European Health & Life expectancies Information System

# Public health interventions to increase health expectancies: possible methods to overcome the gap in the evidence base

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# Background

Over the last decades the added value of health expectancy (HE) health is widely recognized:

1. to monitor health

   - HE is now being used in more than 65 countries

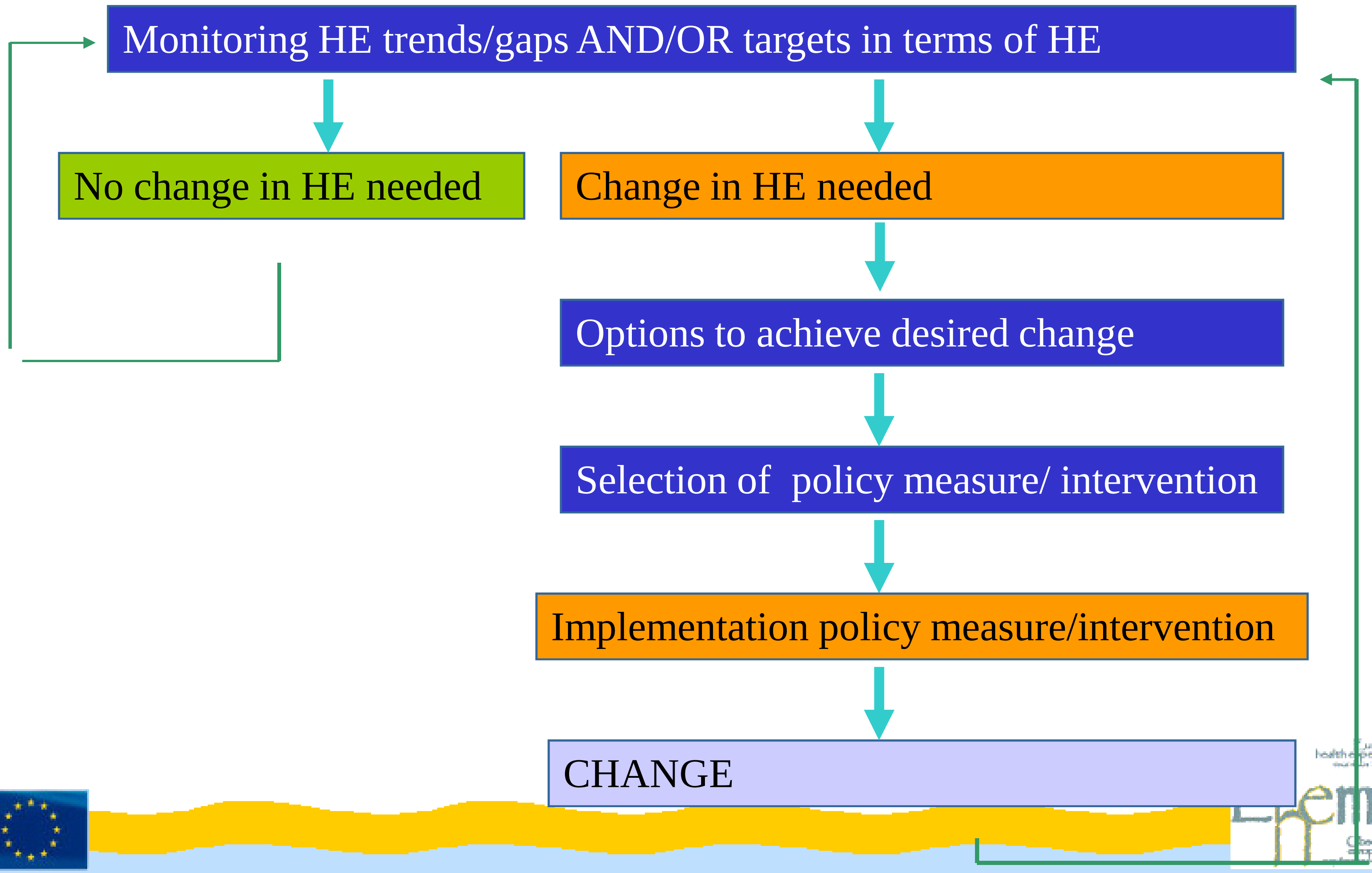
   - Harmonized measure of healthy life years (HLY) are available for all EU countries

2. to set policy aims

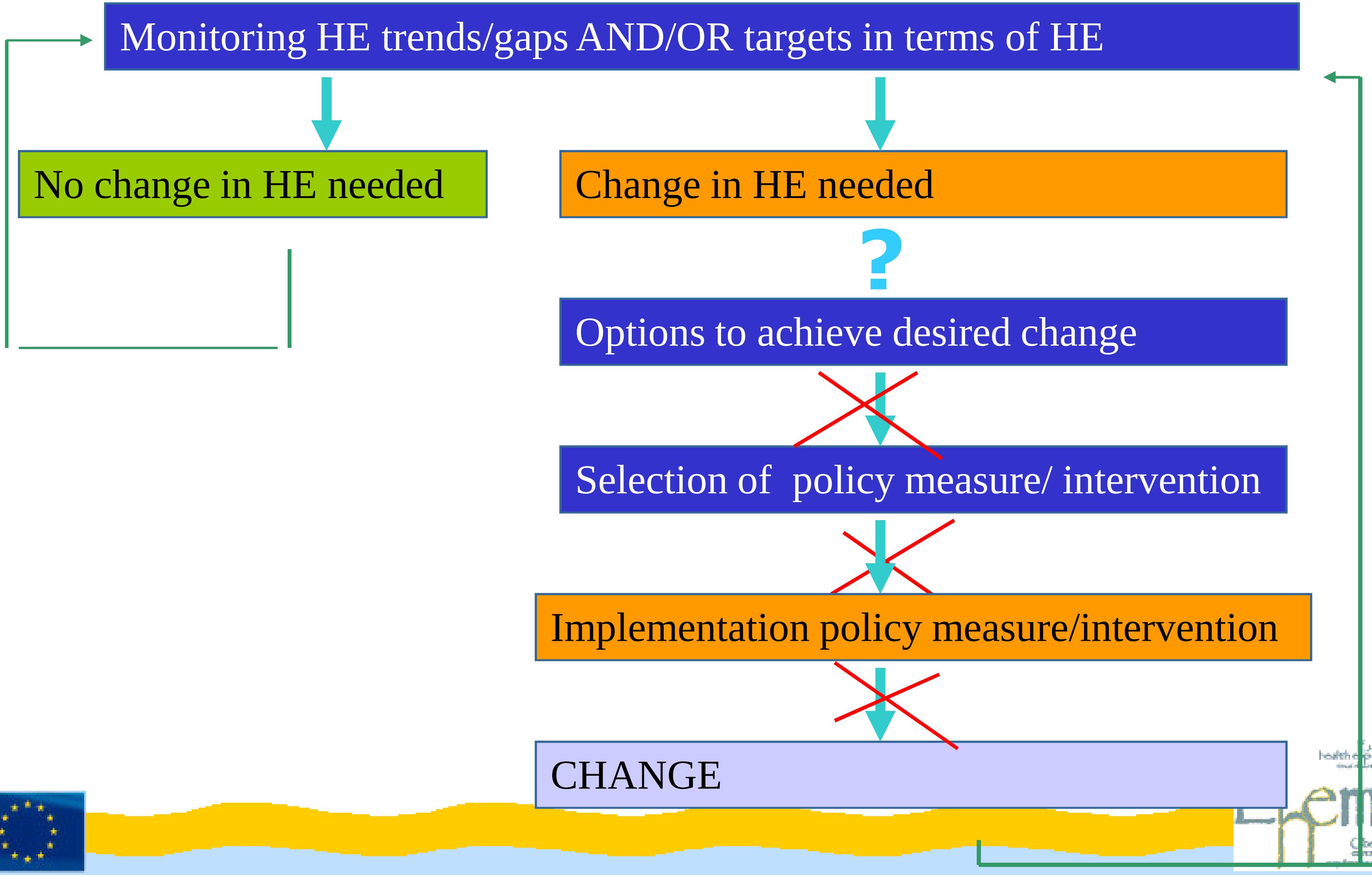
   - Increasing HE and reducing HE gaps are recognized as more important policy aims than increasing LE or reducing LE gaps

However, the step up to having effective sets of public health interventions to increase health expectancy (or reduce inequalities) remains large

# Linking to HE health policy: ideal situation



# Linking to HE health policy: actual situation



# Linking HE to health policy: challenge

Desired change in HE → ? → measusres/interventions

measures/interventions → ? → Change in HE

The link between interventions and HE is hampered by incomplete and only partial knowledge on:

1. determinants of a long healthy life and reduction of years in ill health
2. effects of existing and potential interventions/policy measures on HE

Effects on <u>unhealthy years</u> are hard to predict: opposite effect of:

- mortality reductions: extend years with disability
- morbidity reductions: reduce years with disability

# By-passes to link HE to policy

1. HE comparisons of subpopulations
2. Attribution and decomposition tools to assess where observed (unfavourable) trends or gaps in health expectancies originate
3. ‘What-if’ scenarios to assess of the impact of changes in risk factors on health expectancies.

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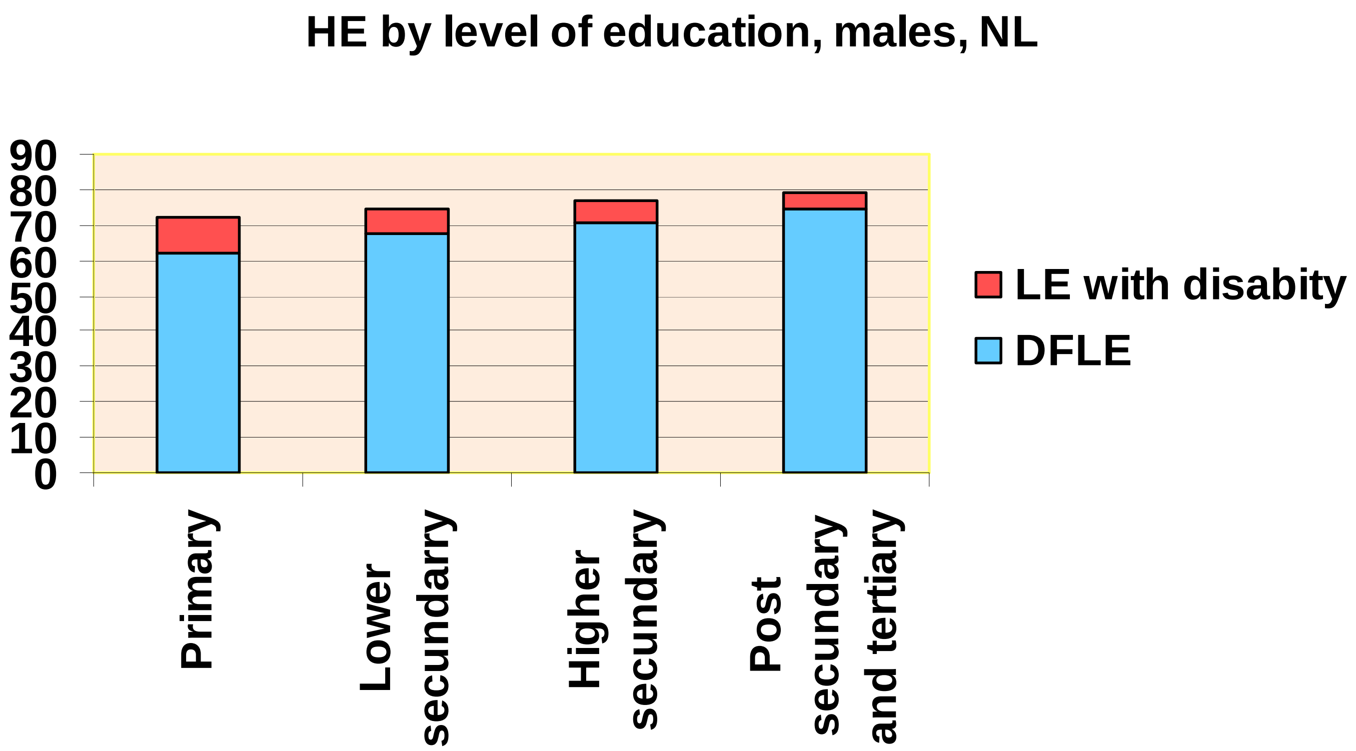
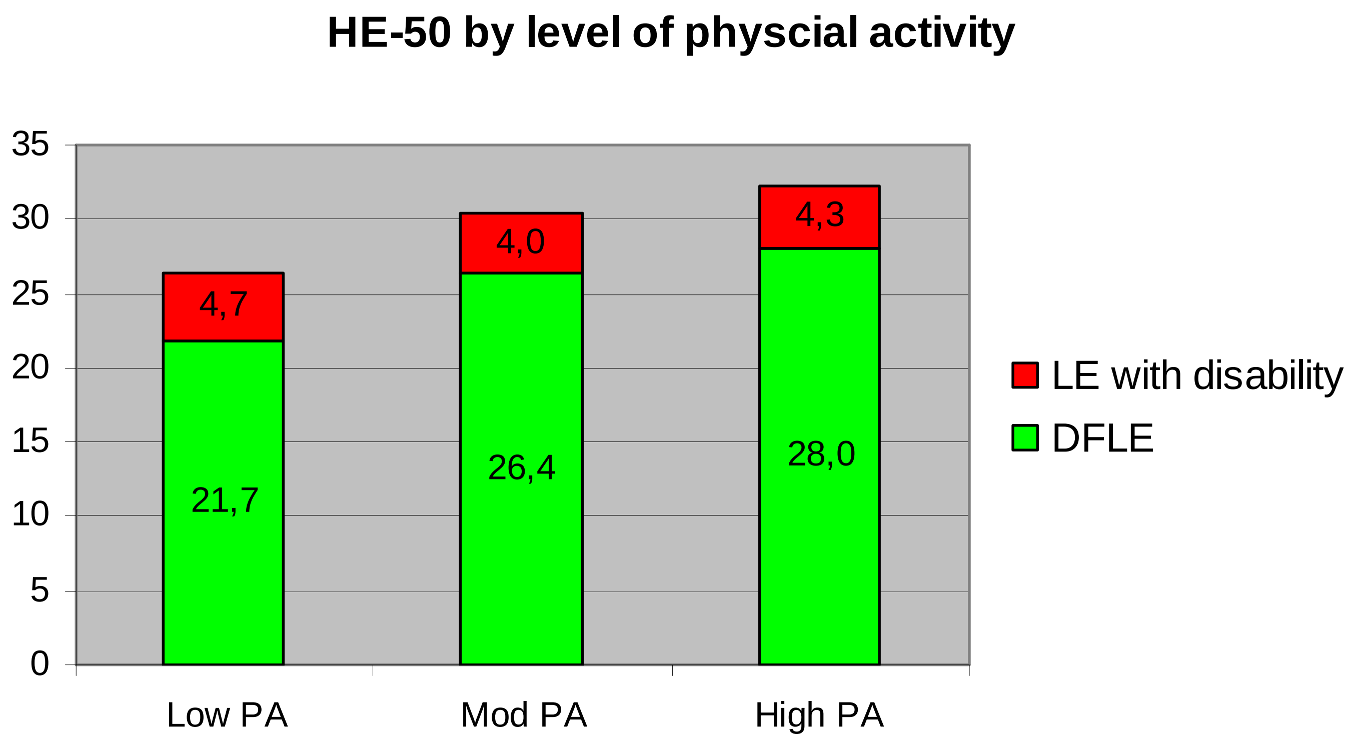
# HE comparisons of sub-populations: SES




Souce: Statline

# HE comparisons of sub-populations: life style




**Source: own calculations based on GLOBE study**

# HE comparison of subgroups: evaluation

1. Shows variations in HE within the population
    - Crucial for monitoring gaps (e.g. SES groups)
    - Can be applied in combination with decomposition tools

2. Shows expected direction of change in HE due to intervention targeting the factor
    - E.g. direction of effect on HE if entire population would be highly physically active
    - Caution: depending on place of factor in causal chain, you may have to correct for other factors (confounders, not intermediates!)

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# Decomposition and attribution

**Decomposition of SES disparity in DFLE by kind of effect, Belgium, age 30**

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | **LE** | **DFLE** | **LED** | **LE** | **DFLE** | **LED** |
| Low education | 44.0 | 27.3 | 16.7 | 50.4 | 24.9 | 25.5 |
| High education | 47.6 | 35.3 | 12.3 | 52.9 | 30.7 | 22.2 |
| Difference (H-L) | 3.6 | 8.0 | -4.4 | 2.6 | 5.9 | -3.3 |
| Due to mortality | 3.6 | 1.5 | 2.1 | 2.6 | 0.6 | 2.0 |
| Due to disability | 0.0 | 6.5 | -6.5 | 0.0 | 5.3 | -5.3 |

**Source : Nusselder et al, 2005.**

# Decomposition and attribution

**Decomposition of SES disparity in DFLE by cause, Belgium, women**

**Age 30**

| | Mort. | Disab. | Total |
|---|---|---|---|
| Total difference in DFLE | 0.6 | 5.3 | 5.9 |
| Due to | | | |
| Cancer | 0.1 | 0.4 | 0.5 |
| Heartdisease/stroke | 0.2 | 1.4 | 1.6 |
| asthma/COPD | 0.0 | 1.5 | 1.5 |
| Diabetes mellitus | 0.0 | 0.7 | 0.7 |
| Back complaints | 0.0 | -0.2 | -0.2 |
| Arthritis | 0.0 | 2.2 | 2.2 |
| Other diseases | 0.2 | 0.2 | 0.3 |
| Background | 0.0 | -0.8 | -0.8 |

Source : Nusselder et al, 2005.

# Decomposition and attribution

## Family of decompositions

| | Causes of death | |
|---|---|---|
| Disability | No | Yes |
| No information | LE difference by age | + LE difference by cause |
| Prevalence | HE difference by type of effect | + HE mort effect by cause of death |
| | HE difference by age | + HE difference by cause of death |
| By cause (attributions) | + HE difference disability effect by cause of disability<br><br>LE with disability by cause (of disability) | + HE difference by cause (death and disability) |

# Decomposition and attribution: evaluation

- Decomposition by type of effect shows part due to mortality vs. part due to disability
- Further decomposition by age shows age groups where gaps/changes occur

  -> may point at determinants

  -> may target interventions to specific age ranges
- Further decomposition by cause shows which diseases (cause of death and disability) explain trends and gaps

  -> may point at determinants
- Attribution of disability by disease shows which diseases are causing the disability change or gap

  -> difference in prevalence of disease

  -> difference in disabling impact

# By-passes to link HE to policy

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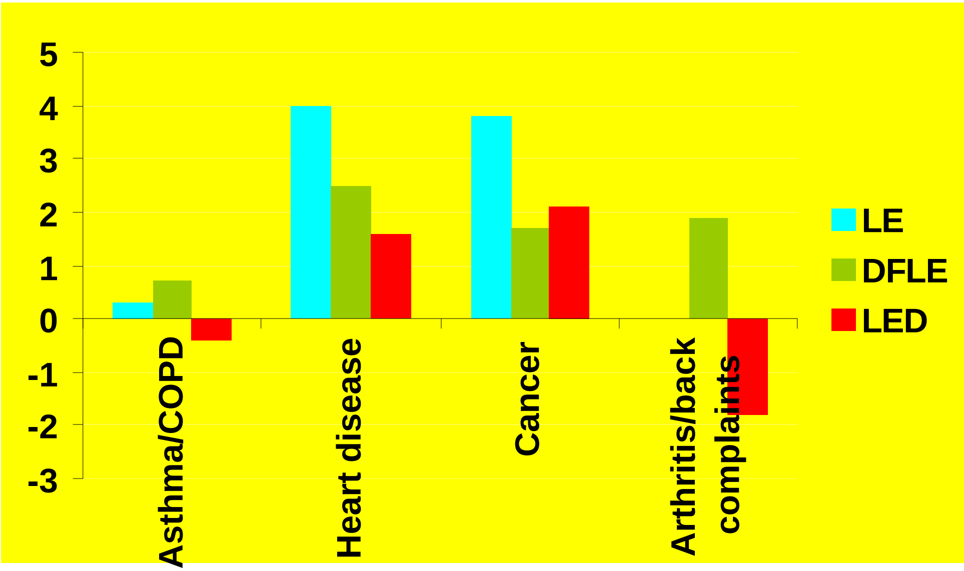
# What-if scenario's: disease-elimination

## Change in LE, DFLE and LED because of elimination of specific disease




Eliminating diseases that are:

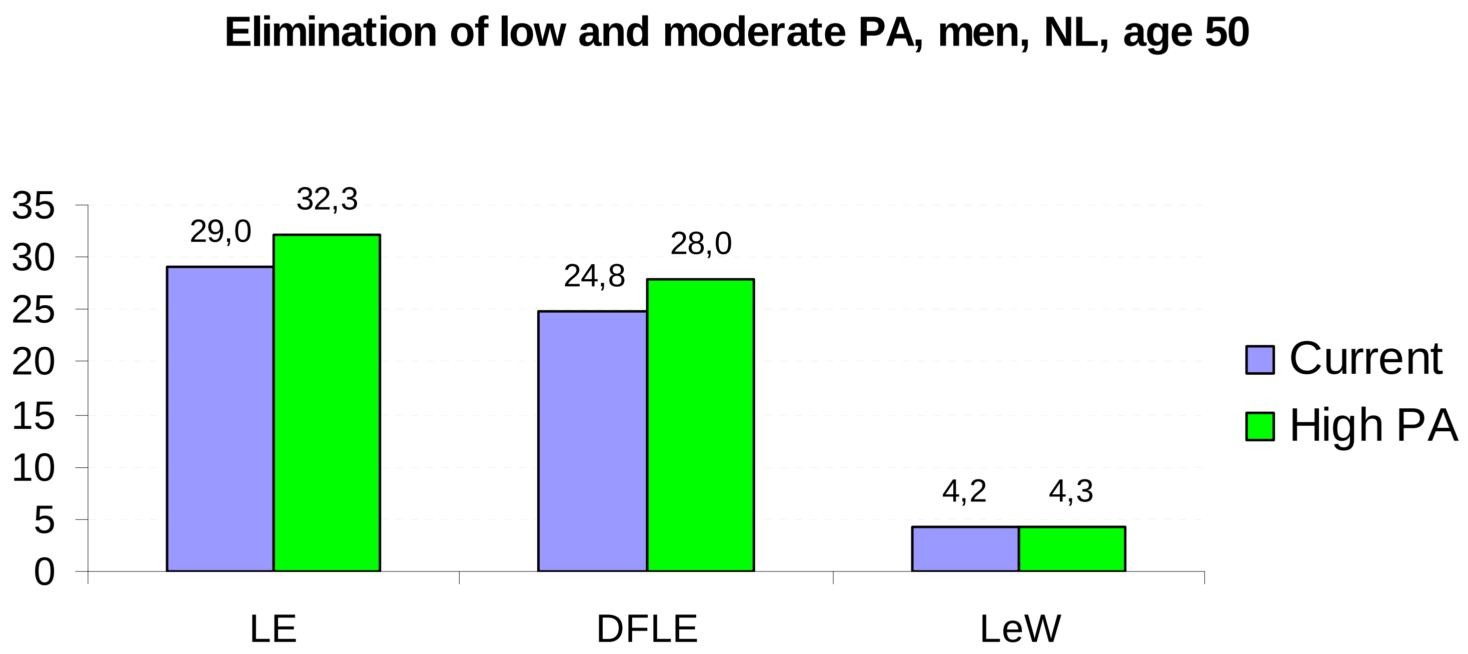
- disabling: reduction LE with disability

- fatal: expansion LE with disability

- both disabling and fatal: depends on the extent to which they cause mortality and disability

**Source : Nusselder et al, 1994.**

# What-if scenario's: elimination not-high PA




| Age 50 | Befre | | Elimination low and moderate |
|---|---|---|---|
| • LE: | 29.0 | -> | 32.3 |
| • DLFE: : | 24.8 | -> | 28.0 |
| • LeD: | 4.2 | -> | 4.3 |

# What-if scenario's: evaluation

Illustration: elimination of unhealthy risk factor exposure/ disease exposure based on life table model

- Elimination: shows maximal potential effect of intervention (100% reduction); also possible to model more realistic changes (less than 100% reduction)
- Life table: steady-state, no time, no real population structure Also possible to use dynamic life table model or dynamic model with real population structure
- What if effect of change in risk factor exposure/disease exposure. This can be extended to specific interventions/policy measures, using information of effect intervention on risk factor exposure

# Limitations

All by-passes are modeling exercises:

- Extrapolation beyond observations
- Often combine information from different data sources
- Causal effect risk factor on mortality, disability hard to establish from available evidence (no RTC, reverse causation)
- Translation required of expected effect of intervention on risk factor exposure (tax on smoking -> reduction in % smokers)

Evidence base should be extended

- Also to further improve the by-passes

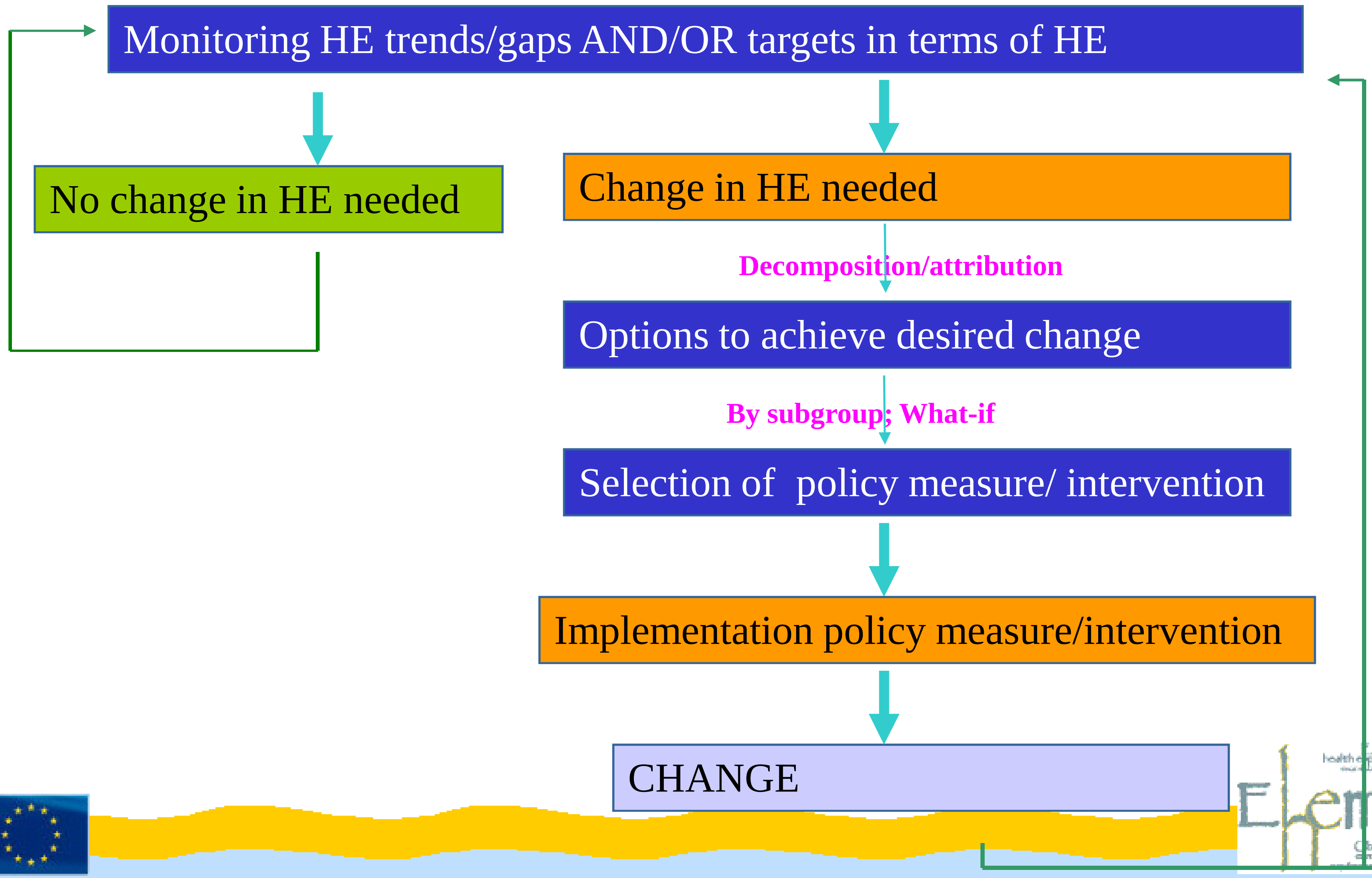
# Conclusion

Using by-passes improves linking HE to interventions/policy options

- Indication of possible options to achieve desired change:
  - HE by subgroup (descriptive) shows variations within the population
  - (Next) decomposition and attribution indicates from where observed (unfavorable) gaps/changes in HLY originate (mortality vs. disability, age groups, causes)

- Selection of best policy measure/intervention:
  - HE by subgroup: crude idea of direction
  - What-if: RF elimination: maximal effect
  - What-if: PIF: more realistic effect RF change
  - What-if: Dynamic model: realistic effect RF change, real population
  - What if : Intervention: Dynamic model: effect intervention/policy measure, real population

# By-passes to link HE to health policy



# EHLEIS Team

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isp wiv  
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University of Leicester  
INED Institut national d'études démographiques  
EHEMU European health expectancy monitoring unit

# What-if scenario's: future plan

DYNAMIC simulation tool to assess the effect of changes in risk factor exposure: what if or due to specific interventions/policy measures on LE and HE

- HE both per year (Sullivan) and cohort
- Dynamic: time
- Intervention: success rate of intervention; particular ages

Extension of DYNAMO-HIA tool

- Real population by age and sex
- Disability prevalence by age and sex
- Mortality by age and sex
- Risk factor exposure by age and sex

- OR linking risk factor exposure to disability
- RR linking risk factor exposure to mortality
- LE and HE are possible outcomes