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Modelling the economics of chronic disease with the EConDA tool and the UKHF microsimulation model

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Summary of presentation

- Introduction - EConDA project
- Obesity risk factor trends
- Microsimulation model
- EConDA tool
- Conclusions
- Questions

Introduction - EConDA project

The main project **objectives** were to:

- seek consensus among relevant experts, policy makers and international organisations on the **methodology for measuring cost-effectiveness of interventions**
- **develop a demonstration model and tool** for integrated approaches to address cost-effectiveness of various interventions for chronic disease prevention

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Methodology – risk factor projections

- Multivariate, **categorical non-linear regression** model applied to cross-sectional risk distribution data from HSE
- Can be stratified by **age**, **sex**, ethnicity, social class, education level, income level and geographic region
- Outputs with 95% confidence limits
- Can accommodate **new datasets** with relative ease
- Program developed in C++

BMI projections to 2050 – For 40-49 year olds in Bulgaria

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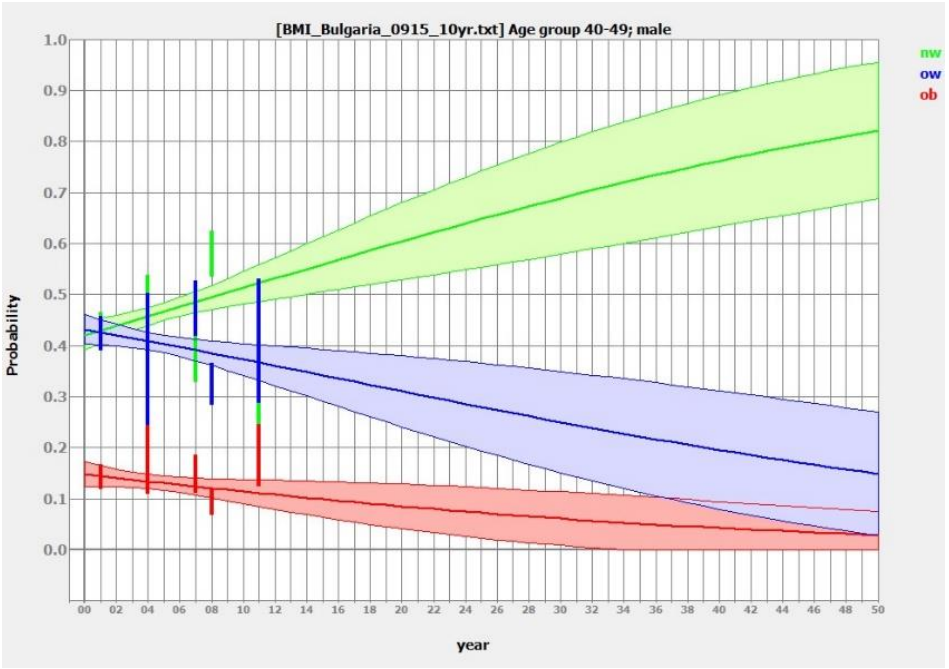
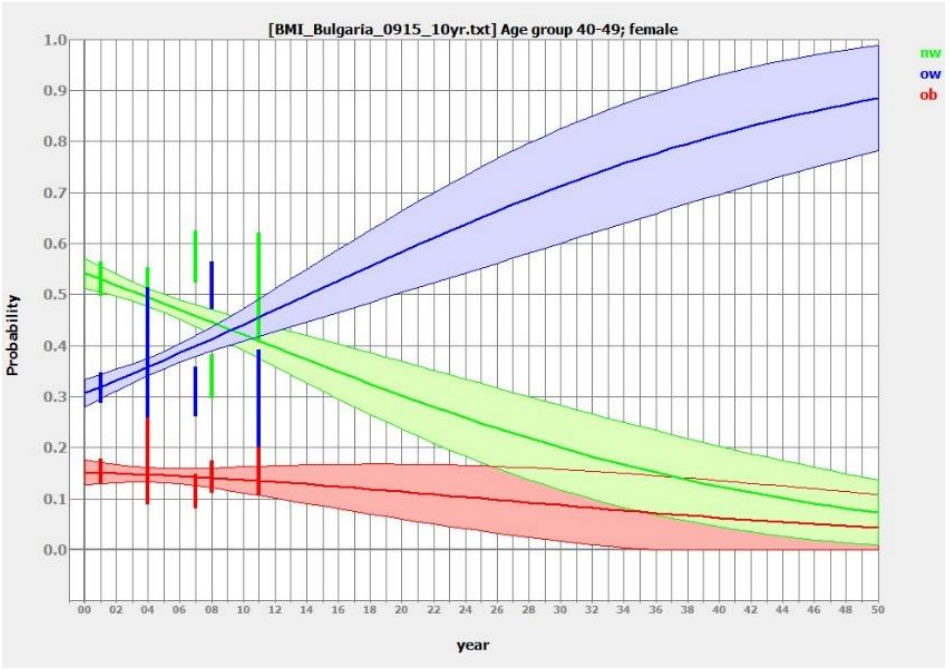
40-49 year old Males



40-49 year old Females



BMI GROUPS: BMI <25 kg/m^2
BMI 25-29.99 kg/m^2
BMI ≥30 kg/m^2

BMI projections to 2050 – For 20-29 year olds in UK

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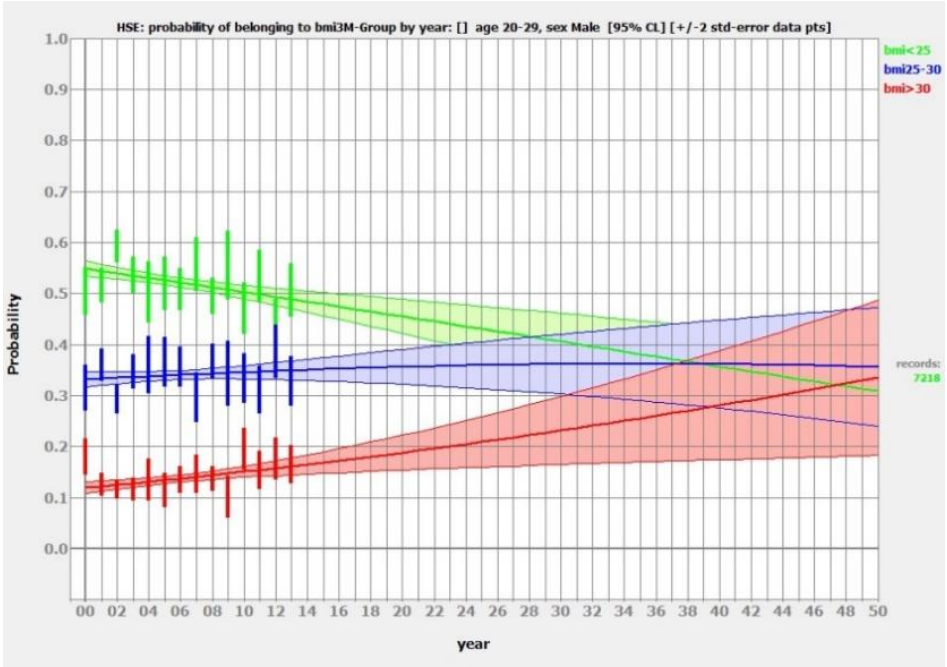
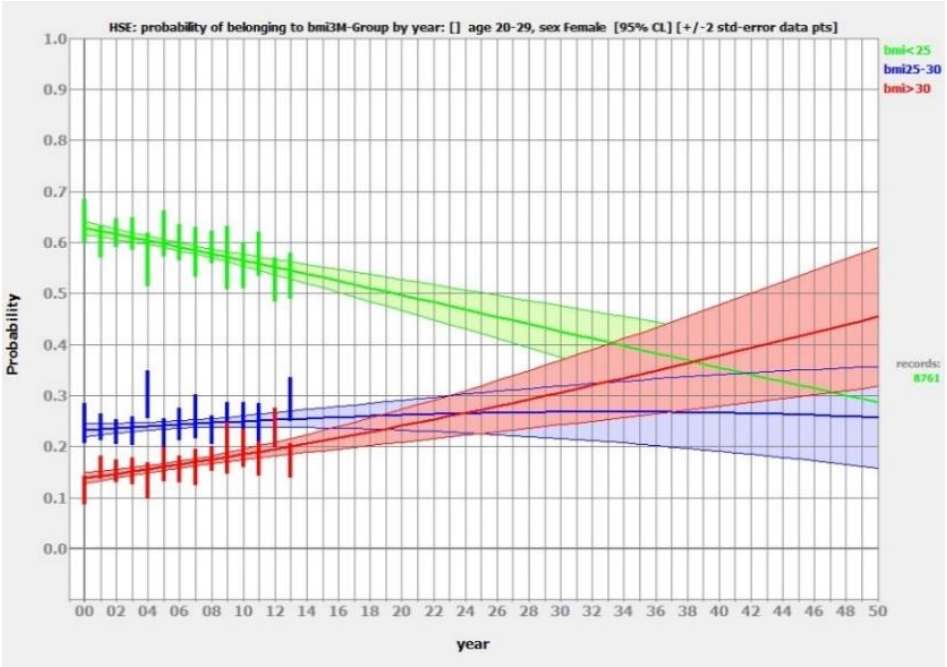
20-29 year old Males



20-29 year old Females



BMI GROUPS: BMI <25 kg/m^2
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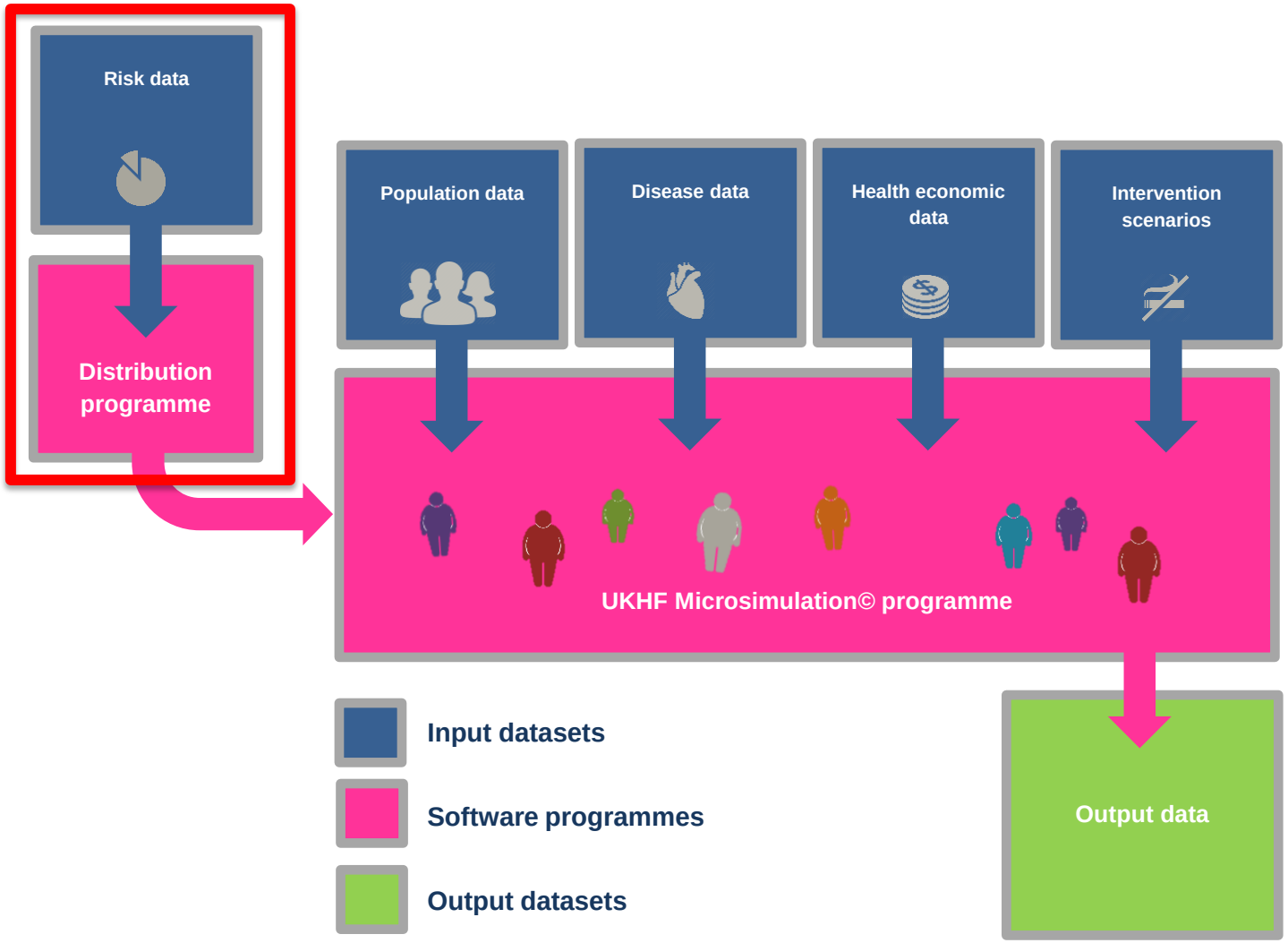
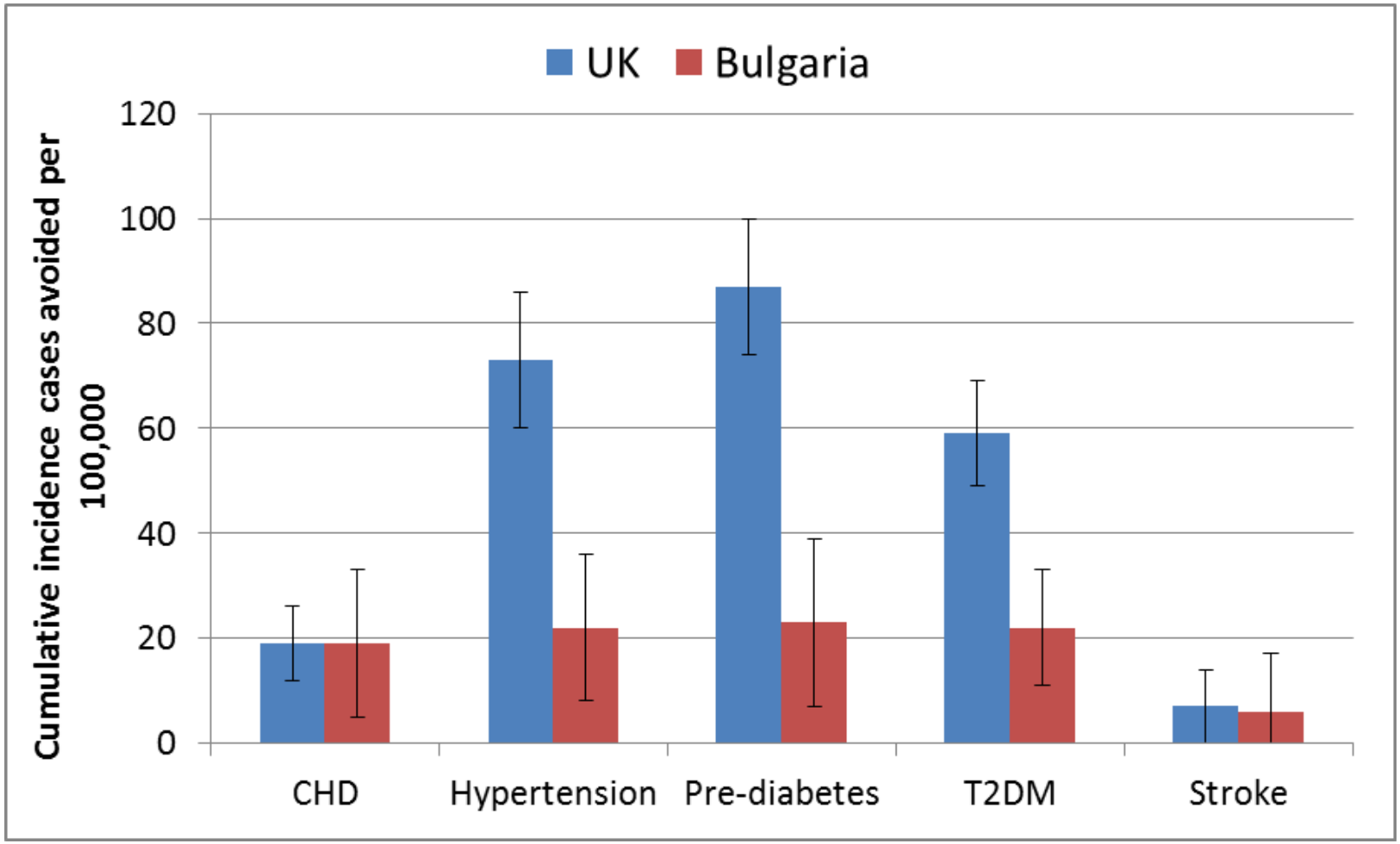
The microsimulation model



Module 2: Micro-Simulation

- Computer model of any specified **population**
- Population accurately reflects **age profiles**, **birth**, **death** and **health statistics** to make future projections
- Model specifically targets the relationship between **individuals' evolving risk factors** and **disease incidence** (number of new cases of a disease).
- Risk factor distributions are determined by predictions & specified health **interventions**
- The model can simulate and compare the **impact** and **cost** of various **public health interventions**
- Simulations for over **80 countries** and **50 US States** at present

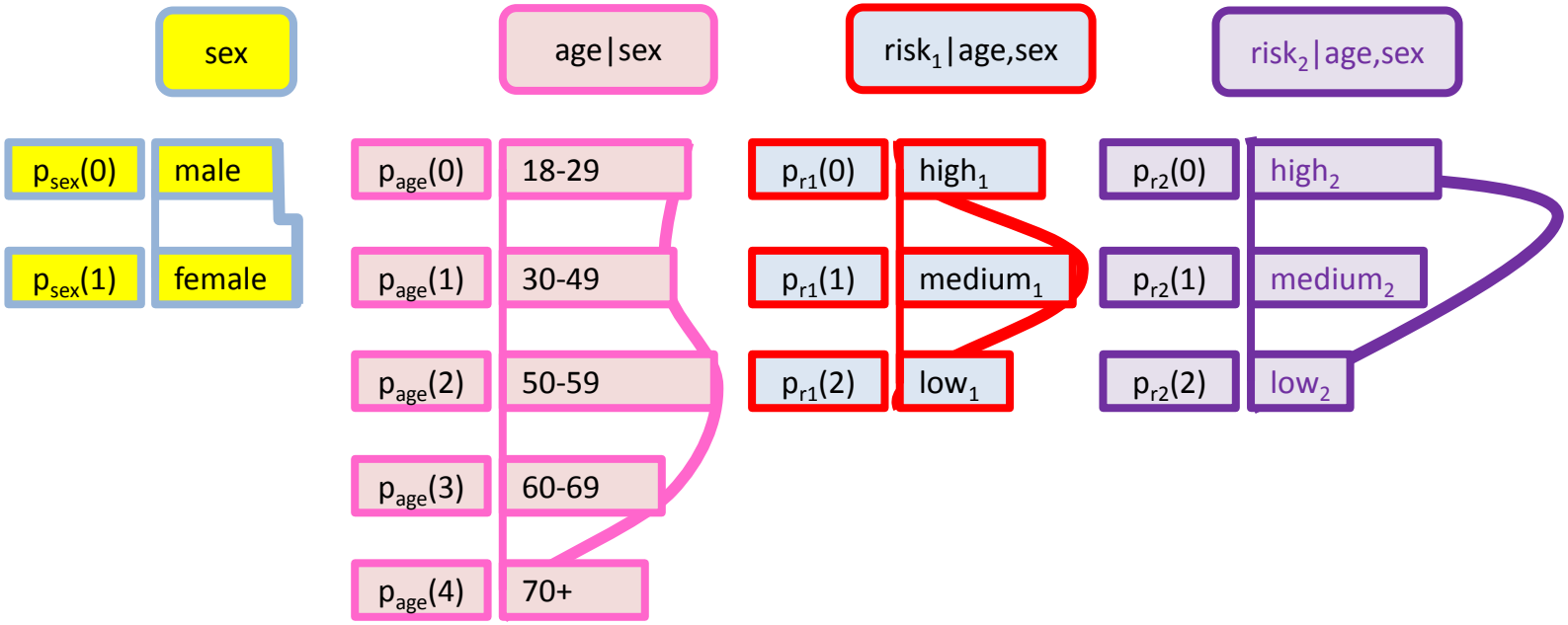
Results: 20% Sugar Sweetened Beverage (SSBs) tax intervention



EConDA tool
www.econdaproject.eu/tools

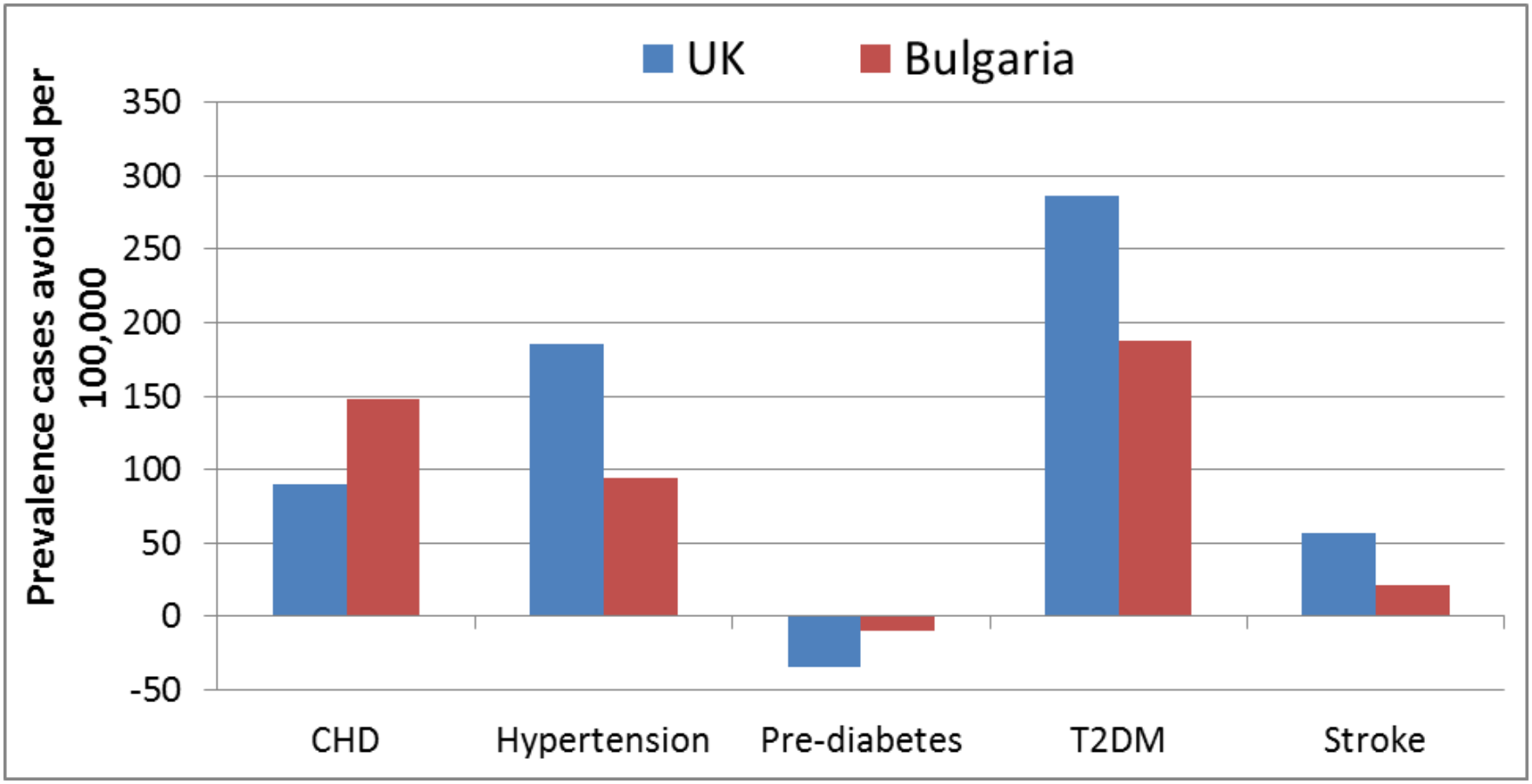
Deterministic EConDA tool – methodology

MIDRiFs System Architecture (ECONDA Tool) \ cohort structure [eg 2×5×3×3=90 people]



cohort member[i, j, k, l] weight = $p_{sex}(i) \times p_{age}(j|i) \times p_{r1}(k|i,j) \times p_{r2}(l|i,j)$ where $i \in [0,1]$, $j \in [0,4]$, $k \in [0,2]$, $l \in [0,2]$

Results: 20% Sugar Sweetened Beverage (SSBs) tax intervention



Conclusions

Model predictions can be used to quantify the impact of potential public health policies in terms of future disease and cost burden

Model assumptions and methodology may impact on the prediction.

- **Assumptions**
  - For example the effect of a SSB tax in different countries. In Bulgaria it is assumed to cause a BMI reduction of 0.01 whereas, in the UK a BMI reduction of 0.05 is assumed based on the best available data on SSB consumption.

- **Methodology (Stochastic vs. Deterministic models)**
  - **Stochastic models** contain **randomness** which reflect the real world case
  - **Multiple simulations** may produce **different results** as simulated individuals are sampled from a **distribution**
  - These models are **highly complex** and are **computationally expensive**

  - **Deterministic models** are determined by the input parameters of the model and will always produce the **same outcomes** for a specific set of parameter values.
  - These tools are often more accessible and provide **policy makers** with a **rapid evaluation** of a policy intervention

- The type of model chosen for development is dependent on the end user.

Impact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Impact

- The project made a significant impact in informing government policy in relation to the sugar sweetened beverage (SSB) tax, as well as receiving substantial news coverage.
- We were notified by the treasury of the SSB tax budget announcement as it happened.
- The obesity and cancer report has been incorporated into the NHS cancer plan.
- **Who we reached:** Health policy-makers, academics, health professionals and chronic disease alliances across the UK.

Thanks

Any questions?

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