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Faculty of Science
Departement Pharmaceutical Sciences

The potential of daily nutrition as preventative health — technology

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Stockholm 2017



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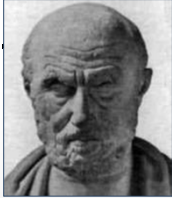
Disclosures

- Director Public Health & Scientific Relations, Danone Company
- Chair of INPHORM, a working group of Health Technology Assessment international (HTAi)
- Member of the ISPOR leadership group on Nutrition Economics
- Member of the Standing Committee Nutrition & Health, International Dairy Federation (IDF)
- Board member of the Mission Scientifique Syndifrais
- Guest lecturer at Université Diderot, Paris

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Public Health



**"Let medicine be thy food,
and food be thy medicine."**

Hippocrates, 460-377 BC

Public Health: The science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals

Science 51 (1306):23-33

PH ... aims to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases

WHO

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Nutrition

A science which analyses the relation between food and health, investigating the metabolic and physiological responses of the body to diet

Different food/nutrition categories

Healthy consumers and at-risk populations

Conventional food	Survival, health, pleasure
Functional	Targets specific body functions/risk factors
Baby food	Age - specific needs

Diseased population (= patients)

FSMP	Special enteral medical nutrition for all ages
Parenteral nutrition	Special parenteral (IV) medical nutrition All ages

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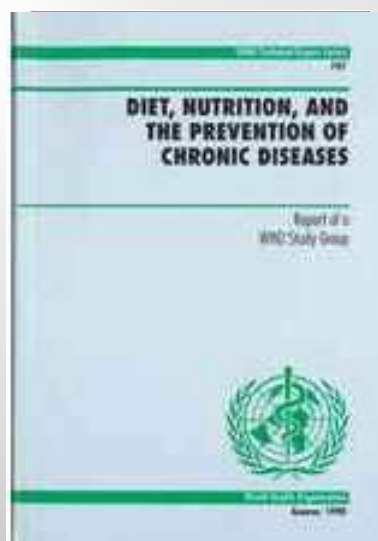


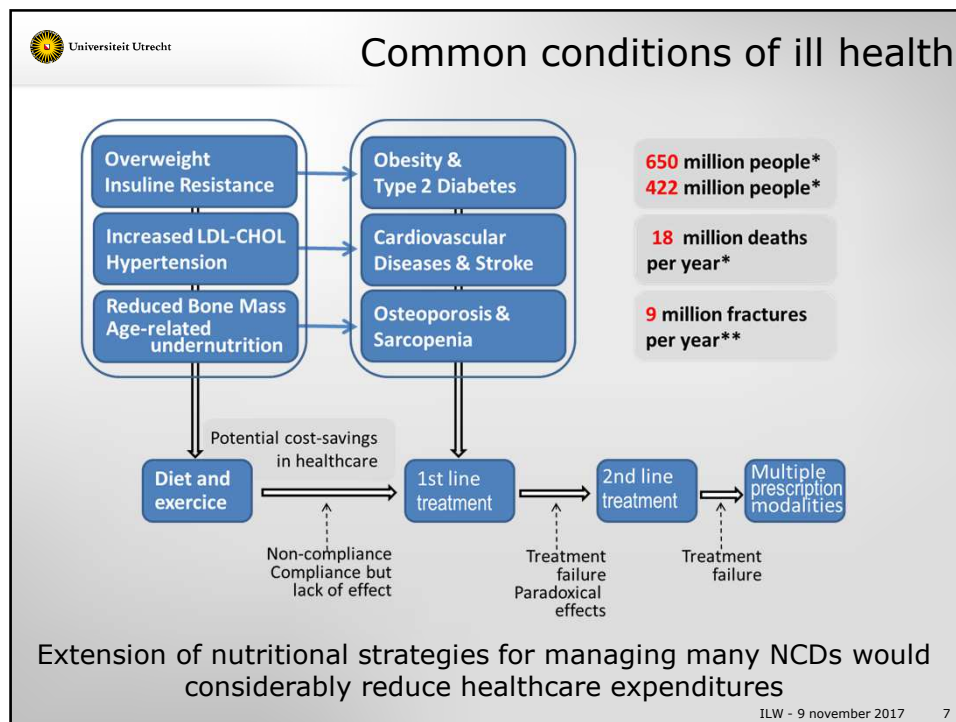
Public Health and Nutrition (I)

Although nutrient deficiency diseases are still prevalent in some countries, and are an important cause of ill-health and premature death, **nutrient-associated chronic diseases** due to incorrect balance and excess of nutrients are now of **significant importance for all countries**, developing and developed alike.

Factors needed for successful nutrition and food policies:

Food and nutrition policies must have the credibility provided by **scientific and epidemiological evidence**, have **political and technical** support, and be regarded as **necessary and convenient by the consumer**.





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'Window of opportunity' closing on non-communicable diseases, warns UN health agency

The world is not on track to meet the target set by the UN Sustainable Development Goals of a one-third reduction in premature NCD deaths by 2030.


Dr. Douglas Bettcher, WHO director for the prevention of NCDs.

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Nutrition and Public Health (II)

potential dangers of turning a lifestyle problem into a medical one



(functional) food may help prevent diseases that currently impose a heavy drain on health care budgets

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Cost/effectiveness of nutrition

Cost/effectiveness information is obtained by analysing the costs and consequences of a health intervention (technology) to address a specific problem under general or routine conditions, rather than under controlled conditions.

HTA: The systematic evaluation of the properties and effects of a health technology, addressing the direct and intended effects of this technology, as well as its indirect and unintended consequences, and aimed mainly at informing decision making regarding health technologies.

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The example of flu-like diseases and probiotics

PLOS ONE | DOI:10.1371/journal.pone.0166232 November 10, 2016

RESEARCH ARTICLE

The Clinical and Economic Impact of Probiotics Consumption on Respiratory Tract Infections: Projections for Canada

Irene Lenoir-Wijnkoop^{1,2*}, Laetitia Gerlier³, Denis Roy⁴, Gregor Reid⁵


There is accumulating evidence supporting the use of probiotics, which are defined as "live micro-organisms which, when administered in adequate amounts, confer a health benefit on the host", as a preventive measure against respiratory tract infections (RTI). Two recent meta-analyses showed probiotic consumption (daily intake of 10^7 to 10^{10} CFU in any form for up to 3 months) significantly reduced RTI duration, frequency, antibiotic use and work absenteeism.

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Two meta-analyses reported the probiotics effects on RTI

Effectiveness of probiotics on the duration of illness in healthy children and adults who develop common acute respiratory infectious conditions: a systematic review and meta-analysis

Sarah King¹, Julie Glanville^{1*}, Mary Ellen Sanders², *et al.*  British Journal of Nutrition 2014 - incl. 20 randomized placebo-controlled trials of probiotics

Probiotics for preventing acute upper respiratory tract infections (Review)

Hao Q, Dong BR, Wu T

 **Cochrane Library**

2015 - incl. 12 randomized placebo-controlled trials of probiotics

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King 2014 (YHEC): shows a reduced duration per RTI episode when consuming probiotics

Significantly shorter illness episodes with probiotics vs placebo:

Mean duration placebo 7.40 days

Mean duration probiotics 6.63 days

Weighted mean difference -0.77 days [-1.50;-0.04], p=0.04

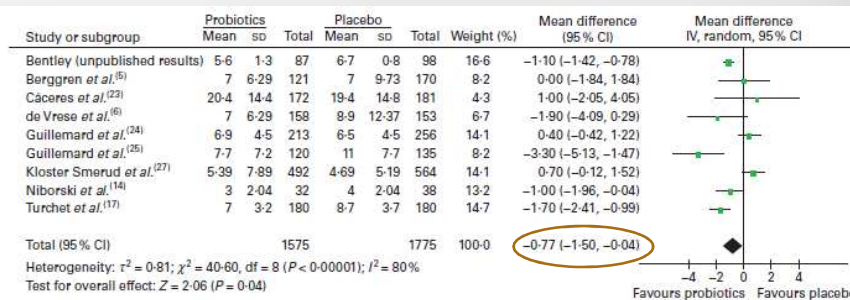


Fig. 1. Mean duration of illness episodes (d). The 'total' is the overall number of illness episodes experienced by the participants (randomised in a 1:1 ratio) in each treatment group. (A colour version of this figure can be found online at <http://www.journals.cambridge.org/bjn>).

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Hao 2015 (Cochrane): preventive probiotics have a positive impact on RTI frequency & duration

Significantly shorter illness episodes with probiotics vs placebo:

Mean duration placebo 8.82 days

Mean duration probiotics 6.93 days

Weighted mean difference -1.89 days [-2.03;-1.75], p<0.001

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4 The mean duration of an episode of URTI	3	831	Mean Difference (IV, Random, 95% CI)	-1.89 [-2.03, -1.75]

Significantly reduced RTI incidence with probiotics vs placebo:

Odds Ratio (OR) 0.53 [0.37;0.76], p<0.001

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4 The mean duration of an episode of URTI	3	831	Mean Difference (IV, Random, 95% CI)	-1.89 [-2.03, -1.75]

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Additional effects of probiotics reported by the meta-analyses

- Significant reduction of RTI-related antibiotics use with probiotics vs placebo (Cochrane)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 The number of participants who used antibiotics	4	1184	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.45, 0.94]

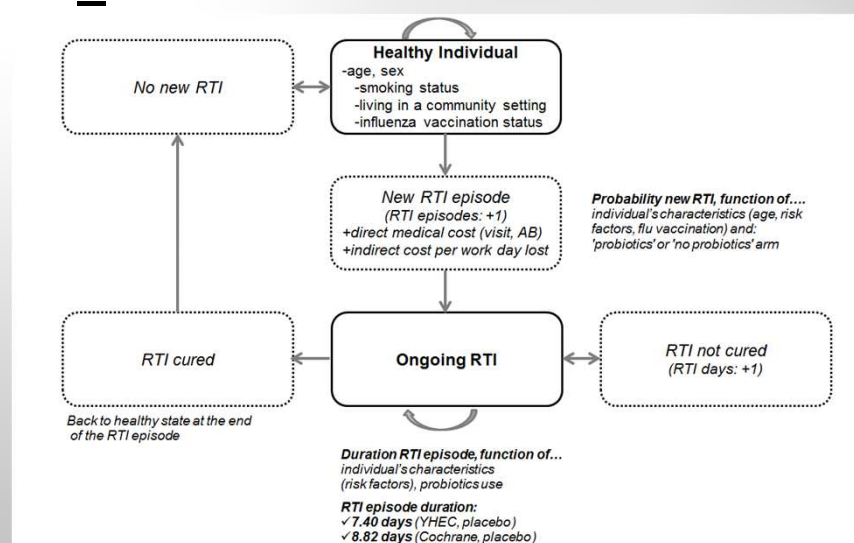
- Significant reduction of RTI-related sick leaves with probiotics vs placebo (YHEC)



Fig. 4. Days absent from day care/school/work. The 'total' is mostly the number of individuals with at least one illness episode. In two studies^{27,28}, the totals used were the number of participants included in the study; in one study²¹, the totals were the number of households randomised, and in another study²², the totals were the number of 'cases' of illness (in all these studies, the number of individuals with illness episodes was not reported). (A colour version of this figure can be found online at <http://www.journals.cambridge.org/bjnr>).

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Model: MA results combined with existing RTI data

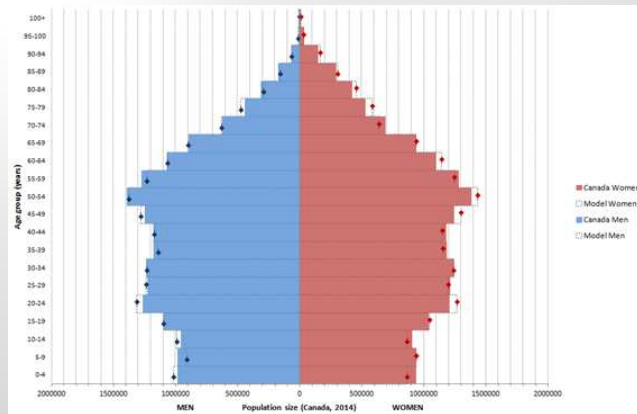


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Study country: Canada



Age and sex from StatCan vs modeled population (N=35,540)
Error rate < 5% between expected and modeled population size

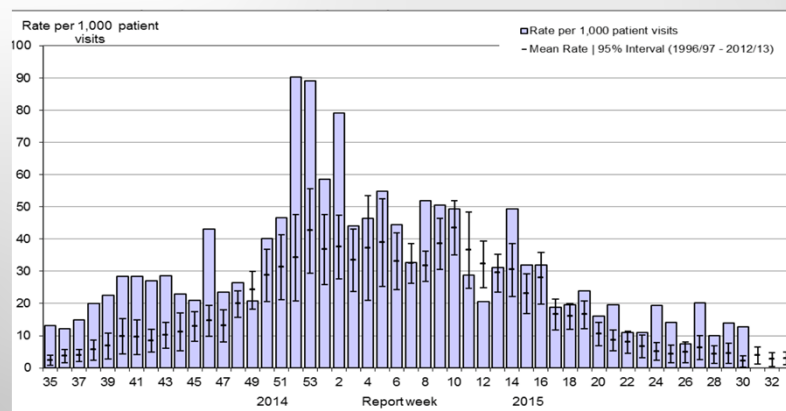
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Key input: probability of RTI episodes

derived from **FluWatch** 'ILI' statistics and **StatCan data**



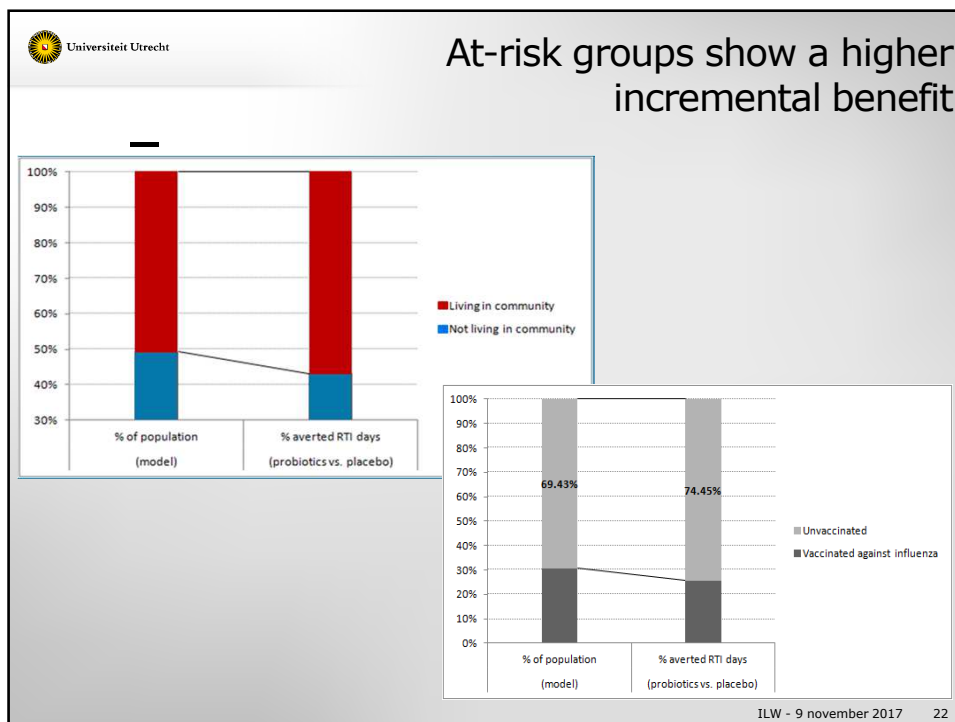
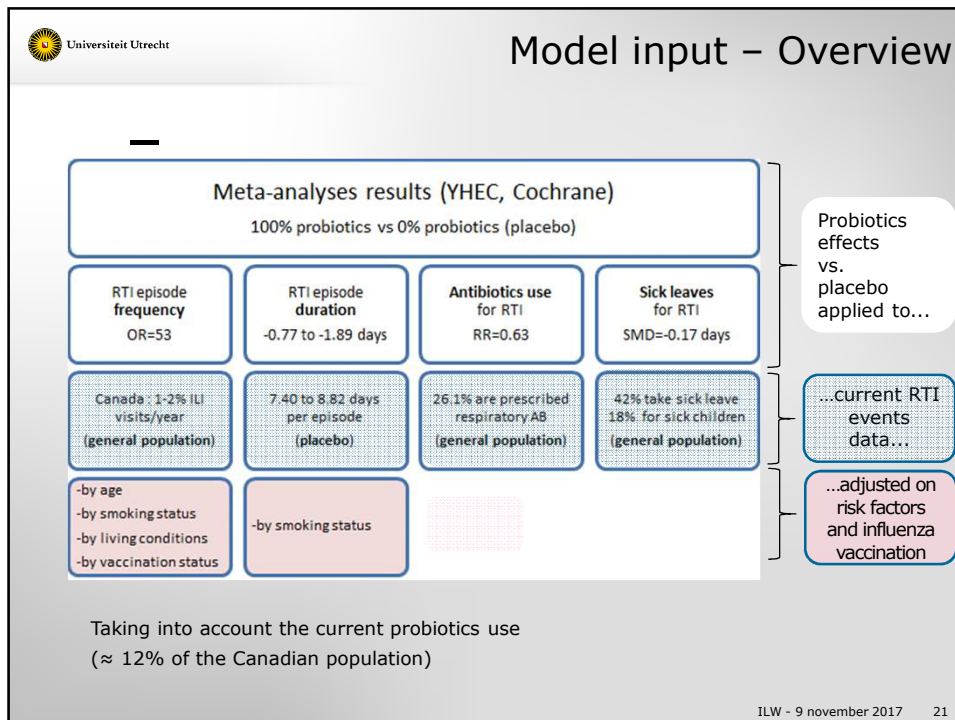
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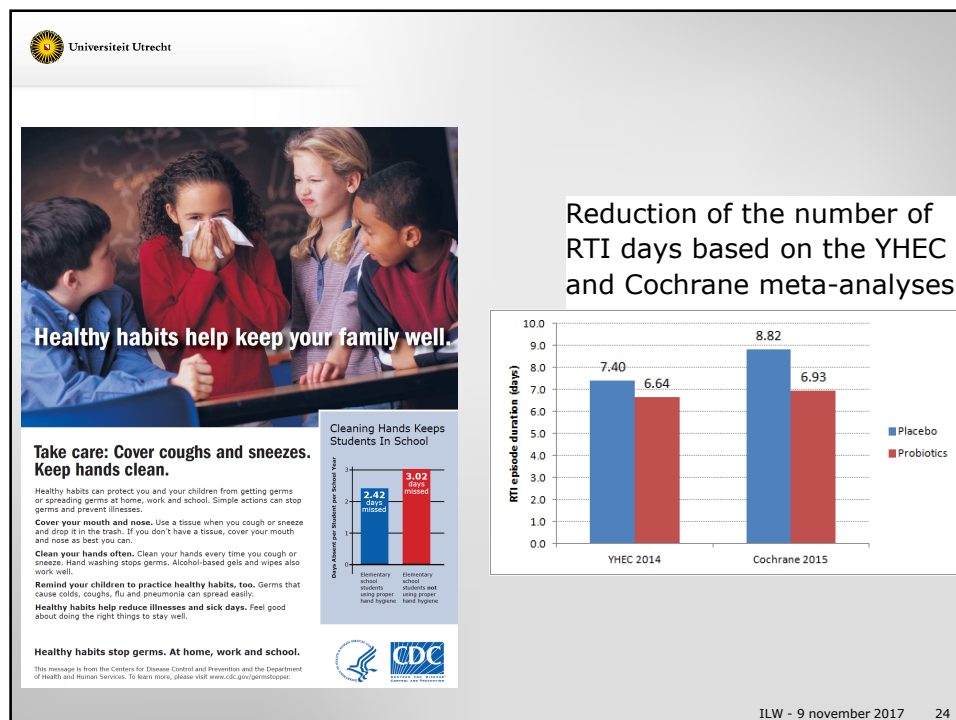
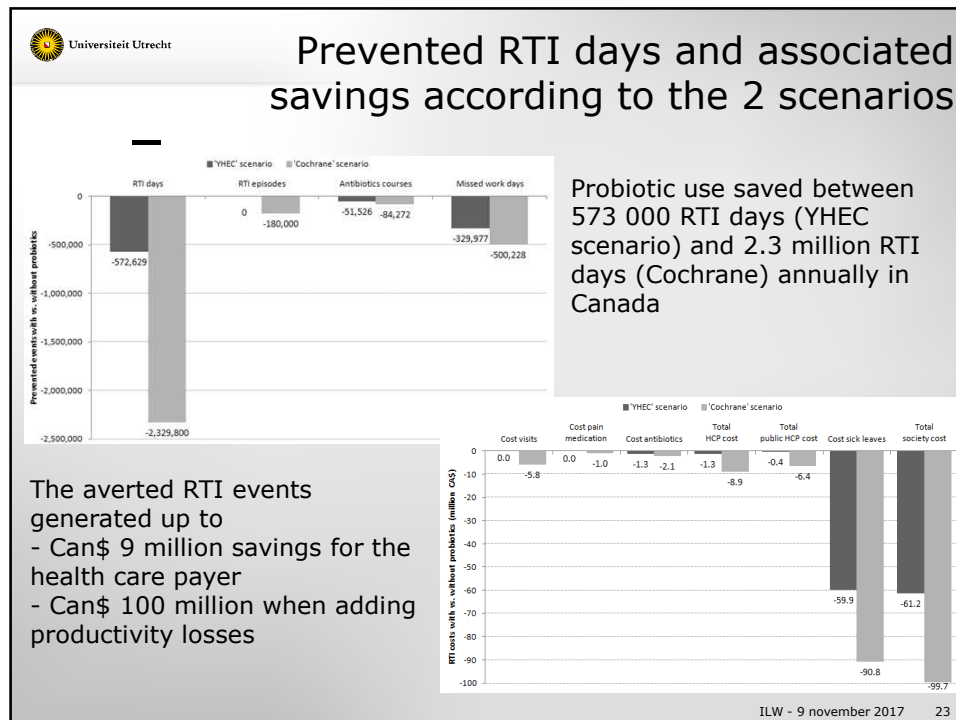
Data used in the model

-
- Combining Fluwatch and StatCan data allowed an estimate of the annual RTI incidence and the related numbers of GP consultations: 1.7-2.2%
 - The prescription rate of antibiotics in case of RTI is 26,1% (Kwong et al, 2009)
 - Absence from work caused by RTI is 42% of employees for an average of 1,7 missed working days (Palmer et al, 2011 - US)
 - In case of child's RTI, 18% of employees miss work for 0,5 days on average (Palmer et al, 2011 - US)

Adjustments for risk factors and vaccination status

-
- Children aged 0-9 years bear a higher burden of ILI
 - People sharing life/work environment have a higher frequency of RTIs (Louhiala et al 1995, Jaakola 1995)
 - Active and passive smokers have longer and/or more frequent RTIs (Bensenor et al, 2001)
 - Individuals vaccinated against influenza have a lower risk of ILI (vaccination coverage StatCan 2014)
 - An estimated 12% of the Canadian population is using probiotics (IPSOS 2012)



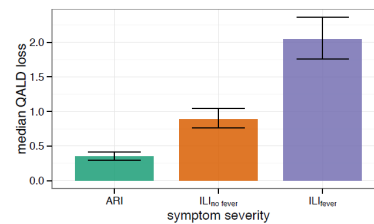


Acute RTIs in daily life

- Adults have an average of 2–4 common RTI episodes annually
- Primary schoolchildren have an average of 3–8
- In the USA, 20 million school days are lost per annum



The QALD loss increases with severity ($p < 10^{-10}$)



A Camacho et al, LSHTM

and they affect quality of life

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In conclusion

Daily nutrition as preventative health technology has great potential for sustained health and sustainable health care systems

Implementation of successful, population-oriented strategies is hampered by

- the scarcity of methodological guidance in PH evaluations
- the failure to motivate/achieve effective and lasting changes in eating behaviour (lifestyle)

HTA offers (un[der]exploited) possibilities for

- developing robust alternative (to RCT) methods and broadening of translational research in complex settings
- generating **positive** outcomes to build policies that motivate the general population to adopt healthy food behaviour

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HTAi - A dedicated working group
<https://www.htai.org/interest-groups/inphorm/>


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Ethics


Hospital Based HTA


HTA in Developing
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Presentations from
HTAi annual meetings
Other Organizations

Initiative for Public Health Outcomes Research & Measurement (InPHORM)
Overview
Activities
Through publication of original research papers, multidisciplinary involvement in international working groups, contributions in scientific congresses, InPHORM explores new avenues for better understanding the principles and the particular characteristics of public health interventions in real-life setting.
Join this IG
All members of HTAi are welcome to participate in this IG. If you are not yet a member of HTAi, simply follow this link: [Become a member of HTAi.](#)
IG Materials
Below are links to IG files and resources (including publications, presentations and to webpages of related groups):

- Presentations from HTAi annual meetings
- Publications
- Additional Resources


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Thank you

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