Demonstrating Excellence in Practice-Based Research for Public Health

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SYNOPSIS

This document explores the opportunity for scholarship to enhance the evidence base for academic public health practice and practice-based research. *Demonstrating Excellence in Practice-Based Research for Public Health* defines practice-based research; describes its various approaches, models, and methods; explores ways to overcome its challenges; and recommends actions for its stakeholders in both academic and practice communities. It is hoped that this document will lead to new partnership opportunities between public health researchers and public health practitioners to strengthen the infrastructure of public health and add new dimensions to the science of public health practice. *Demonstrating Excellence in Practice-Based Research for Public Health* is intended for those who produce, participate in, and use practice-based research. This includes academic researchers and educators, public health administrators and field staff, clinical health professionals, community-based organizations and professionals, and interested members of the public.

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In 1853, physician John Snow provided one of public health's first models of practice-based research. His epidemiologic research that led to removing the handle from the communal Broad Street pump to prevent further cholera infections is a landmark example of practice-based research for all who confront today's most complex public health problems.

Introduction to Public Health by Mary-Jane Schneider

I. INTRODUCTION

This document explores the opportunity for scholarship to enhance the evidence base for academic public health practice and is offered by the Council of Public Health Practice Coordinators of the Association of Schools of Public Health (ASPH Practice Council) as the third in the *Demonstrating Excellence* series.[1] Stimulated by the 1988 and 2003 reports by the Institute of Medicine (IOM) on the future of public health and of public health education,[2-4] the series defines the responsibilities, relationships, collaborations, and contributions between academicians and practitioners within a framework of the university missions of research, teaching, and service. Academic endeavors and theory-generating in public health *require* a practical orientation and, thus, close communication between academicians and practitioners. Finally, practice-based research, as demonstrated in this document, gives balanced consideration to the co-equal responsibilities of public health academia: (*1*) to educate public health practitioners, and (*2*) to generate new knowledge to further the capacity of science and practice.[5]

Demonstrating Excellence in Practice-Based Research for Public Health defines practice-based research; describes its various approaches, models, and methods; explores ways to overcome its challenges; and recommends actions for its stakeholders in both academic and practice communities.

Purpose

Demonstrating Excellence in Practice-Based Research for Public Health is intended for those who produce, participate in, and use practice-based research. This includes academic researchers and educators, public health administrators and field staff, clinical health professionals, community-based organizations and professionals, and interested members of the community. The purpose of this document is to demonstrate the contributions and benefits of conducting inter-, multi-, and transdisciplinary research for community health improvement. [A *community* is an aspect of collective and individual identity characterized by a sense of identification and emotional connection to other members.[6]] Further, this document serves as a resource for academic public health institutions in fulfilling their social responsibility to their communities, community partner organizations, and health departments, such as pro-

viding technical assistance to improve services delivered by health departments and other public health organizations. This document proffers that partnerships between academia and practice have evolved to include participants from community-based organizations and the private sector, and that academic and practice-based partnerships are not limited to local and state health departments. A commitment to collaboration from both academia and practice is necessary to sustain the benefits of practice-based research and to continue productive research partnerships into the future.

Definition

For purposes of this document, the definition of practice-based research lies within a context of competency-based public health practice. *Public health practice* is the strategic, organized, interdisciplinary application of knowledge, skills, and actions necessary to perform public health core functions[1] and to conduct essential public health services for the improvement of the health status of populations.[7] Within this context, *practice-based research is systematic inquiry into the systems, methods, policies, and programmatic applications of public health practice.*[8] This definition includes science-based inquiry that occurs in practice settings such as field epidemiology, systematic reflection on practice experience, and laboratory analysis—to the extent that such inquiry produces generalizable knowledge to improve the outcomes of practice or to inform policy making. The goal of practice-based research is to move the knowledge derived from research to creation, through dissemination, and to application to assure the translation and uptake of relevant science into evidence-based best practices. It is through this sequence that practice-based research contributes to an understanding and development of interventional strategies that can prevent and reduce disease and disability within populations, as well as develop a prepared public health workforce.[3]

Applied scholarly public health practice is the cornerstone of conducting practice-based research and gaining new knowledge and evidence to develop effective community-based prevention and intervention programs and policies. Practice-based research is conceptualized within Ernest Boyer's four dimensions of scholarship (see Figure 1).[9] The *scholarship of discovery* describes the generation of new knowledge for enhancing public health practice. The *scholarship of teaching* includes the transmission of knowledge. The *scholarship of integration* describes research efforts that draw upon the methods, insights, perspectives, and results from multiple disciplines to address single problems of practice. The *scholarship of application* emphasizes the two-way communication between researcher and practitioner through the implementation of results in the field; that is, within an interactive relationship of research and practice, each one informs, invigorates, and improves the other.

Eight basic characteristics exemplify the core values of nearly all forms of practice-based research. As shown in Figure 2, the list of these characteristics is derived from the work of numerous scholars and researchers, many of whom are cited throughout this document. Attention to these characteristics enhances the ability of practitioners, community organizations, and public health researchers to work together to implement new knowledge toward improving health outcomes. In particular, these characteristics emphasize the ways in which community involvement helps to assure that research is socially and contextually appropriate[10] and, thus, likely to be implemented into practice.

Historical context for practice-based research. As public health continues to address the multiple determinants of health in the 21st century, the conduct and growth of practice-based research will increasingly depend on understanding an ecological paradigm[4] of research, or the "interconnectedness of the biological, behavioral, physical and socio-environmental domains."[3] Take, for example, the *Healthy People* goal to eliminate racial and ethnic health disparities.[11] Given the multiple factors that impact population health, the steps toward achieving this goal call for multidisciplinary and transdisciplinary[4] approaches within community settings using an ecological paradigm of research to improve public health policies and decision making.

Public health practitioners' reliance on evidence-based practices has evolved radically from the use of observational and bacteriological laboratory research in the 1880s.[12] By the mid-20th century, when risk factors and prevention strategies for population-based diseases and injury were being identified

and developed, community-based interventions were often implemented without the scientific backing required for clinical interventions. History informs what we do in public health and, in the latter part of the 20th century, progress in evidentiary practice-based research has grounded public health practice in science to improve population health through policy development and assurance activities[3] such as: the development of community water fluoridation, detection of food sources in salmonella outbreaks, mass media campaigns to reduce tobacco use, the distribution of child auto safety seats, diabetes management programs, and mandatory school vaccinations. In addition, research increasingly employs a wide-range of disciplines and various forms of inquiries that cross-fertilize epidemiology, sociology, policy, economics, and education, among others.[5]

Figure 1. The four dimensions of scholarship for practice-based research

The scholarship of discovery: The generation of new knowledge.

The scholarship of teaching: The transmission of knowledge.

The scholarship of integration: Closely related to discovery, this seeks to explore the meaning of what has been discovered by making connections across disciplines, providing context for the interpretation and synthesis of facts, and fitting research findings into larger intellectual patterns.

The scholarship of application: Implies the dynamic, sequential interaction of methods and expertise to facilitate practice, professional, and community sectors in enhancing the development of their capacity for performing essential public health functions.

Adapted from Ernest Boyer, *Scholarship Reconsidered: Priorities of the Professoriate.* Princeton (NJ): Princeton University Press; 1990.

Figure 2. Eight characteristics of practice-based research for public health

1. **Scholarly.** Practice-based research is manifested in Boyer's four dimensions of public health scholarship: discovery, application, integration, and teaching.
2. **Rigorous.** Practice-based research is evidence-based and is subject to standards of rigor and peer-evaluation.
3. **Practical.** Practice-based research addresses subject matter derived from and/or relevant to public health practice and produces outputs that are useful to all of its participants and stakeholders.
4. **Ecological.** Practice-based research is conducted within an ecological paradigm that considers the health of individuals within biological, familial, social, environmental, and policy contexts.
5. **Methodologically diverse.** Practice-based research considers multiple (qualitative and quantitative) methodologies based on the nature of the public health problem; it recognizes the benefits of interdisciplinary, multidisciplinary, and transdisciplinary collaboration.
6. **Collaborative.** Practice-based research collaboratively involves practitioners, community organizations, and academic researchers to enhance knowledge and to improve practices toward ameliorating community health problems, improving the capacity of public health systems, and advancing the health status of populations.
7. **Equitable.** Practice-based research requires the equitable sharing of decision-making among public health practice agencies, community organizations, and academic researchers throughout the research process.
8. **Translational.** Practice-based research for public health emphasizes the means of converting and translating the latest research findings into timely and effective knowledge, tools, applications, and policies that improve and advance the health of populations.

Stakeholders. The 2003 IOM Report, *The Future of the Public's Health in the 21st Century,* cites several recommendations that encourage proliferation of practice-based research environments, including the recommendation that research topics and funding be enhanced to address health problems at the levels of communities and populations.[3]

Public and private organizations and agencies provide support for, and influence the progress of, practice-based research. They contribute to funding and to problem definition, suggest interventions, and incentivize interest and collaboration. The diversity of stakeholders provides exceptional opportunities to partner, dialogue, and leverage resources for research on difficult public health challenges.[13]

Several government agencies have been engaged in promoting practice-based research and have committed resources to increase ecologically based research and research training. For example, a major theme of the National Institutes of Health (NIH) strategic initiative, "Roadmap for Medical Research," is to create research teams that focus on interdisciplinary research and training.[14] The population-focused research initiatives of the Centers for Disease Control and Prevention (CDC) reflect the characteristic that practice-based research is evidence-based and is subject to standards of rigor and peer evaluation, as exemplified in its funding of the Prevention Research Centers and the Injury Control and Research Centers. Furthermore, CDC-funded Centers for Public Health Preparedness[15] and the Public Health Training Centers funded by the Health Resources and Services Administration (HRSA) invest in fundamental and emergency response public health workforce development. These programs evaluate training and education methods, provide evidence for the impact of training on capacity-building within public health agencies, and demonstrate methods for enhancing "competencies" in core public health practice, emergency preparedness, and other professional areas within the public health workforce.[16–18]

In addition to federal agency stakeholders, private associations have also promoted practice-based research. ASPH supports practice-based research between schools of public health and state and local public health departments through the funding of the ASPH Academic Health Departments (AHD). AHD are organized partnerships between schools of public health and health departments that create a dynamic academic/practice collaboration, which effectively pools assets of both institutions in the areas of teaching, research, and service. Academic/practice partnerships for research that use the AHD model can support the *reciprocal dynamic*[1] process of teaching and learning by informing curricula and training through the new knowledge and practices gleaned from the outcomes of practice-based research.

Given the breadth of its scope and the diversity of its stakeholders, practice-based research has complex and inclusive conceptual foundations.

II. CONCEPTUAL FOUNDATIONS OF PRACTICE-BASED RESEARCH FOR PUBLIC HEALTH

This section provides an overview of the conceptual foundations for practice-based research, which collectively underscore its scientific rigor and its practical relevance to practice. Practice-based research encompasses a broad array of paradigms and approaches including applied, population-based, ecologic, and service/civic-oriented. It acknowledges the diversity of researchers and types of research. The choices among these are dictated by the subject matter of the research questions as well as by the end-users' needs and perspectives.

Faculty, practitioners, and community partners who engage in practice-based research construct research upon a strong conceptual foundation linked to the practical applications of the Ten Essential Public Health Services,[19] as well as the Public Health Core Functions of assessment, policy development, and assurance.[2] The scope of practice-based research extends across the public health system in a true intersectional and cross-disciplinary manner. Practice-based research processes allow for constant adjustments in response to the evolving interests and needs from the community. Thus, approaches, methods, and tools are adapted to the research process by: *(1) integrating existing methods with new applications; (2) adapting methods and tools for new applications; (3) translating methods to adapt to emerging and time-sensitive research goals; and (4) developing new and innovative approaches, models, methods, and tools to address current and future research questions.*

This section illustrates how practice-based research employs an array of disciplines, theories, and techniques; demonstrates how practice-based research encompasses many research paradigms; and illustrates how various types of research are typified as "practice-based."

The research continuum

Public health practice research spans a continuum from low to high levels of practical application. In another context—that of healthcare services—Eisenberg describes a way to view this continuum from basic research to health systems research.[20] Practice-based research links the research directly to the practice of public health and utilizes the essential services and three core functions of public health. For example, researchers and practitioners who apply a model of practice to a research study on the effectiveness of a smoking cessation program on teen behavior might test an intervention program on a matched case-control group of teens to determine its effectiveness. In this case, the researcher determines the effectiveness of the program and the practitioner uses the results to achieve the health objective of reducing teenage
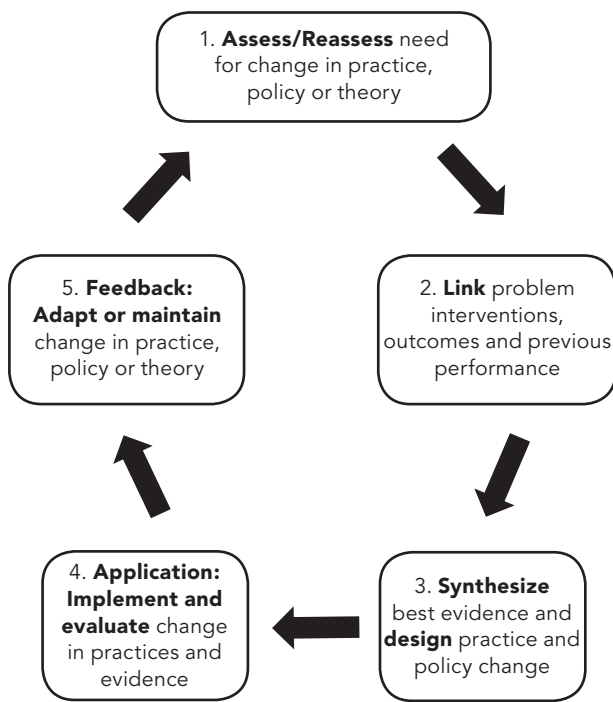
smoking rates. Thus, in this example the research process illustrates an increasing level of practical application and involved partnerships on the spectrum from basic to applied research.

Research paradigms

In broad terms, according to Kuhn, a research paradigm is a shared system of thinking among scientists reflecting their commonly held principles and values, defining how they understand problems and guiding their choices of research model and methods.[21] Different paradigms link scientific theory with various approaches to inquiry and discovery.

Ideally the practice-based research framework is a cycle that pursues two intentions: *(1) that feedback from application should inform the development of theory; and (2) that the re-uptake of knowledge from research should inform and improve policies and practices.* Figure 3 shows how the practice-based research cycle works, with each stage informing the next and with the final feedback stage ultimately influencing how problems are assessed at the first stage of the cycle, which then repeats itself.

Figure 3. Cycle of the practice-based research process

1. **Assess/Reassess** need for change in practice, policy or theory

2. **Link** problem interventions, outcomes and previous performance

3. **Synthesize** best evidence and **design** practice and policy change

4. **Application: Implement and evaluate** change in practices and evidence

5. **Feedback: Adapt or maintain** change in practice, policy or theory

Practice-based public health research uses a diverse set of paradigms to apply scientifically derived outcomes for understanding and addressing factors that promote or hinder the wellness of individuals who are part of the community. Figure 4 reviews a selected number of research paradigms that illustrate the application of each paradigm in linking to practice, accompanied by an example. At stages of the research process, each of these paradigms fulfills the dual intentions of feedback and uptake described above, and each exemplifies the cycle in Figure 3.

The preferences and choices among research paradigms depend not only upon the research purpose but also upon the natural environment (i.e., biological and physical forces) and the social milieu (i.e., legislative policies, cultural norms, social values) of a given public health problem. Another important factor is the time frame within which outcomes, such as a change in population health status, may be observed. This duration can vary from one year (e.g., epidemiological research on salmonella poisoning as studied within the basic, clinical, and applied research paradigms), to five years (e.g., research on the improvement of infant immunization rates using applied, evaluative, and/or descriptive paradigms), to over a decade across population generations (e.g., research on exposure to polluted waters using a basic, clinical, applied, or community paradigm).

The complexity and variety of factors influencing practice-based research paradigms drive creative innovation in the four elements of research.

Four elements of research

Within any practice-based research paradigm, there are four elements that characterize how a systematic inquiry is pursued: approach, model, methods, and tools. All four elements are interactive, interlinked, and provide opportunities for feedback during the research endeavor. The graphic of the Four Elements of Research in Practice-Based Research (Figure 5) illustrates the relationship between the four elements and is followed by discussion.

Research element: approach. As noted earlier, public health practice-based research uses multiple methodologies that may be qualitative and quantitative, as reflected in characteristic #5 of Figure 2. The approach is the orientation of the investigator. For example, a hallmark approach of participatory research is its orientation to engage potential users, stakeholders, and beneficiaries in the research process.[22] Another example of an approach in the basic or clinical research paradigms is hypothesis testing.

Research element: model. A model is the structured format and design that systematize and operationalize the research approach. Models help researchers explain, comprehend, discuss, organize, and manage complex public health problems

Figure 4. Examples of research paradigms relevant to practice-based research

Research paradigm	Description	Links to practice	Example
Basic research	Basic research seeks to investigate new knowledge about phenomena, hoping to establish general principles to explain the phenomena. Its goal is to produce new knowledge and explain normal and abnormal processes.[a]	Uses information derived from traditional scientific methods (e.g., epidemiology) to guide public health programs and agencies so as to protect the public and promote well-being.	Research on West Nile virus link from mosquitoes to American Crow (corvus brachyrhynchos) to persons
Clinical research	Clinical research is conducted using human clients in an aggregated fashion to draw conclusions about phenomena.	Links clinical information to social behavior and social problems in the planning, development, and implementation of public health programs and policies.	Studies of new anti-depressants on the prevention of suicidal behaviors
Applied research	Applied scientific research seeks to apply the information learned from basic research to develop practical use for that new knowledge.	Uses scientific methodology to develop information aimed at clarifying or confronting an immediate societal problem.	Local health department epidemiological investigation on ground beef contamination that supports a public advisory for food recall and immediate arrest on criminal charges[b]
Evaluative research	Evaluative research seeks to assess processes and outcomes of the treatment applied to a problem or the outcome of prevailing practices.[c]	Focuses on investigating the effects of an intervening public health program or policy in the short- and long-term evaluation of the public health program's utility, value, and effectiveness; engages program personnel.	National evaluation of the effectiveness of Healthy Start Programs in the promotion of pre- and post-natal maternal and child health
Descriptive research	Descriptive research attempts to discover facts or describes reality.[a]	Allows for a more in-depth exploration of information and phenomena by public health practitioners for the purpose of gaining a fuller understanding of issues and problems that affect clients and the general public.	Use of a case study to analyze the roll-out process of a state that develops anti-smoking legislation and the impact of the legislation
Community research	Community research is a collaborative research[d] approach that maximizes the equitable involvement of community members, organizational representatives, and researchers in all aspects of the research. The research may originate in a resource agency (community-oriented) or with a relevant community (community-based).	Starts at the point where the client is, which allows the research to more accurately target the development, implementation, and analyses of problems that directly affect clients and the general public.	Use of lay health advisors in the development and implementation of HIV prevention programs for rural hard-to-reach population of Latino migrant farm workers
Systems research	Systems research is a field of inquiry examining the organization, financing, staffing, governance, and delivery of health services at the local, state, and national levels;[e] assesses the impact of these factors on population health; includes research on health care, public health, health policy, and law.	Suggests ways to improve the quality, performance, efficiency, and effectiveness of public health systems that affect community health outcomes.	Application of the National Public Health Performance Standards to state and local jurisdictions related to the effectiveness of carrying out the Ten Essential Public Health Services

[a]Institute of Medicine of the National Academies. Who will keep the public healthy? Educating public health professionals for the 21st century. Washington: National Academies Press; 2003.

[b]Boulton M, Stanbury M, Wade D, Tilden J, Bryan D, Payne J, et al. Nicotine poisoning after ingestion of contaminated ground beef—Michigan, 2003. MMWR Morb Mortal Weekly Rep 2003;52:413-6.

[c]Suchman E. Evaluative research: principles and practice in public service and social action programs. New York: Russell Sage Foundation Publications; 1967.

[d]Minkler M, Wallerstein N, editors. Community-based participatory research for health. San Francisco: Jossey-Bass; 2003.

[e]Mays GP, Halverson PK, Scutchfield DF. Behind the curve: what we know and need to learn from public health systems research. J Public Health Manag Pract 2003;9:179-82.

Figure 5. Four elements of research in practice-based research
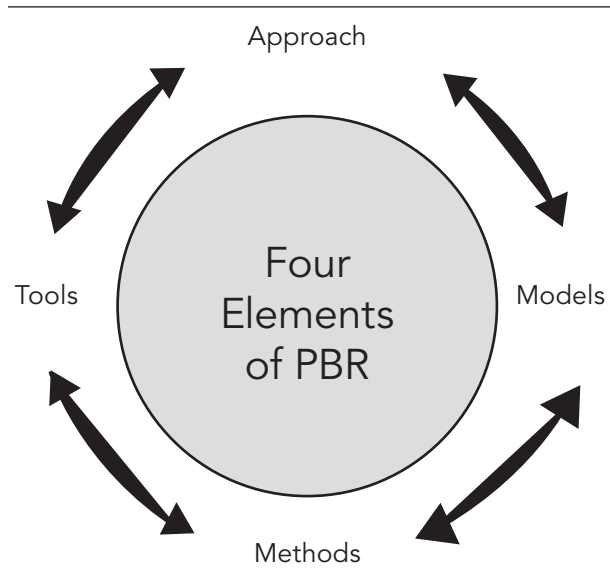
in the natural world, in society, in individual behavior, or in organizations. According to Barbour, models are "neither literal pictures of reality nor 'useful fictions,' but partial and provisional ways of imagining what is not observable; they are symbolic representations of aspects of the world which are not directly accessible to us."[23] In practice-based research, models are useful to help calculate disease and injury trends, determine population behaviors, and guide the development of interventions. For instance, if using a participatory research approach, one might select the community-based model that would engage the community in the research design. If using a systems research paradigm for agencies and organizations, one might use the Burke-Litwin model[24] to plan and manage organizational change. If using a clinical paradigm, the model of clinical research teams from various disciplines, as exemplified at NIH, may be employed.

An important aspect of research models for public health practice is the extent to which they allow for collaboration among practitioners, community organizations, and academic researchers. As shown in Figure 6, Green and Mercer[22] illustrate that models are affected by the degree of participation and types of research participant, and so will vary according to paradigm. For example, defining the research question is the done by only the researchers in a basic research paradigm, but may involve multiple collaborators in a community research paradigm. The respective models for both basic and community

research will therefore include standards of responsibility for problem definition within each paradigm.

Research element: methods. Methods are the structural guidelines used to implement the research model. A unique characteristic of practice-based research is consideration of the ecologic context of the research enterprise at some stage in the Cycle of the Practice-Based Research Process (see Figure 3) to ensure that the outcomes for the community are appropriate. Methods may be qualitative or quantitative in nature, as also seen in the research element "Approach," described earlier.

Using a combination of approaches and methods to solve complex public health problems. Real comprehension of public health problems and proposed solutions requires not only expert knowledge of the issue and its physical, social, cultural, and environmental impact on the involved populations, but also a comprehensive, multi-method research strategy to address the problem. Morse discusses such a strategy called "methodological triangulation," which is the use of at least two methods (usually one that is qualitative and the other that is quantitative) to address the same research problem.[25] Such a strategy allows the public health researchers (the academician and the practice partners are considered as co-equal researchers) the opportunity to apply scientific inquiry—induction, deduction, and verification—to address and resolve public health problems. Figure 7 illustrates how practice-based research requires creative assessment and integration of quantitative and qualitative methods to assure appropriate solutions to complex public health problems.

Research element: tools. Tools are the instruments or means used within a given research method. Tools measure the process and outcomes as linked to the research process. The researcher can use tools innovatively for public health practice research. Many tools are available that are adaptable to practice-based research activities. On the qualitative side, there are case studies, key informant interviews, and client stories that document real life events in a narrative fashion and provide key data that can be used for the application of knowledge to inform the practice of care provision, service delivery, and policy development. On the quantitative side, the use of tools such as surveillance databases and public health opinion polls serve to both track the spread of disease and document the dissemination and effectiveness of health information. Figure 8 lists and describes a number of tools that practice-based researchers (faculty and practice partners) can use to study public health problems and issues, as well as to address key questions that arise from the research process.

The complex and varied conceptual foundations of public health practice-based research recognize a wide array of research paradigms that are carried out in multi-, inter- and

Figure 6. Degree of participation in research: by different stakeholders and type of research or community action
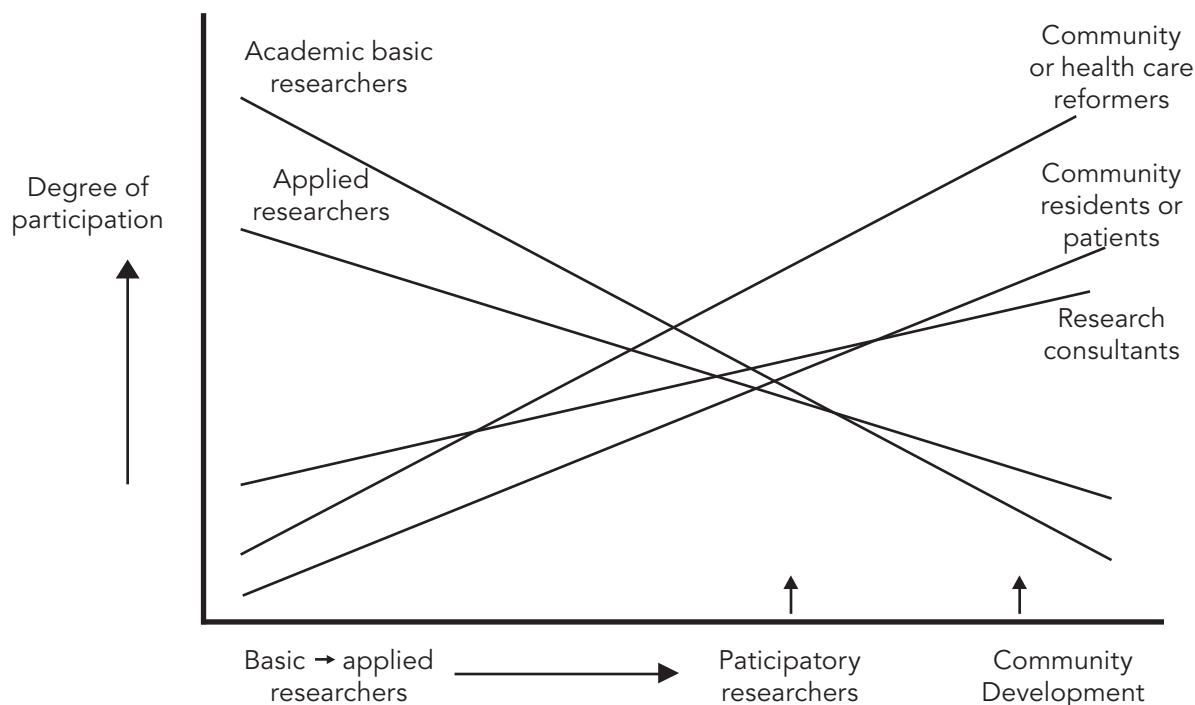
SOURCE: Green L, Mercer S. Can public health researchers and agencies reconcile the push from funding bodies and the pull from communities? Am J Public Health 2001;91:1928.

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trans-disciplinary ways and that engage collaborators having diverse interests and levels of research participation. All of this gives rise to practical challenges for funding, focusing, and incentivizing this kind of research. Resolving these challenges requires careful thought and effort.

III. CHALLENGES OF PRACTICE-BASED RESEARCH IN PUBLIC HEALTH

This section presents a list of common challenges, suggestions for resolution, and recommendations to advance practice-based research in public health, based on a community-based research framework by Viswanathan et al.[26] Schulz et al. note that community-based research is a form of collaborative research to enhance understanding of issues affecting the community and appropriately develop, implement, and evaluate plans of action that will address those issues in ways that benefit the community.[27]

The timely translation and dissemination of results of practice-based research promise many benefits to researchers, practitioners, and communities. However, achieving these benefits can pose numerous challenges, especially in regard to respecting the needs of all stakeholders. Significant tension exists between the imperatives of the university-based research enterprise and the obligations of agencies and organizations responsible for addressing the health needs of populations. The design, implementation, and outcomes of practice-based research impact universities, practitioners, and communities. Thus, attention to the barriers and facilitating factors may improve the quality of research for community health status and strengthen collaborations that generate intra- and inter-institutional policies. These policies, in turn, can positively influence research. Central to these challenges is promoting the premise that practice-based research necessitates the use of an array of approaches and methods to address complex population health demands.

Challenges may be described as falling within one of three

Figure 7. Limitations and resolutions for each type of methodological triangulation

Approach	Type	Purpose	Limitations	Resolution
QUAL+quan	Simultaneous	To enrich description of sample	Qualitative sample	Utilize normative data for comparison of results
QUAL+quan	Sequential	To test emerging hypothesis; determine distribution of phenomena in population	Qualitative sample	Draw adequate random sample from same population
QUAN+qual	Simultaneous	To describe part of phenomena that cannot be quantified	Quantitative sample	Select appropriate theoretical sample from random sample
QUAN+qual	Sequential	To examine unexpected results	Quantitative sample	Select appropriate theoretical sample from random sample

SOURCE: Morse JM. Approaches to qualitative-quantitative methodological triangulation. Nursing Research 1991;40(1):120-2.

domains: partnerships, methodologies, and institutional/cultural factors. Partnerships are critical to the practice-based research process, especially if the research is participatory or community-based, as benefits must be ensured for all involved. For example, often-cited barriers include lack of career advancement for academics and practitioners, lack of data ownership by communities, or results that are not timed to meet community and programmatic needs.[28] Methodological challenges reflect the lack of recognition and understanding of the type of research and evaluation appropriate to the academic/practice/community partnership, as well as the complexity of multiple methods and layers of research processes. Institutional/cultural factors include issues such as non-standardized policies, contradictory federal and institutional administrative requirements, and institutional funding procedures that are incongruent with academia and their practice partner organizations, and can result in disparate financial resources between academia and their practice partners. Finally, insufficient funding available for practice-based research constitutes a major institutional funding challenge; the IOM notes that few resources have been devoted to supporting prevention research, community-based research, or the translation of research findings into practice.

Figure 9 displays the important barriers and facilitating factors/solutions that are evident in the development and conduct of practice-based research.

Ethics particular to practice-based research

All forms of research are constrained, focused, and balanced by ethical standards and methodological integrity. Practice-based research is no different, but it raises challenges for research ethics above and beyond those usual to most fields of science. As a facilitator of ethical practice, practice-based research supports or pursues at least seven of the twelve Principles of the Ethical Practice of Public Health:[29] it addresses principally the fundamental causes of disease and requirements for health (Principle 1), respects the rights of individuals (Principle 2), ensures opportunities for input by community members (Principle 3), seeks information needed to implement effective policies and programs (Principle 5), provides communities with information (Principle 6), helps to ensure the professional competence of public health professionals (Principle 11), and engages public health institutions and their employees in collaborations that build the public's trust and the institution's effectiveness (Principle 12). Ethical standards for practice-based research may also be found in the "Ten Commandments for Community-based Research"[30] and the four proposed ethical goals of community consultation by Dickert and Sugarman.[31]

Research that engages those who are most concerned with and involved in public health problems has particularly serious challenges. For example, close collaboration with non-researchers increases the potential for disclosure and dissemination of information of a private or possibly detrimental nature for individuals and communities. Thus, practice-based research calls for rigorous compliance with state and federal privacy laws and institutional regulations. Engagement of the community requires attention to the breadth and diversity of its values, beliefs, and cultures so that key partners and constituents are not unfairly overlooked or excluded. This necessitates efforts of relation-building and information-sharing that demand time and resources

Figure 8. Selected examples of data gathering tools for practice-based research

Tool	Description
Program Evaluation	Involves methods of monitoring, process, and outcome assessment of programs and services to determine effectiveness.
Economic Analysis	Involves the study of how financial resources and information are used in the analyses of program effectiveness and outcomes.
Geographic Information System (GIS)	Involves the mapping of health problems geographically for the purpose of understanding incidence, prevalence, and impact.
Asset Mapping	Involves the mapping of community resources for the purpose of describing, understanding, and assessing a community's capacity to address its needs.
Intervention Mapping	Involves the use of theory to develop program interventions and provide for a more targeted assessment of intervention outcomes.
Message Mapping	Involves the analysis of the effectiveness of risk communication messages based on changes in population knowledge and behaviors.
Health Needs Assessment	Involves the identification and collection of community health data to ascertain the health status and service delivery gaps.
Public Opinion Poll	Involves the use of survey methodologies to assess public perceptions on general and specific health issues.
Case Studies	Involves the use of specific descriptions of public health programs and events for the purpose of understanding the impact of general and specific health efforts and phenomena.
Policy Analysis	Involves the evaluation of the impact of public health policy on the implementation of health promotion and disease prevention efforts and outcomes.
Performance Appraisal/ Measurement	Involves effort aimed at assessing the capacity and ongoing efforts of public health programs in meeting performance targets.
Scenario Building	Involves the use of specific problem-solving strategies to examine alternative program-based solutions aimed at addressing specific public health problems.
Focus Group	Involves the use of specifically selected groups in a process to define key public health issues, develop key research questions and hypotheses to assess target audience perception on the effectiveness of specific public health interventions; an exploratory tool to derive in-depth, qualitative information such as opinions and attitudes.
Key Informant Interview	Involves the use of specifically selected individuals in a process to define key public health issues, develop key research questions and hypotheses and assist in the assessment of informant's perspectives on the effectiveness of specific public health interventions.
Survey Method	Involves the use of query-based methodologies to assess public perceptions on general and specific health issues within a population using well established sampling techniques.
Nominal Group/Delphi Process	Involves the use of structured process to collect information from a group of experts to define key public health issues, develop research questions and hypotheses, and collect information on public health interventions; involves an interactive group technique for identifying problems, obtaining suggestions for solving problems, or planning programs.

not necessarily essential to other kinds of research. Further, research results that point to ways of improving programs and policies impose an obligation on the researcher and the practitioner to implement those improvements for the benefit of community health and well-being. This suggests that practice-based research is ethically incomplete without attention to implementation and follow-through by researchers as well as non-researcher partners.

As practice-based research is promoted and implemented, it is important to address the challenges of this research and its designs in receiving recognition and support for applied scholarship for academicians, as outlined in the 1999 ASPH Practice Council table "Challenges to Enabling Scholarly Practice in Schools of Public Health."[1] In addition, offering quality incentives and expanded resources for practitioners and community partners will increase sustainability of academic/practice linkages for research.

The future of practice-based research rests on the capacity to develop and maintain stakeholder partnerships that are invested in the systems and institutions, in order to provide continuous funding and generate guidelines that sustain practice-based research. Practice-based research will thrive when it is institutionalized in research missions and guidelines within academic institutions so that rewards and benefits accrue to researchers, practitioners, and community participants. Incentives to create and refine methods and tools will assure the quality of the research and maintain rigor in solving new and emerging problems from the field. Attention to creating educational paths for students, researchers, and practitioners to attain competencies in practice-based research also helps expand the sustainability of this research. Finally, policies and strategies that facilitate the recognition and advancement of practice-based research, as well as reconcile the academic/practice tension, will also help sustain the practice-based research enterprise.

Figure 9. Challenges, restraining factors, and facilitating factors of practice-based research

Challenge statements	Restraining factors	Facilitating factors/solutions
Developing collaborative partnerships	• Minimal skills in establishing and sustaining academic-practice partnerships • Lack of trust and respect • Difficulty in attaining consensus	• Build on prior positive relationships and increase interactions • Identify common research interests and build relationships prior to starting research projects • Identify common goals and objectives • Acknowledge and honor partners' differences • Define roles and responsibilities for individuals and institutions • Nurture and promote leadership development
	Inappropriate or inequitable distribution of power and control	• Foster democratic processes and leadership • Involve partners when identified • Agree upon appropriate compensation for all parties
	Conflicts over funding, including the distribution of indirect costs (intra- and inter-institutional)	• Set priorities in congruence with funder demands and partner needs • Develop and implement mutually agreed upon Memorandums of Agreement (MOA)
	Opportunities and expectations may outstrip capacity to meet needs	• Establish a prioritized joint research agenda • Coordinate and facilitate student and junior faculty involvement
	Time-consuming process	• Acknowledge process of collaboration and time into all phases of research plan • Clearly delineate roles and responsibilities to appropriate individuals • Develop mechanism for review of project demands and partner roles and responsibilities

Figure 9 (continued). Challenges, restraining factors, and facilitating factors of practice-based research

Challenge statements	Restraining factors	Facilitating factors/solutions
Ensuring methodological integrity	Questions of scientific quality	• Identify best approach and model based upon the ecological context • Adapt established tools to practice-based research • Assure that partners agree upon multiple levels of success criteria • Develop jointly agreed-upon research principles • Emphasize population health and new approaches • Move towards a transdisciplinary approach
	Ethics and accountability	• Establish protocols that protect all participants and partners • Develop processes to verify documentation/reporting requirements
	Interpreting and integrating data from multiple sources	• Expand use of technologies that enhance data utilization
Bridging institutional, economic, and cultural issues	Academic policies and incentives: • Lack of support/recognition for practice-based research and practice-based research scholarship in career development • Insufficient opportunities for dissemination of scholarship • Time investment for practice-based research at odds with academic/tenure timeline	• Develop processes to measure scholarship in practice by faculty members • Involve students and junior faculty to facilitate professional growth and funding opportunities • Develop new transdisciplinary forums for evidence and dissemination of scholarship • Recognize practice-based peer-reviewed journals, conferences, and monographs
	Practitioner policies and incentives: • Lack of support for practice-based research in career development • Lack of appreciation of research in practice	• Develop strategies to integrate research activities into partner job descriptions • Plan for utility of findings in practice settings • Disseminate findings and application through community/partner channels • Use research partnership to recruit and retain quality personnel
	Institutional Review Board (IRB) requirements differ across institutions	• Negotiate a comprehensive review process that protects all partners and participants • Document a single review process through an MOA
	Prohibitive administrative fiscal and contractual/grant policies within academic and partner institutions	• Create written protocols for navigating administrative systems, building on lessons learned
	Insufficient funding opportunities for practice-based research	• Justify smaller contractual opportunities as pilot data for larger research projects • Advocate for specific practice-based research funding and expanded funding agendas

IV. RECOMMENDATIONS

Practice-based research in public health focuses on important practical issues, engages the experience of practitioners in the advancement of theory, and informs both practice and public policy with scientifically derived evidence to improve community health. Assuring the growth and rigor of such research requires supportive action from all of its essential stakeholders and participants to create nurturing and sustainable research environments for practice-based research in particular, and public health research in general. A report by the Commission on Community-Engaged Scholarship in the Health Professions, *Linking Scholarship and Communities,* notes that while community engagement may be accepted as fundamental to the mission of professional schools, traditional approaches to understanding and rewarding community-based academic activities have not yielded supportive environments to conduct community research.[32] More supportive academic and community environments will require leadership by many stakeholders to influence values and priorities, as also recommended by the Commission.[32] This section describes five general recommendations to advance practice-based research in public health. These are addressed to academic institutions, public health agencies, community organizations, national associations, and funders. Another set of recommendations in this section is addressed specifically to academic institutions, especially to schools of public health.

General recommendations to advance practice-based research for public health

1. **Provide leadership development in practice-based research.** Leadership and advocacy will be required to advance the understanding, application, benefits and evaluation of practice-based research. Leadership strategies may include the following:

   - Develop and encourage interactive forums across disciplines, institutions, organizations, agencies, and the community to provide systematic opportunities for collaboration.

   - Develop and support institutional policies and practices, such as creating Memorandums of Understanding, that encourage practice-based research, recognize organizational differences, and increase awareness of institutional review board (IRB) processes (e.g., in one ASPH Academic Health Department project, the school of public health developed guidelines on communication for practice-based research).

   - Collaborate with funders at all levels to assist in the dissemination of practice-based research to all stakeholders.

2. **Enhance capacity building for practice-based research.** The infrastructure for practice-based research includes building partnerships that are committed to the mutual benefit of the academy and community and supporting the evolution of researchers and practitioners. Capacity-building strategies may include the following.

   - Establish and enhance campus and community partnerships between academicians and practitioners for practice-based research.

   - Advocate for funding of practice-based research that recognizes the collaboration of agencies, organizations, foundations, and universities across diverse disciplines.

   - Build new research capacity through collaboration with newly identified community and university partners focused on community health problems.

   - Educate, recruit, provide leadership opportunities for, and reward practice-based researchers and practitioners through recognized career opportunities in health professions colleges, universities, and communities.

3. **Foster sustainability for practice-based research.** The practice-based research enterprise will require innovation, resources, and commitment to thrive and remain relevant to community health problems. Sustainable focused strategies may include the following:

   - Engage community, practitioners, and researchers in the strategic planning process of developing the research priorities, approaches, and evaluation methods.

   - Create investments and endowment funding that yield sustainable commitments to practice-based research comparable to investments in other research within academia, agencies, and community organizations.

   - Increase venues for practice-based publications and encourage faculty and practitioners to engage and publish practice-based research.[33,34]

   - Develop efficient and diverse methods to facilitate the transfer of knowledge to researchers, practitioners, and communities.

   - Educate funding sources on the importance of practice-based research in public health.

4. **Develop incentives for practice-based research.** The support of practice-based research will be largely dependent upon identifying and supporting incentives

within and across institutions that value the contribution of practice-based research to the academy, professionals, and the community. Innovative tenure and promotion policies in universities, for example, may encourage faculty investment in practice-based research and foster stronger collaboration with the community. Incentives must be provided for all participants in the research endeavor—faculty and practice partners in public health agencies and in the community—including the creative use of financial rewards, career advancement, and peer recognition. Incentive strategies may include the following:

- Seek funding to support technical assistance in practice-based research for both faculty and public health agencies. A visiting faculty scholar's program at state and local health departments would, for example, provide technical assistance for agencies, offer opportunities for faculty to update practical field experience, and augment the health agency's capacity to conduct community health assessments.

- Develop policies that educate, recruit, and provide professional leadership opportunities for practitioners, as well as recognize and promote the efforts of practice-based research in graduate health professions schools. Tenure and promotion processes that recognize and value the input of practice research partners and stakeholders would particularly support potential researchers.

- Encourage provision of adjunct faculty appointments for practitioners at graduate health professions schools to facilitate relevant practice-based research.

- Provide incentives for professionals to participate in common efforts to partner with organizations, schools, and agencies to enhance their career goals and, if appropriate, to obtain financial benefits.

5. **Promote research integrity and innovation in practice-based research.** The development, advancement, and dissemination of practice-based research all rely on the evidence of scientifically rigorous innovation combined with research integrity. Practice-based research goes beyond traditional research approaches and seeks greater innovation in analyzing the socioeconomic and cultural factors that influence population health. Implicit in these innovative approaches is the recognition of new challenges to research integrity. Approaches may include the following:

- Provide opportunities to advance community identification and translation of research problems, while including practitioners and community organizations in practice-based research.

- Encourage the use of ethical guidelines regarding the inclusion and consultation of communities in practice-based research, the rigorous adherence to standards and procedures for privacy and confidentiality, and the sustained attention to implementation and follow-through from research to practice.

- Develop new and innovative research tools and methods that promptly translate and disseminate practice-based research for community health improvement.

- Develop mechanisms such as decision/negotiation tools that use technology to assess the process and outcomes of the research and generate new research areas.

- Conduct practice-based research with respect for all participants and establish a process for accountability.

- Conduct practice-based research with a process that encourages peer review and compliance with institutional, professional, and community standards.

School of public health roles and responsibilities

Among the benefits of practice-based research for schools of public health are that it: (*1*) maximizes the outcomes for academia, practitioners, and the population; (*2*) contributes to improvement of the public health infrastructure; and (*3*) confirms the value of academic public health practice and thus improves academic/practice partnerships. In advancing practice-based research, schools of public health have a unique role that includes educational, scientific, and civic responsibilities. Educationally, schools teach new generations of practitioners as well as academicians and therefore have a responsibility to engage their students in practice-based research through classroom, laboratory, agency, and community experiences. Scientifically, schools of public health are the originating stakeholder whose essential role is to systematize and foster research collaborations. As to civic responsibility, the extent to which schools of public health support, advocate, and promote practice-based research determines the capacity of the research enterprise to address complex community health problems in applied research.

Practice-based research is a scholarly endeavor for schools of public health, and therefore merits scholarly evaluation criteria for engaged faculty. In 1999, the ASPH Practice

Council proposed criteria to assist public health academia in documenting and evaluating all practice-based scholarship.[1] Figure 10 is a reproduction of a portion of criteria that pertains to practice-based research. This example elucidates ways that public health academia assesses practice-based research as an element of the academician's portfolio that is subject to evaluation, encouragement, documentation, and rewards consistent with other assessments of scholarship in the academy.

V. CONCLUSION

The definition of practice-based research: *Systematic inquiry into the systems, methods, policies and programmatic applications of public health practice,*[9] suggests several critical facts. Practice-based research includes many partnerships to identify and solve the complex public health problems of the 21st century. These partnerships include the traditional public health agencies, universities, and communities. They also include new partnerships of researchers and communities to develop innovative research questions and practical answers. The challenge of *Healthy People 2010* mandates that research approaches and methods be timely, relevant, non-traditional, and practical. Translation and dissemination of practice-based research is fundamental to achieving population impact as well as strengthening the academic/practice linkages.

In conclusion, this document provides parameters and legitimacy for conducting scholarly practice-based research that is also committed to civic engagement. The definition advanced here emphasizes two important goals. First, much research of this kind is already being done, but it remains relatively unfamiliar to and potentially under-recognized by the academic community. This document supports the scholarly *bona fides* of practice-based research, places it within a larger context of formal public health science, strengthens linkages between academia and practice, and aims to stimulate supportive policies and mentorship.

Second, practice-based research depends on partnerships to identify and solve the complex public health problems of the 21st century. These partnerships include the many already existing among public health agencies, universities, and com-munities; they also include new partnerships among researchers and potential users of the research outcomes. It is hoped that this document will encourage discussion and spur new partnership opportunities between public health researchers and public health practitioners, not only to strengthen the infrastructure of public health, but also to add new dimensions to the science of public health practice.

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Figure 10. Criteria for evaluating scholarship in practice-based research

Example of activity	A program evaluation study sponsored by a public health agency
Academician's role and responsibilities	Design methodology, train personnel and supervise data collection, oversee analysis, develop study reports, recommend program changes, and provide technical assistance
Indicators of practice impact	Improved assessment and project evaluation methods, as well as program design; better linkages between academia and sponsoring agency; and improved performance of core functions and essential services

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