

XIV

**HTAi
2017**
Rome,
Italy

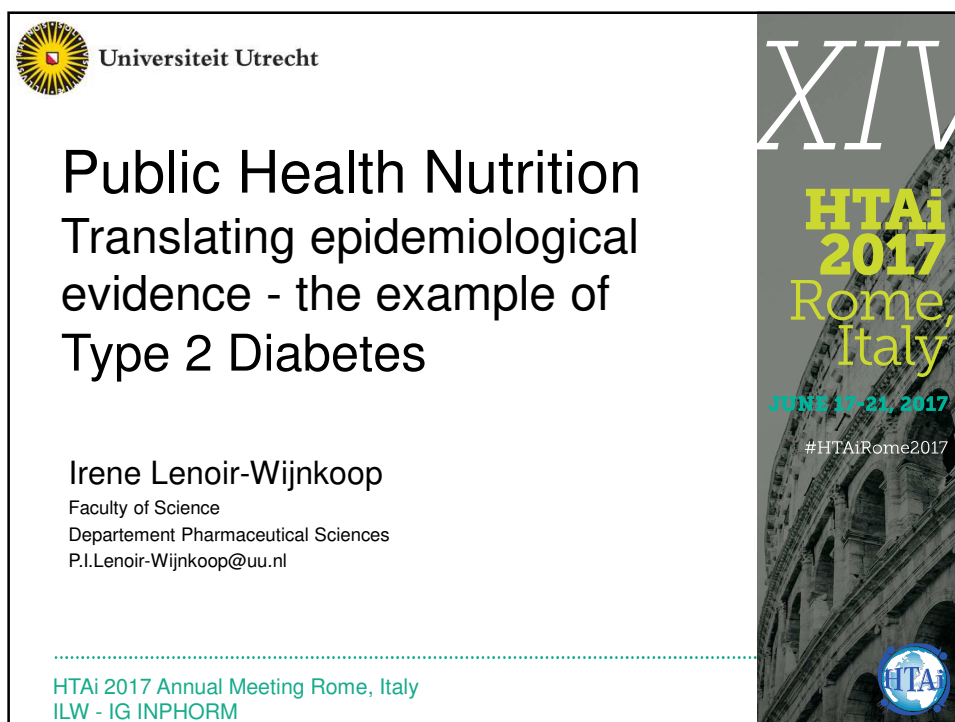

JUNE 17-21, 2017


**HTA for Public Health
Interventions**

addressing the challenges of
complexity and uncertainty

IG INPHORM

#HTAiRome2017



 Universiteit Utrecht

Public Health Nutrition
Translating epidemiological
evidence - the example of
Type 2 Diabetes

Irene Lenoir-Wijnkoop
Faculty of Science
Departement Pharmaceutical Sciences
P.I.Lenoir-Wijnkoop@uu.nl


XIV


**HTAi
2017**
Rome,
Italy

JUNE 17-21, 2017

#HTAiRome2017

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM





Universiteit Utrecht

Type 2 Diabetes

T2D is a rapidly spreading disease and one of the largest global health emergencies of the 21st century

Diabetes in Europe¹

10.3% of the male and **9.6%** of the female population (between 20 and 79 years of age) are suffering from diabetes. This is a total amount of just under **60 million**

Type 2 Diabetes was responsible for 9% of total health expenditure, equivalent to a **137 billion Euro**

Approximately **627,000** Europeans died from diabetes

Diabetes worldwide²



In 2014 about **422 million** adults worldwide had diabetes – this is 4 times more than in 1980

In 2014 the direct annual costs of diabetes to the world were more than **827 billion US Dollars**

In 2012 an estimated **1 million deaths** were directly caused by diabetes

¹All the figures refer to estimates for 2015 (Source: IDF Diabetes Atlas 2015)
²Global Report on Diabetes, WHO, 2016

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM

Universiteit Utrecht

Type 2 Diabetes in the UK

Current Prevalence

4.7% of UK population
3.8 million

Risk for 2025


5 million


¹All the figures refer to estimates for 2015 (Source: IDF Diabetes Atlas 2015)
²Global Report on Diabetes, WHO, 2016

An additional 32 million people between 20-79 yrs of age are estimated to be living with impaired glucose tolerance. This means that they carry an increased T2D risk. A legacy of poor diets and lack of exercise...


Total costs to rise to £40b by 2035

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM




Universiteit Utrecht
Type 2 Diabetes & yoghurt


- Yoghurt: scientific background**
 - Chen et al. *BMC Medicine* 2014, 12:215
<http://www.biomedcentral.com/1741-7015/12/215>




RESEARCH ARTICLE
Open Access

Dairy consumption and risk of type 2 diabetes:
 3 cohorts of US adults and an updated
 meta-analysis

- Yoghurt: real life background**
 - a staple food
 - available & affordable in most parts of the world

HTAi 2017 Annual Meeting Rome, Italy
 ILW - IG INPHORM
 



Universiteit Utrecht
Data from Chen et al



Hazard ratios for a serving of yogurt/day & T2D

Study ID	ES (95% CI)	Weight
Grantham et al. 2013	1.53 (0.71, 3.34)	3.45
Soedamah-Muth et al. 2013	1.15 (0.63, 2.09)	5.27
Stuijs et al. 2012	0.16 (0.06, 0.41)	2.39
Margolis et al. 2011	0.89 (0.78, 1.01)	19.88
Kirri et al. 2009	0.76 (0.44, 1.31)	6.11
Liu et al. 2006	0.61 (0.42, 0.90)	9.61
HPFS	0.85 (0.68, 1.06)	15.71
NHS I	0.75 (0.65, 0.88)	19.16
NHS II	0.94 (0.80, 1.10)	18.42
Overall (I-squared = 65.3%, p = 0.003)	0.82 (0.70, 0.96)	100.00

NOTE: weights are from random effects analysis

NB: This effect was not seen with general dairy consumption

HTAi 2017 Annual Meeting Rome, Italy
 ILW - IG INPHORM
 


 Universiteit Utrecht
 
YHEC case study
 York Health Economics Consortium


An economic model for the use of yoghurt in T2D risk reduction


- Primary research question: How would an increase in the average consumption of conventional yoghurt impact upon UK health care expenditure?
- Supplementary question: How would it impact upon the quality and length of life for a UK population?


Lancet-Wolstone et al. BMC Nutrition (2016) 2:77
 DOI 10.1186/s12916-016-0710-1

BMC Nutrition

RESEARCH ARTICLE [Open Access](#)

An economic model for the use of yoghurt in type 2 diabetes risk reduction in the UK 

HTAi 2017 Annual Meeting Rome, Italy
 ILW - IG INPHORM 


 Universiteit Utrecht

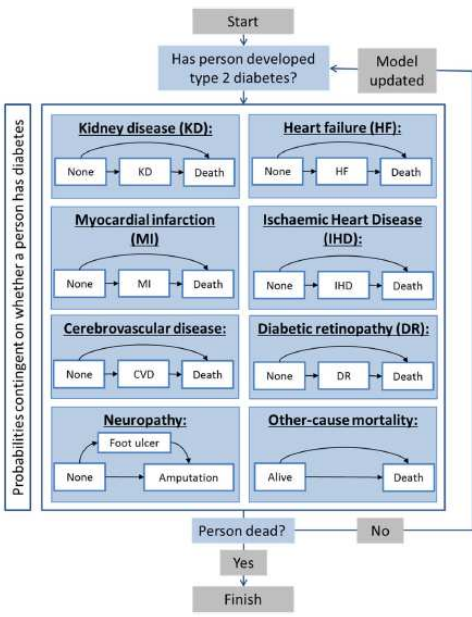
Computational model

Parameter estimates

- Current and proposed yoghurt consumption
- UK demographics
- Incidence/prevalence
- Relative risk of T2D comorbidities
- Mortality rates

100,000 iterations
 based on the simulated UK population > 25y

HTAi 2017 Annual Meeting Rome, Italy
 ILW - IG INPHORM





Universiteit Utrecht

Healthcare cost assumptions

- Direct cost of diabetic treatment and monitoring circa £500 pa
- The costs associated with each condition are modelled from the perspective of the NHS
- 2 categories – hospital costs and non-inpatient costs
- Per patient hospital costs are conditional upon being admitted (dictated by a separate probability function)
- Non-inpatient costs include the costs predicted for consultations with GPs, nurses, health visitors, dieticians, chiropodists and eye care specialists

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM




Universiteit Utrecht

Logit model value of costs

Variable	Logit model coefficient	Hospital care (£)	Non-inpatient care (£)	Additional (£)
Constant	-1.353	3318	531	-
Aged 65+	0.041	38	4	-
Male	-0.118	-218	-162	-
Event during current year				
Ischaemic heart disease (angina)	3.379	8636	331	-
Fatal Ischaemic heart disease	4.701	1037	-	-
Heart failure	2.98	1147	447	-
Fatal heart failure	-	-	-	3637
Myocardial infarction	4.506	3845	963	-
Fatal myocardial infarction	5.115	-1341	-	-
CKD requiring RRT	-	-	-	23275
Stroke	2.419	7133	559	-
Fatal stroke	-	1042	-	-
Diabetic retinopathy	-	-	-	138
Blindness in one eye	0.825	1621	1258	-
Foot ulcer	-	-	-	743.68
Amputation	4.059	7516	2166	-
Historic event				
Ischaemic heart disease (angina)	0.553	2042	121	-
Heart failure	0.824	2017	441	-
Myocardial infarction	0.68	1369	671	-
Stroke	0.37	2371	224	-
Blindness in one eye	0.266	-601	205	-
Amputation	1.254	1616	1079	-

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM






Universiteit Utrecht

Utility decrements applied

Condition	Decrement
Age (per year)	-0.00029
Diabetes	-0.07
Ischemic heart disease	-0.09
Heart failure	-0.12
Myocardial infarction	-0.06
CKD requiring RRT	-0.11
Cerebrovascular disease (stroke)	-0.10
Diabetic retinopathy	-0.04
Blindness	-0.06
Foot ulcer	-0.07
Amputation	-0.11

HTAi 2017 Annual Meeting Rome, Italy
 ILW - IG INPHORM

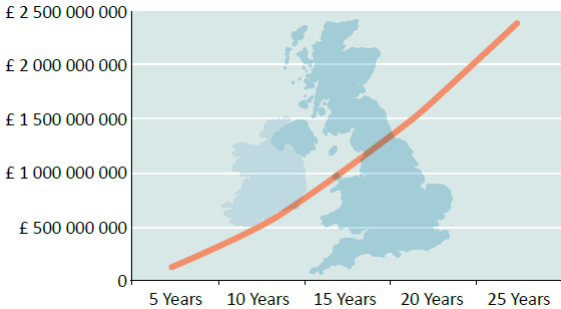



Universiteit Utrecht

Outcomes


UK population health care cost savings:

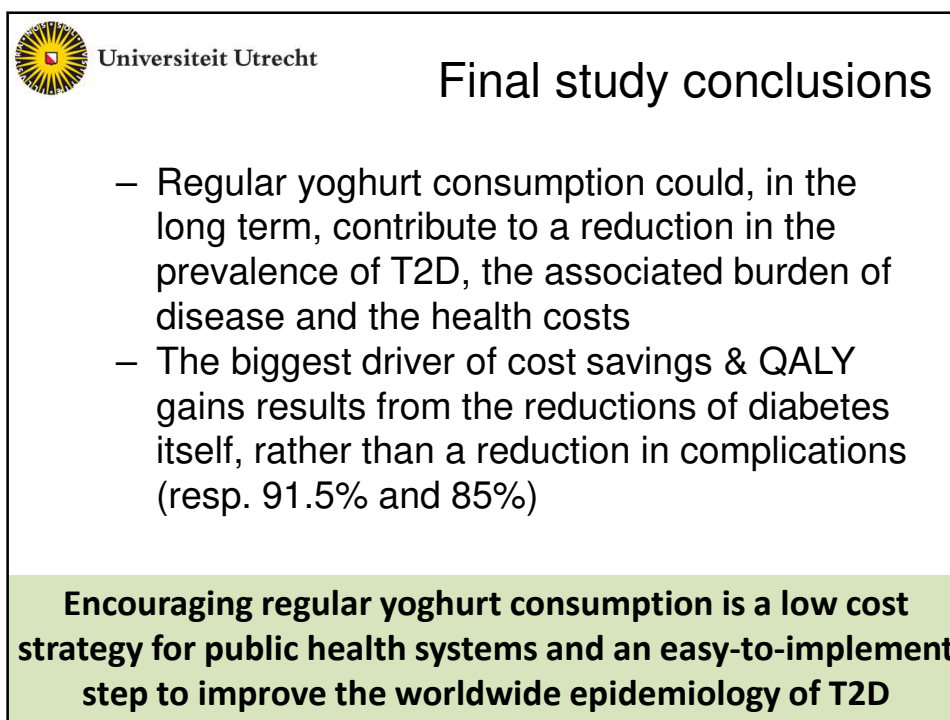
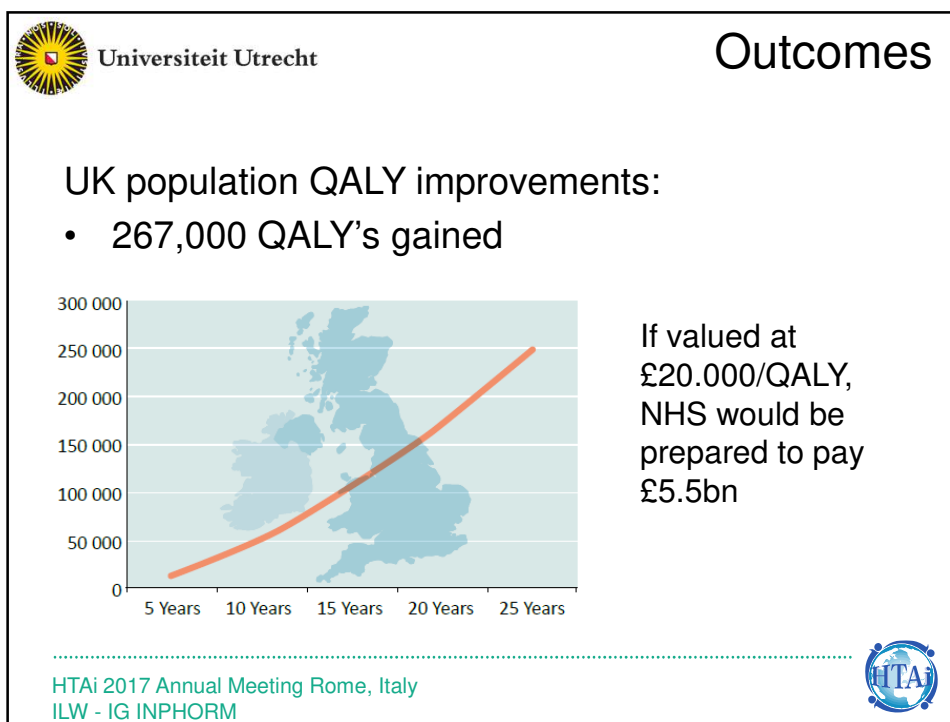
- nearly 400,000 fewer cases of T2D
- £2.3bn reduction in NHS expenditure




Generated by a lower rate of T2D and associated complications

HTAi 2017 Annual Meeting Rome, Italy
 ILW - IG INPHORM








Universiteit Utrecht

Limitations

- To which extent model outcomes can be based on results from big cohort studies?
- In the lifestyle context, how to frame the right balance between correlation and causality?
- How to incorporate the many –often crucial- interfering factors for getting meaningful projections?
 - Epigenetics of nutrition (daily food choices!)
 - Transgenerational influences
 - Vicious vs virtuous circles

.....

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM




Universiteit Utrecht

T2D - Risk Factors

- Developmental origins of obesity and T2D
 - Prepregnancy & maternal overweight/ obesity results in similar conditions in the next generation and **a vicious circle is thus triggered**
-

The NEW ENGLAND JOURNAL of MEDICINE


ORIGINAL ARTICLE


Health Effects of Overweight and Obesity
in 195 Countries over 25 Years

The GBD 2015 Obesity Collaborators*

.....

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM



 Universiteit Utrecht

How diabetes has taken its toll

422 million
adults were living with diabetes in 2014 -
that's

314 million
more than there were in 1980


8.5% of adults worldwide has diabetes

1.5 million people died as a result of
diabetes in 2012


2.2 million additional deaths were caused
by higher-than-optimal blood glucose


43% of these 3.7m people died before they
were 70 years old

Source: WHO



HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM




 Universiteit Utrecht

Conclusion

For ensuring sustainable health infra-
structures, the potential of small “low-
level” behaviour changes on a broad scale
outweighs/counterbalances the associated
uncertainties and could/should be far
better exploited

HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM





Universiteit Utrecht

Acknowledgments

Nick Finer (University College London)

Andrew Prentice (MRC Unit The Gambia & International Nutrition Group, LSHTM)

James Mahon & Lindsay Claxton (York Health Economics Centre)



YHEC 's link to the case study:
York Health Economics Consortium

<http://www.yhec.co.uk/tools-resources/case-studies/an-economic-model-for-the-use-of-yoghurt-in-type-2-diabetes/>

Funded by an unrestricted grant from the



HTAi 2017 Annual Meeting Rome, Italy
ILW - IG INPHORM

