

A Model for Prioritization of Public Health Programs

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**With Applications to the Missouri
Department of Health, Division of
Chronic Disease Prevention and
Health Promotion**

Public Health Prioritization

- **Allocation of Constrained Resources**
 - What are the health priorities?
 - What are the risk or preventive factors?
 - What interventions are available?
 - Which are the most cost-effective?
 - How do critically evaluate these questions using scientific evidence?

Public Health Prioritization

How has public health resource allocation been performed in the past?

- 1. It is the status quo-funding is available;**
- 2. Emotionally driven - policy maker suffer from conditions**
- 3. Funding becomes available – vertical programs**
- 4. Expected burden based on population size – best scenario**

Can we do Better?

Previous decision-making models and indicators

- **Multiple Criteria Models (Mosley, et al)**
 - Burden of disease, Cost-effectiveness, Health System Strengths
- **Comprehensive Model (Vilnius and Dandoy, 1990)**
- **DALY's (Murray, et al)**
- **QALY's (Stone, et al)**

Public Health Prioritization

A comprehensive model (Vilnius and Dandoy, 1990)

- Size of the problem
- Seriousness of the problem
- Effectiveness of potential interventions
- “P.E.A.R.L”

The Future of Public Health, IOM 1988

“...every public health agency (to) exercise its responsibility to serve the public interest in the development of comprehensive public health policies by promoting use of the scientific knowledge base in decision-making about public health.”

Public Health Prioritization

- **Need a systematic and objective approach to public health resource prioritization.**
- **Much like clinical and preventive medicine, Public Health prioritization should move towards more evidence-based practice.**

Possible Models

- **Three Possible Models**
 - **Model 1—Ranks All Diseases ***
 - **Model 2—Ranks Eleven Major Chronic Diseases**
 - **Model 3—Ranks Sixteen Risk Factors**
- **Presenting Model 3 – BRFSS Prioritization Model**
- * Simoes EJ et al. J Public Health Management Practice, 2006, 12(2), 161–168

Model Constraints

- **Use local/state surveillance data**
- **Comprehensive Literature Review**
- **Expert panel of public health professionals**
- **Incorporate all Behaviors and Risk Factors**
- **Interconnectedness of Risk Factors**

Health Risk Factors in Missouri

Priority Disease/Condition	Smoking	Excessive Alcohol Intake	Nutrition Imbalance	Obesity	Sedentary Lifestyle	Environmental Pollutants
Chronic Diseases/Conditions						
COPD	■					■
Diabetes	■		■	■	■	
Stroke	■	■	■	■	■	
Heart disease	■	■	■	■	■	
Lung cancer	■		■			
Asthma	■					■
Arthritis				■	■	
Prostate Cancer						
Mental Health Diseases/Conditions						
Substance-related conditions	■	■				
Suicide attempts		■				
Senility	■	■	■	■	■	
Alcohol-related conditions		■				
Injuries						
Motor-vehicle injuries		■				
Assaults		■				
Fall injuries		■	■	■	■	
Infant Health Conditions	■	■	■	■		
Infectious Diseases						
Pneumonia & Influenza	■					■

The BRFSS Prioritization Model: Sixteen Risk Factors

- Smoking
- Physical Activity
- Obesity
- < 5 a Day
Fruits/Vegetables
- No Pap Smear
- No Mammogram
- No CBE
- No
Rectosigmoidoscopy
- No FOBT
- No BP Screening
- No Cholesterol
Screening
- Hypertension
- High cholesterol
- Diabetes
- Dietary Fat
- Low Education (<12)

The BRFSS Prioritization Model

- **Criteria - Looks at Indicators of:**
 - **Magnitude**
 - **Urgency**
 - **Severity**
 - **Amenability to Intervention**
 - **Community Support ¹**
 - **Racial and Ethnic Disparity ²**
- ¹ included in amenability initially- later added as independent criteria
- ² later added as independent criteria but not presented here

The BRFSS Model: Four Criteria and Eight Indicator Measures

- **Magnitude**
 - Prevalence
- **Urgency**
 - Annual % change
- **Severity**
 - PAR
 - Impact on Others
- **Amenability**
 - Effectiveness
 - Cost
 - Patient Acceptance
 - Community Acceptance

Methods to our Madness: Missouri 1999

Criteria	Magnitude	Urgency	Severity	Amenability
Indicators	<ul style="list-style-type: none"> • Mortality rate • <u>Prevalence rate</u> • Incidence rate • YPLL • Proportion of mortality in population <65 	<ul style="list-style-type: none"> • Incidence rate • Percent change in Mortality • <u>Percent change in Prevalence</u> • Percent change in Incidence 	<ul style="list-style-type: none"> • Case Fatality Rate • Ratio of Mortality by Incidence • Ratio of Mortality by Prevalence • <u>PAR</u> • <u>Potential to Impact Others</u> 	<ul style="list-style-type: none"> • <u>Availability</u> • <u>Effectiveness</u> • <u>Cost</u> • <u>Patient Acceptance</u> • <u>Community Acceptance</u>
Source	<ul style="list-style-type: none"> • <u>BRFSS</u> • DDM1 • MO Annual Cancer Report • <u>DISMOD</u> • CDC Wonder 	<ul style="list-style-type: none"> • DDM1 • CDC Wonder • <u>BRFSS</u> • MO Obesity Red Surv • MO Nutr Surv 	<ul style="list-style-type: none"> • Combining Magnitude and Urgency • <u>Lit Review</u> • <u>Expert Panel</u> 	<ul style="list-style-type: none"> • <u>Lit Review</u> • <u>Expert Panel</u> • <u>Focus Group</u>

Appendix 7. Magnitude of Risk Factor

Risk Factor	Prevalence	Rank
Didn't consume at least 5 fruits/vegetables a day	80	1
No FOBT (50+/2 years)	75	2
No Rectosigmoidoscopy (50+)	62	3
Obesity (by BMI)	35.5	4
Hypercholesterolemia (Ever told cholesterol was high)	30.2	5
No Cholesterol Screening (Never had a cholesterol check)	29.7	6
Physical Activity (No LTPA)	27.9	7
Smoking (Current smoker)	27.1	8
No CBE (50+/2 years)	26.5	9
No Mammogram (50+/2 years)	25.7	10
Hypertension (Ever told BP was high)	24.6	11
Hypertension (Ever told BP was high)	22	12
No Pap smear in last 3 years	15.4	13
Dietary Fat	12	14
Diabetes (Ever told had diabetes)	6.1	15
No Blood Pressure Screening (In last two years)	4.9	16

Appendix 8. Urgency of Risk Factor

Risk Factor	Annual Percent Change (DDM2)	Rank
Smoking (Current smoker)	-0.3	11
Physical Activity	0.1	14
Obesity	5.1	16
Didn't consume at least 5 fruits/vegetables a day	-2.1	6
No Pap smear in last 3 years	-2.4	5
No Mammogram (50+/2 years)	-3.8	2
No CBE (50+/2 years)	-0.2	12
No Rectosigmoidoscopy (50+)	-3.5	3
No FOBT (50+/2 years)	0	13
No Blood Pressure Screening (In last two years)	-0.4	10
No Cholesterol Screening (Never had a cholesterol check)	-2.0	7
Hypertension (Ever told BP was high)	1.6	15
Hypercholesterolemia (Ever told cholesterol was high)	-0.3	12
Diabetes (Ever told had diabetes)	-1.9	8
Dietary Fat	-3.2	4
Low Education (<12 years)	-0.62	9

Appendix 9A. Severity of Risk Factor or Potential to Impact disease (Conservative)

Risk Factor	PAR *	Potential to Impact Others #	Cons Total Score	Cons Total Rank
Smoking (Current smoker)	25	2	10	8
Physical Activity	11.6	1	5	4
Obesity	12	0	5	4
Didn't consume at least 5 fruits/vegetables a day	30	1	12	9
No Pap smear in last 3 years	36.5	0	12	9
No Mammogram (50+/2 years)	21.7	0	10	8
No CBE (50+/2 years)	21.7	0	10	8
No Rectosigmoidoscopy (50+)	18	0	6	5
No FOBT	18	0	6	5
No Blood Pressure Screening (In last 2 yrs)	18.6	0	7	6
No Cholesterol Screening (Never had a cholesterol check)	9.3	0	2	2
Hypertension (Ever told BP was high)	20	0	9	7
Hypercholesterolemia (Ever told cholesterol was high)	10	0	3	3
Diabetes (Ever told had diabetes)	5	0	1	1
Dietary Fat	20	1	10	8
Low Education (<12 years)	46	1	14	10

- Lowest PAR found in literature review or estimated
- # from expert panel

Appendix 11. Population Attributable Risk (PAR)

Risk Factor	PAR and Related Disease
Smoking (Current smoker)	87% Lung Cancer <i>90% COPD</i> 45.5 IHD <i>25% Stroke</i> 32% Cervical Cancer 26% Diabetes
Physical Activity	<i>43% Stroke</i> 23.5% Colon Ca 24.5% IHD <i>11.6% Breast Ca</i> 24% Diabetes
Obesity	<i>49% Diabetes</i> <i>12% Breast Ca</i> 23% IHD 46% Stroke 23% Hypertension 32.5% Colon 22.5% OA
Didn't consume at least 5 fruits/vegetables a day	30% Colon Ca
No Pap smear in last 3 years	36.5% Cervical Ca
No Mammogram (50+/2 years)	21.7% Breast Ca

Appendix 10A. Amenability to Improve Risk Factor (Using Conservative values for Effectiveness and Unit Cost)

Risk Factor	Effectiveness of Improving Risk Factor	Unit Cost	Patient Acceptance	Community Acceptance	Amenability Total Score	Amenability Final Rank
Smoking (Current smoker)	5-25%	\$6-30	1	2	12	3
Physical Activity	14.3-50%	\$10-400	1	3	17	7
Obesity	14.3%	\$30	1	2	14	5
Didn't consume at least 5 fruits/vegetables a day	9.6%	\$6-17	2	3	16	6
No Pap smear in last 3 years	30%	\$30-47	3	3	20	9
No Mammogram (50+/2 years)	47%	\$50-125	2	3	19	8

Table 3A. Summary Ranking of Criteria by Risk Factor (Conservative)-selected factors

Risk Factor	Magnitude Score	Urgency Score	Conservative Severity Score	Conservative Amenability Score	Summary Score
Smoking (Current smoker)	9	11	8	3	31
Physical Activity	10	14	4	7	35
Obesity	13	16	4	5	38

Table 4A: Final Ranking of Risk Factors (Conservative)- 1999

Ranking from Highest to Lowest Priority	Risk Factor
1	No FOBT
2	Obesity & No CBE
3	<5 Fruits/Vegetables
4	Physical Activity
5	Hypertension & Smoking
6	Hypercholesterolemia
7	No PAP
8	Low Education & No Mammogram
9	No Rectosigmoidoscopy & Dietary Fat
10	No Cholesterol Screening
11	No BP Screening
12	Diabetes

Table 4B: Final Ranking of Risk Factors (Non-Conservative)-1999

Ranking from Highest to Lowest Priority	Risk Factor
1	Obesity
2	No FOBT
3	Smoking
4	Physical Activity & Hypercholesterolemia
5	<5 Fruits/Vegetables
6	No CBE
7	No Cholesterol Screening
8	Hypertension
9	No PAP
10	Low Education
11	No Rectosigmoidoscopy
12	No BP Screening & No Mammogram & Diabetes
13	Dietary Fat

Table 4C: Final Ranking of Risk Factors (Weighed Conservative and Non-Conservative)- 1999

Ranking from Highest to Lowest Priority	Risk Factor
1	No FOBT, Obesity
2	Smoking & <5 Fruits/Vegetables & No CBE & Physical Activity
3	Hypercholesterolemia
4	Hypertension
5	No PAP
6	No Cholesterol Screen
7	Low Education
8	No Mammogram & No Rectosigmoidoscopy
9	Dietary Fat
10	No BP Screening
11	Diabetes

Budget Summary, Missouri State Fiscal Year 1999	
Breast and Cervical Cancer	2,330,453
CVD	1,303,662
Tobacco Use Prevention	1,113,392
Cancer Surveillance	666,050
Arthritis	376,370
Diabetes	252,523
Nutrition	155,330
CVD Surveillance	74,669
Other Cancer Activities	33,388
Prostate Cancer	30,341
Total Administration	989,070
Total	7,169,918

Missouri Department of Health and Senior Services Web Application (2007)

<http://www.dhss.mo.gov/PriorityMICA/>

Four Criteria:

1. Magnitude (prevalence/incidence)
2. Urgency (prevalence/incidence trend)
3. Amenability to change
4. Community support

Prioritization of Selected Risk Factors in Missouri

Sex: Both Sexes, Race: All Races, Age Group: All Ages

Risk Factor	<u>Rank</u>	Total Weight
<u>No Exercise</u>	1	65.5
<u>Obesity</u>	2	63.5
<u>Mother Overweight</u>	3	58.5
<u>No Mammography</u>	4	56.0
<u>No Cervical Cancer Screening</u>	5	53.0
<u>Smoking</u>	6	50.5
<u>Out-of-Wedlock Births</u>	7	48.5
<u>High Blood Pressure</u>	8	47.0
<u>High Cholesterol</u>	9	46.0
<u>Smoking During Pregnancy</u>	10	42.5
<u>Low Birth Weight</u>	11	41.5
<u>Very Low Birth Weight</u>	12	37.5
<u>No Health Insurance for ER Visits</u>	13	37.5
<u>VLBW Infants Not Delivered in Level III Centers</u>	14	33.0
<u>Mother Underweight</u>	15	30.5
<u>Prenatal Care Inadequate</u>	16	30.5

Limitations

- Use only epidemiological measures available in the surveillance system
- Infectious disease condition will always rank low because risk factors not available
- Economic burden not included
- Limited knowledge on intervention effectiveness
- Community support measure is arbitrary



Prevention Center Program Web Site



www.cdc.gov/prc

PRC - CDC's Prevention Research Centers Program - Microsoft Internet Explorer

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