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Research Protocol for the Multi-Network Practice and Outcome Variation (MPROVE) Study

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**Multi-Network Public Health Practice and Outcome Variation Examination (MPROVE) Study
Research Protocol
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1. Background

Health professionals and policy-makers require a stronger evidence base on how best to organize, finance and deliver public health services that promote health and prevent disease and disability on a population-wide basis. Prior research shows that the scope and scale of public health services vary widely across communities, as do the institutional and financial arrangements used to produce these activities. However, relatively little is known about the causes and consequences of this variation, the degree of alignment with community needs and preferences, and the effects on population health. Efforts to improve the quality, efficiency, and outcomes of public health practice require an in-depth understanding of how these activities are produced and delivered within communities. Very little empirical evidence currently exists concerning what economists and management scientists term the “production functions” for public health activities – the mechanisms through which the inputs of time, money, labor, and information are transformed into products, programs, and strategies designed to protect and promote health.

Generating comparable evidence and applications in public health requires valid measures of the inputs and outputs of public health service delivery. A recent Institute of Medicine report found large gaps in the availability of these types of measures across the public health system.¹ Such input and output measures enable rigorous empirical estimation of production functions for public health services, and stronger causal inferences about the drivers of quality, efficiency, and outcomes in public health. Empirical estimates of public health system production functions will enable rapid and far-reaching advances in public health services and systems research by (1) elucidating the factors that affect quality, efficiency, and productivity in public health service delivery; (2) identifying the optimal mix of inputs and production processes in different institutional and community settings; and (3) estimating the health and economic impact of—and returns from investments in—public health activities. This evidence is urgently needed to inform the decisions faced by policy-makers and public health practitioners on issues such as where best to invest new resources so as to maximize gains in population health, where to cut resources during times of economic scarcity to as to minimize adverse health impact, and how to design policy and management strategies that improve quality, efficiency, and equity in public health practice.

This study supports six established public health practice-based research networks (PBRNs) in implementing a collaborative research study of local public health delivery using the collective infrastructure of multiple PBRNs. Each PBRN comprises multiple local and state public health agencies that operate within the state, along with a university-based research center located in the state. ***The research project will involve creation of a multi-network registry of local public health delivery measures and analysis of the measures to investigate geographic variation in service delivery across a large and diverse collection of public health settings represented within the networks of the participating PBRNs.*** The study will focus on public health delivery measures in three domains of activity: communicable disease control; chronic disease prevention; and environmental health protection. While not comprehensive, these three domains are representative of the breadth of

¹ Institute of Medicine. *For the Public's Health: The Role of Measurement in Action and Accountability*. Washington, DC: National Academies Press; 2010.

activities carried out by public health systems across the U.S. and are designed to address priority population health outcomes. These domains also represent areas where significant measurement development activities are already underway within one or more public health PBRNs that can be expanded and replicated across networks

The PBRNs in Colorado, Florida, Minnesota, New Jersey, Tennessee, and Washington state will participate in this study, with funding from the Robert Wood Johnson Foundation. The PBRN National Coordinating Center based at the University of Kentucky College of Public Health will coordinate the study and lead the multi-network analysis activities, in collaboration with the participating PBRNs.

All measures to be acquired and used in the study reflect aggregate service delivery in the local geopolitical jurisdiction served by the local public health agency: a county, a city or township, or a multi-county or multi-town district. The measures of local public health delivery to be obtained and analyzed through this study reflect routine activities conducted by local and state public health agencies as part of their official governmental responsibilities. All measures are defined and constructed at the aggregate level of the local public health agency jurisdiction, and do not involve data on individually identifiable living human subjects. ***No protected health information and no personal identifying information will be involved in this study.***

2. Objectives: List your research objectives.

The study will accomplish the following aims:

- (1) Assemble measures of local public health service delivery in three domains of activity – communicable disease control, chronic disease prevention, and environmental health protection – for local public health agency jurisdictions located in six states (CO, FL, MN, NJ, TN, WA). The measures will be constructed and compiled by the public health PBRN operating in each state using a combination of secondary data sources from existing administrative records and surveillance systems, and primary data collected through a web-based survey of local public health officials in each state.
- (2) Analyze the extent and nature of geographic variation in public health delivery measures within and across the 6 states using standard geographic analysis methods.
- (3) Link public health delivery measures with secondary data sources on public health agency organization, financing, legal structures, and community health status within the six states.
- (4) Identify organizational, financial, and legal characteristics that explain variation in public health delivery measures within and across the six states, using hierarchical multivariate analytic methods.

3. Study Population

The study population comprises local public health agencies operating in the six states of CO, FL, MN, NJ, TN, and WA. A total of 349 local public health agencies operate within these states, serving geopolitical jurisdictions that include counties and consolidated city/county jurisdictions (85%), cities and townships (11%), and multi-county districts (4%). Approximately 62% of these agencies serve jurisdictions located in metropolitan areas, with the remaining agencies serving nonmetropolitan and rural areas. A total of 46.9 million people reside in the jurisdictions served by these agencies, with approximately 14% African American residents and 6% Hispanic and Latino residents. The resident population closely corresponds

to the U.S. population overall with respect to age distribution, family size and structure, household income, and educational attainment.

4. Subject Recruitment Methods:

The PBRN in each state will engage its member local and state public health agencies in the conduct of this study. These agencies will provide the secondary data and primary data to be used in the study. The lead organization for each PBRN will oversee agency recruitment and engagement activities for its network. These lead organizations are as follows:

- Colorado: The Colorado Association of Local Public Health Officials
- Florida: Duval County Health Department
- Minnesota: Minnesota Department of Health
- New Jersey: New Jersey Department of Health and Social Services
- Tennessee: University of Tennessee-Knoxville
- Washington: Chelan-Douglas Health District

Each PBRN will hold meetings and conference calls with leaders of its member agencies to describe the purpose of the study and the measures to be obtained and analyzed as part of the study. All measures used in the study will be obtained from member state and local public health agencies using one of two sources:

- (1) secondary data sources maintained by state and local agencies, including program administrative records and public health surveillance systems; and
- (2) data reported by the administrator of each local public health agency using a self-administered, web-based survey instrument fielded by the PBRN lead organization in each state.

For measures based on secondary data sources, each PBRN will submit a data request to its member state agencies and/or local agencies that specifies the data elements and time periods requested for each measure. For measures based on primary data collection via the web-based survey of agency administrators, the administrators will be recruited to complete the survey via email notification letters and supplemented with telephone recruitment contacts. Each PBRN will emphasize that agency participation in the study is voluntary, and that agencies may discontinue their participation in the study at any time.

5. Research Procedures

Secondary Data Acquisition: The procedures used by each PBRN to acquire the secondary data sources needed for each measure of local public health service delivery measure will vary based on whether the data source is maintained by the state health agency or by multiple local public health agencies within the network. For data sources maintained at the state agency level, the PBRN will request and obtain machine-readable electronic files from the state health agency, containing data elements for each local public health agency jurisdiction in the state. For data sources maintained at the local agency level, the PBRN will request and obtain separate electronic files from each local agency in the network.

Primary Data Collection: For measures to be constructed from the web-based survey of local public health administrators, each PBRN will implement a web-based survey of the administrators of its

member local public health agencies. The survey instrument used by each PBRN includes a core set of questions that are common to all PBRNs, shown in the appendix. Each PBRN will send an introductory letter to the administrators of its member local public health agencies via email, along with a web-based link to the survey. Each PBRN will use its own secure, web-based survey platform and software to collect responses to the survey instrument, or will use the secure web-based REDCAP survey platform maintained by the University of Kentucky. PBRNs will provide email and telephone follow-up to non-responding agency administrators. PBRNs will provide participating administrators with a customized report of study results as a benefit of participating in the data collection activity.

Data Processing and Storage: All primary and secondary data will be maintained on secure, password-protected computers and data storage media to prevent unauthorized access to data.

Data Cleaning and Quality Assurance: Each PBRN will conduct a standard battery of data cleaning and quality review procedures with measures from both the secondary data sources and the primary data collection, including range tests and correspondence analysis. When missing or anomalous data elements are detected, the PBRN will follow up with the agency providing the data in an effort to acquire corrected data.

Data Transfer to the University of Kentucky for Multi-Network Registry: After completing data review and cleaning procedures, the lead organization of each PBRN will transmit data on the local public health delivery measures to the PBRN Coordinating Center research team at the University of Kentucky for construction of the multi-network data registry. The only identifying information to be included on the data files transferred to the University of Kentucky will be (1) the name of the county, city/township, or district geopolitical jurisdiction in which the measure was collected; and (2) the year of data collection. Data files will be placed in an encrypted, password-protected format prior to transfer to prevent unauthorized access to data. All data files will be stored and maintained on a secure, password-protected computer server at the University of Kentucky College of Public Health, accessible only to the key personnel on the UK research team. A multi-network registry data file will be constructed by concatenating the individual PBRN data files into a consolidated master file for analysis.

Secondary Data Linkage: Data from several additional, publicly-available data sources will be merged with the local public health delivery measures to facilitate analysis, using identifying information on the geopolitical jurisdiction (county, city/township, or district) and year of each measure. Agency-level data on local health department organizational, financial, and operational characteristics will be obtained from the National Association of County and City Health Officials' National Profile of Local Health Departments. County-level data on area demographic and socioeconomic characteristics and health resources will be obtained from the U.S. Health Resources and Services Administration's Area Resource File, and from the U.S. Census Bureau's County Business Patterns file. City and township-level demographic data will be obtained from the U.S. Census Bureau's Area Population Estimates files. State-level data on state health department organizational, financial, and operational characteristics will be obtained from the Association of State and Territorial Health Officials' National Profile of State Health Agencies. Area-level estimates of health risk behaviors, disease prevalence, and health services use will be computed from the U.S. Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System. County-level estimates of preventable mortality will be obtained from the U.S. Centers for Disease Control and Prevention's Compressed Mortality File.

Data Analysis: The PBRN Coordinating Center research team at the University of Kentucky will conduct descriptive and inferential analyses of the local public health delivery measures, focusing on within-state

and between-state geographic variation in service delivery. Descriptive analyses will focus on the magnitudes and patterns of variation in service delivery, including the degree of spatial correlation and clustering in the measures, and the degree of correspondence in the measures within and between domains of activity. Inferential analyses will use multivariate, hierarchical models to identify the types of agencies and community settings that experience comparatively high and low levels of public health delivery, and to identify the organizational, economic, and sociodemographic factors that explain these patterns of variation. Alongside these multi-network pooled analyses, the individual PBRNs will conduct more detailed analyses of their state-specific data, and collaborate with their member agencies to develop theories, hypotheses, and explanations related to the observed patterns of variation.

6. Data Collection:

The specific measures of local public health delivery to be obtained and analyzed are described in the attached inventory. All measures reflect aggregate service delivery in the local geopolitical jurisdiction served by the local public health agency: a county, a city or township, or a multi-county or multi-town district. ***No protected health information and no personal identifying information will be involved in this study.***

7. Potential Risks:

The potential risks involved in this study are very low. The measures of local public health delivery to be obtained and analyzed through this study reflect routine activities conducted by local and state public health agencies as part of their official governmental responsibilities. All measures are defined and constructed at the aggregate level of the local public health agency jurisdiction, and do not involve data on individually identifiable living human subjects. Even in the event of an unintentional disclosure of data to individuals outside of the research team, the data are not likely to pose risks to the wellbeing or employability of individuals who staff the public health agencies that will contribute the data, because these data already are in the possession of these agencies and they reflect routine operations of public health authorities. Rather, the comparative analysis of these data will allow agencies and their staff to gain new knowledge about strategies to improve the delivery of public health services in their communities. Even so, permission will be obtained from the agencies that contribute data before any agency-specific and agency-identified data are published or publicly released by the research team.

8. Research Materials, Records, and Privacy:

The specific measures of local public health delivery to be obtained and analyzed are described in the attached inventory. All measures used in the study will be obtained from member state and local public health agencies using one of two sources: (1) secondary data sources maintained by state and local agencies, including program administrative records and public health surveillance systems; and (2) data reported by the administrator of each local public health agency using a self-administered, web-based survey instrument fielded by the PBRN lead organization in each state. All measures reflect aggregate service delivery in the local geopolitical jurisdiction served by the local public health agency: a county, a city or township, or a multi-county or multi-town district. ***No protected health information and no personal identifying information will be involved in this study.***

9. Confidentiality:

After completing data review and cleaning procedures, the lead organization of each PBRN will transmit via secure electronic protocol a data file or files containing the local public health delivery measures to the PBRN Coordinating Center research team at the University of Kentucky for construction of the multi-network data registry. The only identifying information to be included on the data file(s) transferred to the University of Kentucky will be: (1) the name of the county, city/township, or district geopolitical jurisdiction in which the measure was collected; and (2) the year of data collection. Data files will be placed in an encrypted, password-protected format prior to transfer via secure electronic file transfer protocol (FTP) to prevent unauthorized access to data. All data files will be stored and maintained on a secure, password-protected computer server at the University of Kentucky College of Public Health, accessible only to the key personnel on the UK research team. A multi-network registry data file will be constructed by concatenating the individual PBRN data files into a consolidated master file for analysis. This registry datafile will be maintained in perpetuity at the University of Kentucky College of Public Health to allow for future follow-on studies and longitudinal analyses of change in service delivery.