research Meeting; **APHA** = American Public Health Assoc. Annual Meeting; **ASTHO** = Assoc. of State and Territorial Health Officials Annual Meeting; **NACCHO** = National Assoc. of City and County Health Officials Annual Meeting; **NALBOH** = National Assoc. of Local Boards of Health Annual Meeting; **UK PHSSR** = Keeneland Conf. at University of Kentucky

About half of PHSSR community members attend the APHA Annual Meeting. A large group at the top left of the figure only attends APHA. Another large group at the left center of the image attends both APHA and ARM. A sub-group of around 100 community members (circled in the image) attends ARM, but none of the other meetings that are more specific to public health. Fewer community members attend the practice-focused meetings held by ASTHO, NACCHO and NALBOH. The group at the upper right of the image, only attends these meetings, and likely represents public health practitioners. Meeting attendance for practitioners often is limited by expense and job responsibilities. A small group in the lower right of the image only attends the UK PHSSR meeting. These may be individuals who participate in Public Health Practice-based Networks, for whom attendance is subsidized.

3.3 Productivity and engagement

To characterize the strength of community members' involvement in the field we examined their productivity and engagement. We defined productivity as having received funding for PHSSR *and* authored or co-authored a PHSSR publication during the past three years. We defined engagement as having shared resources (i.e. data, personnel, or funds) with any of six key groups *and* presented PHSSR at any of the six meetings during the past three years.

Table 5. **Productivity and engagement of 652 survey respondents**

	Freq	Percent (%)		Freq	Percent (%)
Funded	205	31	Productive	133	21
Published	294	45			
Share resources	204	31	Engaged	101	16
Present work	192	30			

There were 47 people that were both productive and engaged, based on all four criteria, and 133 people met three of the four criteria (Table 3). The main difference between the group of 47 and the group of 133 people is whether they received funding for PHSSR. This group of 133 people represents the nucleus of the PHSSR community in that they are its most productive and engaged members.

Figure 24 illustrates how these groups form a network with a core of more involved members and a periphery of increasingly less involved members. The core inner circle represents the 47 members that meet all four criteria. The second ring represents the nucleus of 133 members that meet three of four criteria. The concentric rings show decreasing levels of involvement at the periphery of the network. There is a relatively even distribution of blue and green colored nodes showing when members joined the community. This suggests that productivity and engagement are not dependent on length of time members have been involved in PHSSR.

Figure 24. **A network of PHSSR community members showing a core-periphery structure with concentric levels of involvement**
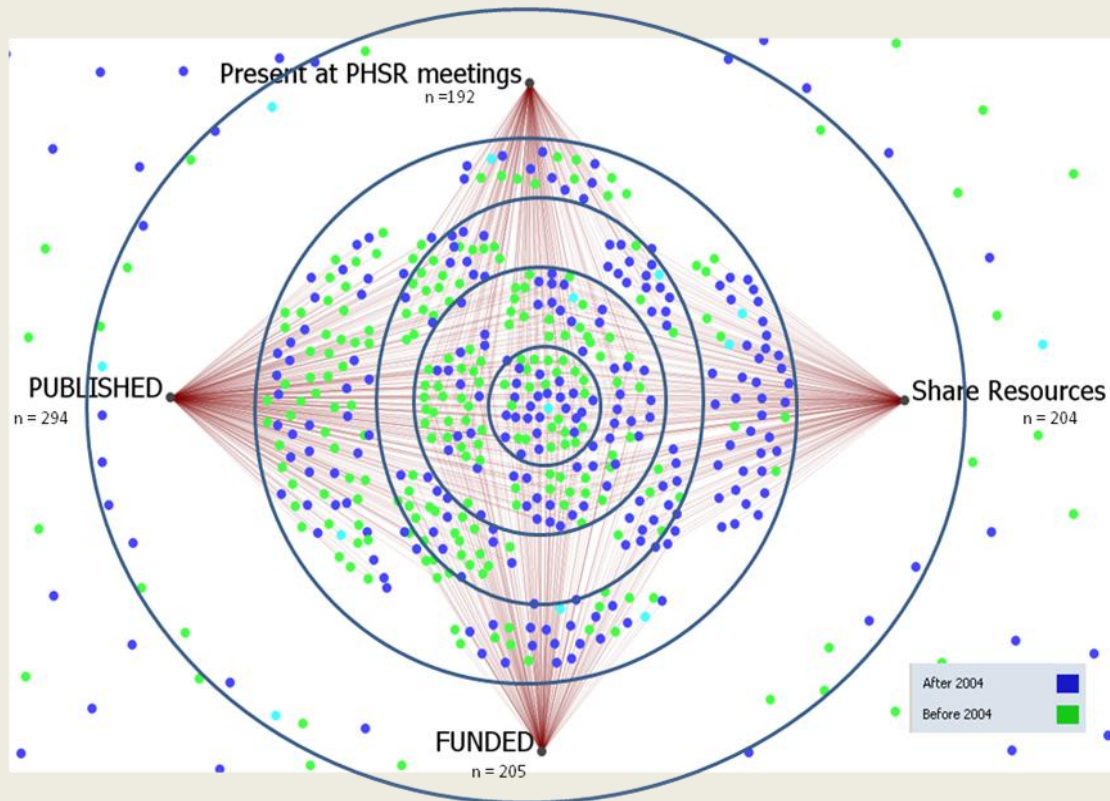
3.4 Characteristics of 133 most productive and engaged community members

About 44% of the 133 most productive and engaged members joined PHSSR after 2004, compared to 53% newcomers in the community as a whole. More members at the nucleus of the community are older (aged over 50) and more of them have experience in public health practice. Expertise in Health Policy Management, the most commonly held expertise in the community overall, is held by a greater proportion of members in the nucleus group. The proportion of members that have mentored others is 73% within the nucleus of the community, compared to just 46% in the community as a whole.

Interaction with RWJF PHSSR programs is higher in the nucleus group. Of special note is the proportion of members at the nucleus of the community who are involved with Accreditation/Quality Improvement and Public Health Practice-based Research Networks. The proportion involved in these two RWJF programs is twice as high as in the community overall (Table 4).

Table 6. **Characteristics of individuals at the nucleus of the community**

Feature	Nucleus (%)	Community (%)
Joined PHSSR after 2004	44	53
Age > 50	52	45
Expertise - PH Practice	56	43
Expertise - Health Policy Management	62	52
Mentor others	73	46
Interaction RWJF - Accreditation/QI	**42**	**19**
Interaction RWJF - PH Practice	**34**	**17**

Section 4: Description of 90 survey respondents not involved in the PHSSR community

4.1 Source of email addresses

In survey question #1 the respondents were asked *"Approximately when did you begin your involvement in PHSSR?"* Ninety out of the 742 survey respondents responded "*I do not consider myself involved in PHSSR"*. Of these, 53 email addresses came from the AcademyHealth PHSR-IG list. Paradoxically, 23 belonged to the University of Kentucky PHSSR blog site. The remainder came from attendee lists of the 2009 Keeneland Conference, the Yale PHSSR Conference, and other RWJF PHSSR events.

4.2 Characteristics

Compared to PHSSR community members, survey respondents who indicated they were not part of the community were less doctorally educated (42% doctoral and 47% master's), and less from academia (35%). Although self-identified as not involved in the PHSSR community, 31 out of 90 indicated they *were* members of AcademyHealth PHSR IG. The major attractions to the IG were curiosity about PHSSR (55%), or regarding it as a forum for learning about emerging research (58%), or as a source of evidence for improving practice (45%). Non-PHSSR people were much less productive and engaged in PHSSR. Very few of them were funded (8%) or had publications (14%). During the past three years a PHSSR community member was 4.7 more likely to have a publication, and 5.1 times more likely to have funding when compared to a non-PHSSR person. Very few non-PHSSR people attended PH specific meetings during the past three years (ASTHO 3%, NACCHO 6%, and Keeneland 4%). Only nine non-PHSSR people interacted with RWJF PHSSR programs. Their interaction was limited to the Accreditation/Quality Improvement program.

Section 5: Authorship/Co-Authorship Network Analysis

5.1 Central and peripheral topics

We used Sciologer software to visualize a network depicting the publications of the 133 most productive and engaged members at the nucleus of the PHSSR community. Productive and engaged members are as defined in Section 3. There were 118 members within the nucleus of the PHSSR community *for which we were able to locate publications (on any topic) indexed in Pub Med.*

Figure 23 shows 2344 research articles representing the indexed publications by these 118 community members and their co-authors. In the network figure, nodes are either authors or publications. A person icon ☖ represents an author or co-author. A paper icon ☐ represents a publication. Authors are linked to their co-authors and to the papers they have written. The size of each node is determined by its node degree (number of links to other nodes.) Positions of nodes are determined by a force-directed placement algorithm. This algorithm places the nodes in such a way as to make the links relatively equal in length, with as few crossing links as possible. Node colors are assigned in such a way that closely related nodes have similar colors. The topic labels were identified by expert opinion and placed in the image manually.

Figure 23a shows that the PHSSR community has researched a wide range of topics that are not specific to PHSSR. In Figure 23b the core of the network shows researchers studying specifically PHSSR-related topics, including Preparedness, Performance, Public Health Workforce, and Law (circled).

Figure 23. **Co-authorship network of PHSSR research, from before 1988-2010, with topics labeled at the periphery and core of the network**
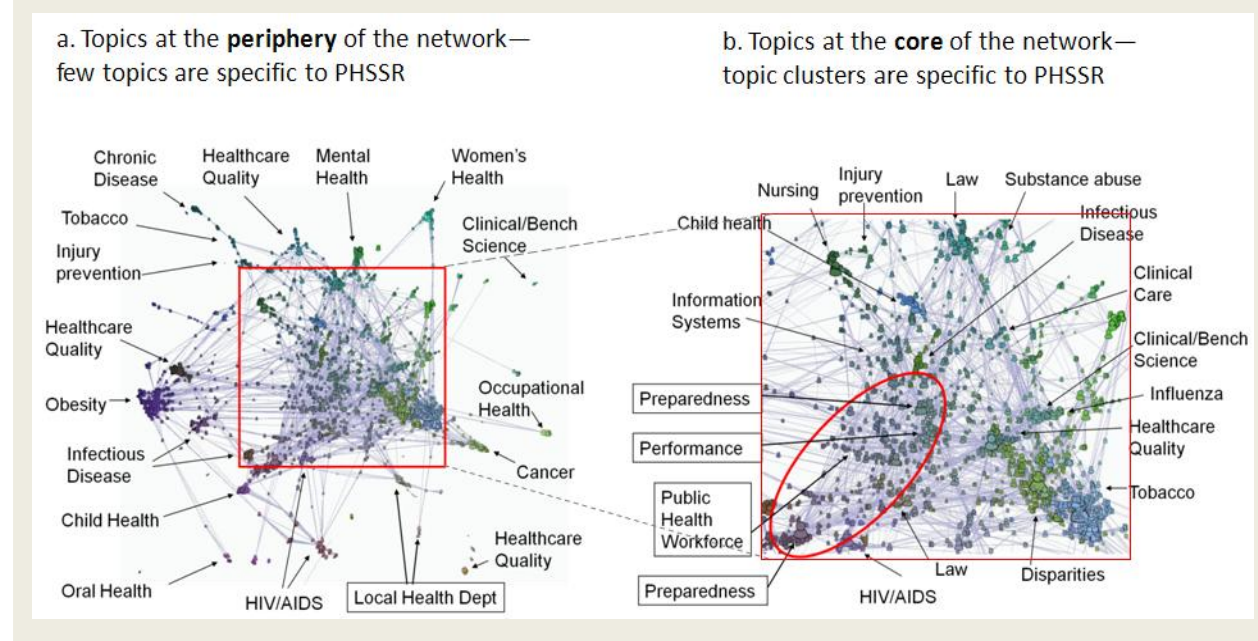
5.2 Growth of Scholarly Output

Figure 24, below, shows the growth of the PHSSR community over time. As with Figure 23, the nodes are either authors or articles, and links are assigned between authors and their co-authors, as well as between authors ⚇ and the articles ☐ they have written. Authors are linked to co-authors and to papers they have written. The two earliest time intervals feature individual groups of authors/co-authors working independently, with few links among groups. The most recent time intervals show the emergence of the community of practice, with an increasing number of links among groups. Shades change across years; i.e., a group in a dark shade in one time slice may not correspond to a dark-shaded group in the next time slice. There are two distinct phase changes where leaps in productivity are visible. The phase showing publications between 1995 -2001, corresponds to the release of *Public Health in America*, which defined the essential services of public health in 1994. The phase showing publications between 2005-2007 corresponds the start of RWJF's ten-year initiative to support PHSSR in 2004.

Figure 24. **The PHSSR community over a six time intervals illustrating the growth of scholarly output**

1950-1988   1989-1994   1995-2001

2002-2004   2005-2007   2008-2010
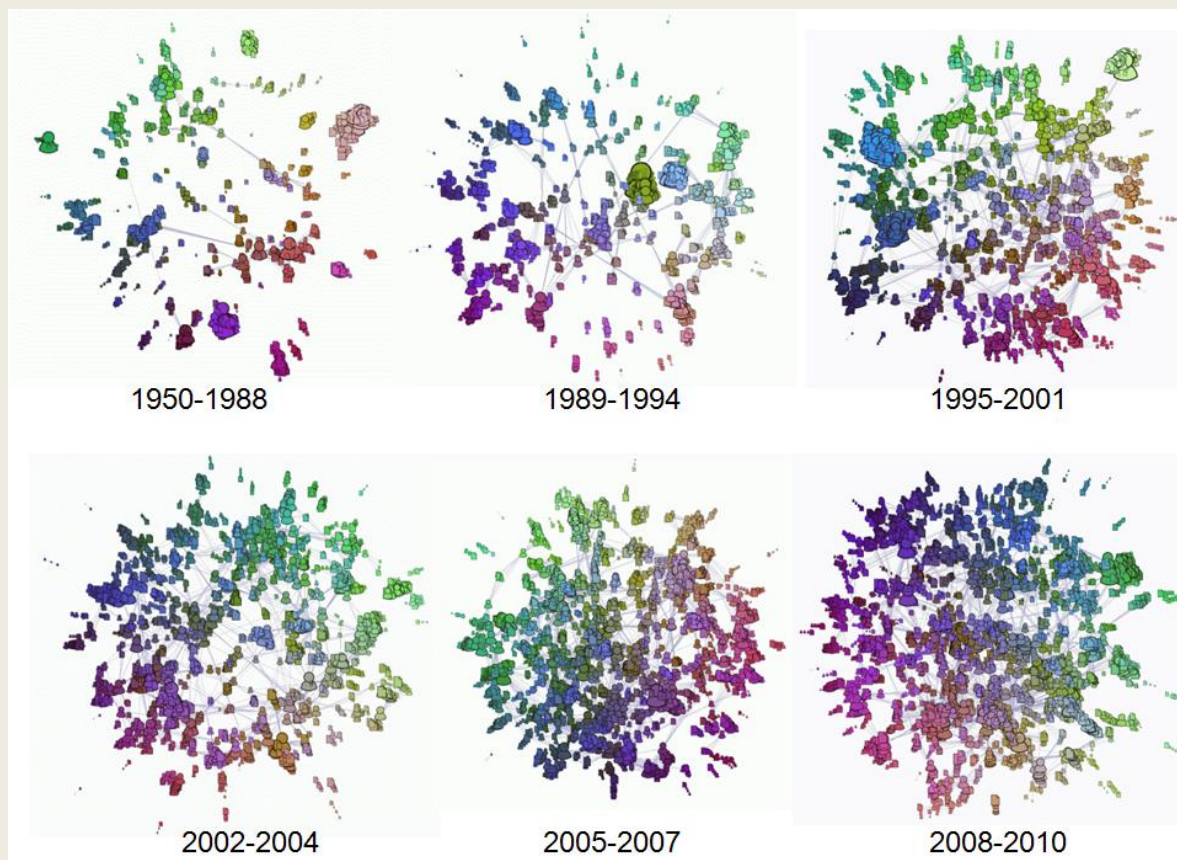
5.3 Case studies illustrating individual career paths

Figure 25 presents case studies of three individual authors. These networks were produced by using an individual author's list of publication identifiers as input. Each network was labeled in the same manner as the co-authorship network. The leftmost author has published exclusively on managed care and related topics. The author in the middle has published on public health topics including obesity and tobacco, but also health services research and research on public health law and ethics. The rightmost author has published a number of articles on managed care, oral health and depression.

The publication histories of these randomly selected authors are illustrative of the trajectories of many of the PHSSR community authors studied.

Figure 25. **Three networks representing the career paths of specific authors illustrating the variety of work being conducted by individuals in the community.**
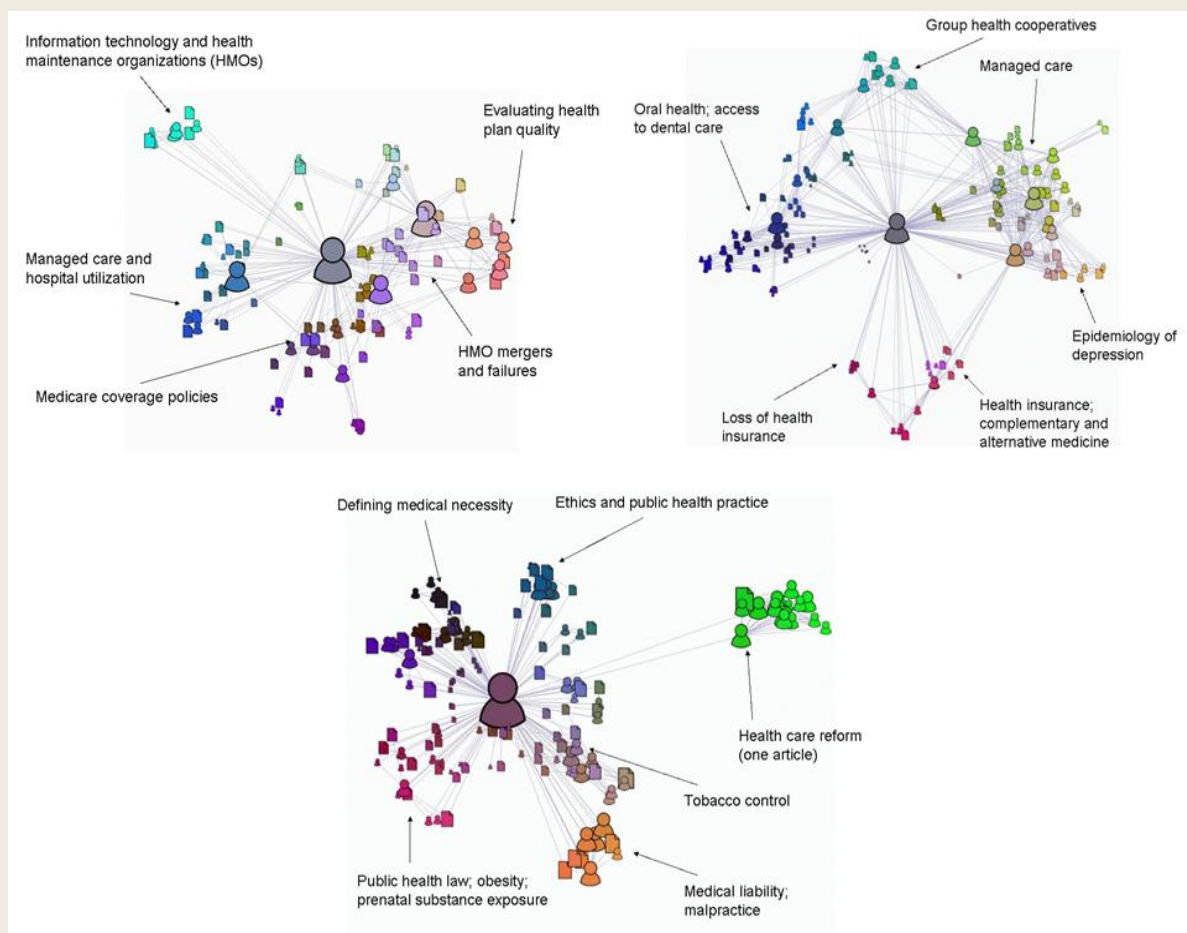
5.4 Journals favored by the PHSSR community

The 118 authors published articles in a total of 490 unique journals. Table 3 lists the titles of 20 journals in which these authors published most frequently from before 1988 through 2010. The journals represent a wide scope of health topics. Journals in which these authors publish most frequently (*Journal of Public Health Management and Practice* and *American Journal of Public Health*) are particularly associated with public health services and systems. Other journals generally associated with public health are *Public Health Reports, American Journal of Preventive Medicine, Public Health Nursing,* and *Annual Review of Public Health*. Journals less associated with public health, such as *Wisconsin Medical Journal, The AIDS Reader, Nursing Economics,* and *Pediatrics,* are evidence that this group of authors is active in research fields other than PHSSR.

Table 7. **Journals in which 118 authors from the PHSSR community published most frequently from 1950 through 2010.**

Frequency	Journal
197	Journal of Public Health Management and Practice
127	Wisconsin Medical Journal
78	American Journal of Public Health
61	The AIDS Reader
61	Health Affairs
59	JAMA: The Journal of the American Medical Association
49	Public Health Reports
41	American Journal of Preventive Medicine
39	Health Services Research
35	Nursing Economic$
29	Journal of General Internal Medicine
28	Journal of Law, Medicine & Ethics
23	Medical Care
22	The New England Journal of Medicine
22	Pediatrics
18	Public Health Nursing
16	Annual Review of Public Health
16	The Journal of the Kentucky Medical Association
16	Maternal and Child Health Journal
15	American Journal of Managed Care

Figure 26, below, illustrates the co-authorship network of PHSSR research by showing the network of journals in which articles appear from 1950 to May 2010. The icons representing journals are sized to indicate to the number of articles appearing in that journal. Author nodes have been hidden. Journal labels illustrate sub communities in the network. The image shows how individuals in specific communities of practice publish in common journals. Thematically related journals are spatially proximate to one another because links between authors and journals draw related journals closer

together in space. A few of the journal clusters have been manually circled in blue to differentiate them from nearby clusters. Among the identifiable communities are dental care, diabetes, environmental health, infectious disease, medicine, nursing, and women's health

Figure 26. **Co-authorship network of PHSSR research showing only journals, from 1950 to June 2010.**
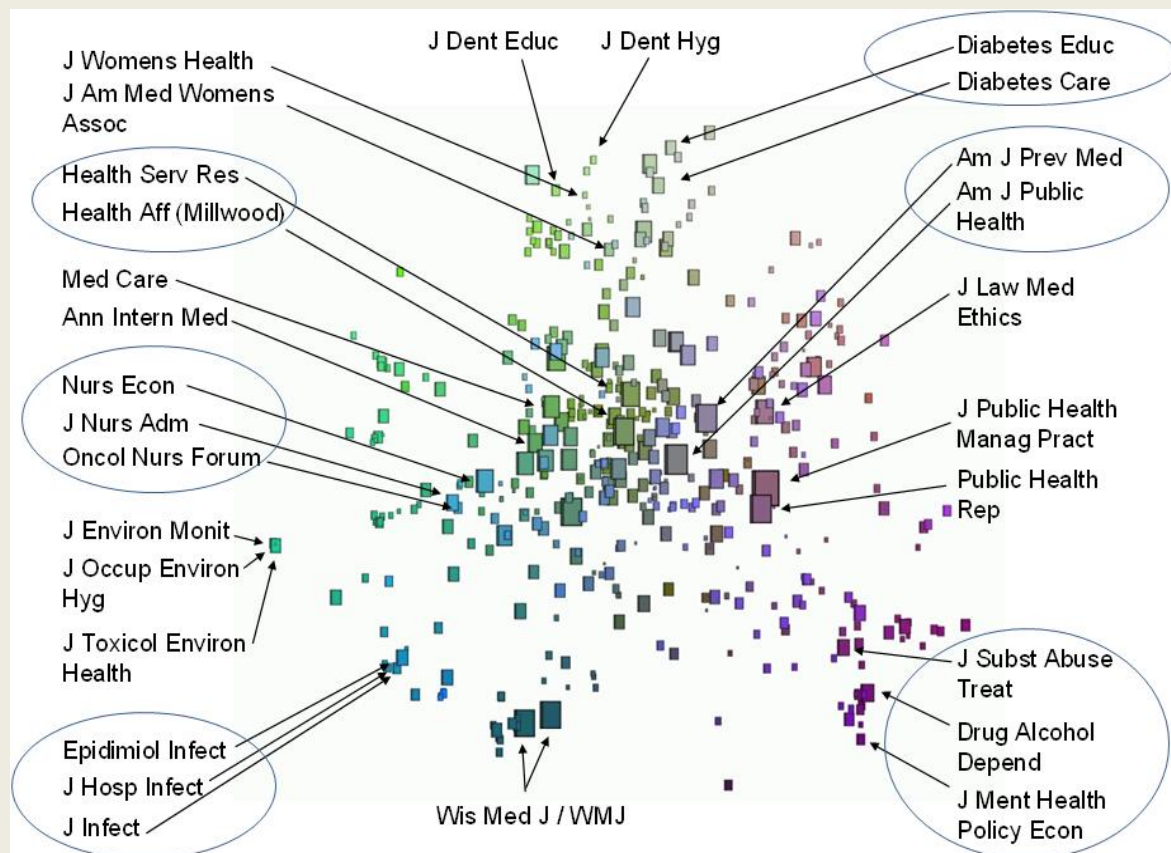
A few of the journal clusters have been manually circled in blue simply to differentiate them from nearby clusters.

Section 6: Semantic analysis of concepts in PHSSR publications

6.1 Concepts in PHSSR publications

To characterize concepts present in publications by PHSSR community members, the titles and abstracts of publications retrieved for the co-citation analysis were analyzed. Approximately 28,000 unique terms were extracted and dramatically reduced in a stepwise fashion, first by deletion of stop words (e.g. and, but, that), and terms occurring with ubiquitous frequency (i.e. frequency >3000). Non-informative adjectives and adverbs (e.g. robust, frequently) and non-specific nouns (e.g. study, time, problem) were also removed. Bi-grams (e.g. public health) and n-grams (e.g. Robert Wood Johnson) were converted to single concepts.

The term set was further reduced using expert opinion of the investigators to remove plurals and to harmonize semantically equivalent terms into categories, such as anatomical terms, clinical processes, or anti-microbial agents. These concepts were mapped back to the authors. This produced a network in which the nodes represent concepts and authors. Links represent occurrence of the concept in the titles and/or abstracts from that author. A computational grouping algorithm was applied identify subgroups containing more links between authors and concepts than would be expected at random. The algorithm identified concept-to-author groupings that were labeled by the investigators. They represent **six conceptual areas of research**:

At-risk Population (AP)	Workforce and Infrastructure (WI)
Disease Prevention (DP)	Performance (P)
Healthcare Quality (HQ)	Population Health

These groups incorporate several conceptual areas such as research specific to at-risk populations and healthcare quality that do not traditionally fall under the purview of PHSSR. There are two explanations for this phenomenon. First, PHSSR is a comparatively new field of research. Research done earlier in the authors' careers is likely to be in areas other than PHSSR. Second, there is little dedicated funding for PHSSR, therefore the work of current PHSSR community members is likely to have other foci. Despite this, concept-to-author groups related to workforce and infrastructure, and performance did emerge.

To visualize the concept groups we use a matrix representation. A matrix representation is another way to display a network – specifically, its underlying numerical data. Each row represents one of the 118 authors for whom we located publications indexed in Pub Med and each column represents one of the 123 concepts. Therefore each cell represents the connection between a PHSSR community member/author and one concept. Cells are shaded depending on the strength of the connection – *white* means no connection (concept not found in author's titles or abstracts); *black* means a strong connection (concept found in several of author's titles or abstracts). Conceptual coverage is approximated by the frequencies of the concept. The concept frequency table is presented in Appendix III.

Figure 27 shows the author-to-concept groups. Rows are sorted by cumulative author link weight, greatest at bottom, and columns are sorted within each area by cumulative concept link weight, greatest on the left. Cells are shaded according to the relative strength of the link between author and concept, darkest being strongest.

Figure 27. **Matrix representation of the relationship between 118 authors and 123 concepts found in the titles and abstracts published by those authors from 1950 through May 2010**
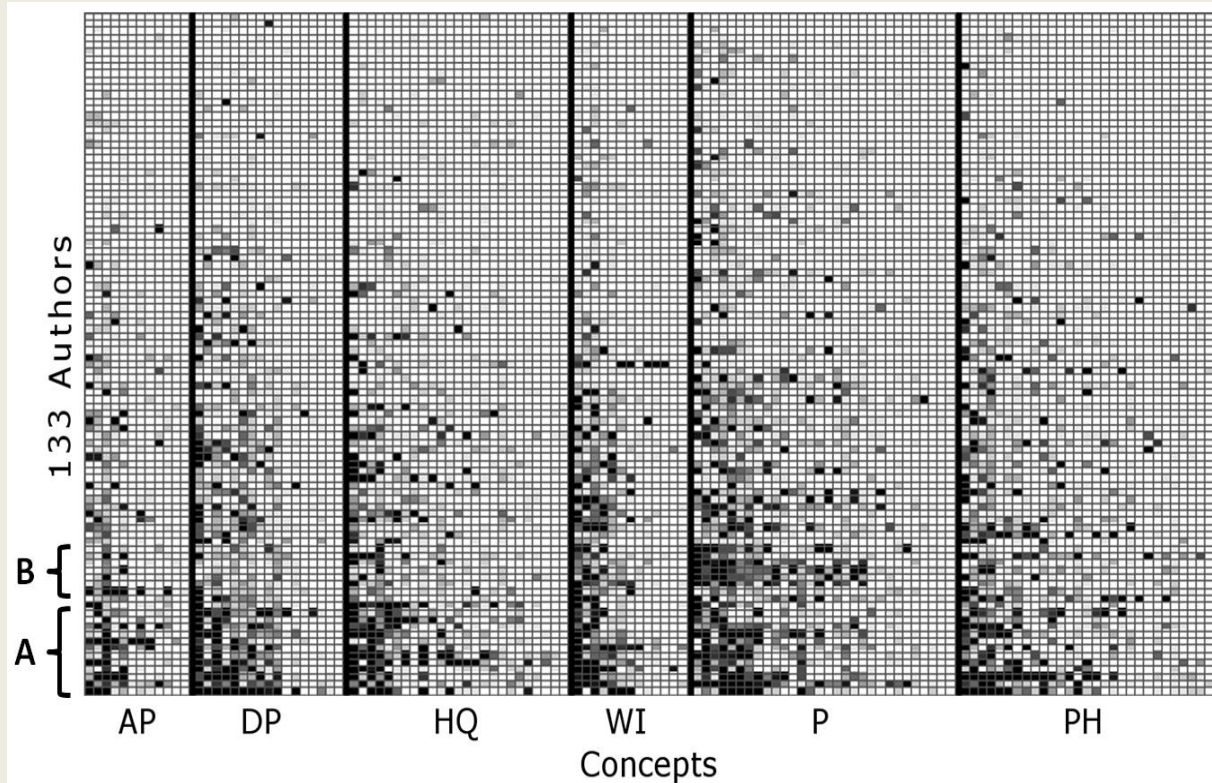

Of note in Figure 27 are the two groups of authors identified as A and B. The group labeled A represents the 15 most prolific authors from among the 118 authors for which we have data.   Their pattern of conceptual coverage appears to be representative of all six conceptual areas of research. The group labeled B represents the next most prolific set of five authors, and their conceptual coverage pattern has a high concentration in the 'workforce and infrastructure' and 'performance' areas that most closely match with PHSSR related concepts. The remaining 103 authors do not have clearly defined patterns in their conceptual coverage.

6.2 Changes in concepts found in PHSSR publications over time

Figure 28 displays the percent change in frequency of concepts from the preceding time interval for each of the six conceptual areas of research by 118 authors for whom we have data. The growth of published research in all conceptual areas between 1989–1994 and 1995–2001 was high, often doubling. Of particular note is the near tripling of frequency for performance concepts following the publication of the Essential Services in 1994. In the time interval after the World Trade Center and anthrax attacks in 2001, there is a marked loss of growth in all six conceptual research areas. This suggests a shift away from publication by the PHSSR community during that period. Growth resumes in the 2005–2007 time interval, following the PHSSR funding initiative by RWJF. The most growth is in conceptual areas of workforce, infrastructure, and performance. These patterns illustrate how productivity in the PHSSR community is sensitive to public health events and to available funding.

Figure28. **Graph depicting the percent change in frequency of concepts from the preceding time interval in the titles and abstracts of 118 PHSSR authors**
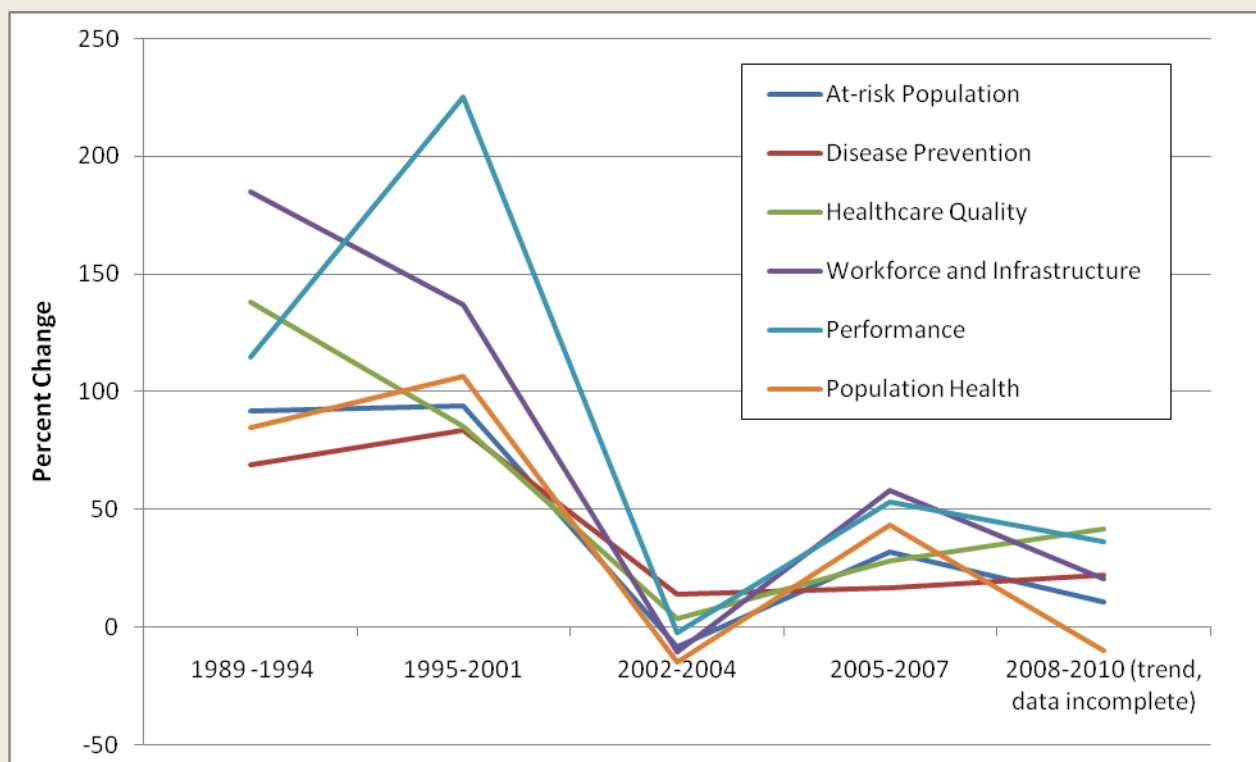
6.3 Gaps in conceptual coverage

In order to explore potential conceptual gaps in PHSSR the *frequency* of all concepts across all titles and abstracts of the 118 authors was computed and ranked. Recall that these 118 authors are the subset of 133 most productive and engaged PHSSR community members who have publications indexed in Pub Med. The concept frequency table is presented in Appendix III. Specific terms that may represent gaps in published PHSSR include 'assurance' and 'productivity' 'teamwork' and 'sustainability'.

The scope of this project only allowed us to analyze term frequencies independently, not in the context of the entire publication from which the title and abstract is drawn. Also results for the most recent time interval (2008 – 2010) are time sensitive. For example, since the citation data was collected only up to May 2010 'epidemic' appears as an infrequent term, but as publications emerge on the 2010 H1N1 outbreak that occurred in earlier 2010 this will likely change.

Summary and Recommendations

In this report descriptive statistics and network analyses have been presented to characterize the emergence of the public health services and systems research community, and to capture interactions among community members' expertise, interests, and the available resources within the field.

We found that half of the community members became involved in 2004 or after. The majority are female, white, under 50, doctorally prepared, and 40% hold the MPH degree. Half are from academia and 20% are from public health practice. About half have expertise in Health Policy Management and Quality Improvement/Outcome Evaluation, but these are also areas where the community wants mentors or more access to experts. We also found that a meaningful proportion of the community collaborates by discussing ideas and working together, and close to half have traveled to collaborate directly with colleagues on PHSSR.

Community members who joined before 2004 are more likely to be older, doctorally educated, and published, all factors that are consistent with career longevity. Public health accreditation and practice based networks have attracted more senior newcomers, likely an effect of RWJF's efforts to both develop and promote inquiry in these areas which are rich in research potential.

Younger people attracted to the PHSSR community since 2004, often through invitation from a colleague, are as likely to have received funding as those who became involved before 2004. This clearly demarcates the success for RWJF's initiative to build the field. Yet, even when funded or published newcomers are less able to cite colleagues' PHSSR work, suggesting these productive newcomers may not be aware of substantial problem solving and foundational work already accomplished by the PHSSR community.

RWJF, and to a lesser extent CDC, are the major sources of funding for PHSSR. RWJF has clearly influenced growth of PHSSR and drives the field with authority. In fact, a seventy percent majority of the respondents consider RWJF a definitive source of information about PHSSR, on par with their opinion of the indexed literature.

A pattern of submitting grant proposals with PHSSR as a *secondary* focus illustrates how PHSSR community members "get around" a lack of dedicated Federal funding for the field. Despite limited funding community members successfully publish their PHSSR work, although one-third report barriers in translating research to public health practice.

These results are intended to help the Robert Wood Johnson Foundation and other interested parties define the future direction of PHSSR. In describing the broad and specific needs of the PHSSR community this report provides evidence that may guide future policy, help to engage other funders in responding to the needs of the field, and to support the collective efforts of the community's members. Based on the results of the study, recommendations are as follows:

- Growth in an emerging field occurs through participation in communities of practice, which is at first legitimately peripheral but that increases gradually in engagement and complexity. This is precisely the pattern seen in Figure 24. A clear resource for the community are the 133 most productive and engaged members that represent the nucleus of the PHSSR community. This group is enhanced by a nearly even mix of older members and newcomers, and a proportion of PH practitioners identical to that in the community as a whole (20%). The groups' resource sharing, and its efforts to attend and present their work at meetings, help to draw peripheral members from all three categories into the community of practice

- During the early stages of an emerging field of inquiry researchers at different places are often unaware of similar work done by colleagues. Our results suggest a similar process is occurring with newcomers to PHSSR. A guide to PHSSR history and resources may help those entering the field build on the substantial problem solving and foundational work already accomplished by the PHSSR community. As these important contributions become clear to students and other potential community members, regard for the field and recruitment will typically increase.

- A mechanism for consultation/access to experts, particularly on Quality Improvement and Outcome Evaluation, would be of value to PHSSR community members.

- AcademyHealth is well positioned to broaden the PHSSR base—but this may not be a supportable approach in the absence of dedicated funding streams. However, health services researchers affiliated with AcademyHealth and interested in PHSSR may be a potential source of new ideas and expertise for the community, and a resource for consultation, training and mentoring on health services research methods.

- There is a small sub group within the community with expertise that bridges health services research, public health practice, and PHSSR. Coordinated career opportunities to develop this mix of expertise such as internships, fellowships, or post doctoral research awards may be a way for stakeholders to promote sound growth of to the field.

- Public health practitioners are only 20% of the PHSSR community. It is typically difficult for practitioners to attend research meetings due to budgetary and time constraints. While time constraints are more difficult to address, scholarships or other means of subsidizing practitioners to attend PHSSR meetings may attract their participation in PHSSR.

- Multiple strategies are needed to establish funding resources for PHSSR. For PHSSR community members to write proposals that are responsive and fundable by Federal agencies, PHSSR questions must be incorporated into Federal grant guidance (RFPs and FOAs) and the mission/portfolio statements of key Federal agencies. Several foundations and other sources of PHSSR funding were identified by survey respondents. A consortium of foundations to leverage resources may be an avenue for continued support for PHSSR.

- A research agenda is needed that will systematically focus on gaps in knowledge, and guide development of data and other resources that can be shared to support rigorous inquiry. Research

that addresses concepts of assurance, productivity, strategy, and sustainability may help to balance the focus of inquiry in the field. This process should include wide representation from within the community as those involved will play a major role in promotion and dissemination of the agenda.

- Sustainability of PHSSR will depend on translating research into practice. Results have to produce an impact that is measurable on public health processes and outcomes. This is a major barrier for the community that must be addressed. This ideally should be done in a collective forum by collaborators at the core and at the periphery of the community, to ensure many perspectives are included.

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Acknowledgements

Appendix I

Survey Questionnaire

Dear Colleague:

In the following survey we ask **27 questions** and a few text responses about your involvement in Public Health Services and Systems Research (**PHSSR**).

The survey takes about **20 minutes or less to complete**.

If you are interrupted you can log-in again to finish.

12 randomly selected respondents will receive a one year AcademyHealth membership worth $175.

Definition: Public health Services and Systems Research (**PHSSR**) is the field that studies the organization, financing, and delivery of public health services to the nation's communities, and the impact of those services on the public's health.

1. Approximately when did you begin your involvement in PHSSR?

Please select the most recent date that applies.
a)	Before 1988
b)	Before 1994
c)	Before 2001
d)	Before 2004
e)	2004 or after
f)	I do not consider myself to be involved in the PHSSR community.
g)	Don't know/Not sure

2. What attracted you to PHSSR? Please check all that apply.

a)	I am not involved in PHSSR
b)	Motivated by employment in public health
c)	Asked by a colleague or mentor to join a project
d)	Asked by a public health organization to do a project
e)	Found a funding source
f)	Stimulated by a publication
g)	Wanted to be of service to public health
h)	Don't know
i)	Other

If there are other reasons you were attracted to PHSSR, please enter your reason(s) in the text box.
If not, enter 'x' in the box and continue to the next question.

3. If you are a member, why did you join the AcademyHealth Public Health Systems Research Interest Group (PHSR IG)? Please check all that apply.

a)	I am not a PHSR IG member
b)	I had to select an Interest Group when I joined AcademyHealth
c)	A forum for presenting my work
d)	A forum for learning about emerging research
e)	A forum to learn about evidence for improving practice
f)	Networking and professional support
g)	Training
h)	Access to funding or scholarship opportunities
i)	Curious about PHSSR
j)	Don't Know
k)	Other

Are there other reasons you joined the Academy Health Public Health Systems Research Interest Group (PHSR-IG)? If so, enter the reason(s) in the text box.
If not, enter "x" in the box and continue to the next question.

4. What is your primary organizational affiliation?

a)	Public Health State/Territorial
b)	Public Health Local, County, Municipal
c)	Public Health Federal
d)	Academia
e)	Advocacy Organization
f)	Foundation
g)	Association or Non profit
h)	Health Insurer or Purchaser
i)	Hospital or health organization
j)	Non-healthcare organization
k)	Media
l)	No affiliation
m)	Other

5. Please type the 5 digit zip code of your primary place of work in the text box below.
If you are not working, please enter your home zip code.

6. Do you have appointments in both a public health and an academic organization? (For example: a health officer who is on the faculty in a school of public health)

a)	Yes
b)	No
c)	Don't know
	Not sure

7. What is your gender?
> a) Female
> b) Male

8. Do you consider yourself Hispanic, Latino, or of Spanish origin? Your response is voluntary.
> a) Yes
> b) No
> c) Skip this question

9. What is your race? Please select all that apply.
> a) White
> b) Black or African American
> c) American Indian or Alaska Native
> d) Asian
> e) Native Hawaiian or other Pacific Islander
> f) None of the above

10. What is your age group?
> a)   20 - 35
> b)   36 - 50
> c)   51 - 65
> d)   Over 65

11. Please indicate your highest level of education.
> a) Associate's degree
> b) Bachelor's degree
> c) Master's degree
> d) Doctoral degree
> e) Graduate student
> f) None of the above

12. Do you hold a Master's degree in Public Health (MPH)?
> a) Yes
> b) No
> c) MPH Student
> d) Don't know/Not sure

13. Please tell us about your expertise and interests in PHSSR.
Expertise = a high degree of skill in or knowledge of a subject based on education, research, experience or occupation.

Expertise =I have expertise in this area.
Interest = I do not have expertise but I have an interest in this area.
Neither = I do not have expertise but I have an interest in this area.
Don't know/Not sure

a) Biostatistics
b) Clinical Services Research
c) Economics and/or Finance
d) Education
e) Environmental Health Science
f) Epidemiology
g) Health Policy Management
h) Health Sciences (medicine, nursing, dentistry, etc)
i) Informatics
j) Law and Regulation
k) Public Health Practice
l) Social and Behavioral Sciences
m) Quality Improvement/ Outcome Evaluation

14. Please tell us about your access to mentors and experts for PHSSR.
Mentor = an experienced person who acts as a teacher or trusted counselor to stimulate professional development.

Expert = a person with a high degree of skill in or knowledge of a certain subject.
Mentor = I want a mentor in this area
Expert = I do not want a mentor but I wish I had more access to experts in this area
Neither = I do not want a mentor nor access to experts in this area

a) Biostatistics and/ or Epidemiology
b) Clinical Services Research
c) Economics and/ or Finance
d) Education
e) Environmental Health Sciences
f) Health Sciences (medicine, nursing, others)
g) Informatics
h) Law and Regulation
i) Public Health Practice
j) Social and Behavioral Sciences
k) Quality Improvement/Outcome Evaluation

15. In <u>the past calendar year</u>, did you give mentoring to a newcomer or more junior member of the PHSSR community <u>or</u> did you get mentoring from an experienced member of the PHSSR community in any of the following ways? Please check all that apply.
  a) Training
  b) Advisement
  c) Networking opportunities

16. **In <u>the past year calendar year,</u> have you personally visited a colleague(s) in the PHSSR community for the purpose of PHSSR? (for example, to consult on a project, serve on an advisory board, or similar activities**)
  a) Yes
  b) No
  c) Don't know/ Not sure

17. Please think about the broad network of people involved in the field of PHSSR.
Please note in this question we ask about your experience <u>during the past calendar year</u>.

Estimate the number of people whose **work you understand well enough to cite** in a manuscript.
Estimate the number of people you have **discussed innovative ideas with** in regard to PHSSR
Estimate the number of people you have **worked with** on a PHSSR project
  a) 0-4 people
  b) 5-10 people
  c) 11-25 people
  d) 26-50 people
  e) More than 50 people
  f) Don't know/Not sure

18. In your opinion, how definitive are the following sources of expertise on PHSSR?
Definitive means 'complete and conclusive'
  a) Most Definitive
  b) Definitive
  c) Somewhat Definitive
  d) Not at all Definitive
  e) Don't Know

A professional organization representing Public Health (i.e. NACCHO, ASTHO, NALBOH or similar)
Government agencies (CDC, HRSA, NIH, AHRQ or similar)
Robert Wood Johnson Foundation
Colleagues in the Public health research community
Colleagues in the Public health practice community.
Indexed literature such as peer-reviewed journals, books, and publications.
Non-indexed Grey literature*

*Grey literature is information produced by government, academia, and business that is not indexed or controlled by commercial publishing. Examples include reports, working papers, white papers, standards and protocols.

19. Please tell us about your experience during the past 3 years obtaining funding for PHSSR. This question refers to your experience as a *principal investigator or co-investigator*.

No = I have not applied for nor received funding
Funded for PHSSR = I have funding specifically for a PHSSR project
Submitted just PHSSR = I have submitted a proposal specifically on a PHSSR topic
Submitted included PHSSR = I have submitted a proposal on another topic and included a PHSSR question in the proposal

Please check all that apply.
  a) AHRQ (Agency for Healthcare Research and Quality)
  b) CDC (Centers for Disease Control and Prevention)
  c) CMS (Centers for Medicare & Medicaid Services)
  d) HRSA (Heath Services and Resources Administration)
  e) NIH (National Institutes of Health)
  f) NSF (National Science Foundation)
  g) Robert Wood Johnson Foundation
  h) VHA (Veterans Health Administration)

If you have applied for or received PHSSR funding from other sources, please list them the text box.
If not, enter 'x' in the box and continue to the nest question.

20. In the past 3 years have you used any of the following PHSSR assets?
Please check all that apply.

  a) Academy Health public Health Systems Research Interest Group website/web resources
  b) University of Kentucky Center for PHSSR web resources/online learning community
  c) PHSSR Webliography (http:www.nlm.nih.gov/nichsr/phssr/_webliography.html)
  d) Data from the National Public Health Performance Standards Program
  e) Data from surveys of State and Local Health Departments and/or Local Boards of Health
  f) National Library of Medicine Partners in Public Health Listserv
  g) National Library of Medicine Health Services Research Resources (HSRR) website
  h) None of the above

21. Please indicate your experience during the past 3 years, submitting manuscripts on a PHSSR topic to *peer-reviewed* journals or publications.

This **includes** peer-reviewed conference proceedings that are indexed in the literature. It **does not include** non-indexed or invited abstracts, posters, panels, or presentations.
a) None
b) 1-3
c) 4-7
d) 8 or more
e) Don't know/Not sure

Number **submitted** as <u>first author?</u>
Number **accepted** as <u>first author</u>?
Number **submitted** as <u>contributing author</u>?
Number **accepted** as <u>contributing author</u>

22. In the past 3 years have you produced or contributed to a grey literature publication?
Grey Literature is information produced by government, academia, and business that is not indexed or controlled by commercial publishing, such as reports, white papers, standards and protocols.
a) Yes
b) No
c) Don't know/Not sure

23. In the past **3 years**, please characterize your level of collaboration with the following groups.

None = No interaction at all
Know of = Have knowledge of this group
Give/get info = Give or get information such as documents, reports, publications, including information on Web sites
Share resources = Give or get resources such as data, expertise, project consultation, research tools, and/or staff time but **no financial interaction**
Share funds = Participate in a formal partnership or project **with shared funding** or other financial interaction

> Association of State and Territorial Health Officials (ASTHO)
> National Association of City and County Health Officials (NACCHO)
> National Public Health Performance Standards Program
> National Network of Public Health Institutes
> Public Health Accreditation Board
> Public Health Foundation
> University of Kentucky Center for Public Health Systems &Services Research

24. Please indicate your participation during any of the past 3 years in the following professional meetings.

a)   Did not attend
b)   Attended
c)   Attended & presented PHSSR work
d)   Don't Know/Not sure

Academy Health Annual Research Meeting
American Public Health Association (APHA) Annual Meeting
Association of State and Territorial Health Officials (ASTHO) Annual Meeting
Keeneland Public Health Services and Systems Research Annual Conference
National Association of County and City Health Officials (NACCHO) Annual Conference
National Association of Local Boards of Health (NALBOH) Annual Conference
Public Health Information Network (PHIN) Annual Conference

Based on your experience, are there meetings held by other groups that (than those mentioned in the previous question) that provide a forum for PHSSR? If so, please list up to three groups in the text box below. If not, type 'none' and continue to the next screen.

25. Please characterize your interaction with these Robert Wood Johnson Foundation (RWJF) PHSSR programs.
a)   No interaction at all
b)   Have knowledge of the program
c)   Applied for RWJF funding or involved in RWJF project **in the past 3 years**
d)   Involved in this area **in the past 3 years** but not on an *RWJF-funded project*
e)   Don't know/Not sure

Please check all that apply
Accreditation/Quality Improvement
Health Impact Scores
Match-Community Scorecards
Public Health Law Research Program at Temple University
Public Health Practice-based Research Networks
Public Health Services and Systems Research Call for Proposals
Public Health Data Harmonization Project at University of Kentucky
Trust for America's Health
Tobacco Policy Initiatives

26. Please rate the difficulty of each of the following tasks specifically relating to your involvement in PHSSR. Please base your responses on your personal experience.

a)   Extremely difficult

b) Very difficult
c) Somewhat difficult
d) Not at all difficult
e) Don't know/ Not sure

Identifying potential collaborators with the necessary Knowledge and /or skills
Initiating collaborations with governmental public health agencies (federal, state and local)
Initiating collaboration with non-governmental public health partners (e.g. community-based organizations)
Indentifying unique, researchable questions
Identifying unique and researchable questions
Explaining PHSSR to my colleagues or supervisors
Meeting my institutions academic promotion or tenure criteria
Meeting my organization workload or performance expectations
Translating research to public health practice

Are there other difficult tasks not included on the previous page? If so, please specify.
If not, please enter "x" in the text box and continue to the last question.

27. Please share any thoughts or suggestions you may have regarding PHSSR in the text box.
If you have nothing further to tell us please enter 'none.'

Appendix II

Other Meetings Attended by PHSSR Community Members

1. Academy of Management
2. Academy of Preventive Medicine
3. Addiction Health Services Research Conference
4. America's Health Insurance Programs (AHIP)
5. American Academy of Child Adolescent Psychiatry
6. American Academy of Family Physicians (AAFP)
7. American Academy of Pediatrics (AAP)
8. American Anthropological Association
9. American Association for Dental Research
10. American Association for Public Policy Analysis and Management (APPAM)
11. American Association of Public Health Dentistry
12. American College of Cardiology (ACC)
13. American College of Epidemiology
14. American College of Healthcare Executives (ACHE)
15. American College of Preventive Medicine (ACPM)
16. American College of Sports Medicine
17. American College of Surgeons Clinical Congress
18. American Collegiate Schools of Planning -- Health & Human Services Planning
19. American Congress of Rehabilitation Medicine (ACRM)
20. American Evaluation Association (AEA)
21. American Geriatrics Society
22. American Heart Association
23. American Hospital Association (AHA)
24. American Legacy Foundation
25. American Medical Informatics Association and Annual Symposium
26. American Political Science Association (APSA)
27. American Psychiatric Association
28. American Public Health Association
29. American Society for Bioethics and Humanities (ASBH)
30. American Society for Healthcare Engineering of the American Hospital Association (ASHE)
31. American Society for Public Administration (ASPA)
32. American Society of Anesthesiologists (ASA)
33. American Society of Clinical Oncology
34. American Society of Health Economists
35. American Society of Preventive Oncology
36. American Thoracic Society (ATS)
37. American Veterinary Medical Association
38. Assessment Initiative Conference
39. Association for Prevention Teaching and Research
40. Association for Public Policy & Analysis
41. Association of American Medical Colleges (AAMC)
42. Association of Community Health Nursing Educators

43. Association of Public Health Laboratories (APHL)
44. Association of Schools of Public Health (ASPH)
45. Association of State and Territorial Directors of Nursing (ASTDN)
46. Association of University Programs in Health Administration forums
47. College of Physicians & Surgeons of Philadelphia
48. College on Problems of Drug Dependence (CPDD)
49. Commonwealth Fund meetings
50. Communities Joined in Action
51. Community health organizations
52. Community Health Workers Association
53. Council of State and Territorial Epidemiologists (CSTE)
54. Council on Epidemiology and Prevention meetings
55. Decision Sciences Institute
56. Economic and Social Research Institute (ESRI) Health and GIS
57. Florida Association of County Health Departments, Business Administrator's Inc.
58. Florida Public Health Association
59. Gerontological Society of America (GSA)
60. Global Health Council
61. Grant makers In Health
62. Guidelines International Network
63. Harvard Humanitarian Health Initiative Summit Meetings
64. Health Foundation of Greater Cincinnati
65. Health Organizational Research Association
66. Health Maintenance Organization Research Network (HMORN)
67. Health Research and Educational Trust (HRET)
68. Health Services Research in Europe
69. Healthcare Financial Management Association (HFMA)
70. Houston Area Annual Health Services and Outcomes Research Conference
71. Institute for Healthcare Improvement (IHI)
72. Institute of Industrial Engineering
73. Institute of Medicine
74. Institute of Operations Research and Management Science (INFORMS) Conference
75. International Association for Dental Research
76. International Health Economics Association (iHEA)
77. International Network for Social Network Analysis (INSNA)
78. International Society for Infectious Diseases
79. International Society for Pharmacoeconomics and Outcomes Research (ISPOR)
80. International Society for Quality in Health Care Ltd. (ISQUA)
81. Joint Meeting on Adolescent Treatment Effectiveness (JMATE)
82. Joint Statistical Meetings (JSM)
83. Joint Urban Warrior/Joint Irregular Warfare Academics sessions
84. Kaiser Family Foundation
85. Kelsey Seybold Health Services & Outcome Research Conference
86. Kentucky Nurses Association
87. Kentucky Public Health Association
88. Louisiana Public Health Association
89. Medical Library Association

90. Metropolitan Official Health Agencies of the Kansas City Area (MOHAKCA)
91. Midwest Nursing Research Society conference
92. Minnesota Health Services Research Conference
93. Myers & Stauffer LC (MSLC) meetings
94. National Indian Health Board (NIHB)
95. National Academy for State Health Policy (NASHP)
96. National Association of Chronic Disease Directors
97. National Association of Community Health Centers
98. National Association of Counties (NACO)
99. National Association of County and City Health Officers (NACCHO)
100. National Association of Local Boards of Health
101. National Association of Political Scientists
102. National Association of Public Health Institutes (NNPHI)
103. National Association of School Nurses
104. National Association of State Alcohol/Drug Abuse Directors (NASADAD)
105. National Association of State and Territorial Epidemiologists
106. National Association of State Health Policy
107. National Association of State Medicaid Directors (NASMD)
108. National Association of State Mental Health Program Directors (NASMHPD)
109. National Conference of State Legislatures—Access to Healthcare
110. National Correctional Health Association
111. National Environmental Public Health Conferences
112. National Health Policy Forum
113. National Immunization Conference
114. National Medicaid Congress
115. National Medical Association Conference
116. National Network of Public Health Institutes
117. National Network of Public Health Leadership Institutes
118. National Oral Health Conference
119. National Research Service Award (NRSA) Trainees' Research Conference
120. National Rural Health Association (NRHA)
121. National Rural Health Conference
122. National Bureau of Economic Research (NBER)
123. National Council for Community Behavioral Healthcare (NCCBH)
124. National Environmental Health Association (NEHA)
125. New Mexico Public Health Association
126. National Initiative for Children's Healthcare Quality (NICHQ)
127. North Carolina Department of Public Health
128. National Uniform Billing Committee (NUBC)
129. Pan American Health Organization (PAHO)
130. Partnership for Prevention
131. Pediatric Academic Societies (PAS)
132. Physicians for Human Rights
133. Public Health Accreditation Council of Texas (PHACT)
134. Public Health Law Association
135. Public Health Law Research Annual Meeting
136. Public Health Preparedness Summit

137. Public Management Research Association (PMRA)
138. Robert Wood Johnson Foundation
139. Rural Health Association
140. Robert Wood Johnson Foundation
              Clinical Scholars Program
              Scholars in Health and Society
141. Society for Advancement of Violence and Injury Research (SAVIR)
142. Society for Epidemiologic Research (SER)
143. Society for Healthcare Epidemiology (SHEA)
144. Society of Critical Care Medicine (SCCM)
145. Society for Academic Emergency Medicine
146. Society for Community Research and Action
147. Society for General Internal Medicine
148. Society for Health Systems
149. Society for Medical Anthropology (of the American Anthropological Association)
150. Society for Medical Decision Making
151. Society for Public Health Education (SOPHE)
152. Society for Social Work and Research
153. Society of Medical Decision Making
154. Society of Public Health Educators
155. Society on Research on Adolescents
156. Southern Obesity Summit
157. State public health association meetings and conferences
158. System Dynamics Society
159. Texas Association of Public Health Officers (TALHO)
160. Texas Health institute
161. Texas Public Health Association (TPHA)--will discuss PHSSR at April 2010 Annual Conference
162. Centers for Disease Control and Prevention (CDC)
              Chronic Disease Meeting
              Evaluation Institute
              Prevention Research Center meeting
              Annual grantee meetings
              Maternal and Child Health Epidemiology Conference
163. US Department of Health and Human Services
              Agency for Healthcare Research and Quality (AHRQ) Annual Meeting
              Health Services and Resources Administration, Office of Rural Health (ORH) All Programs
              Meeting
              Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) Stakeholders
              Workshop
              Public Health Quality Forum
              Public Health Systems Working Group
              Substance Abuse & Mental Health Services Administration (SAMHSA)
164. US-Mexico Border Health Association
165. US Dept of Veterans Administration (VA) Health Services Research &Development Meeting
166. World Health Organization/Health Metrics Network
167. Yale Public Health Systems and Services Research Conference

Appendix III.

Semantic analysis of concepts and frequencies

Concepts extracted from the titles and abstracts of indexed publications by 118 PHSSR community members for whom we have data. Concepts were algorithmically grouped into six conceptual areas, and labeled using expert opinion. Terms are ordered by the frequency with which they appeared in titles and abstracts. Relevant terms that may represent gaps in PHSSR are bolded.

At-risk Populations		Disease Prevention (Primary, Secondary, or Tertiary)		Healthcare Quality		Workforce and Infrastructure		Performance		Population Health	
Mental health	538	Clinical process	868	Insurance	1234	Health professional	1025	Performance	680	Child health	957
Treatment	369	Nutrition obesity	784	Hospital	468	Workforce	637	Organizational	549	Pathophysiology	415
Population	356	Risk	372	Cost	365	Outcome	444	Preparedness	502	Disease	382
Substance abuse	310	Anatomy	367	Management	346	Law	396	Jurisdictional terms	459	Prevention	312
Occupational health	217	Environmental	304	Chronic disease	323	Finance	209	Community	415	Cancer	299
Correctional health	145	Statistics	246	Pharmacotherapy	250	Implementation	124	Policy	307	Disparities	222
Drug	120	Impact	231	Medicaid	240	Healthcare delivery	110	Resource	254	Epidemiology	202
Social justice	90	Cardiovascular	228	Immunization	208	Political	44	Collaboration	230	Tobacco	199
HIV AIDS	81	Information systems	164	Healthcare quality	172	Veterans health	44	Competency	169	Mortality	177
Diagnose	44	Effective	141	Influenza	139	Innovation	29	Capacity	163	Physical activity	144
Interagency	7	Bench science	102	Structure	128	Teamwork	16	Infectious agent	158	Prevalence	138
Health behavior	1	Wellness	70	Rural	125	Electronic health record	14	Accreditation	153	Injury prevention	135
		Rehabilitation	32	Oral health	116	**Authority**	**11**	Evidence	141	Smoking	113
		Zoonotic agent	21	Expenditure	111			Partnership	130	Education	90
		Advocacy	20	Symptom	88			Agency	129	Death	88
		Health improvement	4	Efficient	63			LHD	126	Incidence	87
		Synthesize	1	Inpatient	62			Infrastructure	116	Genetics/genomics	83
				Administration	56			Government	106	Women's health	74
				Outpatient	46			Surveillance	105	Anti-microbial	61
				Hospitalization	40			Leadership	86	Coordination	51
				Health belief	35			Implement	44	Cell	41
				Assurance	**22**			Outbreak	43	Dissemination	33
				Productivity	**12**			Certification	37	Toxicology	32
				Equity	7			Systematic	35	Utility	31
				Programmatic	3			**Strategy**	**27**	Morbidity	27
								Credential	**17**	Epidemic	18
								Sustainability	**7**	Screening	17
								Biological	5	STD	4
								Underutilized	1		