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Cost-effectiveness of public health interventions – a new methodological approach

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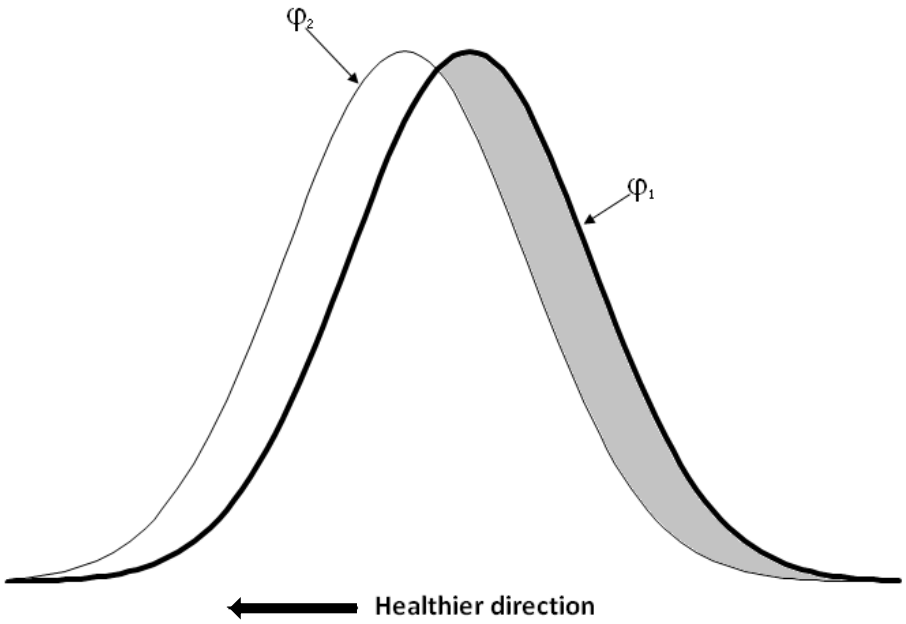
Slide 1

IF1 Inna Feldman, 27/06/2014

The goal of public health interventions:

- To move the distribution of life style risk factors in a healthier direction:
  - decrease disability-causing disease
  - improve quality of life in the population



- How to capture the health gains of a public health intervention?
- Can we provide a support for decision makers in allocating resources to public health interventions?

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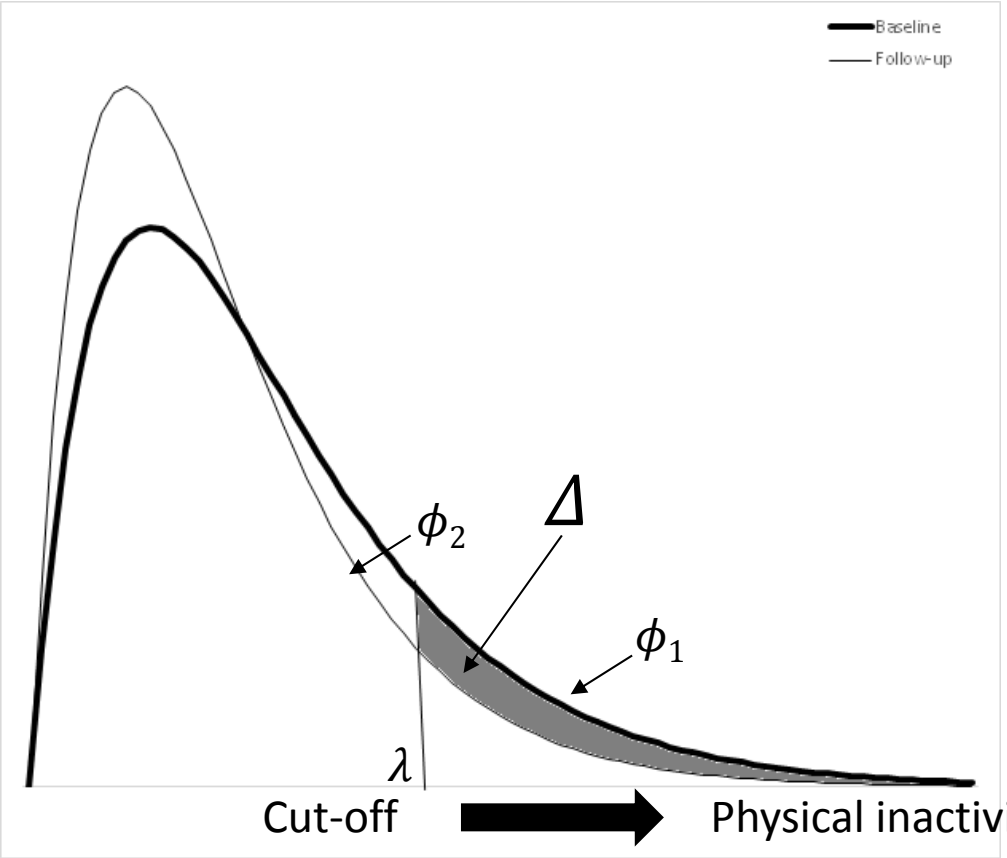
Aim

- To assess the effectiveness of a public health intervention using **changes** in the **distribution curve** of the targeted **life style risk factor**
- To estimate the cost-effectiveness of a hypothetical public health intervention tackling the life style risk factor

- Physical inactivity

The distribution curve as outcome measure!



$$\Delta = \int_{\lambda}^{\infty} \phi_1 - \int_{\lambda}^{\infty} \phi_2$$

Δ = % of the population that have moved from risky level

Sarkadi A, Sampaio F, Kelly MP, Feldman I. **A novel approach used outcome distribution curves to estimate the population-level impact of a public health intervention.** *J Clin Epidemiol. 2014 Jul;67(7):785-92.*

Risks, Health and Societal costs – RHS model*

- Simulates changes in incidence and related societal costs of several chronic diseases following changes in prevalence:

- Population: adults, 20-44, 45-64 and 65-84 years old, men and women

Feldman I. and Johansson P. The Swedish RHS-model (Risk factors, health and societal costs). Technical report. Available at http://www.hfsnatverket.se/lib/get/doc.php?id=15399bcf46ed95

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Calculation methods

- Based on Relative risks **(RR)** and Potential Impact Fractions **(PIF)** *

$$PIF = \frac{(P^* - P)(\mathrm{RR} - 1)}{P(RR - 1) + 1}$$

- The incidence rate of the disease after change in the related risk factor (I*): $I^* = I \times (1 - PIF)$

Physical inactivity and diabetes:
P=0.22 (22%); P*=0.20 (20%); RR=2.0 PIF=0.02

A reduction in prevalence of physical inactivity from 22 % to 20 % results in a reduction in the incidence of diabetes by 2 %.

* Morgenstern H, Bursic ES. A method for using epidemiologic data to estimate the potential impact of an intervention on the health status of a target population. *J Community Health. 1982; 7:292-309*.

The risk factors and the diseases

	Obesity, BMI>30	Daily smoking	Physical inactivity	Risky consumption of alcohol	ICD-10 code
Diabetes type 2	x	x	x		E11
Ischemic heart disease	x	x	x		I20, I24, I25
Stroke	x	x	x		I61, I63, I64
COPD		x	x		J40-J44
Depression	x	x	x	x	F32-F33
Hip fracture		x	x	x	S72.0-S72.2
Liver cirrhosis				x	K70, K74
Epilepsy				x	G40- G41
Mental and behavioral disorders due to use of alcohol				x	F 10
Cancers:					
Colon	x	x	x	x	C18
Lung		x			C34
Breast	x	x	x	x	C50
Prostate	x	x			C61
Esophageal				x	C15
Liver				x	C22

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Outcomes

- Health gains :
  - decreased incidence
  - increased QALYs
  - increased DALYs

- Change in societal costs:
  - health care
  - municipality care
  - sickness insurance

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Effectiveness and cost-effectiveness of a hypothetical population- based health promotion intervention tackling physical inactivity

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Mass media campaign[1]

- Effectiveness, calculated using change in distribution of physical activity, from RCTs[2]:

  Δ = 2% - reduction in prevalence of physical inactivity

- Cost-effectiveness, RHS-model, Uppsala county
  - Health gain: 14 QALYs
  - Societal savings: £500,000

[1] **Sassi, F. *et al.*** (2009), *OECD*, No. 48 http://dx.doi.org/10.1787/220087432153

[2] **Dixon *et al.***, 1998; **Foerster *et al.***, 1995; **Craig *et al.***, 2006

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Conclusion:

- The intervention is estimated as
  - Cost-effective if the intervention costs are less than £900,000 with ICER<£30,000 /QALY
  - Cost-saving if the intervention costs are less than £500,000

Cost-effectiveness of public health interventions:

- changes in the distribution curve of health-related outcomes (risk factor)
- population-based modeling of risk reductions, health outcomes and societal costs