LIFETIME COST OF CHILDHOOD OBESITY

JRC Ispra (VA), Italy. 12 – 13 November 2015

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1. EU JOINT ACTION ON NUTRITION & PHYSICAL ACTIVITY (JANPA)
EU Joint Action on Nutrition & Physical Activity (JANPA)

“To contribute to halting the rise in overweight and obesity in children and adolescents by 2020 in EU, within...”

HLG, DG Sante and CHAFEA

September 2015 - November 2017

www.janpa.eu
JANPA work packages

WP 1: Co-ordination (France)
WP 2: Dissemination (Italy)
WP 3: Evaluation activities (Greece)

WP 4: Estimating the lifetime impact & cost of childhood obesity in 7 EU countries (Ireland)

WP 5: Nutritional information (France)
WP 6: Healthy environments by integrated approaches (Hungary)

WP 7: Early interventions (Finland)
2. LIFETIME COST OF CHILDHOOD OBESITY: JANPA WP 4
Objectives of JANPA WP 4

“To develop the evidence-based economic rationale for action on childhood obesity”

In seven EU MSs:

1. Describe the lifetime impact & cost of (present-day) childhood obesity
2. Breakdown these impacts and costs by year of occurrence
3. Assess benefits of reducing childhood obesity by 1% & 5%

Based on an adaptation of Foresight Obesity Model
Lifetime cost of childhood obesity: challenges

Childhood impacts rarely included in obesity costing studies

Many impacts do not occur until later life

Many obese adults were not obese children but those who were are at greater risk of adult diseases (Juanola et al)

But direct evidence linking childhood obesity & adult impacts is complex & scarce

Some promise in a number of long term linked longitudinal studies
Lifetime cost of childhood obesity studies

- RRs
- Obesity-related diseases
- Obesity treatment & deaths
- Adjusted QOL measures & costs
- Deaths from other causes

Legend:
- Forecast of (sex - age) population BMI distribution
- Individual BMI trajectory
Example 1: Finkelstein et al

Synthesis of six US studies of lifetime medical costs

Incremental lifetime per capita (direct) medical cost: obese 10 yo compared to healthy weight 10 yo

Modified results of six short-listed studies

Significant variation in methodology

US $12,660 – US $19,630 (adjusted for usual weight gain)
US $16,310 – US $19,350 (unadjusted)
Recommended US $19,000

Highlighted need for estimates of indirect costs
Example 2: Sonntag et al

Used three German cross-sectional data sources (national surveys of children, adolescents and adults)

Estimated transition probabilities of moving between BMI categories at different ages

Simulated lifetimes BMI trajectories for HW children and OW/OB children separately

Ran simulations and estimated lifetime excess costs by taking differences
Example 3: Foresight Obesity Model

μsim \{ \text{population, risk, disease, intervention, cost} \}

\{ \text{age, sex, class, ..., risk factors, risk history, disease history} \}

Simulated People

Output

This presentation is part of the Joint Action JANPA (Grant agreement n°677063) which has received funding from the European Union’s Health Programme (2014-2020)
Proposed approach

• Incidence-based approach
• Based on an adaptation of Foresight Obesity Model
• In 7 EU MSs but will assess generalisability to rest of EU
• Societal perspective: other as well as health impacts

Possible adaptations:
• Range of impacts: childhood as well as adult impacts,
  Simulation of lifetime BMI trajectories
• Generation of lifetime health impact trajectories
• Incorporation of other impacts
Participating Member States
Data requirements

• Relative risks of each obesity-related impact
• Population profiles and projections
• BMI data
• Incidence of health impacts – morbidity & mortality
• Incidence of other impacts
• Healthcare costs
• Other costs
• Utility weights for adults (and children?)
Potential health impacts

<table>
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<th>IRISH ADULT COSTING STUDY</th>
<th>UK HEALTH FORUM WHO (EUROPE) FORECASTING STUDY</th>
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Potential other impacts

Childhood:

• Losses incurred by families (eg parental work absenteeism)
• Lower school attendance and performance

Adulthood:

• Productivity losses (absenteeism & presenteeism)
• Productivity losses (premature mortality)
Possible costs

- Hospital: in-patient and out-patient
- Primary care
- Drugs and prescribing cost
- Ancillary services – eg dietician services, etc
- Sickness benefits
Occurrence of impacts & costings

A mixture of three approaches:

• “Top down” approach based on estimation of Population Attributable Fractions (PAFs)
• “Bottom up” approaches based on analysis of healthcare utilisation in cross-sectional studies
• “Bottom up” approaches based on analysis of healthcare utilisation in longitudinal studies

Other costing (productivity losses) based on:
• Human capital / Friction-cost approaches?
BMI trajectories

Currently: Multivariate regression (age, sex, year) analysis of historical BMI data to forecast population BMI distributions, initialise BMI and assume “constant BMI percentile ranking” to derive lifetime BMI trajectories.

Alternatives:
- More advanced statistical methods (e.g., PAC analyses, exponential models).
- Estimate transition probabilities between BMI categories and use Markov processes to simulate BMI trajectories (Sonntag et al. in Germany).
- Latent growth curve analyses to identify latent BMI trajectories from longitudinal studies and sample to derive lifetime BMI trajectories (e.g., Peneau et al. in France).
Health impact trajectories

Currently: Simulated by a Markov process using four states formed by combining “Alive / Dead” & “With / Without the obesity-related disease”. Transition probabilities estimated from epidemiological parameters

If age-sex specific transition probabilities are not available, next year’s state determined by last year’s BMI and state

Processes underlying each obesity-related disease assumed to act independently

Only deaths from other causes are included in the model
Incorporating other impacts & costs

Impacts and costs calculated elsewhere and added to health impacts and costs (eg Irish study)

Alternatives:
• Health impacts and costs scaling up using health cost:other cost ratio
• Generate other impact trajectories (eg EConDA Project?)
Assess potential benefits of reduced childhood obesity

• Present-day obesity rates and current trends provide “no intervention” base

• Rerun models with 1% and 5% reductions in childhood obesity rates; benefits assessed by taking differences

• How to formulate 1% or 5% reductions

• Adjustment for weight gain associated with ageing?
3. FEEDBACK FROM ECOG 2015
HEALTH ECONOMICS WORKING GROUP
The Questions

• Are simulation studies the best basis for quantifying impacts of childhood obesity that occur across the lifecourse?

• What is the best way to estimate lifetime BMI trajectories in different parts of the world?

• What are the key childhood other impacts of childhood obesity?

• How do we explore how lifetime impacts of childhood obesity vary across population subgroups.
The Feedback

Simulations studies need to be supplemented by longer term longitudinal studies that provide direct evidence of links between childhood obesity and adult obesity / longer term impacts

Need alternative method to capture psycho-social impacts & lifetime costs

Need alternative method to describe inequalities
THANK YOU
ANY QUESTIONS?

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