



# Modelling health outcomes of prevention measures for NRW: potential health gains due to reduced obesity and overweight

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## Background

DYNAMO-HIA identified as a potential tool for quantitative HIA

→ Feasibility testing and adaptation to NRW situation



# DYNAMO-HIA

- Free available software
- Developed by EU consortium coordinated by Erasmus MC und RIVM (NL)
- download incl. extensive documentation  
[www.dynamo-hia.eu](http://www.dynamo-hia.eu)

**DYNAMO-HIA**  
a Dynamic Model for Health Impact Assessment

My DYNAMO-HIA Home

**Welcome to the DYNAMO-HIA website**

**Dynamic Modelling for Health Impact Assessment**

On this website you will find information about the DYNAMO-HIA project

**Aim**

The aim of the DYNAMO-HIA (DYNAMIC Model for Health Impact Assessment) was to develop a web-based tool to assess the health impact of policies. This tool can be used to quantify the health impact of policies in the European Union (EU) through their influence on health determinants

**Results**

The software developed in the project can be downloaded from this website

Also the user-manual and a detailed description of the calculations inside the program can be downloaded, as well as all presentations made during the project

**Funding**

DYNAMO-HIA was funded by the EU Public Health Programme 2003-2008 of the European Commission's Directorate General for Health and Consumer Affairs (DG SANCO), with co-financing from the Erasmus Medical Center Rotterdam, the Institute of Public Health and the Environment in the Netherlands, the Catalan Institute of Oncology, the International Obesity task force, the London School for Hygiene and Tropical Medicine, the Haughton Institute in Dublin and the Instituto Tumori in Milan.

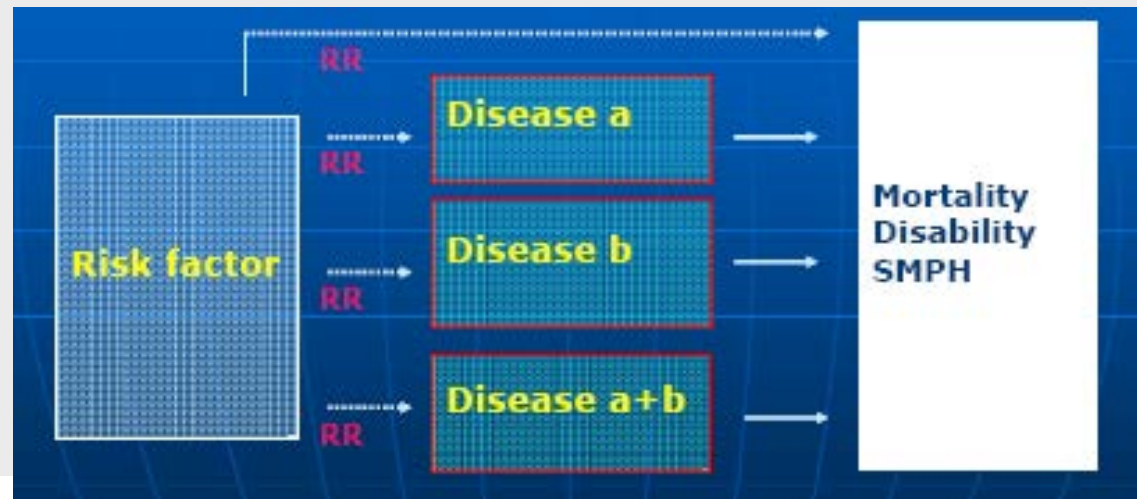
Erasmus MC  
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DEI TUMORI  
ICO  
Institut Català d'Oncologia  
iaso

Dynamo-Hia website, version 0.91



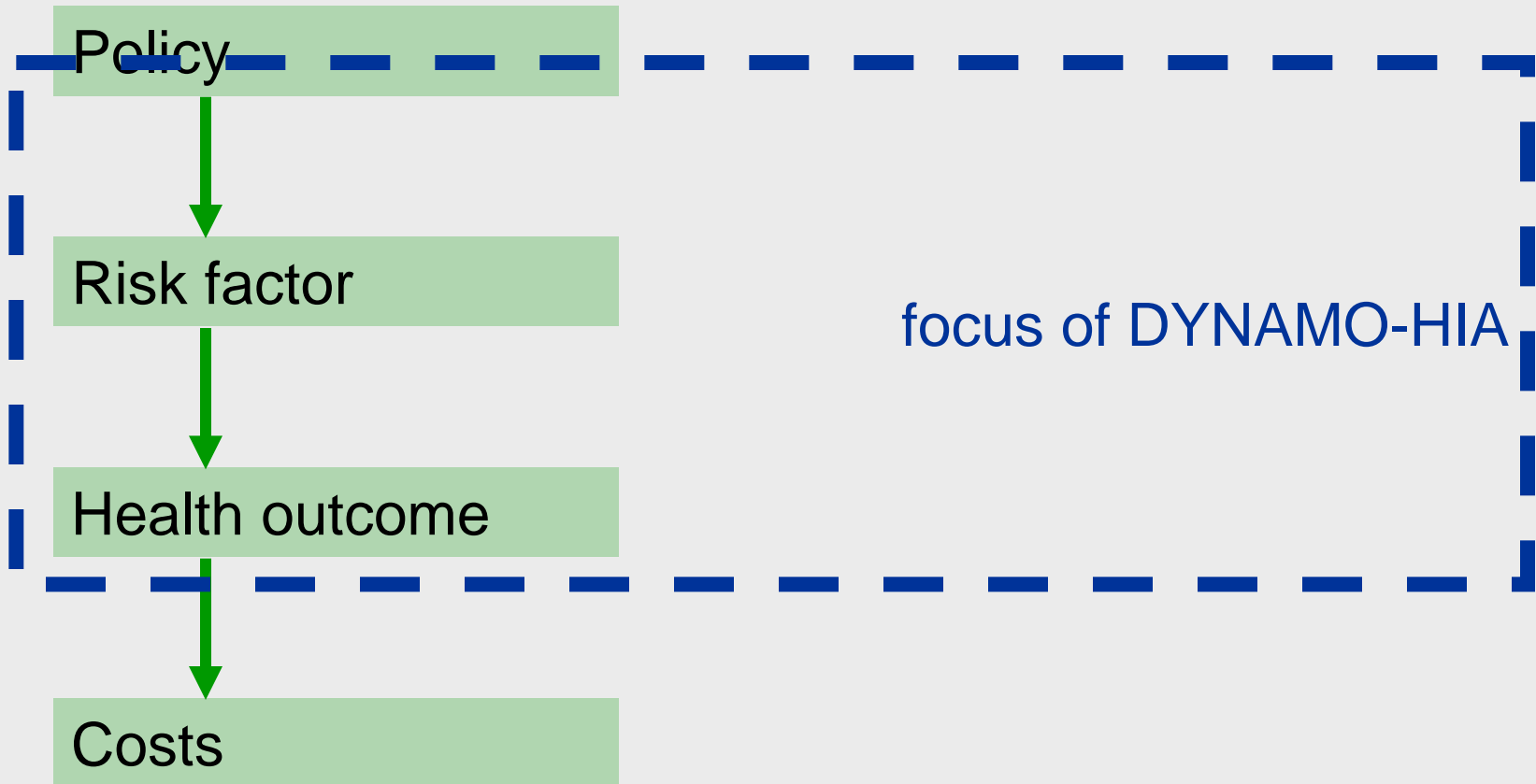
## Basics DYNAMO-HIA tool

- **Projects** the **effects of changes** in **risk factor** exposure due to policy measure or intervention on disease-specific and summary measures of population health
- **Organizes** and stores necessary input data
- **Synthesizes** according to standard causal epidemiological pathway  
(Nusselder / Boshuizen, 2011)





# 'Full chain' of quantifying health impacts





## DYNAMO-HIA – 2

- simulates a **real life** population **through time**
- is based on epidemiological evidence + available data
- provides large set of outcome measures
- is publicly available + no programming skills needed
- data are included for large set of EU countries



## DYNAMO-HIA – 3

### Type of data

- Population numbers
- Newborns (optional)
- Incidence, prevalence and mortality for relevant diseases
- All-cause mortality
- All-cause disability (optional)
- Exposure distribution of risk factors
- RRs linking exposure to health outcomes

### General

- All data by single-year of age (0-95 years) and sex
- Flexibility in choice risk factor exposure, disease type and transitions between risk factor states



## Basic input data

### Population data

- **Counts 0-95 yrs (2009)**
- **Newborns (2009)**
- Overall daly weights, single year in % (optional)
- **Overall mortality, single year in %**

**bold: NRW data**

Risk factors: Alcohol, **BMI**, smoking

- **Prevalence**

### 9 Diseases

- Prevalence
- Incidence
- DALY weights (optional)
- Excess mortality
- Relative Risk from risk factor
- Relative Risk from diseases
- Breast cancer
- Colorectal cancer
- Esophageal cancer
- Lung cancer
- Oral cancer
- COPD
- Diabetes
- IHD
- Stroke





## BMI categorisation (WHO)

Normal weight	$< 25$	
Overweight	$25 - < 30$	kg / m <sup>2</sup>
Obese	$\geq 30$	



## Body Mass Index (BMI) – data sources for NRW

age	source	methodology	region	year	sample size
0 - 3					
4	kindergarten examination	measured data	NRW	2010	11 765
5 - 6	school-entrance examination	measured data	NRW	2011	141 125
7 - 13					
14 - 15	school-leaving examination	measured data	NRW	2010	5 177
16 - 17					
18 – 75 and older	multiple	self-reported	NRW	2009	

by sex



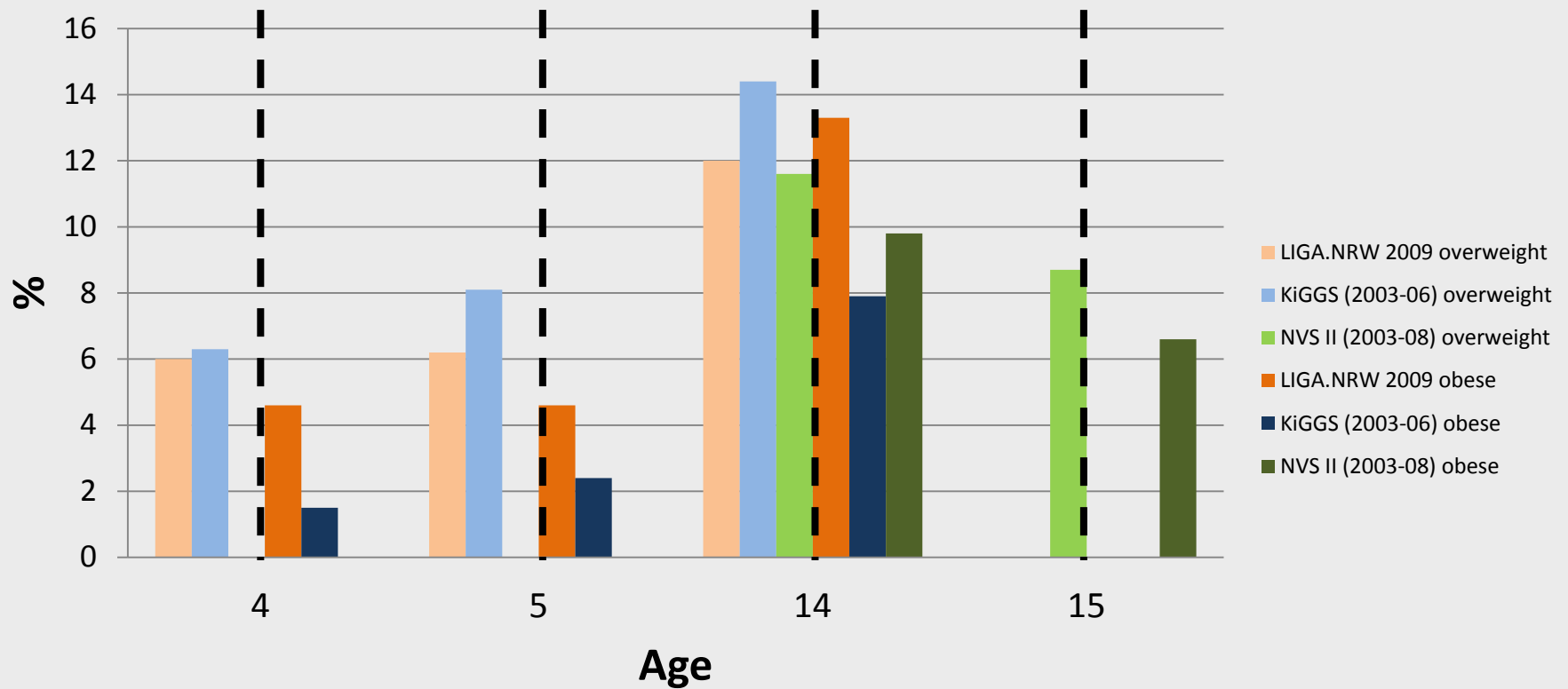
## Body Mass Index (BMI) – data sources **Germany**

<b>age</b>	<b>source</b>	<b>methodology</b>	<b>level</b>	<b>year</b>	<b>sample size</b>
3 months - < 17	KiGGS	measured data	Germany	2003 – 2006	17 158
14 - < 17	NVS II	measured data	Germany	2003 – 2010	11 765

by sex and age (per year)

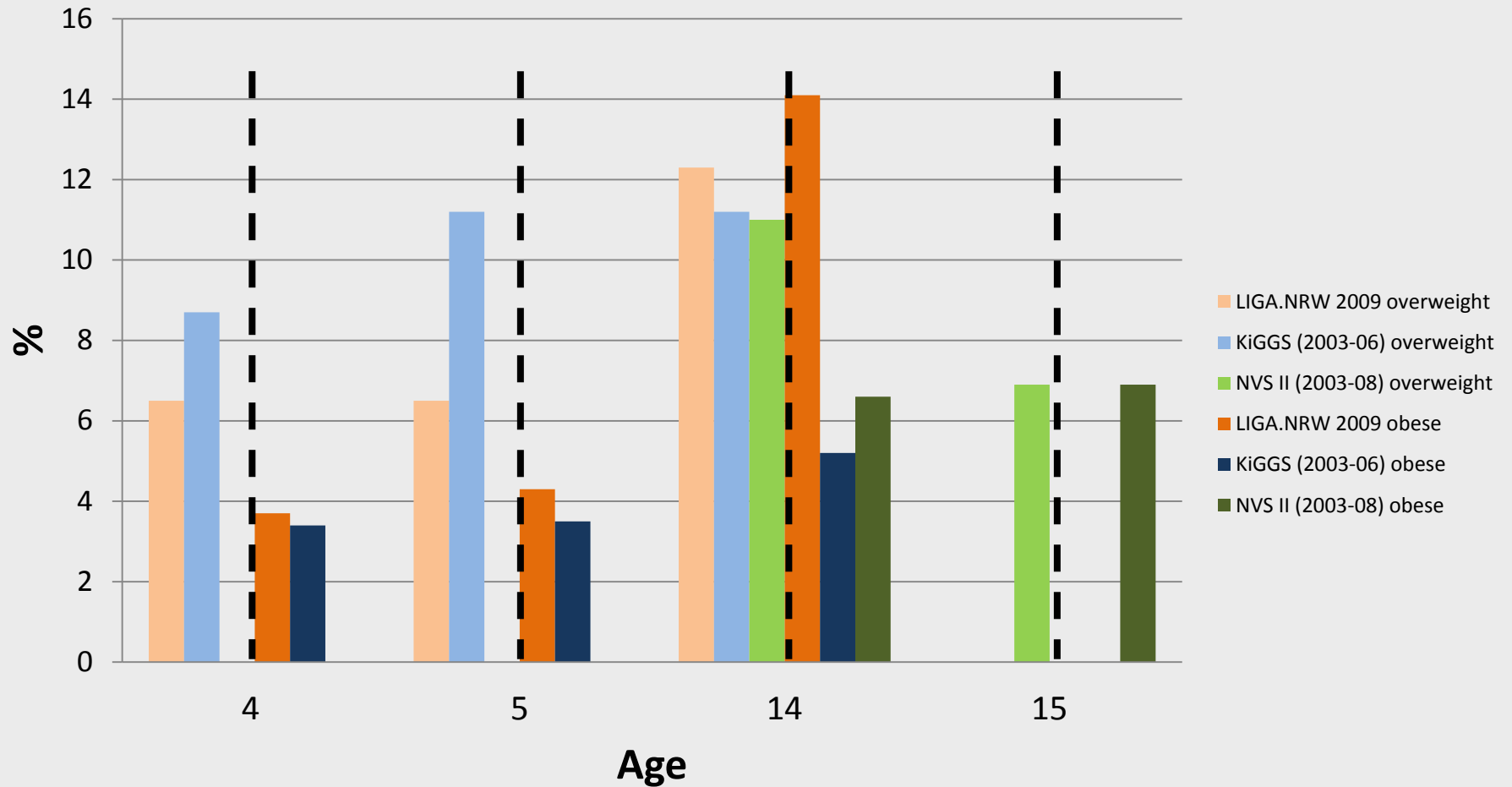


# Comparison BMI – boys





# Comparison BMI – girls





## Body Mass Index (BMI) – data sources NRW: adults

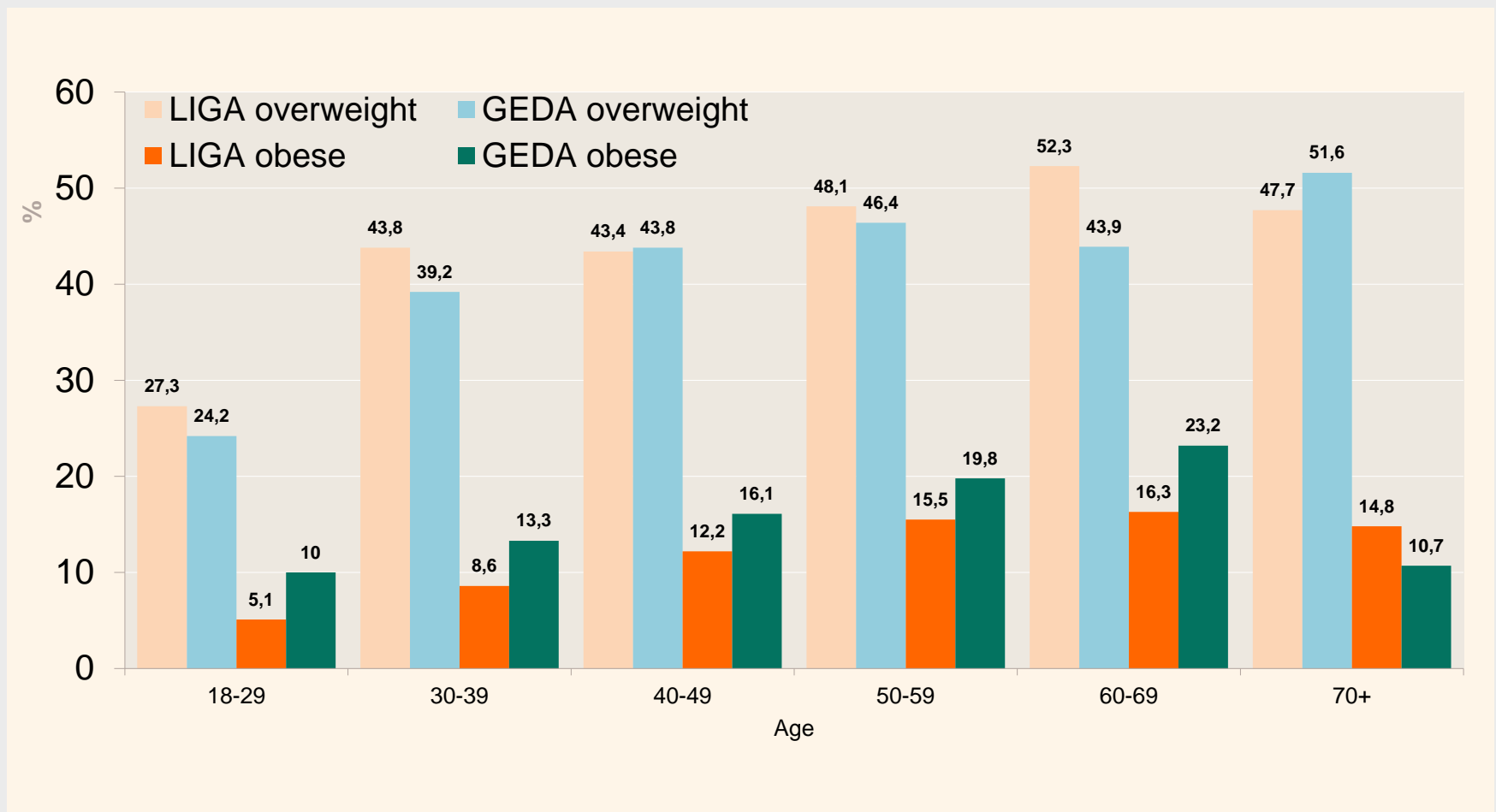
source	methodology	sample size
NRW Mikrozensus 2009	face-to-face interview; self-reported data	1% NRW Population n = 179 622
NRW Survey 2009	telephone interview; self-reported data	n = 2 006
GEDA NRW / RKI 2009	telephone interview; self-reported data	n = 4 496

## Germany (DYNAMO-HIA integrated data set)

NVS II	measured data	n = 13 207
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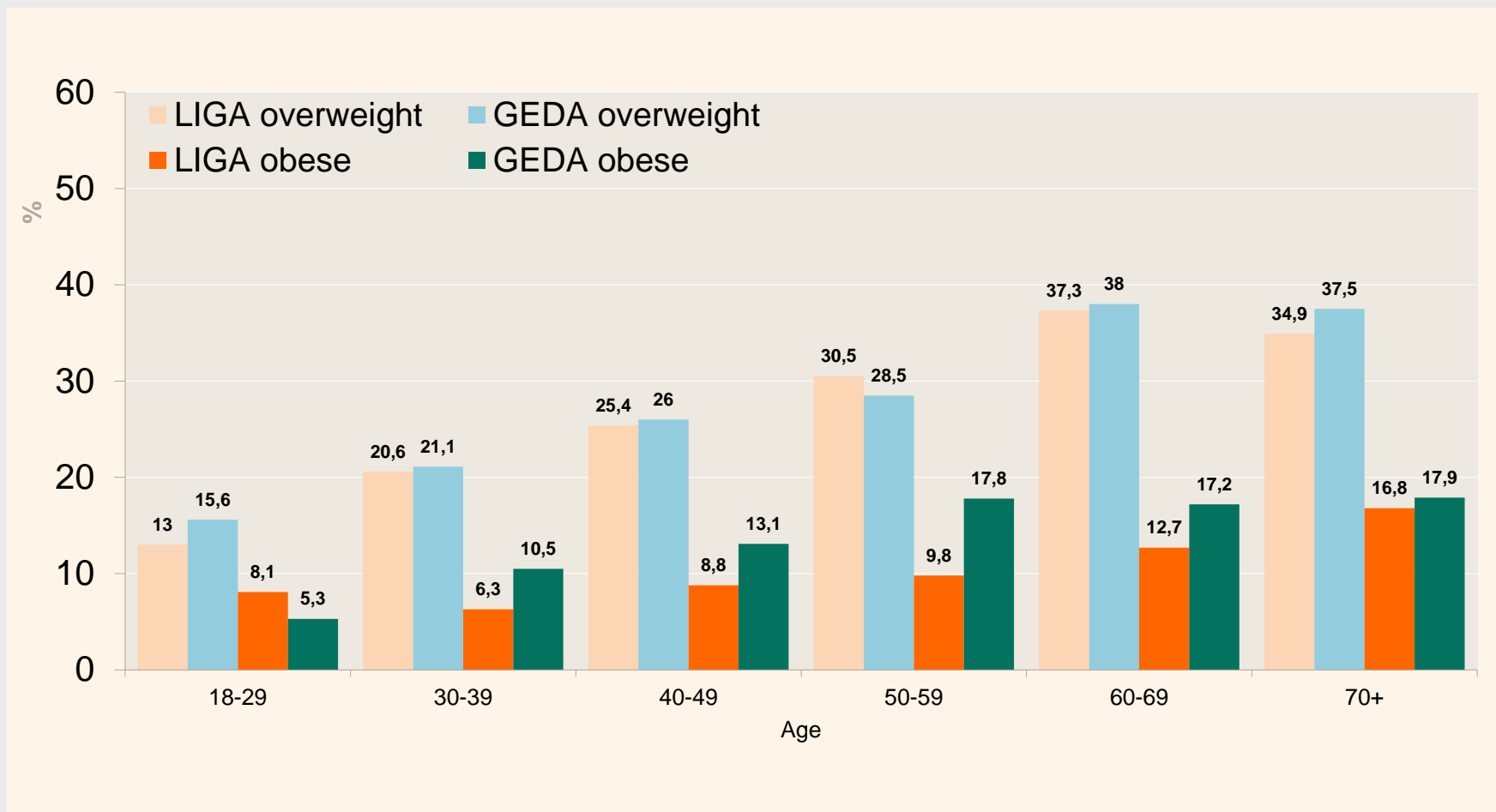


## Comparison BMI – LIGA vs. GEDA (2009): male adults NRW





## Comparison BMI – LIGA vs. GEDA (2009): female adults NRW







## Selection BMI data for NRW

### Criteria

- High quality
- NRW relevance
- Sample size
- All age groups, preferably by year
- Recent
- Corresponds to RR function

### Selection

- Children: KiGGS data
- Adults: GEDA NRW sample



## Scenarios

- Reference scenario: BMI prevalence as in 2009; 5 diseases: IHD, stroke, diabetes, colorectal cancer, breast cancer

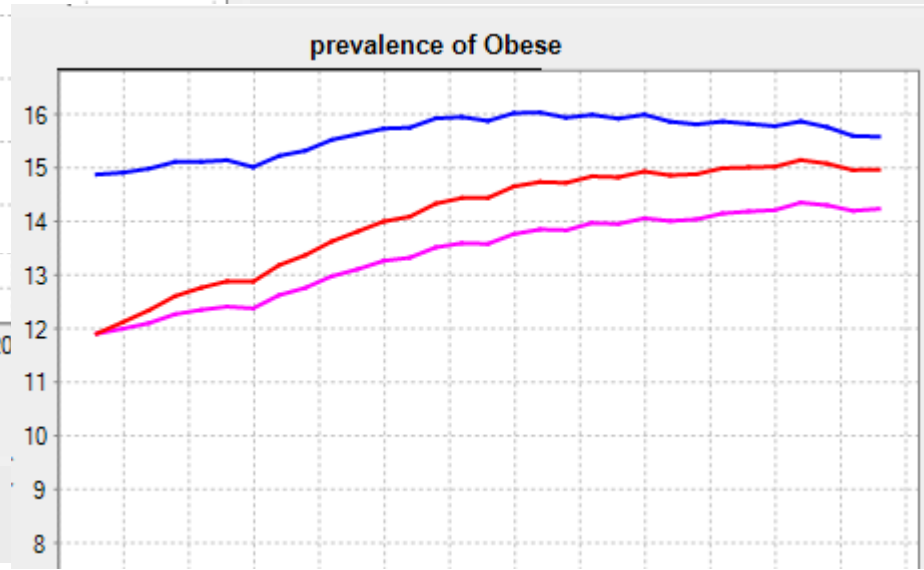
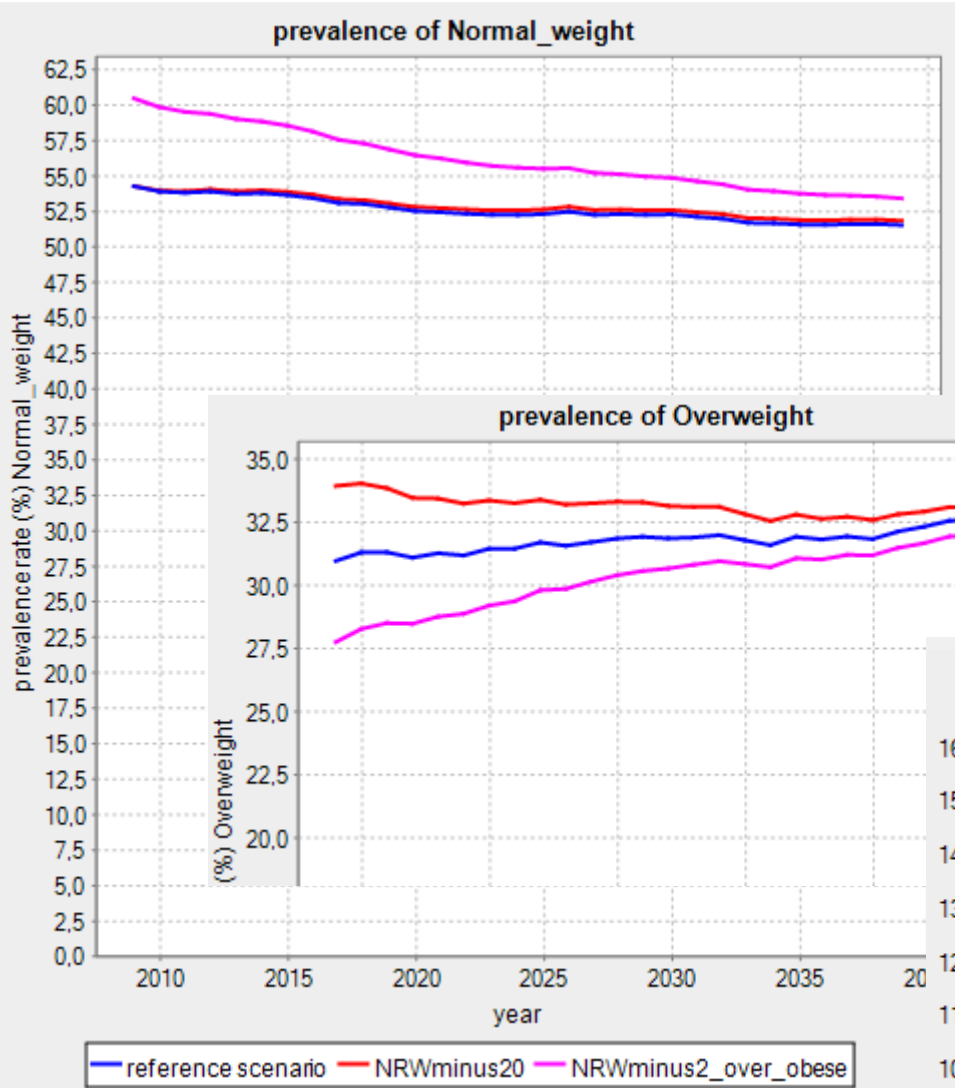
### Alternative scenarios

Knowledge about the quantitative effectiveness of interventions regarding reduction of obesity/overweight is scarce

- Scenario 1: reduction of the prevalence rate of obesity with 20% over all age groups
- Scenario 2: reduction of the prevalence of obesity **and** overweight with 20% over all age groups

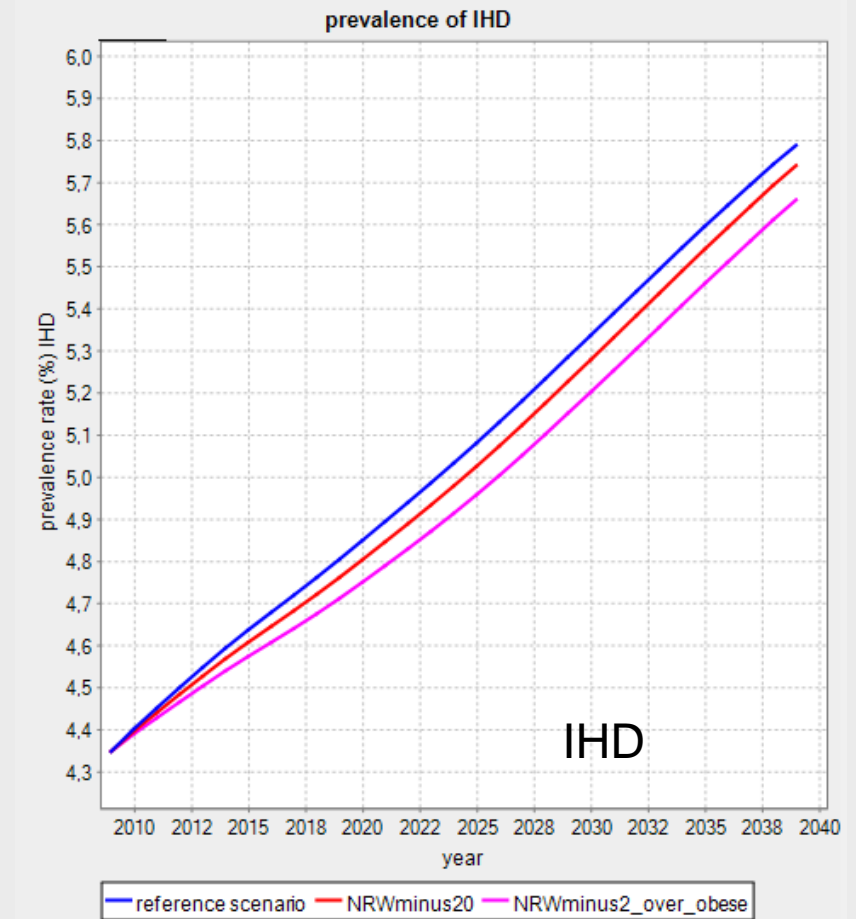
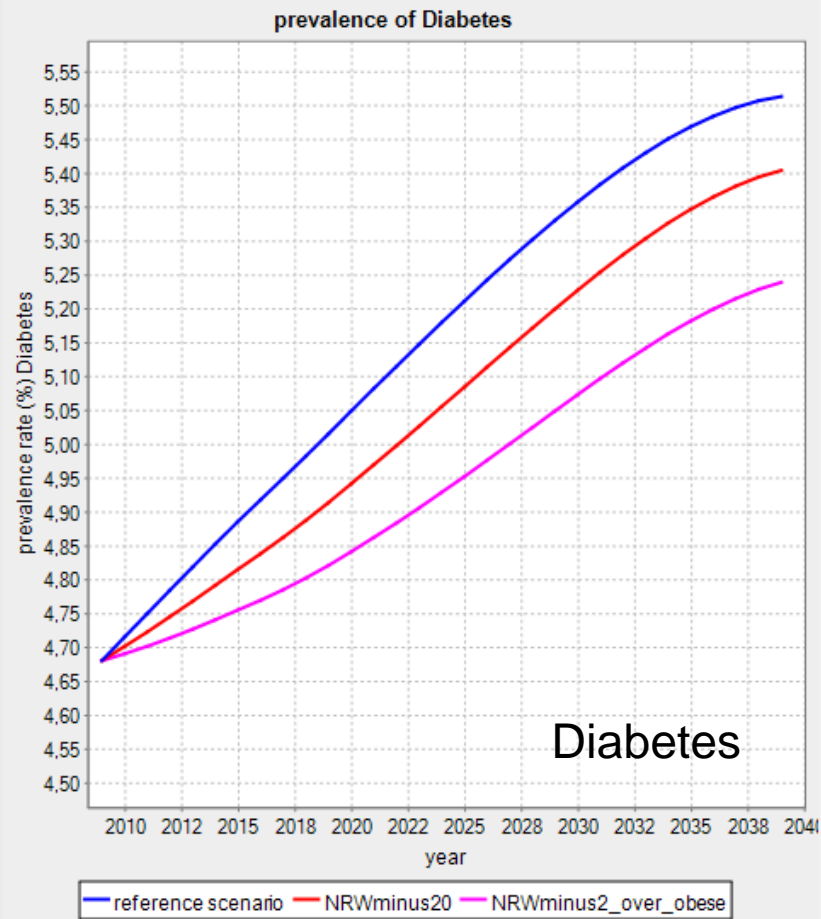


# Results





# Results – prevalence





## Discussion – 1

### Strengths of DYNAMO-HIA

- Free available
- Contains already a rich set of quality assured data (national level)
- Extensive documentation and training material
- Complex epidemiological model(s) implemented
- Life course approach incl. transitions between risk factor states
- Own risk factors and other diseases can be included
- Effects of interventions / policies can be modeled by comparing scenarios



## Discussion – 2

### Challenges

- Availability of high quality input data
- Assumptions are necessary, also for overcoming missing data
- Construction of scenarios outside of DYNAMO HIA
- Data analysis and processing of input data outside of DYNAMO HIA
  
- Scenario modelling applied on meta level; more realistic scenarios will follow
- Comparability of prevalence estimates for NRW / Germany
- Sensibility analysis of input data
- Expansion of further risk factors (e.g., physical activity) and diseases



## Conclusion

- DYNAMO-HIA can be adjusted to NRW situation
- Allows comparative analysis of different interventions / policies on population health by scenario analysis („what-if“) for estimating prevention potentials and health impacts
  
- Epidemiological knowledge is key
- Familiarisation takes time
- Expansion of further risk factors (e.g., physical activity) and diseases possible and planned



# Contact

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Innovation in Health

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