

White Paper Encouraging an Agenda for Social, Behavioral, and Economic Sciences to Advance Measurement Serving Community Based Research

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for the Context Subcommittee of the Outcomes Committee of the Community Engagement Key Function Committee of the National CTSA Consortium

ABSTRACT (200 Words)

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The evaluation and assessment of community health and of interventions designed to improve it are critical for informed health planning and policy-making. In recognition of the importance of communities to the nation's health, the NIH has identified community engagement as a core component of its Clinical and Translational Science Awards (CTSA).

Social, behavioral, and economic scientists should collaborate with community researchers to enhance the conceptualization and measurement of community health, the mechanisms and outcomes of interventions designed to improve health, and the impact of local contexts on both communities and outcomes. Critical goals include: 1) develop theories to describe the impact of simple and complex interventions in communities; 2) standardize and promote measurement of context variables so that relevant local factors are measured and accounted for; 3) develop an understanding of how to employ existing data regarding context to enhance our capacity to generalize beyond local communities; and 4) identify factors and metrics needed for the design of studies in which communities are randomized with appropriate measurement and statistical control of key confounders at the community level.

The development of community health research as an applied translational science needs the focus of social, behavioral, and economic scientists. The public health depends upon it.

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for the Context Subcommittee of the Outcomes Workgroup of the Community Engagement Key Function Committee of the National CTSA Consortium

TEXT FOLLOWS (1996 Words)

Statement of the problem

Although it is well understood that communities differ and that the typical health of individuals in diverse communities differs, practical measures and methods to characterize communities and community health are not well-developed.^{1,2} The lack of validated, cross-disciplinary, theory-driven approaches to measurement hinders community health research.

How should local conditions be measured? What data should be used? What outcomes are attributable to an intervention? How do local conditions impact the response of a specific community to interventions intended to improve health? How ought multiple attributes of a community be accounted for simultaneously?

Focused collaboration of SBE scientists with other relevant disciplines (medicine, public health, environmental studies, informatics, urban planning, etc) may yield critical insights into the relationship between communities, interventions, and health, and provide the basis for the systematic advancement of efforts to translate research findings into health improvements at the community level. While social scientists and epidemiologists have laid a critical foundation for understanding impacts of community upon health, this work has yet to be translated into either an understanding of how community context interacts with the effectiveness of interventions intended to improve community health, or a practical typology of the relevant constructs and measures. Such advances could support development of an evidence base to stimulate community health improvement as an instrument for improving the public health.

Communities may be defined as geographic, or on the basis of shared experiences, vocations, practices, cultures, or beliefs. They may be characterized by their dominant tendencies or their diversity. One important challenge for research into the health of communities is to systematically account for variability between communities while garnering knowledge from empirical observations made from local community-based interventions. Advancement of this science will require enhanced measurement of key context variables, and the development of social science theories that describe their interrelatedness, their effect on the impact of specific interventions, and their contributions to community health outcomes. This is an area of national and growing need, as is the evaluation of Community Engagement Research (CEnR), a partnership-based approach to community health research that is prominent within the NIH Clinical and Translational Science Awards.

Towards a Specified Language of Community Context

The relationship between communities, interventions, and outcomes may vary depending upon the characteristics of that community. For example, the impact of building a new hospital may depend upon workforce, which is influenced by local educational systems, economic climate, and geographic location. Similarly, the success of a community intervention to prevent obesity may depend upon community leadership,

school financial stability, built environment, and the absence of street crime. Factors are typically interconnected and interdependent.

The presence or absence of a receptor site for an intervention may drive its success. Increasing insurance coverage does little to improve the health of a community with an inadequate health care infrastructure. Programs that improve transportation to recreational facilities require safe places for play or sport. These are simple examples of community context.

Not all aspects of context are important for each intervention. A guiding conceptual model for an intervention should point to contextual variables most likely to make a difference. But measurement should extend beyond those obvious variables to provide at least some discovery capacity for the evaluation. Sociologists, environmental scientists, organizational theorists, psychologists, urban planners, and economists are among those who can contribute to developing theoretically sound approaches to the identification, modeling, and measurement of contextual variables. In addition, and of great importance to CEnR, the approach to (and nature of) community engagement may have implications for the success of community interventions, presenting another challenge for measurement and modeling. Ethnographers may be critical to identify how things really succeed and fail in the community, the importance of charismatic and effective local leaders, and the importance of as yet undefined aspects of capacity or engagement.

Social science models will need to take into account that interventions may address deficits in community resources or capacity, may try to change or alter the impact of existing resources, or both. Contextual factors may also modulate effect size. Thus for any given study, analytic models may need to be additive, multiplicative (effect modifying), or both. The development of a valid typology, standard definitions, specifications, and measures, as well as the models to relate them will require a significant research effort in which behavioral scientists, organizational theorists, and other SBE scientists cross disciplinary boundaries to work with health professionals (e.g. epidemiologists, physicians) and community partners.

Our pragmatic view of context includes:

- Community characteristics that may impact the likelihood of a given intervention's impact;
- Factors that impact the generalizability of findings from one community to the next;
- Characteristics that define potentially impactful variability whose measurement enables research performed across communities to be analyzed in a manner that accounts for them.

This perspective is shaped by several key goals:

1. To enhance our capacity both to understand evaluations of community health improvement efforts and to produce generalizable knowledge from such evaluations;
2. To enhance our capacity to use data to identify other communities to which the findings of community health research can be generalized;
3. To make the evidence produced through research more accessible to and useful to communities and policy makers for planning purposes; and

4. To enhance our capacity to conduct studies across communities in a way that allows for randomization, stratification, and analytical adjustment similar to studies done in individuals. Enhancing the capacity for reliable and valid characterization of community context will enhance the capacity to conduct cluster trials with the community as the unit of analysis and appropriate control of confounders.

Development of these methods will require participation of social and behavioral scientists, econometricians, and biostatisticians as well as the involvement of content and methods experts currently involved in CEnR.

The diversity of variables to be considered is evident even from the following brief list: Built Environment; Transportation; Air and water quality; Environmental toxins; Climatology; Demography; Pre-existing health status; Various measures of community capacity (e.g. financial, educational, social capital, health and social services, local leadership, etc); Secular trends (e.g., gentrification, decay); History and characteristics of community (stable, immigrant, transient, etc); Safety (including crime); Literacy; Library & Computer resources; Arts; Policy environment; Community culture (including attitudes and beliefs, as well as the nature of social bonds). One simplified taxonomy for these might include: 1) Demography & Culture; 2) Health and Health Care; 3) Capacity and Social Services Environment; 4) Economic and Business Environment; and 5) Weather, Built and Physical Environment. Figure 1 illustrates an individual's exposure to potentially impactful community contexts over the life course.

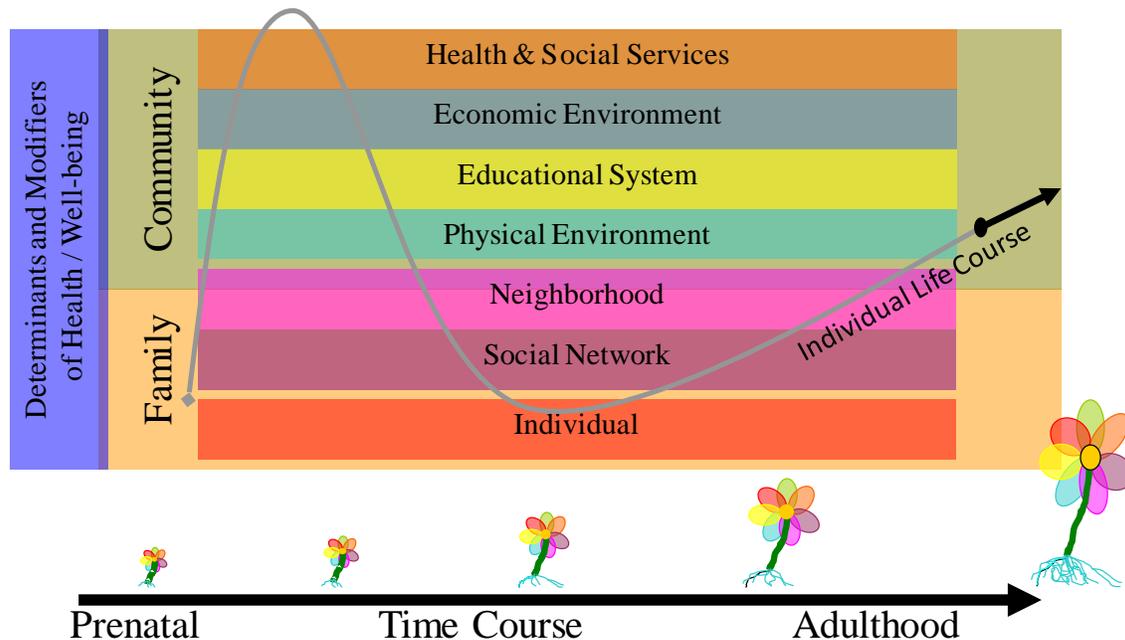


Figure 1. Contextual variables may impact individuals, families, neighborhoods, and broader communities, and shape the trajectory of an individuals' life course, indicated by the curved arrow. Development, health and rootedness vary over time and are impacted by contextual variables.

Social and behavioral scientists may contribute to the usefulness of existing data through the development of typologies and collaboration, for example with informaticians to develop ontologies and linking algorithms which can integrate data from multiple

diverse data resources, including data bases on built environment, crime, climate, air pollution, and health services. The opportunity exists to develop an informatics for community health measurement. Social scientists may also contribute to the enhancement of national surveys to support these aims.

Measures of Community Health

Approaches to measure community health outcomes that integrate across perspectives and disciplines are not well-developed. Significant work will be required. The current state of the art still incorporates the rate or average of tracer conditions or statistics, such as rates of: infant mortality, obesity, high school or college graduation, poverty, etc. While measures that look at distributions within populations do exist, for example measures of income inequality, efforts to translate and aggregate the health of individuals into the health of a community and to measure how a specified community impacts health is in an early developmental stage.^{1,3} Presumably community health is both an integrative measure, bringing together the current state of the health of individuals into a meaningful snapshot, and a predictor of health: membership in a specific community may make your future more or less healthy than it would have been were you outside of that group. Working closely with community-based researchers to identify key constructs, SBE scientists must be central to efforts to develop and assess measures and models. The CEnR community will be both a consumer and an active partner of this work. Community engaged research will identify measurement needs that should provoke progress in SBE efforts to develop intuitive and useful measures of community health and well being. Measurement scientists, psychometricians, and social science and behavioral theorists will be prominent in this work.

Identification and application of appropriate conceptual/analytical models

Broad community interventions are notoriously challenging to evaluate. The SBE sciences can collaborate with community researchers to address a key challenge: developing a typology of how interventions may work and the corresponding requirements for analytic approaches with which to identify effects for each type. Such interdisciplinary work will provide the foundation for developing both broad and “middle range” behavioral, sociological, and organizational theories as well as criteria for assessing the adequacy and efficiency of analytical models for the evaluation of each. Such transdisciplinary work offers the possibility of developing typologies that allow studies to be compared, contrasted, and aggregated, allowing knowledge to accrue in the field. The need for logistical congruence is fundamental to the development of an epistemology for community health improvement research.

As noted above, community health interventions may have diverse mechanisms of actions and interdependency. They may identify and address gaps in resources, producing an additive mechanism of action, or the impact may predominantly be effect modifying, suggesting an interactive or multiplicative analytical model may be most critical. There also may be interventions that succeed in building up to a critical mass of a given resource and produce one or more thresholds. These models may be combined in parallel and/or in series. The challenge is to describe complex models and key variables in reliable and valid ways to promote meaningful evaluation.

A pharmacological analogy from the intensive care unit may illustrate the challenge. Dopamine is a powerful agent that can increase the blood pressure of critically ill patients. It also relaxes blood vessels, which has two related effects: it increases blood

flow to kidneys and other peripheral tissues; and it risks lowering the blood pressure by so doing. As a result, the administration of dopamine to a critically ill patient who is dehydrated or for whom the intravascular (blood) volume is not maintained can be disastrous. A patient in an identical situation for whom blood volume is maintained may be kept alive or off of dialysis because of the use of dopamine. Dopamine dose, hydration, and other medications all combine to have their effect in an interdependent manner that also depends upon baseline conditions. Elucidating such effects in the human body is challenging; without the work suggested herein, identification of similarly complex events in the community setting will remain impossible.

Community health researchers, including CEnR, are challenged both to develop an understanding of circumscribed interventions under local conditions, and to develop a science that allows for the application of such understanding in other communities and contexts. The SBE sciences have an opportunity to support the growth of community health research as an applied translational science, from which improved theories and models help to distinguish signal from noise, and to identify the form and magnitude of interactions such as with existing conditions or context. Similar challenges exist for the young field of improvement science, in which researchers struggle to distinguish the independent impact of interventions from interactions between interventions and organizational context. Current research into the impact of life course exposures on health and disease would also benefit from this work.

CONCLUSION

Improving the health of the nation depends upon improving the health of communities. Developing a science to guide such improvement urgently requires the development and testing of measures, typologies, models, theories, and practices. This represents an immediate opportunity for the behavioral, social, and economic sciences to engage with new colleagues to think about the measurement, health, and organization of communities and thereby to make direct contributions to the health of the United States. Lives are at stake.

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