Public Health Metrics:
Key Considerations and Criteria

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Public health services & systems research

A field of inquiry examining the organization, financing, and delivery of public health services at local, state and national levels, and the impact of these activities on population health

Strategies to promote health and prevent disease & injury on a population-wide basis: programs, policies, administrative practices

Mays, Halverson, and Scutchfield. 2003
Considerations for “good” public health metrics

- **Relevance** to program or policy goal
- **Health impact**: prevalence & severity
- **Economic impact**: costs and resource use
- **Distributional impact**: equity and disparities in impact
- **Tractability**: able to be influenced by relevant actors/actions
- **Degree & velocity of change**
- **Attribution**: vulnerability to confounding, selection
- **Measurement quality**: validity, reliability, sensitivity, specificity
- **Feasibility**: data availability, collection/reporting burden
- **Public values/preferences**: what matters most to the public
Considerations for “good” public health metrics

Measuring outcomes
- Morbidity, mortality, cost, experiences, QOL/wellbeing
- Attribution, sensitivity, and specificity can be problematic
- Programs may have diffuse effects on multiple outcomes

Measuring processes/activities
- Strength of evidence that processes impact outcomes
- Proximal indicators of progress

Measuring structures/inputs
- Human, capital, informational resources
- May be context-sensitive
- Structural equivalence of multiple implementation strategies
Selecting Measures Based on Expected Health Impact: VOI Approach

- Proportion of the population currently exposed to the risk factor(s) addressed by the measured activity [risk exposure]

- Proportion of the exposed population that is expected to be reached by the measured activity [expected reach]

- Relative risk of the health outcome(s) comparing the exposed to the unexposed population [preventable fraction]

- Relative risk of the health outcome(s) comparing the population reached by the measured activity to the population not reached [efficacy]

AL Siu, EA McGlynn, et al. 1992
**VOI Example**

- **Activity:** Community-wide campaigns to increase physical activity
  Community Guide: “Strong Evidence of Effectiveness”
- **Risk Exposure (Adults):** 64% failure to receive recommended PA
- **Preventable fraction:** 24% reduction in premature mortality
- **Efficacy:** median net improvement of 4% in receipt of recommended PA
- **Expected Reach:** 30%
- **Impact fraction:** expected proportional reduction in the outcome attributable to improvement of the measured activity

\[
= 0.64 \times 0.30 \times 0.04 \times 0.24
= 0.00184
\]

Example: Measurement Selection and Use in Public Health Practice-Based Research Networks

First cohort (December 2008 start-up)
Second cohort (January 2010 start-up)
Affiliate/Emerging PBRNs (2011-14)

>2000 public health agencies
>50 universities
>100 CBOs
Multi-Network Practice and Outcome Variation Examination Study (MPROVE)

6 Participating PBRNs

- Identify measures of high-value public health services:
  - Chronic disease prevention
  - Communicable disease control
  - Environmental health protection

- Create registry of measures: consistent across communities

- Profile geographic variation in the delivery of selected public health services across local communities

- Decompose variation into attributable components:
  - need-sensitive or preference-sensitive factors
  - supply-sensitive factors

- Examine associations between service delivery & outcomes
## Participating MPROVE networks

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<th>State Agencies</th>
<th>Local Agencies*</th>
<th>Academic Units</th>
<th>Other</th>
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<th>Lead Institution</th>
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MPROVE measurement dimensions

- **Availability/Scope:** specific activities produced
- **Volume/Intensity:** Frequency of producing activity over period of time
- **Capacity:** Labor and capital inputs assigned to an activity
- **Reach:** Proportion of target population reached by activity
- **Quality:** effectiveness, timeliness, equity of activity
- **Efficiency:** resources required to produce given volume of activity
Levels of measurement

- **Community Level**: Includes services/activities regardless of who performs/contributes
- **Agency Level**: Focuses on activities directly contributed by governmental public health agency
Measure selection criteria

- Expected health impact
- Expected economic impact
- Control/influence by public health agencies and their partners
- Pre-existing evidence of validity and reliability
- Feasibility of obtaining data
Example: Delphi Rating of Measures

Chronic Disease Measures: Feasibility x Health Impact Ratings

Feasibility

Health Impact
Final MPROVE Measures

- **Chronic disease prevention (8 measures)**
  - Tobacco prevention
  - Obesity prevention

- **Communicable disease control (14 measures)**
  - Immunization
  - Enteric disease control
  - STI control
  - Tuberculosis control

- **Environmental health protection (5 measures)**
  - Lead exposure protection
  - Food safety protection
Proportion of local settings able to report MPROVE measures

- Healthy food (A)
- Physical activity (A)
- Tobacco (A)
- Physical activity (C)
- Oral health prevention (A)
- STI cases (C)
- Immunization (A)
- Healthy food staffing (A)
- Enteric confirmed cases (C)
- Enteric reported cases (C)
- Food inspection volume (A)
- Agency PA funding (A)
- Oral health screening (A)
- Lead rate (C)
- Smoking enforcement (C)
- Enteric completion time (A)
- TB case volume (C)
- Enteric investigations (A)
- STI staffing (A)
- Vaccine preventable diseases (C)
- Immunization (C)
- TB contact treatment (A)
- Food inspection reach (A)
- STI contact tracing (A)
- Food safety staffing (A)
- TB treatment (A)
- Lead investigation (A)
- TB contact screening (A)
Implementation of community-wide health education campaigns to promote physical activity

<table>
<thead>
<tr>
<th>State</th>
<th>CO</th>
<th>FL</th>
<th>MN</th>
<th>NJ</th>
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Implementation of clean indoor air policy enforcement activities

- Violations
- Investigations
- Citations/fines
- All
- Any

States:
- FL
- MN
- NJ
- TN
- WA
- 6-States
Average FTE staffing for communicable disease intervention specialists per 100,000 population
Average completion time for enteric disease investigations

Completion time (days)

CO | FL | MN | NJ | TN | WA | 6 states

Completion time (days)
Overall Patterns of Variation in Local Public Health Measures

Estimates from random effects regression models
Correlates of Variation in Local Public Health Measures

% of Total Variance

Estimates from state fixed-effects regression models

*p<0.05
Conclusions

- All measures have strengths and limitations
- No single measure will fulfill all attributes perfectly
- Use multiple measures to ensure that measurement system provides desirable attributes
- Multiple measures are less vulnerable to gaming and unintended consequences
For More Information

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