

## Effectiveness Research and Prioritization of Public Health Interventions

The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the CDC.

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### Evidence-Based Public Health Practice (Brownson et al., Annu Rev Public Health 2009)

Table 2 Typology for classifying interventions by level of scientific evidence

Category	How established	Considerations for the level of scientific evidence	Data source examples
Evidence-based	Peer review via systematic or narrative review	Based on study design and execution External validity Potential side benefits or harms Costs and cost-effectiveness	<i>Community Guide</i> Cochrane reviews Narrative reviews based on published literature
Effective	Peer review	Based on study design and execution External validity Potential side benefits or harms Costs and cost-effectiveness	Articles in the scientific literature Research-tested intervention programs (123) Technical reports with peer review
Promising	Written program evaluation without formal peer review	Summative evidence of effectiveness Formative evaluation data Theory-consistent, plausible, potentially high-reach, low-cost, replicable	State or federal government reports (without peer review) Conference presentations
Emerging	Ongoing work, practice-based summaries, or evaluation works in progress	Formative evaluation data Theory-consistent, plausible, potentially high-reaching, low-cost, replicable Face validity	Evaluability assessments* Pilot studies NIH CRISP database Projects funded by health foundations

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### Precursors to Translation Research

1. Basic Science/  
Physiological Research

2. Observational Epidemiology

3. Intervention Effectiveness

-Cross-sectional surveys  
 -Ecologic studies  
 -Case-control studies  
 -Prospective cohort

-Controlled intervention Studies  
 -Randomized controlled trials  
 -Cost-effectiveness Studies  
 -Systematic Reviews

•Mechanisms  
•Treatments  
•Efficacy

•What?  
•Who?  
•Where?

How?  
(Do Interventions Work?)

•Clues to intervention

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### Bradford Hill Criteria for Evaluation of the Evidence of Causality

- Strength of Association
- Dose-response effect
- Temporality
- Consistency of evidence
- Biological plausibility
- Specificity of association
- Experimentation

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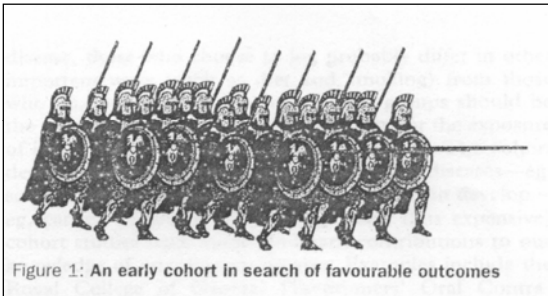
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### Types of Studies: Observational Cohorts



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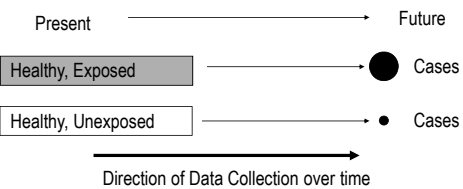
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### Observational Cohort Studies

#### Prospective Cohort Study

Participants are chosen from the community (or based on some type of exposure) and assessed



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### How do we use risk factors?

- To contribute to understanding of etiology of disease.
- To guide the development of effective interventions.
- To assist in efficient identification of people who will benefit from intervention.

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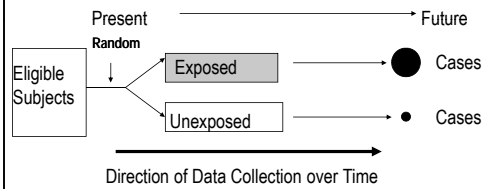
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### Experimental Studies

Un tipo de estudio de cohorte  
Asignación aleatoria de los participantes



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### Central References for Best Practices

- U.S. Prev Serv Task Force
- ADA Clinical Guidelines
- Zhang and Li Cost Effectiveness Review
- Community Guide to Preventive Services
- NCQA / Alliance
- Cochrane Public Health Group
- Cochrane Collaboration Reviews

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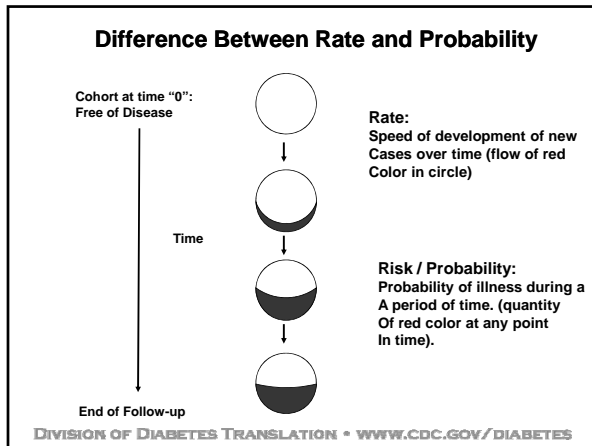
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### Measures of Association

Type of Study	Measure of Effect	Measure of Association
Cohort		
Case - control		
Cross-sectional		

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## *Evolution of the Evidence Base for Diabetes Prevention and Control*

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**Evidence from observational  
epidemiology:  
Ecologic Studies**

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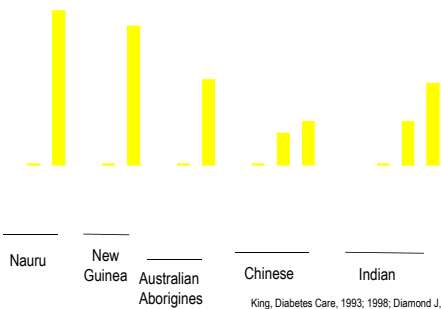
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**Migration Studies: Association Between Westernization  
and Diabetes  
Prevalence in Susceptible Populations**



King, Diabetes Care, 1993; 1998; Diamond J. Nature, 2003

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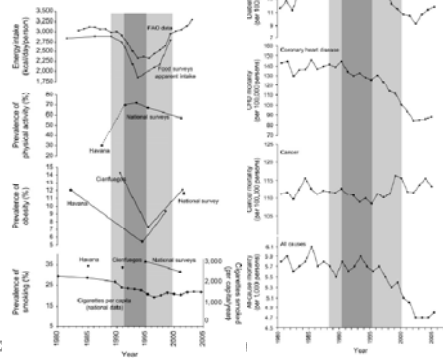
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**Natural Experiments**

Impact of Energy Intake, Physical Activity, and Population-wide Weight Loss on Cardiovascular Disease and Diabetes Mortality in Cuba, 1980-2005



Franco et al.,  
*Am J Epidemiol*, 2007

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## Evidence from Cohort Studies and Analytic Epidemiology

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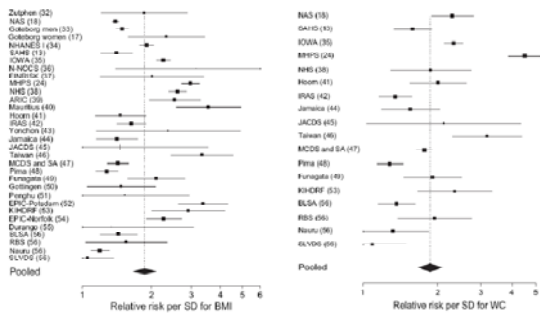
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### Relative risk of incident diabetes per standard deviation of BMI and Waist circumference from a meta-analysis of 32 studies



Vasquez, Epidemiol Rev 2007

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### Gestational Diabetes and the Incidence of Type 2 Diabetes: A systematic review (Kim et al., Diabetes Care, 2002)

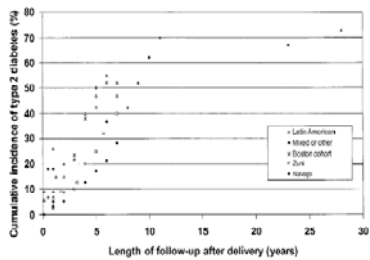


Figure 2—Cumulative incidence of type 2 diabetes by ethnicity and length of follow-up, adjusted for retention. Studies using local criteria or WHO criteria for GDM diagnosis are not illustrated.

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**Summary: Risk Factors for Type 2 Diabetes**

- Age ↑
  - Family History ↑
  - Gestational Diabetes ↑
  - Obesity / fat distribution ↑
  - Physical Activity / fitness ↓
  - Smoking ↑
  - Very low birth weight ↑
  - Depression ↑
  - Antipsychotic medications ↑
  - Retroviral therapy ↑
  - Antihypertensive medications ↑↓
- Dietary Factors
    - Carbohydrates ↑↓
    - Fats ↑↓
    - Glycemic load ↑
    - Cereal fiber / whole grain ↓
    - Dairy products ↓
    - Alcohol ↓
    - Coffee ↓

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**Evidence from Intervention Studies**

(Individual RCTs, Health Services Research, and Cost-effectiveness Studies)

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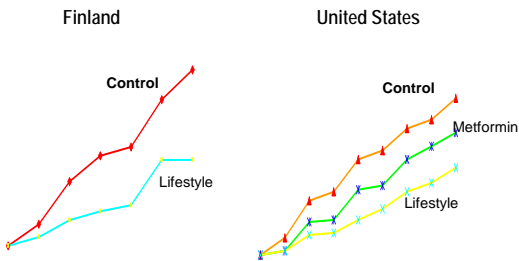
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**Proportion of Participants Developing Diabetes During the Finnish and U.S. Diabetes Prevention Studies**



Tuomilehto, N Engl J Med, 2001; DPP Research Group, N Engl J Med, 2002  
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**Classic Components of Disease Management Programs for Diabetes**

- Delivery System Design (e.g., care management; practice teams)
- Information support (e.g., registries; feedback systems)
- Self-care support (patient education; collaborative decision making)
- Decision Support (guidelines; provider education; specialty support).
- Community linkages (resource linkage; particularly uninsured)
- Health system policy
  - Create incentive systems.
  - Increase quality improvement team leads contact.
  - Co-payment and formulary structures that promote adherence.

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**Emerging Issues and Pending Questions in Best Practices?**

- How should we handle risk factors with strong consistency but no intervention evidence?
- Policy-level practices for primary and secondary prevention?

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**Policy Options to Influence Diabetes Risk**

- Taxation
- Food and Menu labeling
- Engage Private Industry
- Crop subsidy policies
- Incentives/promotion for community availability and affordability of foods.
- Incentives/promotion for community support for physical activity.
- Regulation of foods in public areas.
- School food and physical education policies.

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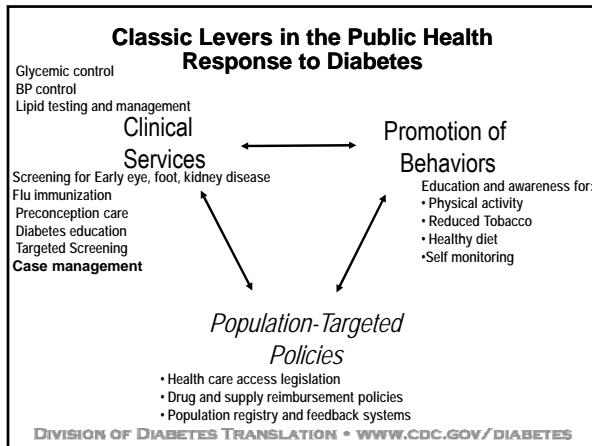
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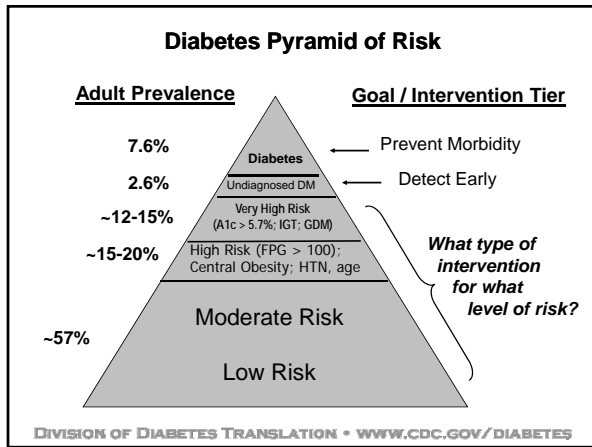
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