

Report of All Countries: Main quantitative and qualitative results of the PYLL analysis

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METHODOLOGY

Amer Journal of Public Health, Vol 40, 1950 (17-26)

A Standardized Rate for Mortality Defined in Units of Lost Years of Life

WILLIAM HAENSZEL, F.A.P.H.A.

*Director, Bureau of Vital Statistics, State Department of Health,
Hartford, Conn.*

PYLL-definition: Simple calculation

“standard expected length of life ” – before which a death is premature



70
yrs

A Pavel died of heart attack at age of 55 years



B = Anna died of alcohol poisoning at age of 28 years



C = Elisabeth died of brain hemorage at age of 71 years



WHY ARE PREMATURE DEATHS MONITORED AND PYLL IS CALCULATED ?

From Haenszel 1950:

COMMENT

The conventional standardized death rate is influenced by the relative stability of the mortality rates at the older ages and does not permit sufficient weight to be given to the differences in mortality at younger ages, which are so important when viewed from the aspect of amount of life lost. The sug-

EQUATIONS

Calculation of age-standardized PYLL-rate

Equations:

Age-standardized PYLL = $100000/N \times (\sum_{a=0 \rightarrow L-1} ((L-a) \times (d_a/n_a) \times N_a))$

Variance PYLL = $(100000/N)^2 \times (\sum_{a=0 \rightarrow L-1} ((L-a)^2 \times (N_a/n_a)^2 \times (d_a/n_a) \times (n_a - d_a)))$

95 % Confidence interval = age-standardized PYLL $\pm 1,96 \times \text{square-root (variance PYLL)}$

If CI95 % minimum is $<0 \implies$ lower limit = 0

where

(L-a) = lost years of dead at time of death in age group a

d_a = number of dead in age-group a

n_a = person years in age-group a

N_a = a of age-group in the whole standard population

N = size of standard population,

x is sign of multiplication and/where $**2$ means into power of 2

Age-groups are 0 yrs, 1-4 yrs, 5-9 yrs, 10-14 yrs, 15-19 yrs, 20-24 yrs, 25-29 yrs, 30-34 yrs, 35-39 yrs, ..., 65-69 yrs.

When the target age 70 is reached, the lost years of a dead one (=L-a) by age-groups are 69.5, 67.0, 62.5, 57.5, 52.5, 47.5, 42.5, 37.5, 32.5, 27.5, 22.5, 17.5, 12.5, 7.5, 2.5

As a standard population the OECD 1980 population is applied;

140669, 547645, 700764, 719340, 741611, 710404, 676832, 660553, 546359, 505176, 481914, 473148, 440361, 337337, 336354

.

.

. Preventable Causes of Death by WHO

Preventable causes (1-28 categories)

- 1 = 'All causes (A00-R99,V01-Y89)'
- 2 = 'Infectious, parasitic diseases (A00-B99,J65)'
- 3 = 'HIV-disease (B20-B24)'
- 4 = 'Malignant neoplasms (C00-C97)'
- 5 = 'Malignant neoplasm of colon, rectum, anus (C18-C21)'
- 6 = 'Malignant neoplasm of trachea, bronchus, lung (C33-C34)'
- 7 = 'Malignant neoplasm of female breast (C50)'
- 8 = 'Endocrine, nutritional, metabolic diseases (E00-E90)'
- 9 = 'Diabetes mellitus (E10-E14)'
- 10= 'Diseases of blood & blood forming organs (D50-D89)'
- 11= 'Mental disorders (F00,F02,F04-F09,F11-F99)'
- 12= 'Dementia, Alzheimers disease (F01,F03,G30,R54)'
- 13= 'Other dis. of nervous system & sense organs (G00-G29,G31.0-G311,G31.8-G620,G622-G720,G722-H95)'

Preventable causes cont.

- 14= 'Diseases of circulatory system (I00-I425,I427-I99)'
- 15= 'Ischaemic heart disease (I20-I25)'
- 16= 'Acute myocardial infarction (I21,I22)'
- 17= 'Cerebrovascular diseases (I60-I69)'
- 18= 'Diseases of respiratory system (J00-J64,J66-J99)'
- 19= 'Pneumonia & influenza (J09-J18,J849)'
- 20= 'Bronchitis, asthma & emphysema (J40-J47)'
- 21= 'Diseases of digestive system (K00-K291,K293-K67,K71-K851,K853-K859,K861-K93)'
- 22= 'Chronic liver disease and cirrhosis (K73,K74,K76)'
- 23= 'Alcohol related diseases and accidental poisoning by alcohol (F10,G312,G621,G721,I426,K292,K70,K852,K860,O354,P043,Q860,X45)' +(G4051 in Finland)
- 24= 'External causes of injury & poisoning (V01-X44,X46-Y89)'
- 25= 'Land traffic accidents (V01-V89*)'
- 26= 'Other land transport accidents (V01-V89*)'
- 27= 'Accidental falls (W00-W19)'
- 28= 'Suicide (X60-X84,Y870)'

Population and death data were collected from 10 countries for 2003, 2009 and 2013. PYLL-rates were calculated for the region and the 8 countries. For Lithuania, also PYLL-rates of 10 Lithuanian regions were calculated.

DATA RECEIVED

- From each country (10) population data for 2003, 2009 and 2013 by 5-year age groups for men and women
- From each country (10) death data for 2003, 2009 and 2013 grouped according preventable causes of death (28 aggregated groups/ICD-10)
 - From some countries individual death data (e.g., in Lithuania an intra-country regional PYLL-rates were calculated by the residence of the dead)
 - From some countries semi-aggregated data by 28 groups of preventable causes of death in 5-year age intervals for men and women
 - For Norway and Russia from WHO the semi-aggregated data which were re-aggregated for the 28 groups of preventable causes of death
- From OECD the world populations for 2003, 2009 and 2013 by 5-year age groups for men and women

Table 1. PYLL-RATES* IN 2013 in the ND-countries**

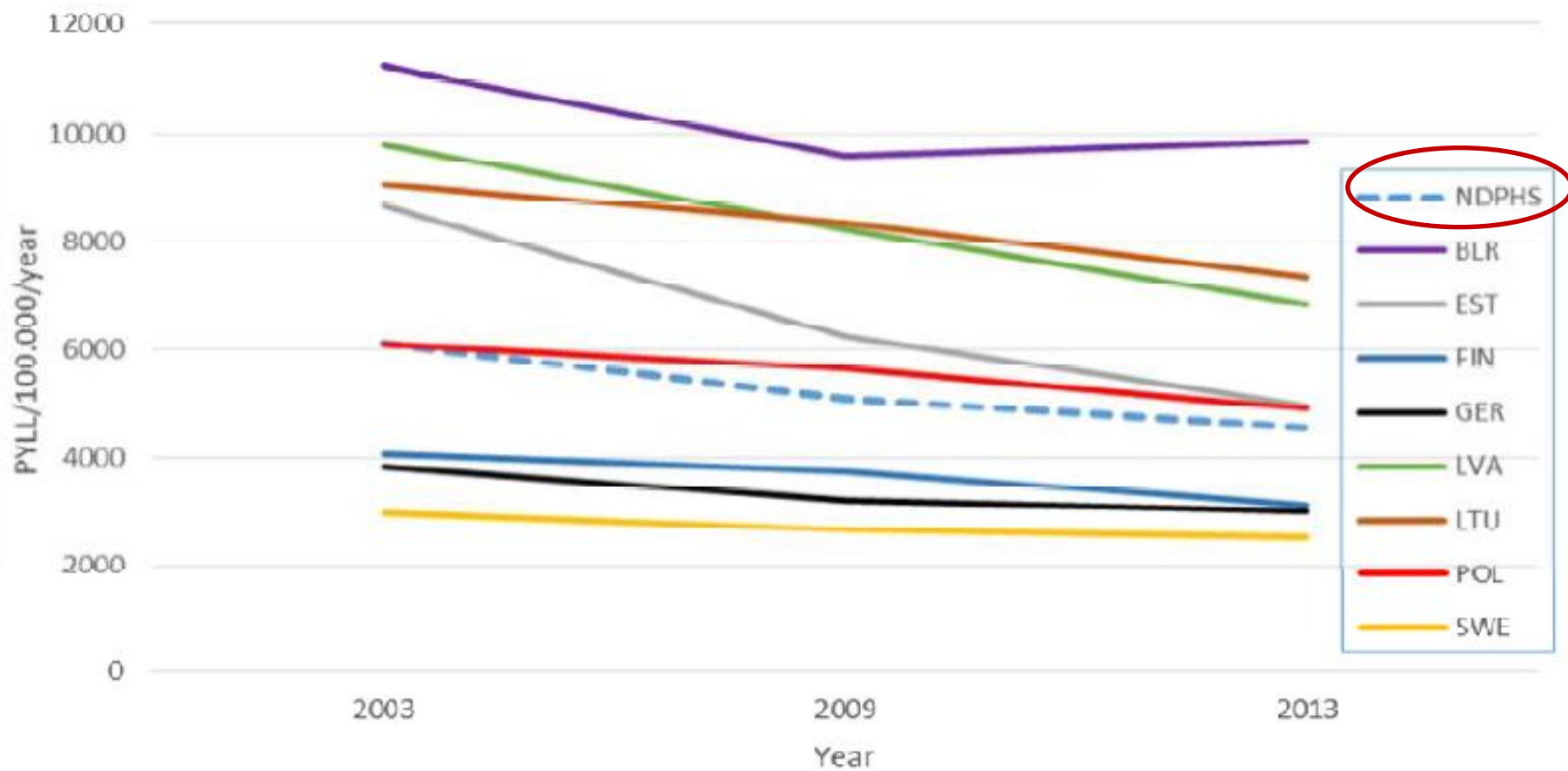
	ALL	MEN	WOMEN
BELARUS	9851	15396	4770
ESTONIA	4979	7208	2900
FINLAND	3115	4221	1987
GERMANY	3008	3816	2197
LATVIA	6837	10010	3961
LITHUANIA	7369	11205	3859
POLAND	4901	6984	2865
SWEDEN	2511	3092	1911
REGIONAL RATE***	4549	6281	2838
AVERAGE OF 8 ND-COUNTRIES	5321	7741	3056

* Age-standardized per 100 000 citizens

** Country Reports:
PYLL-rates 2003, 2009 and 2013

*** Terms of Reference for ND-PYLL Project

PYLL NDPHS 2003 -2009-2013 ALL CAUSES (ALL= MEN & WOMEN)



**REDUCTION (=IMPROVEMENT)
IN PYLL-RATES 2003 - 2013
ALL (MEN AND WOMEN TOGETHER)**

REDUCTION IN PYLL-VALUE 2003 - 2013

12%

16%

19%

20%

21%

23%

26%

30%

43%

BLR

SWE

LTU

POL

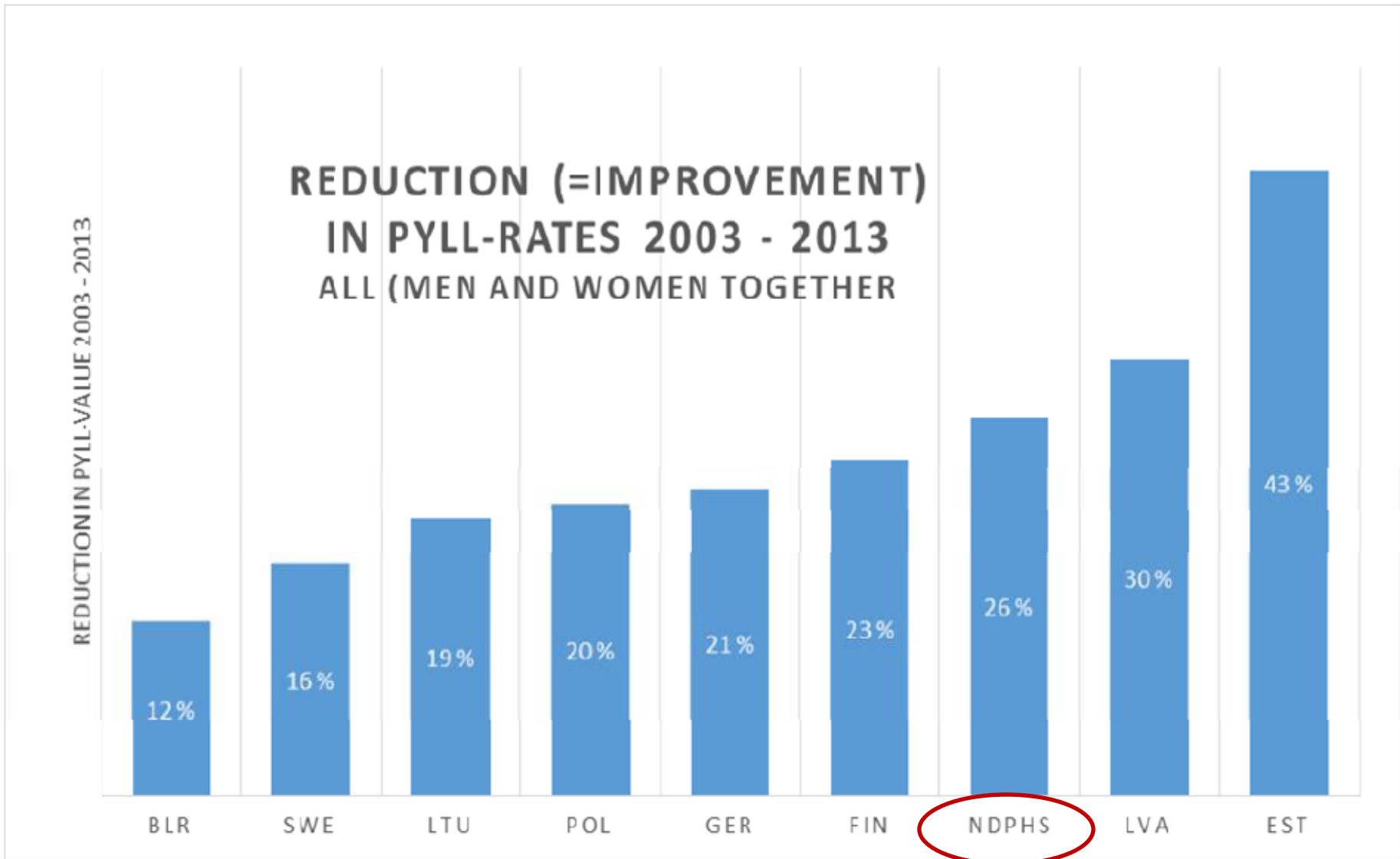
GER

FIN

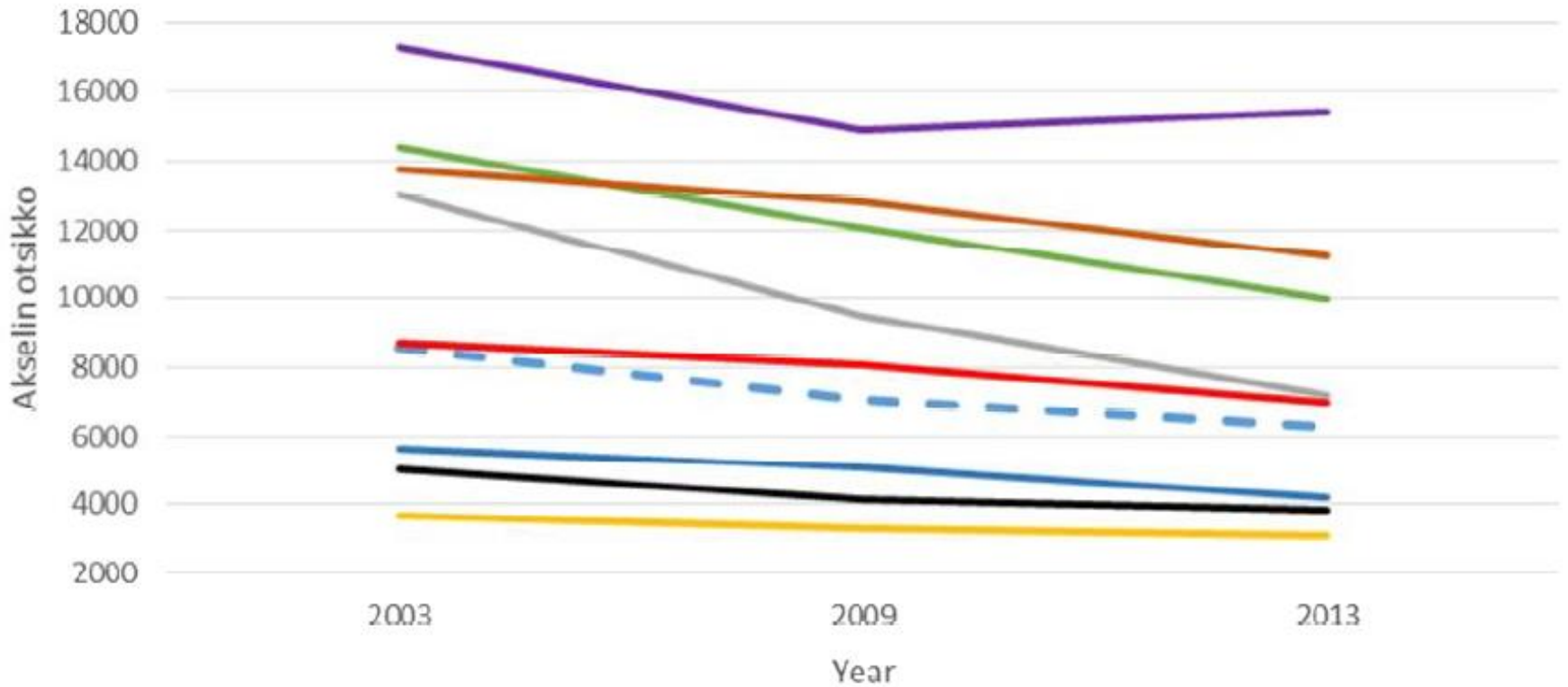
NDPHS

LVA

EST

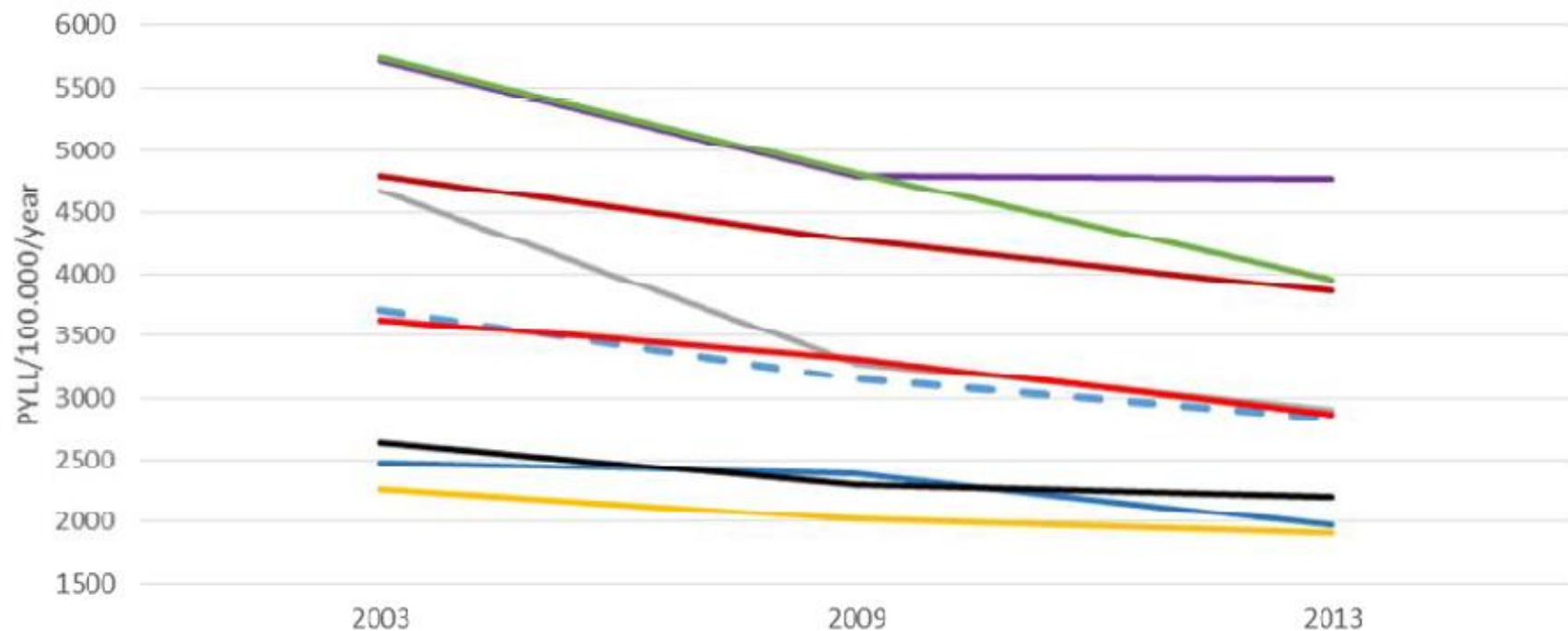


PYLL NDPHS 2003 - 2009 - 2013 ALL CAUSES (MEN)



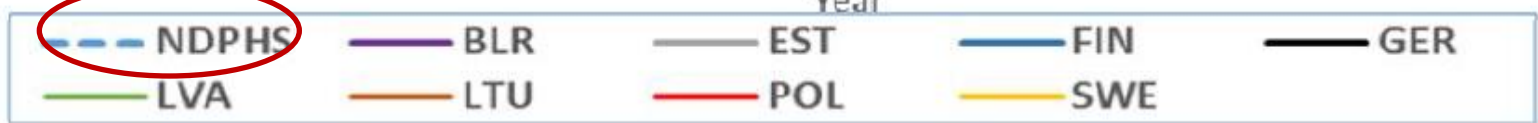
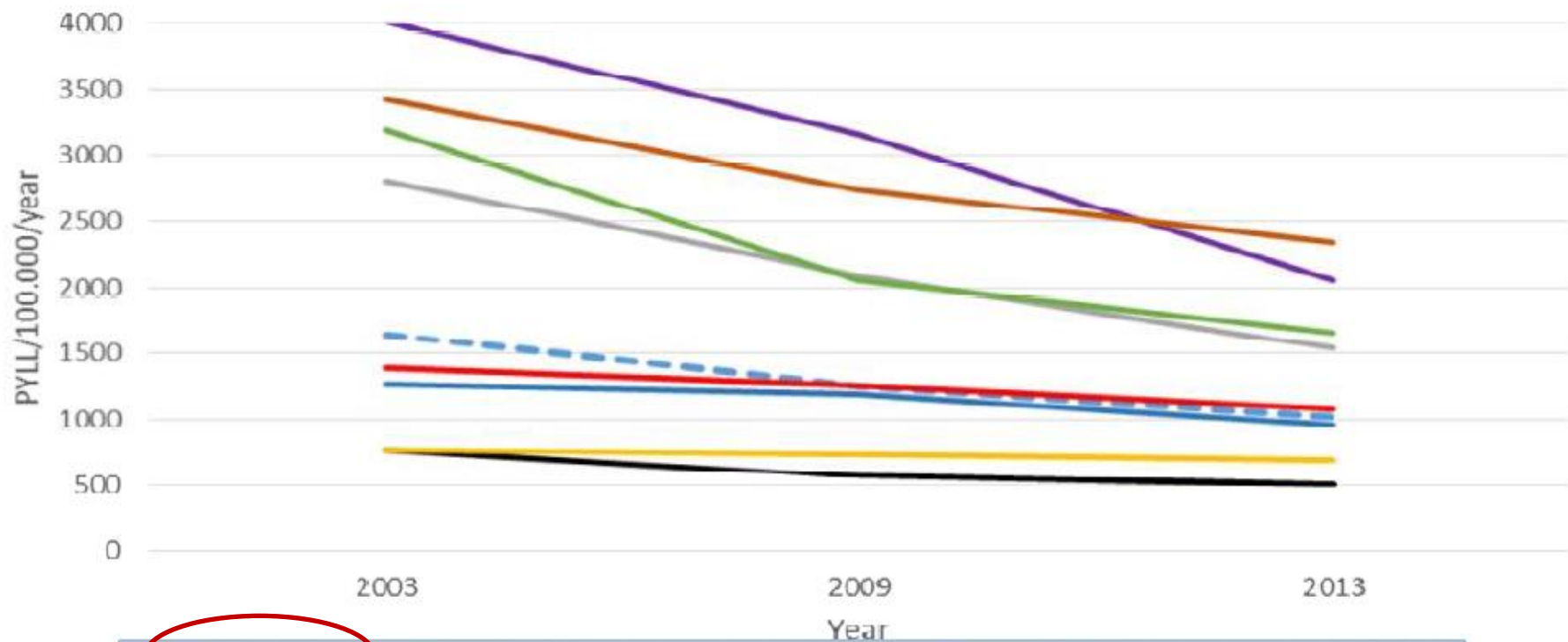
NDPHS BLR EST FIN GER LVA LTU POL SWE

PYLL NDPHS 2003 - 2009 - 2013 ALL CAUSES (WOMEN)

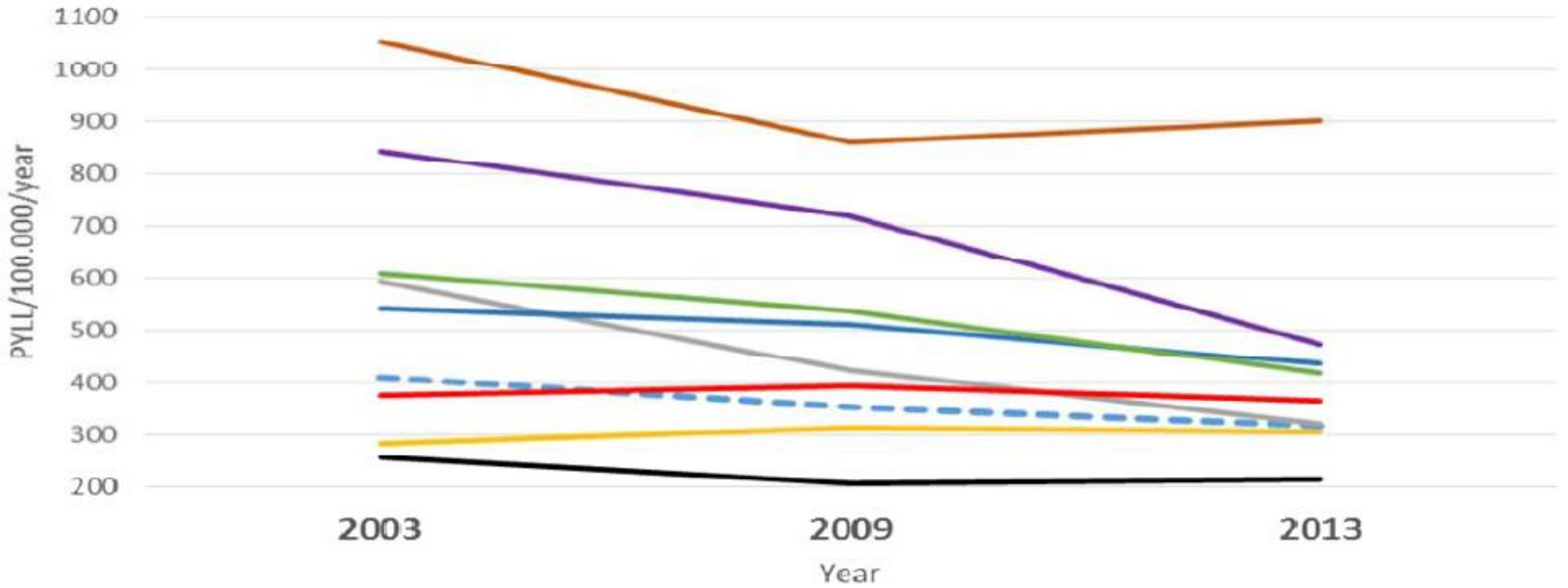


NDPHS BLR EST FIN GER LVA LTU POL SWE

PYLL NDPHS 2003 -2009-2013 EXTERNAL CAUSES / ACCIDENTS (ALL= MEN & WOMEN)

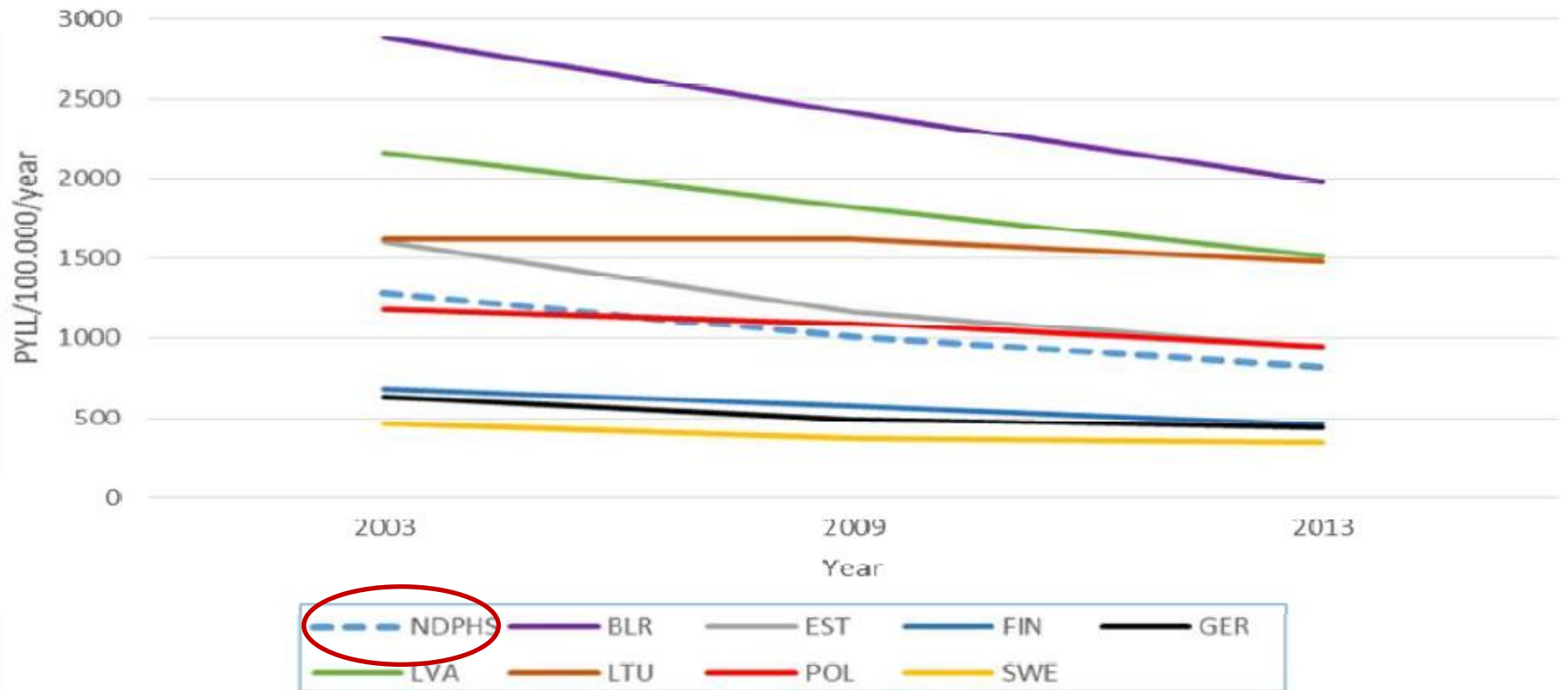


PYLL NDPHS 2003 -2009-2013 SUICIDES (ALL= MEN & WOMEN)

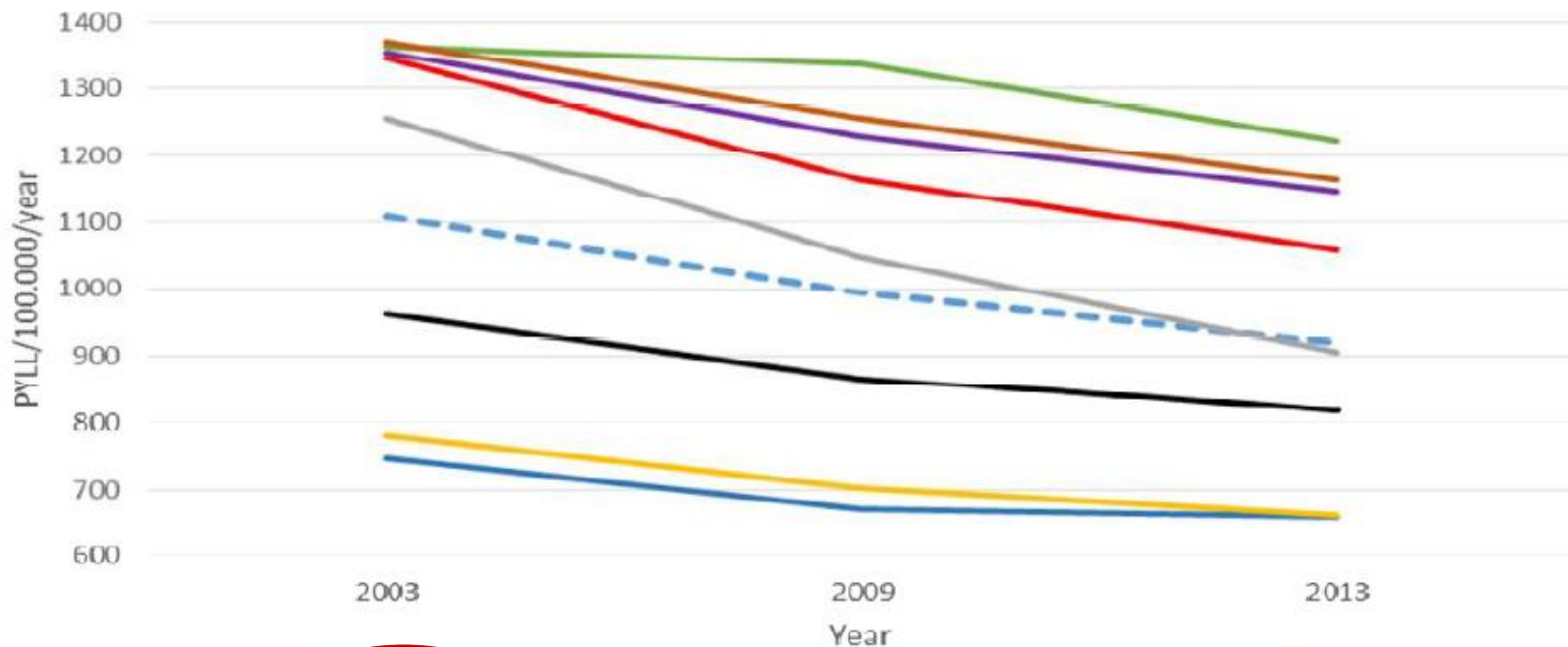


- NDPHS
- BLR
- EST
- FIN
- GER
- LVA
- LTU
- POL
- SWE

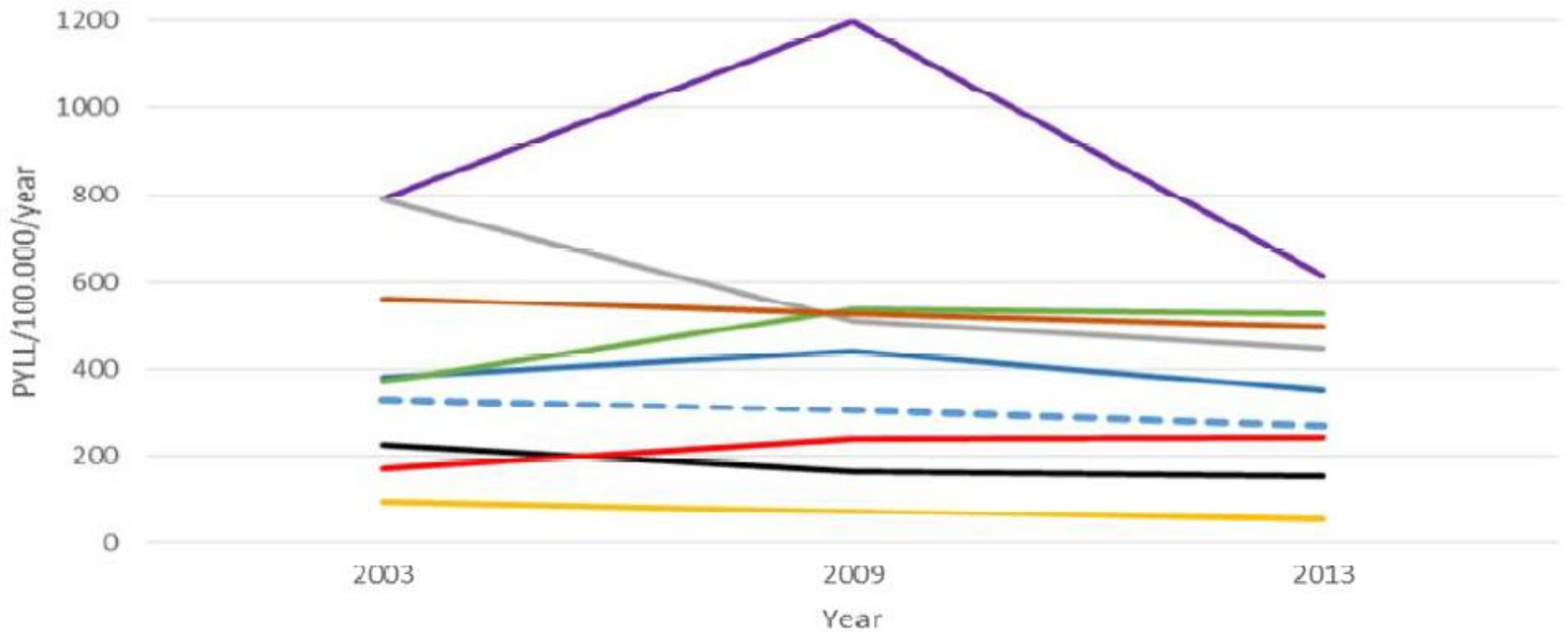
PYLL NDPHS 2003 -2009-2013 VASCULAR DISEASES (ALL= MEN & WOMEN)



PYLL NDPHS 2003 -2009-2013 MALIGNANT DISEASES (ALL= MEN & WOMEN)



PYLL NDPHS 2003 -2009-2013 ALCOHOL RELATED CAUSES (ALL= MEN & WOMEN)



The age-standardized PYLL-rates in the regions of Lithuania in 2013

REGION	TOTAL	MEN	WOMEN	ratio of men/women
ALYTAUS	8940	13100	4845	2.7
KAUNO	6346	9516	3580	2.6
KLAIPEDOS	7128	10595	3961	2.7
MARIJAMPOLES	8039	11743	4342	2.7
PANEVEZIO	7604	11403	3969	2.9
SIAULIU	7932	12406	3723	3.3
TAURAGES	8200	12626	3938	3.2
TELSIU	7333	10309	4570	2.2
UTENOS	10340	16363	4191	3.9
VILNIAUS	7069	11030	3629	3.0
LITHUANIA	7369	11205	3859	2.9
REGION	4549	6281	2838	2.2*

* Sweden = 1.6 and Belarus = 3.2

PYLL INTERPRETED AS LOST/GAINED HUMAN CAPITAL

HOW MUCH NATIONAL ECONOMIES RESPECTIVELY GAIN PER YEAR NOW

WHEN THERE ARE LESS PREMATURE LOSSES OF LIFE THAN 10 YEARS AGO?

COUNTRY	PYLL (ALL) 2003	PYLL (ALL) 2013	PYLL Difference (2003 -> 2013)	GDP/capita/ 2013 (€)	Saved human capital (per 100.0000/year) (€)	Population (Million) 2013	Saved human capital whole population /year (MRD €)
BLR	11227	9851	1376	7 578 €	10 427 328 €	9,5	1,0
EST	8663	4979	3684	18 783 €	69 196 572 €	1,3	0,9
FIN	4070	3115	955	49 147 €	46 935 385 €	5,4	2,6
GER	3830	3008	822	46 269 €	38 033 118 €	80,6	30,7
LVA	9816	6837	2979	15 375 €	45 802 125 €	2,0	0,9
LTU	9072	7369	1703	15 538 €	26 461 214 €	3,0	0,8
POL	6106	4901	1205	13 647 €	16 444 635 €	38,5	6,3
SWE	2981	2511	470	60 430 €	28 402 100 €	9,6	2,7

CONCLUSIONS

METHODOLOGY:

Only major weakness (i.e., definition of the cause of death in death certificate) should be addressed by international standardization.

QUANTITATIVE RESULTS:

- PYLL-rates of all countries are improving.
- Loss of human capital can be slowed down in most countries.
- The higher the PYLL-rate, the greater the inequity.

NEXT STEPS:

- Formulation of priorities for interventions;
- Intra-country regional monitoring;
- Evaluation of actions taken by follow-up of PYLL-rates.

