Cancer at work

Work-related Cancer in EU, ETUI Forum

Brussels 16 December, 2016

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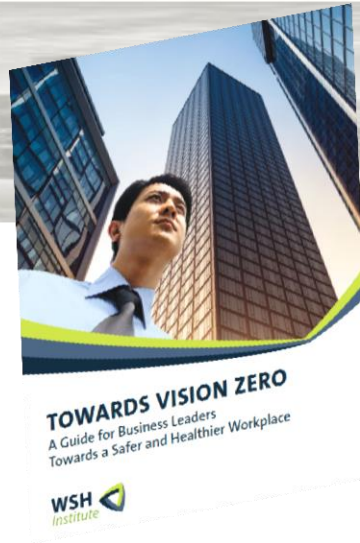
Workplace Safety and Health Institute, Singapore

Action today – less cancers in future

What are the occupational cancer trends expected in future

Occupational cancer is a long-latency disease: 20-55 years latency

Measures to be taken



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What we know

- Globally, cancer kills 8.2 million people each year and 14 million new cancers are detected every year, according to WHO/IARC. Cancer is a multifactorial disease.
- **Mortality will increase 78 per cent by 2035 (IARC).**
- And this is the case also with occupational cancers if we'll continue with "business as usual"
- Epidemiological studies indicate that occupational exposures cause 5.3–8.4 per cent of all cancers and among men 17–29 per cent of all lung cancer deaths, according to best estimates.

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IARC/WHO: Cancer cases will increase

- In the EU28, there were a predicted 1.386 million cancer deaths in 2015.
- Europe, EU28, is the leading victim of occupational cancer globally, 7.5% of all cancer deaths, or 102,500 deaths based on ILO estimates, EU Commission endorsed,
- By 2035 expecting the “business as usual” - approach there will be 182,500 occupational cancer deaths
- Worst hit EU Member States are the Netherlands, United Kingdom and Belgium, followed by Italy - **do you agree**?

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Deaths and population attributable fractions for WHO, ILO and GBD by disease and injury

Table 1: Deaths and population attributable fractions for WHO and ILO methodologies by disease or injury grouping

Disease or injury group	Total deaths	Deaths attributable to occupational risk factors			Population-attributable fractions			Diseases or injuries included in estimate	
		WHO	ILO	IHME/GBD	WHO	ILO	IHME/GBD 2105	WHO	ILO
Communicable & other Group I	1,529,947	139,248	230,517	0	9.10%	15.07%	0.00%	HIV, STDs excluding HIV, Hepatitis B	Tuberculosis (incl.silico-tuberculosis), lower respiraratory tract infections (pneumococcal disease) All A and B codes
Malignant neoplasms	11,992,224	434,095	666,209	488,691	3.62%	5.56%	3.43%	Lung cancer, Mesothelioma, Leukemia, Nasopharynx cancer, Larynx cancer, Ovarian cancer	IARC 1 and 2A, Lung Cancer, Mesothelioma Nasopharynx cancer, Larynx cancer, Ovarian cancer, Colorectal cancer, Skin cancer, prostate cancer,
Neuropsychiatric conditions	2,560,823	0	42,986	0	0.00%	1.68%	0.00%	-	Mental health disorders, Vascular and unspecified dementia (F01, F03), Depressive episode (F32), All G and H codes Parkinsos's disease, Alzheimer's diseases, alcohol and drug use disorders excluded
Circulatory diseases	28,949,476	0	827,460	0	0.00%	2.86%	0.00%	-	Ischaemic heart disease I21-I25, Stroke I60-I69, Cardiomyopathy, myocarditis, and endocarditis
Respiratory diseases	6,693,988	426,645	169,656	356,600	6.37%	2.53%	5.33%	Chronic obstructive pulmonary disease, Asthma	Pneumonia J12, J13, J15,J17, Chronic obstructive pulmonary disease J41-J44, J47, Asthma, Pneumoconiosis, Cryptogenic fibrosing alveolitis J84,
Digestive diseases	3,061,902	0	24,657	0	0.00%	0.81%	0.00%	-	Gastric and duodenal ulcer K25-K26 (shift work)
Genitourinary system	1,751,986	0	17,775	0	0.00%	1.01%	0.00%	-	Chronic renal failure nephritic syndrome N03,N11, N18,N19,N28
Asthmatic diseases				41,536					Included in Respiratory diseases
Unintentional injuries	3,873,724	207,310	352,769	203,677	5.35%	9.11%	5.26%	Falls, Drownings, Fire, heat and hot substances, Poisonings, Injuries from mechanical forces, Road injuries, Other transport injuries, Injuries from animal contact, Foreign body, Other unintentional injuries	Accidents and violent incidents, incl. accidental poisoning,road injuries at work but not commuting, Homicide and injury purposely inflicted by other people, Suicides
OVERALL	60,414,070	**1,207,298**	**2,332,029**	**1,085,807**	**2.00%**	**3.86%**	**1.80%**		

Source: Dr Frank Pega/WHO, Dr Jukka Takala ICOH/WSH Institute

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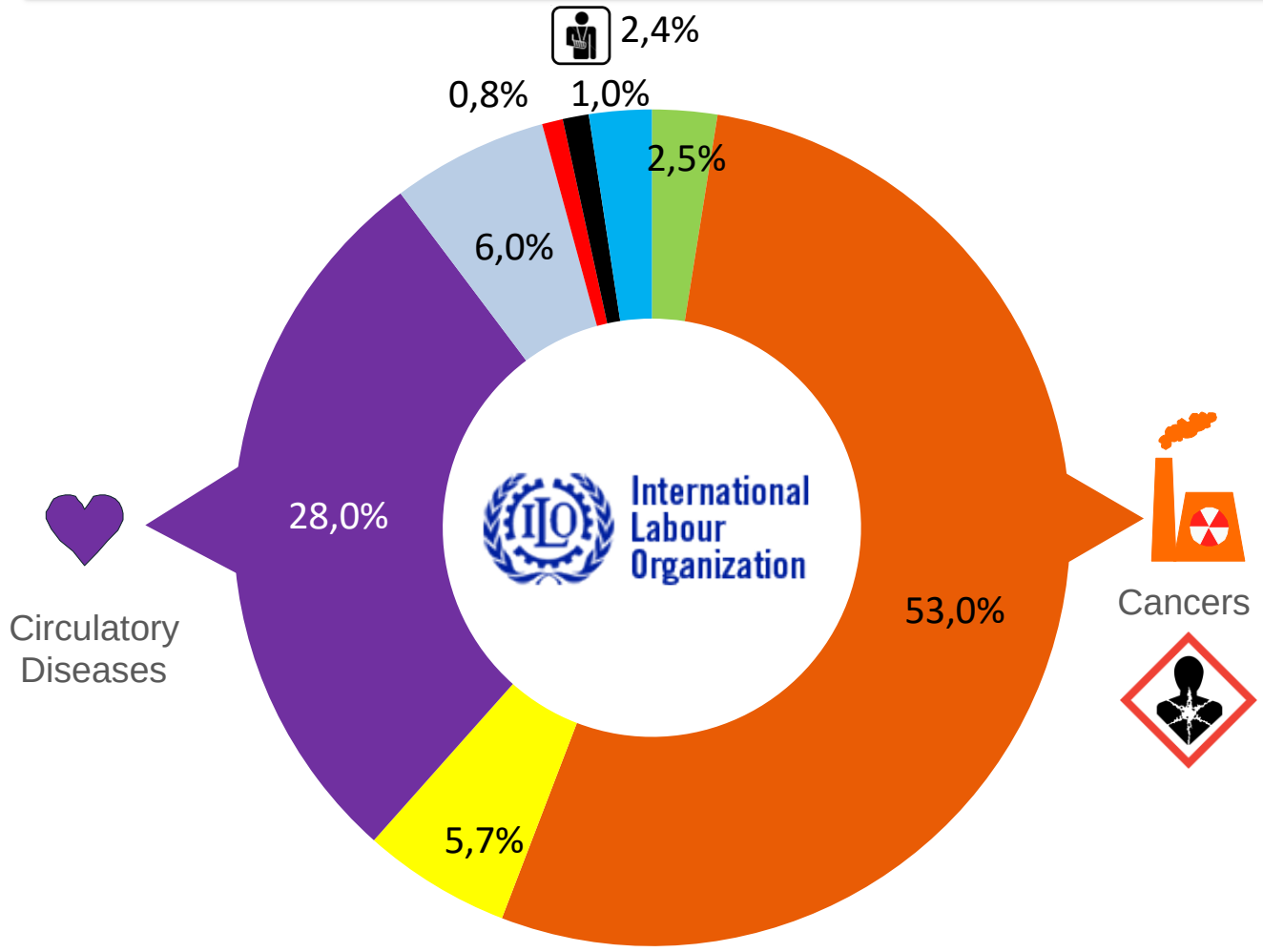
% of Work-related Deaths caused by Illness in EU28



In EU28, cardiovascular and circulatory diseases accounts for 28% and cancers at 53%. They were the top illnesses responsible for 4/5 of deaths from work-related diseases. Occupational injuries and infectious diseases together amount accounts for less than 5%.

[See "Global estimates": http://goo.gl/0xSHGI](http://goo.gl/0xSHGI)

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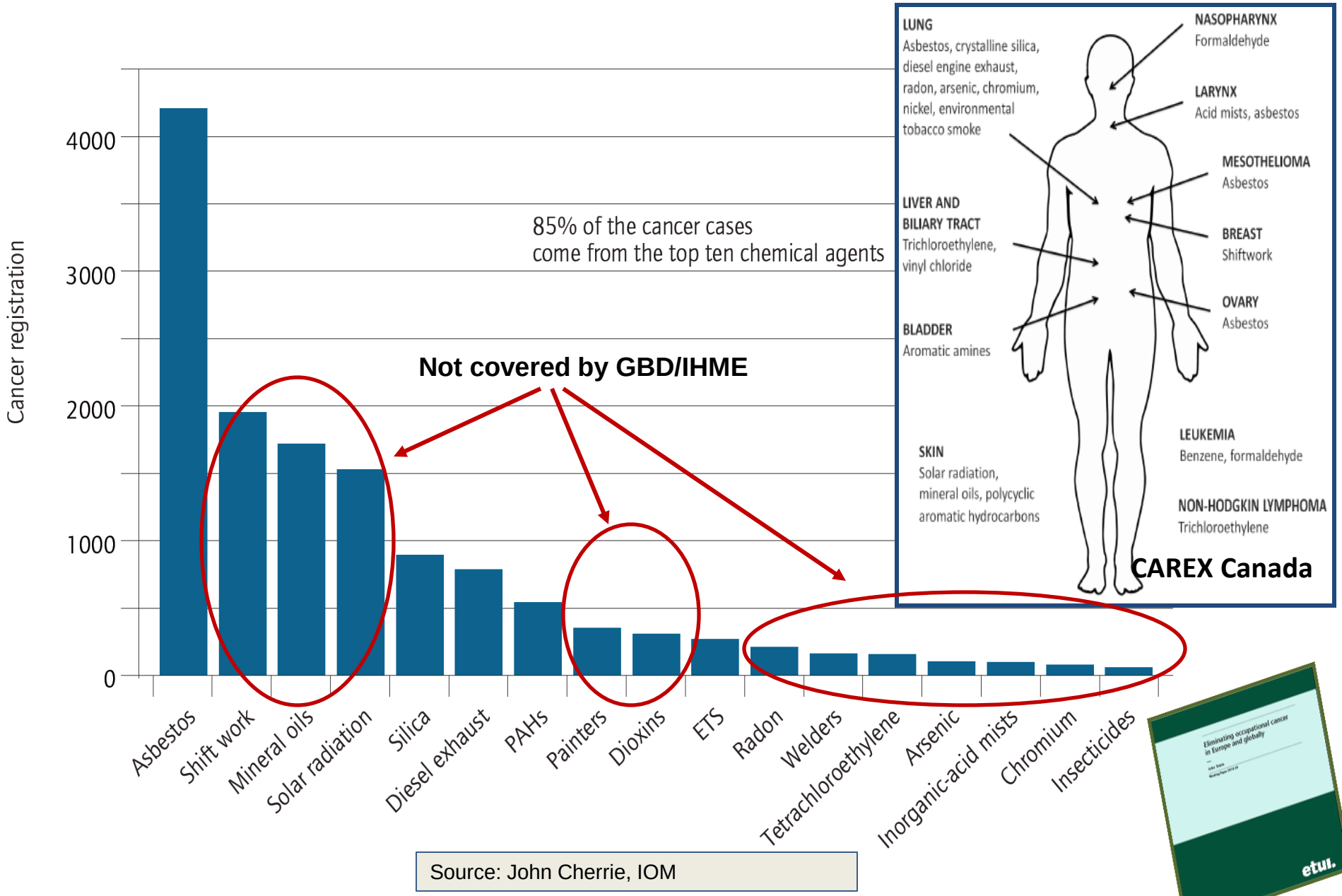
Figure 4 **Most frequent carcinogens and exposures at work in the United Kingdom**



Source: John Cherrie, IOM

Compare Dutch RIVN Report and GBD on Occupational Cancer in EU28

Table 3.2: Total absolute mortality due to cancer in the EU-28 countries in 2012, as a result of exposure to carcinogenic substances at work

Cancer type	Lower range[1]	Central estimate[1]	Upper range[1]	GBD 2015
C33_C34 - Trachea, bronchus and lung	38,500	45,900	50,900	64,361
C45 - Mesothelioma	6,500	7,200	8,200	9,664
C18-C21 Colon, rectosigmoid junction, rectum, anus and anal canal[2]	4,700	4,700	4,700	-
C61 - Prostate[2]	4,300	4,340	4,300	701
C67 - Bladder	1,500	3,500	4,900	-
C25 - Pancreas	0	3,000	6,800	-
C00-C14 - Lip, oral cavity, pharynx	560	2,600	11,300	-
C81-C85 - Hodgkin disease and lymphomas	10	1,500	2,500	-
C15 - Oesophagus	370	1,200	1,900	-
C16 - Stomach	570	1,200	2,000	-
C70-C72 - Brain and central nervous system	20	1,100	2,200	-
C22 - Liver and intrahepatic bile ducts	50	920	1,700	-
C32 - Larynx	160	680	1,100	701
C64 - Kidney, except renal pelvis	0	480	950	11
C56 - Ovary	0	390	620	335
C53 - Cervix uteri	0	360	650	-
C43 - Skin[2]	240	240	240	-
C91-C95 - Leukaemia	50	210	1,300	199
C50 - Breast[2]	90	90	90	-
C88_C90_C96 - Lymphoid, haematopoietic and related tissue	0	50	130	-
Total	**57,700**	**79,700**	**106,500**	N/A

1 Rounded numbers (<1000 to the nearest ten; >1000 to the nearest 100)

2 Only point estimate available

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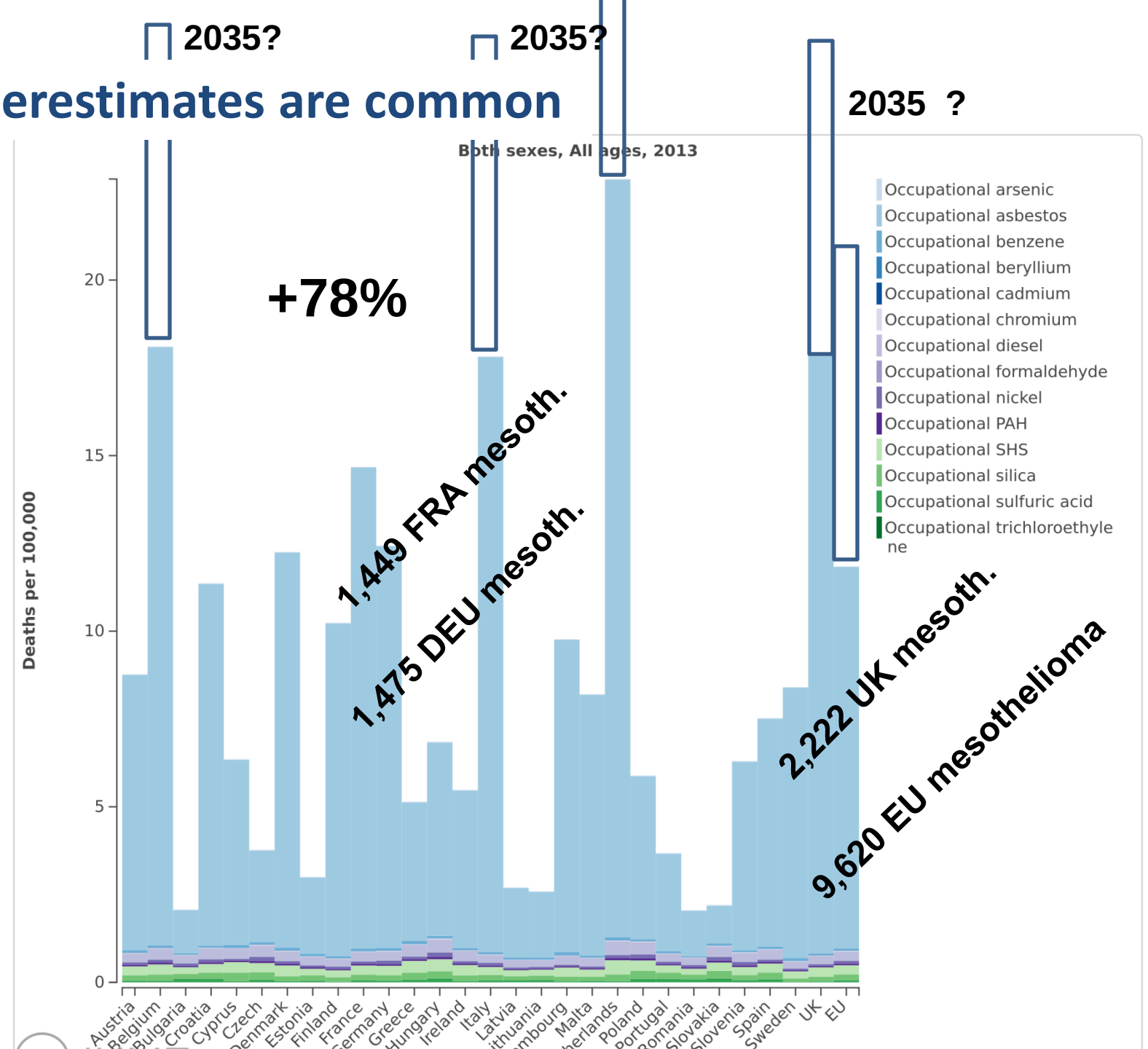
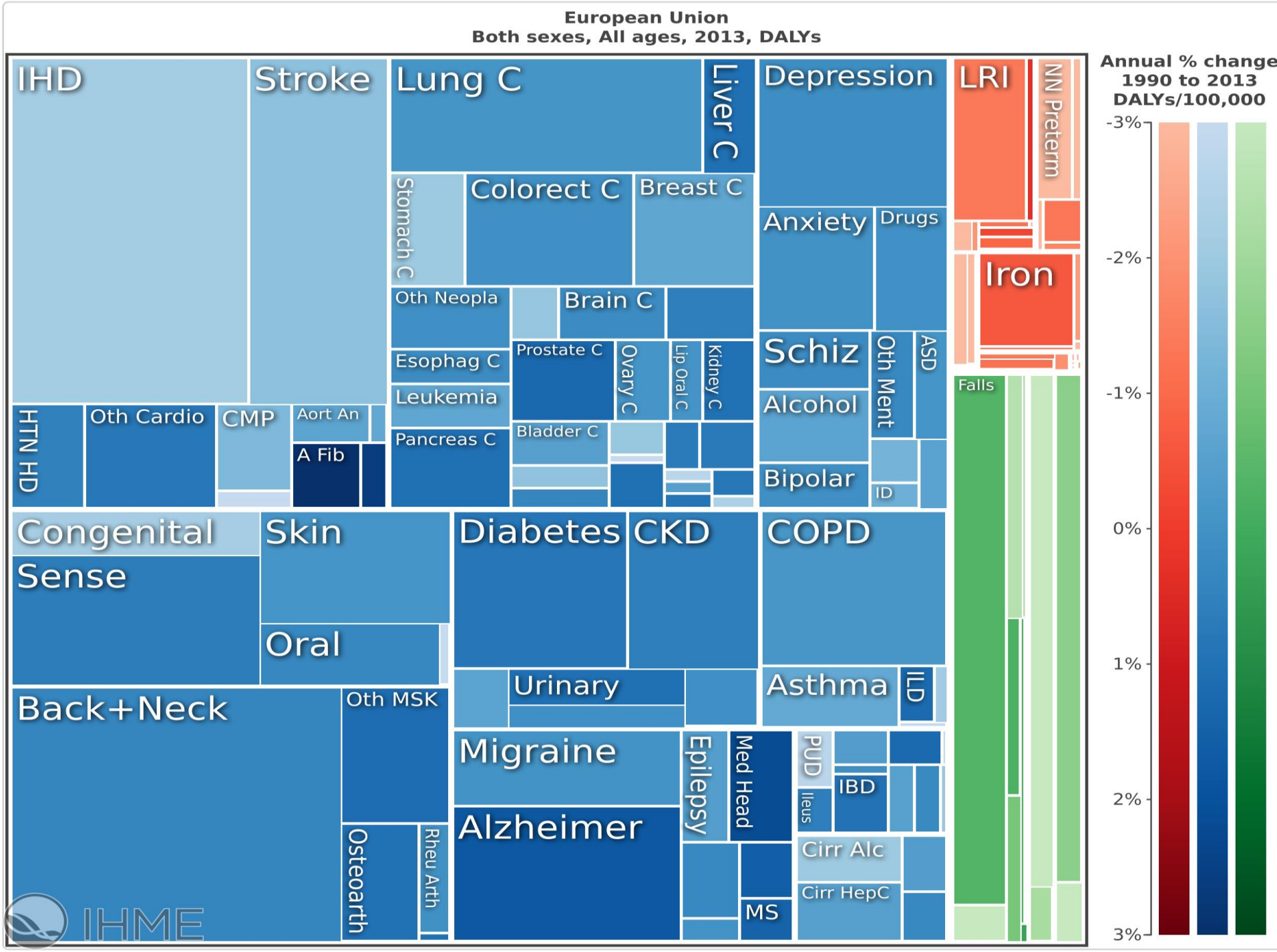
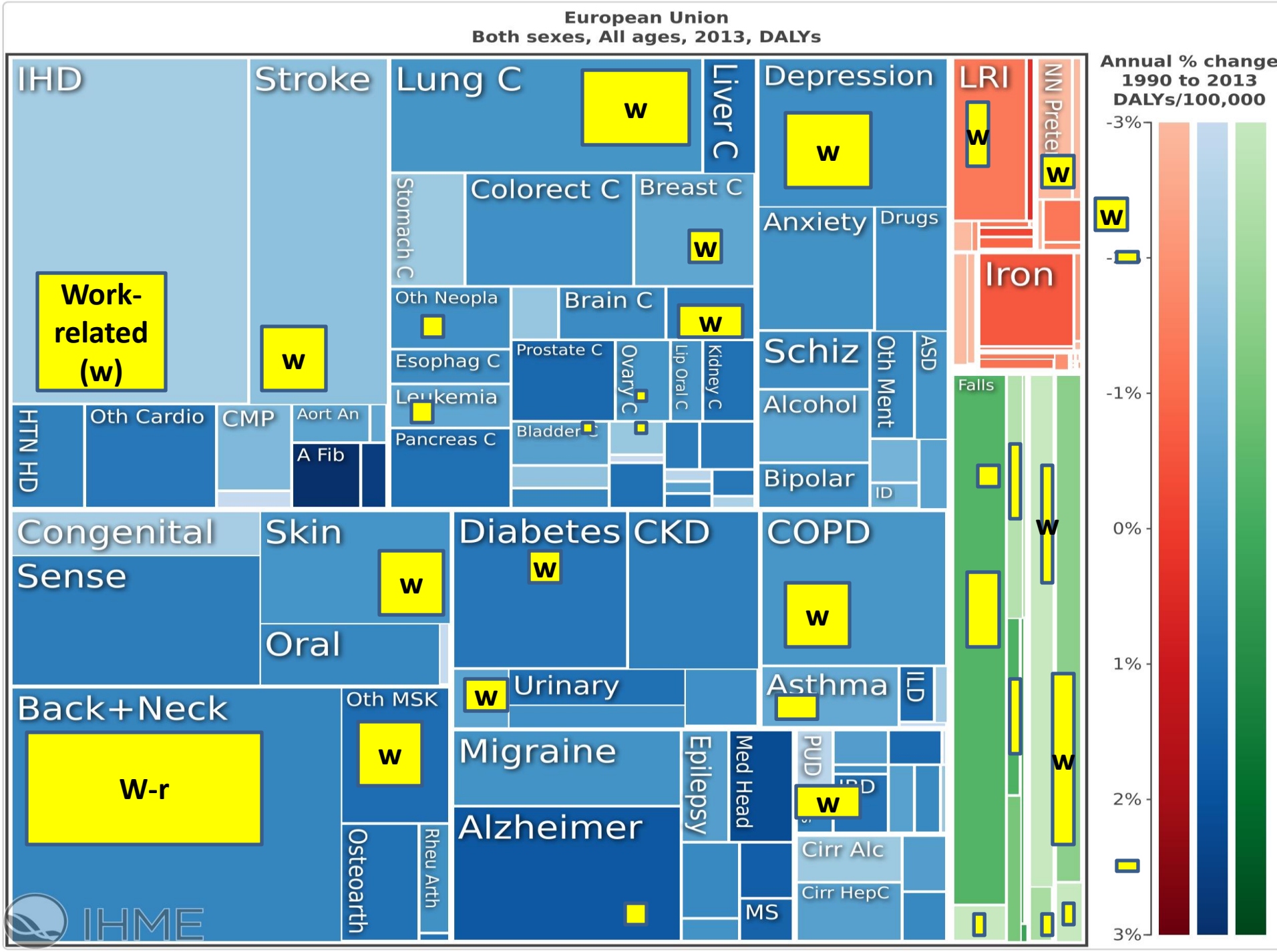
Underestimates are common




European Union
Both sexes, All ages, 2013, DALYs
IHD
Stroke
Lung C
Liver C
Depression
LRI
NN Preterm
Stomach C
Colorect C
Breast C
Anxiety
Drugs
Iron
Oth Neopla
Brain C
Schiz
Oth Ment
ASD
Prostate C
Ovary C
Lip Oral C
Kidney C
Esophag C
Alcohol
Leukemia
Bladder C
Pancreas C
Bipolar
ID
HTN HD
Oth Cardio
CMP
Aort An
A Fib
Falls
Congenital
Skin
Diabetes
CKD
COPD
Sense
Oral
Urinary
Asthma
ILD
Back+Neck
Oth MSK
Migraine
Epilepsy
Med Head
PUD
Ileus
IBD
Alzheimer
Cirr Alc
Cirr HepC
Osteoarth
Rheu Arth
MS
IHME
Annual % change
1990 to 2013
DALYs/100,000
-3%
-2%
-1%
0%
1%
2%
3%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Oth Ment
ASD
Esophag C
Prostate C
Ovary C
Lip Oral C
Kidney C
Leukemia
Alcohol
Pancreas C
Bladder C
Bipolar
ID
HTN HD
Oth Cardio
CMP
Aort An
A Fib
Falls
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Congenital
Sense
Skin
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Oral
Diabetes
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CKD
COPD
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Urinary
Asthma
ILD
Back+Neck
W-r
Oth MSK
w
Migraine
Epilepsy
Med Head
PUD
D
w
Alzheimer
Cirr Alc
Cirr HepC
MS
Osteoarth
Rheu Arth
Annual % change
1990 to 2013
DALYs/100,000
-3%
-1%
0%
1%
2%
3%
IHME

Work –relatedness of common diseases

International Labour Organization

The attributable fractions related work of various diseases. Fractions (%) are based on largely industrial country conditions while application of these fractions was adapted to conditions in selected developing countries

Causes	Attributable fraction	Attributable fraction, men	Attributable fraction, women
Communicable diseases	8.8	4.8	32.5
Malignant neoplasms	8.4	13.8	2.2
Respiratory systems diseases	4.1	6.8	1.1
Circulatory systems diseases	12.4	14.4	6.7
Neuro-psychiatric conditions	3.4	6.6	1.8
Digestive systems diseases	2.1	2.3	1.5
Diseases of the genitourinary system	1.3	3.0	0.4

Population Attributable Fractions

TABLE I. Examples of Attributable Fractions

Causes	Attributable fraction											
	Nurminen and Karjalainen[9]		Rushton et al.[15]		Steenland et al.[14]		Driscoll et al.[13]A		Morrel et al.[21],B		Leigh et al.[22]C	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Communicable diseases	4.8	32.5										
Tuberculosis	0.6	75			5–6							
Malignant neoplasms	13.8	2.2	8.0	1.5	3.3–7.3	0.8–1.0						6–10
Bladder	14.2	0.7	11.6	2.0	7–19	3–19			10	5		
Kidney	4.7	0.8			0–2.3				1	0.5		
Larynx	9.3	0.5			1.0–20.0				2	1		
Leukemia	18.5	2.5	2.7	0.8	0.8–2.8		2 (b)	2 (b)	10	5		
Liver	3.5	5.3			0.4–1.1				4	1		
Lung	29.0	5.3	21.6	5.5	8.0–19.2	2	10 (b)	5 (b)	15	5		
Mesothelioma	90.0	25.0	98.0	90.0	85–90	23–90						
Non-melanoma skin cancer	13.1	3.8	11.8	3.0	1.2–6.0				10	2		
Sinonasal	24.0	6.7	64.3	18.4	33.0–46.0	30.0–42.0			25	5		
Respiratory diseases	6.8	1.1										10[c]
Asthma	17.8	18.4			11–12		21 (c)	13 (c)	2.0	2.0		
COPD	14.0	3.8			5–24		18 (c)	6 (c)				
Pneumoconioses	100	100			100	100			100	100	100	
Circulatory diseases	14.4	6.7			6.3				1.0	1.0	5–10	
Neuropsychiatric conditions	6.6	1.8							1.0	1.0	1–3	
Digestive diseases	2.3	1.5										
Genitourinary system	3.0	0.4							1.0	1.0	1–3	

Note: COPD = chronic obstructive pulmonary disease.
[A]Attributable fractions have been taken from two papers of Driscoll et al.
[B]Covers only deaths due to occupational exposure to hazardous substances
[C]Pneumoconiosis is not included in the figure of Leigh at al.

Journal of Occupational and Environmental Hygiene May 2014

Source: Hämäläinen P, Takala J, Saarela KL

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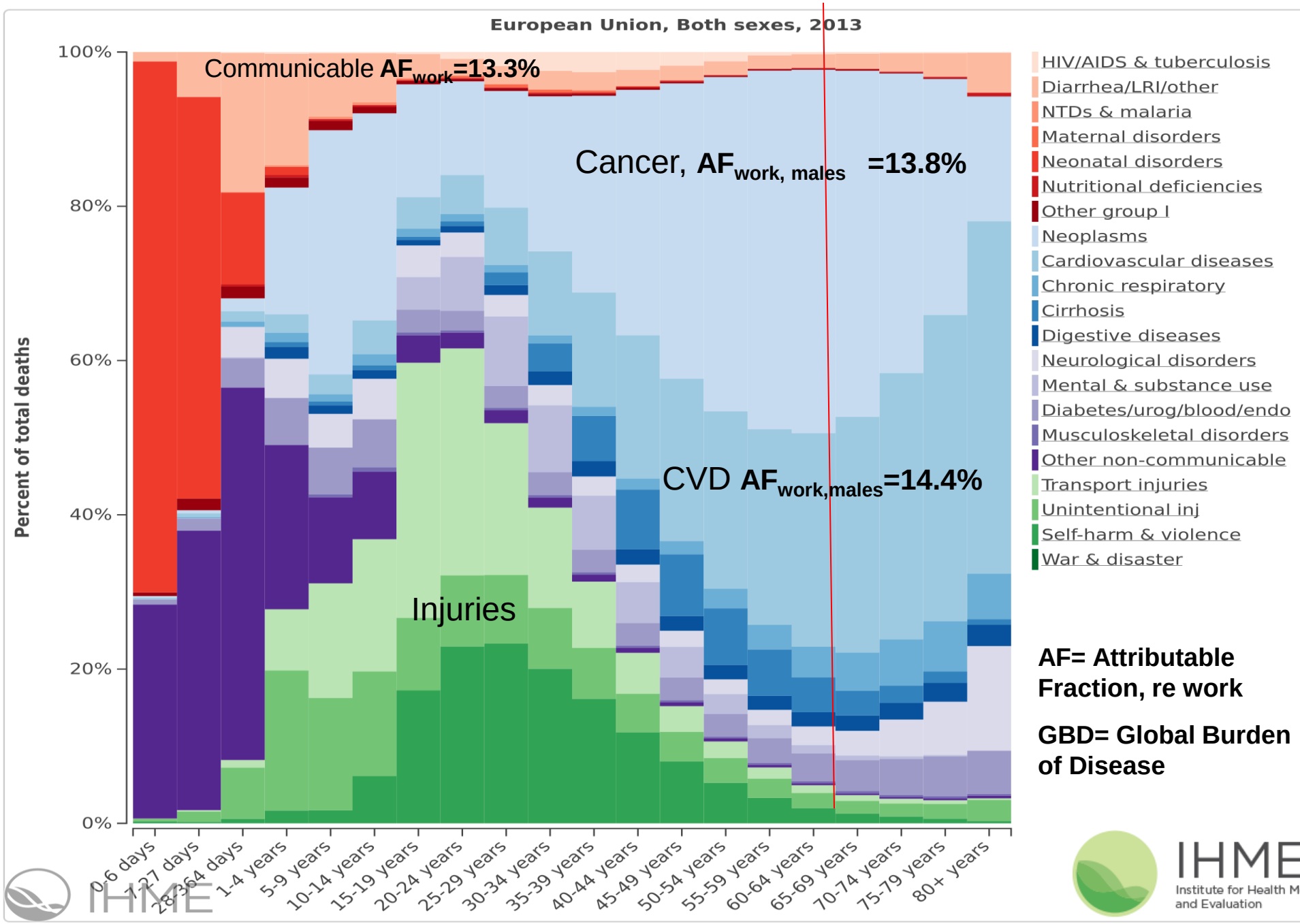
Deaths EU28 in 2013



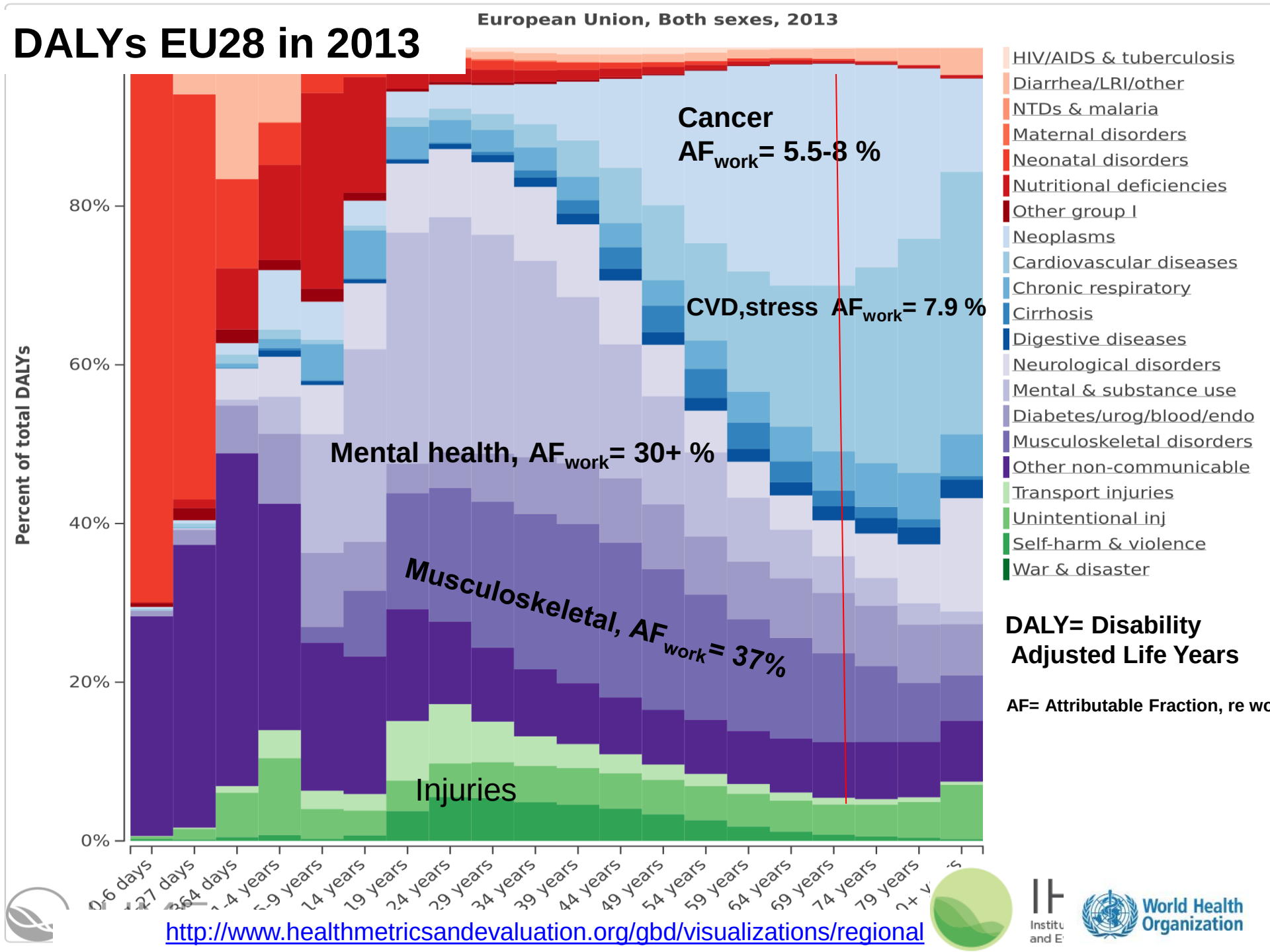
AF= Attributable Fraction, re work

GBD= Global Burden of Disease

IHME

Institute for Health Me and Evaluation

DALYs EU28 in 2013



DALY= Disability Adjusted Life Years

AF= Attributable Fraction, re wo

http://www.healthmetricsandevaluation.org/gbd/visualizations/regional

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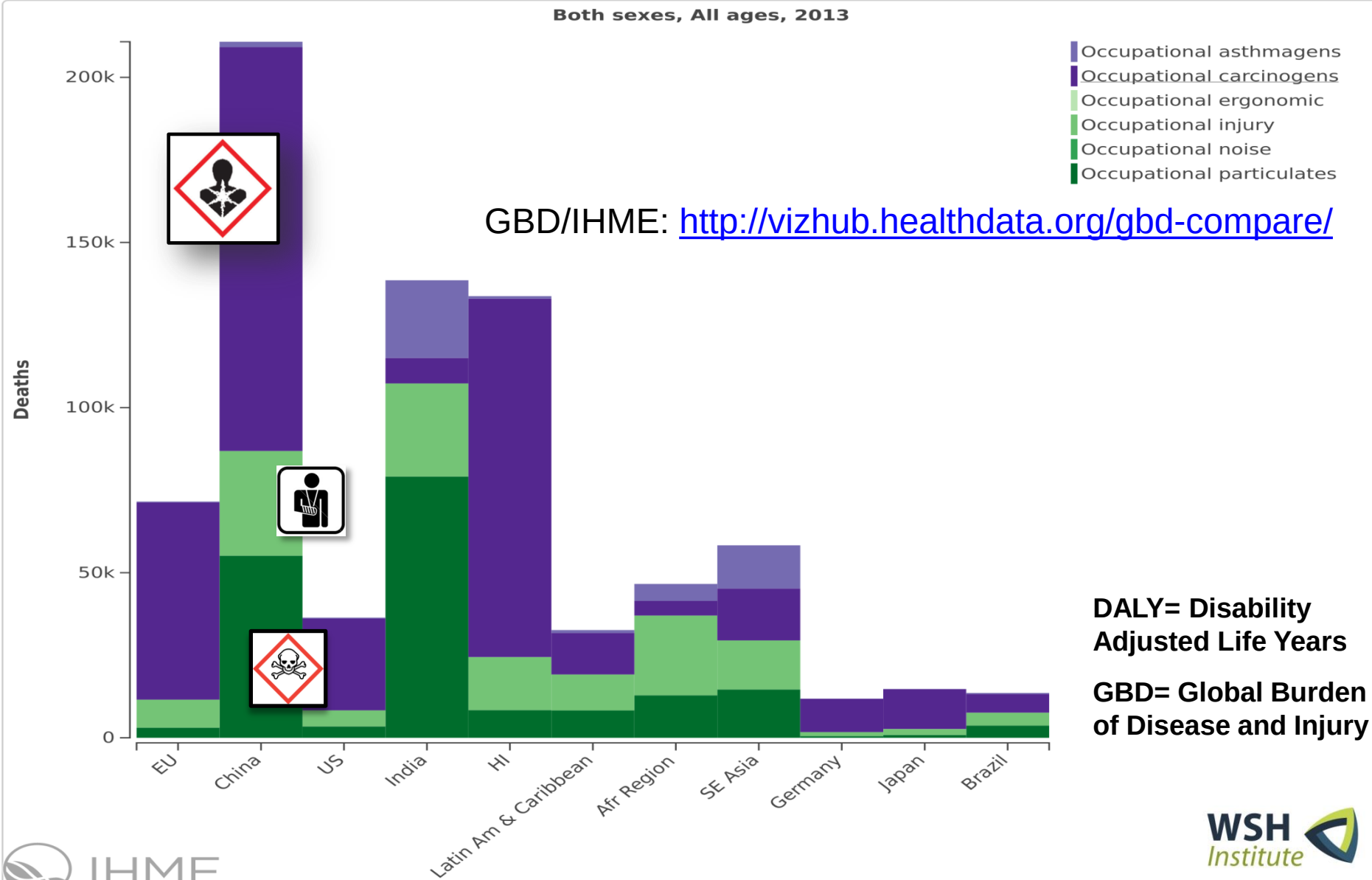
World Health Organization

Selected Occupational Risks, 2013 (IHME)



GBD/IHME: http://vizhub.healthdata.org/gbd-compare/

DALY= Disability Adjusted Life Years

GBD= Global Burden of Disease and Injury

Table 1 **Rough division of occupational cancer by EU28 member states and subterritories within the EU in 2011**

International Labour Organization

Source: goo.gl/fuUXsl

Country	Occupational cancer deaths
Andorra	17
Austria	1820
Belgium	2079
Bulgaria	1445
Croatia	742
Cyprus	179
Czech Republic	2238
Denmark	1242
Estonia	292
Finland	1135
France	12035
Germany	17706
Gibraltar	5
Greece	2131
Greenland	14
Guernsey	13
Hungary	1808
Ireland	928
Isle of Man	18

Country	Occupational cancer deaths
Italy	10609
Jersey	23
Latvia	491
Lithuania	694
Luxembourg	98
Malta	75
Monaco	21
Netherlands	3721
Poland	7501
Portugal	2371
Romania	4233
San Marino	0
Slovakia	1150
Slovenia	442
Spain	9807
Sweden	2103
United Kingdom	13330
Total EU	**102,517**

Switzerland 1905

etui.

ICOH

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http://www.notimetolose.org.uk/

European Union

Deaths/ year

- 58,885 asbestos (asbestos consumption adjusted)
- 6,900 silica dust
- 5,000 diesel exhaust
- 4,500 mineral oils
- 4,500 shiftwork
- 2,000 external tobacco smoke at work
- ……

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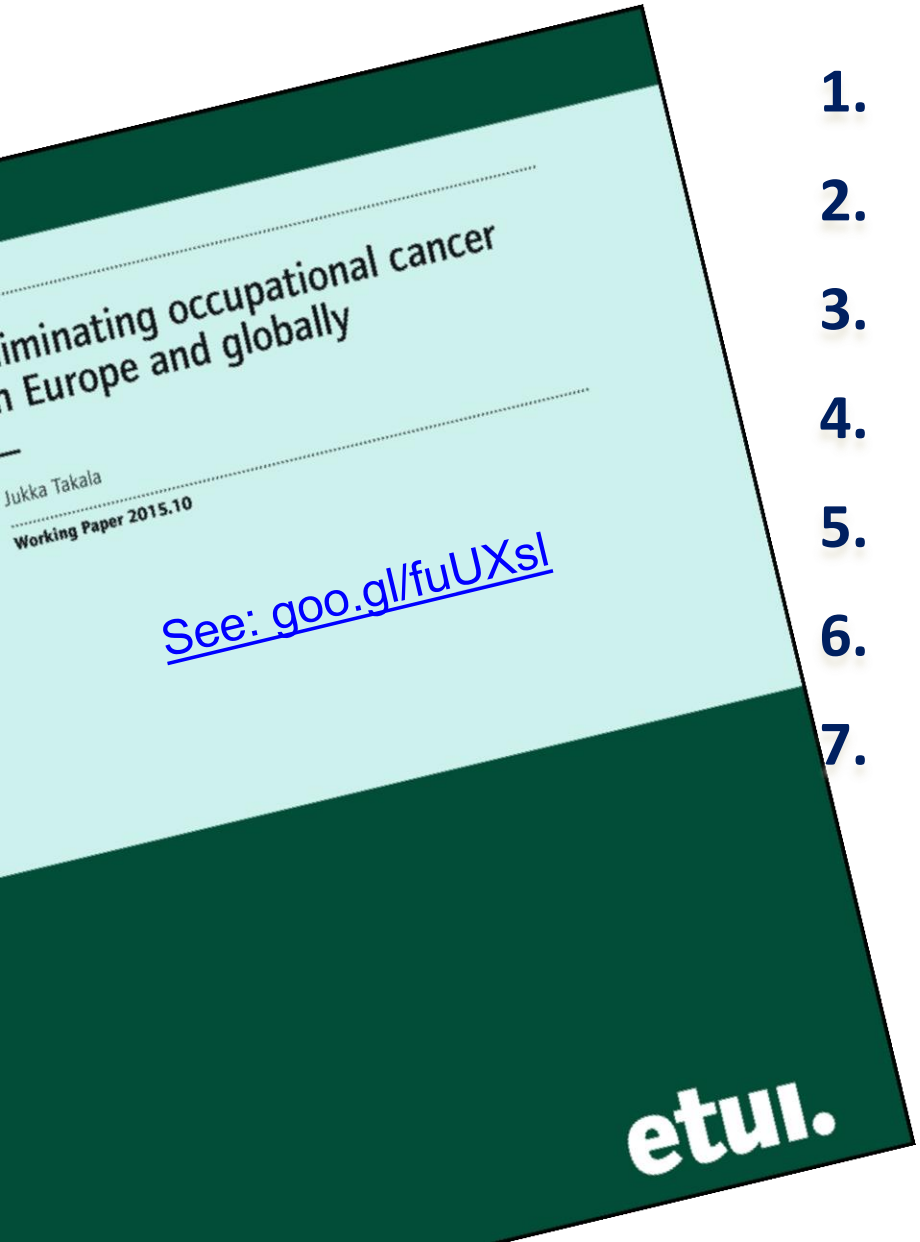
Progress of asbestos –related cancer estimates in EU

1. 100,000 deaths in 1998 (ILO)
2. 108,000 deaths in 2000 (WHO)
3. 130,615 deaths in 2005 (GBD)
4. 172,399 deaths in 2010 (GBD
5. 194,252 deaths in 2013 (GBD)
6. ***258,078*** *GBD2016* ***- 304,841*** *Takala2016*
7. ??? deaths in 2020-

EU28 Increase of asbestos –related cancer deaths



1. 47,000 deaths in 2015 (Takala)
2. 48,375 deaths in 2000 (GBD est 2013)
3. 53,718 deaths in 2010 (GBD est 2013)
4. 55,487 deaths in 2013 (GBD est 2013)
5. 58,885 deaths in 2015 (Takahashi et al.)
6. 59,748 deaths in 2015 (GBD est 2013)
7. 66,900 deaths in 2015 (GBD est 2015)

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Estimated Global ***Mesothelioma Deaths*** *(Annual N*), based on WHO data.*

* Reported N in 59 countries, estimated M in 172 countries, Odgerel,Takahashi et al[17]

Deaths at Work/All

Extrapolation method	Reported Global	Non-reported, adjusted Global	China/EU28
(1) Best estimate, asbestos consumption adjusted	15,011*	23,377	
(2) Estimates based on asbestos use, **All GBD 2015 and best estimates** **Work** $AF_{meso.work}$ = 94.9%[26] Rushton	**32,373 (IHME) - 38,400 (new)** **22,822 (IHME) - 36,400 (new)**		**China: 4,512** (GBD/IHME 2015 all) **EU28: 11,404** (GBD/IHME 2015 all)
(3) Reported/Estimated by continent, employment and asbestos adjusted, other EU estimates, all	15,011	21,247- 23,377	**EU: 8,363** Odgerel, Takahashi et al 2016 all **EU: 10,368** Takala 2015 all

Asbestos related lung cancer and other asbestos related deaths *(Takala et al, not published)*

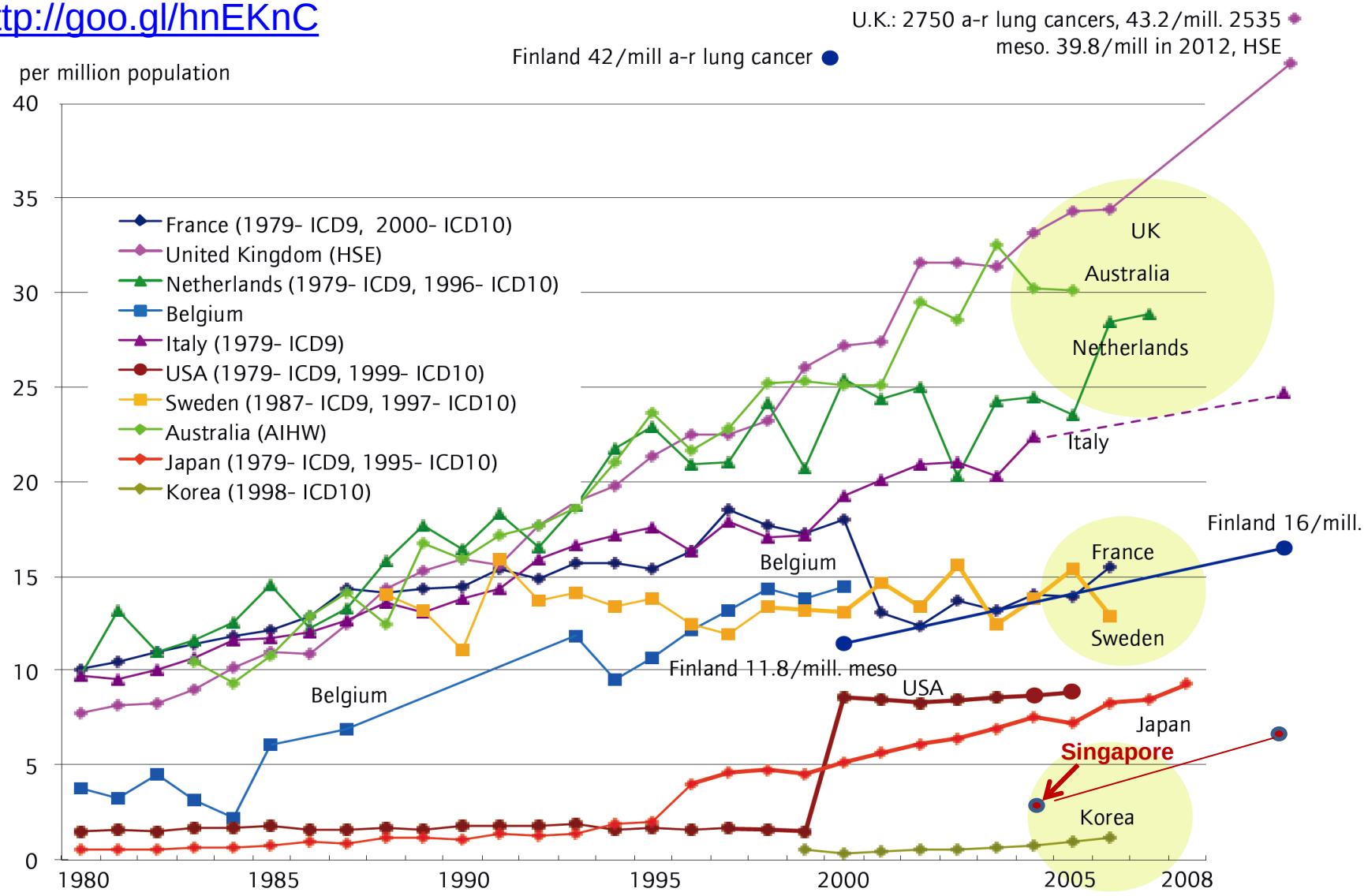
Methods of estimated lung cancer deaths using mesothelioma as a proxy for asbestos use	Lung cancer/ mesothelioma rate	Asbestos related lung, other cancer (and other asbestosis) deaths World	China/EU28
McCormack, Peto et al.[14] average estimate using chrysotile, lung cancer, all , GBD 2015 Study	6.1	197,475	
McCormack, Peto et al., low - high estimates, lung cancer, all, GBD	2.0-10	64,746 – 323,730	
Nurminen, Karjalainen [8], using mixed fibres, asbestos exposure verified by lung tissue fibre counting, lung cancer, all, GBD	3.525	137,475	
GBD based rate on global asbestos-related lung cancer and mesothelioma at work: 154,601/22,822=6.77436 [16] Ovary and larynx cancers, GBD 2015 Asbestosis, GBD 2015	6.77	$177{,}423_{work}$ - $283{,}221_{work}$ $2{,}802_{work}$ $3{,}597_{work}$	***based on GBD/IHME 2015$_{work}$*** **Area meso/ARLC/Ova/Lary** **EU28** 9,664/56,461/335/440 **China** 2,477/24,405/294/199 **Earth** 22,822/154,601/1397/1405

Global asbestos deaths, work: 183,822 – 289,621 Mid-point 236,700

All asbestos exposed, global: 258,078 - 304,841 Mid-point 281,500

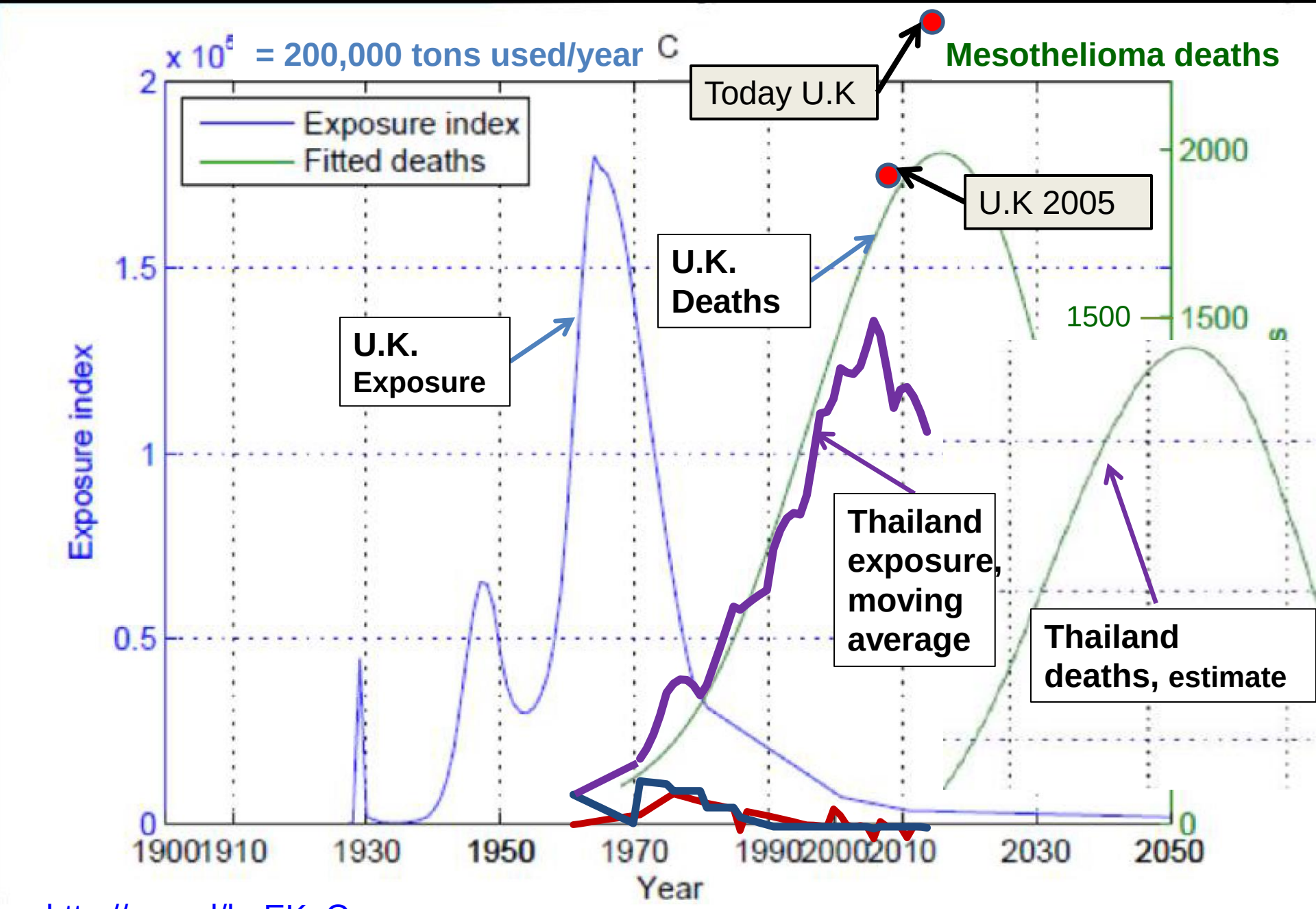
Figure 5 **Mesothelioma and related asbestos-related lung cancer mortality and proposed groups**

http://goo.gl/hnEKnC



WHO Mortality Database, ICD 10: C45 Mesothelioma, ICD 9: 163 Malignant Neoplasm of Pleura
UK: HSE Statistics - Mesothelioma, http://www.hse.gov.uk/statistics/causdis/mesothelioma/
Australia: National Cancer Statistics Clearing House of Australian Institute of Health and Welfare (AIHW)

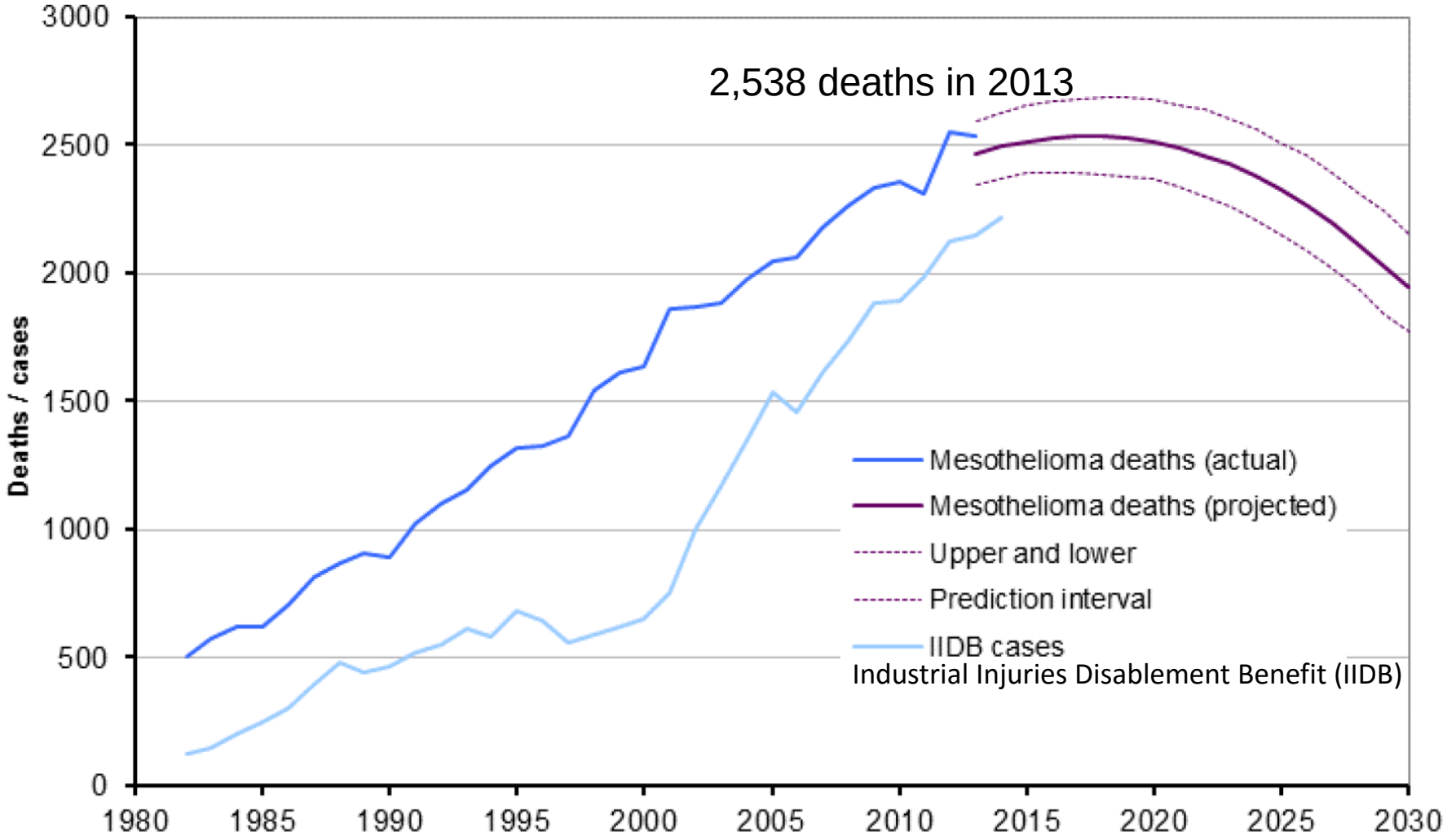
Sources: Figure elaborated by Sugio Furuya, additions by Takala and Goh 2014. The last figure for Italy is taken from Takahashi *et al*.



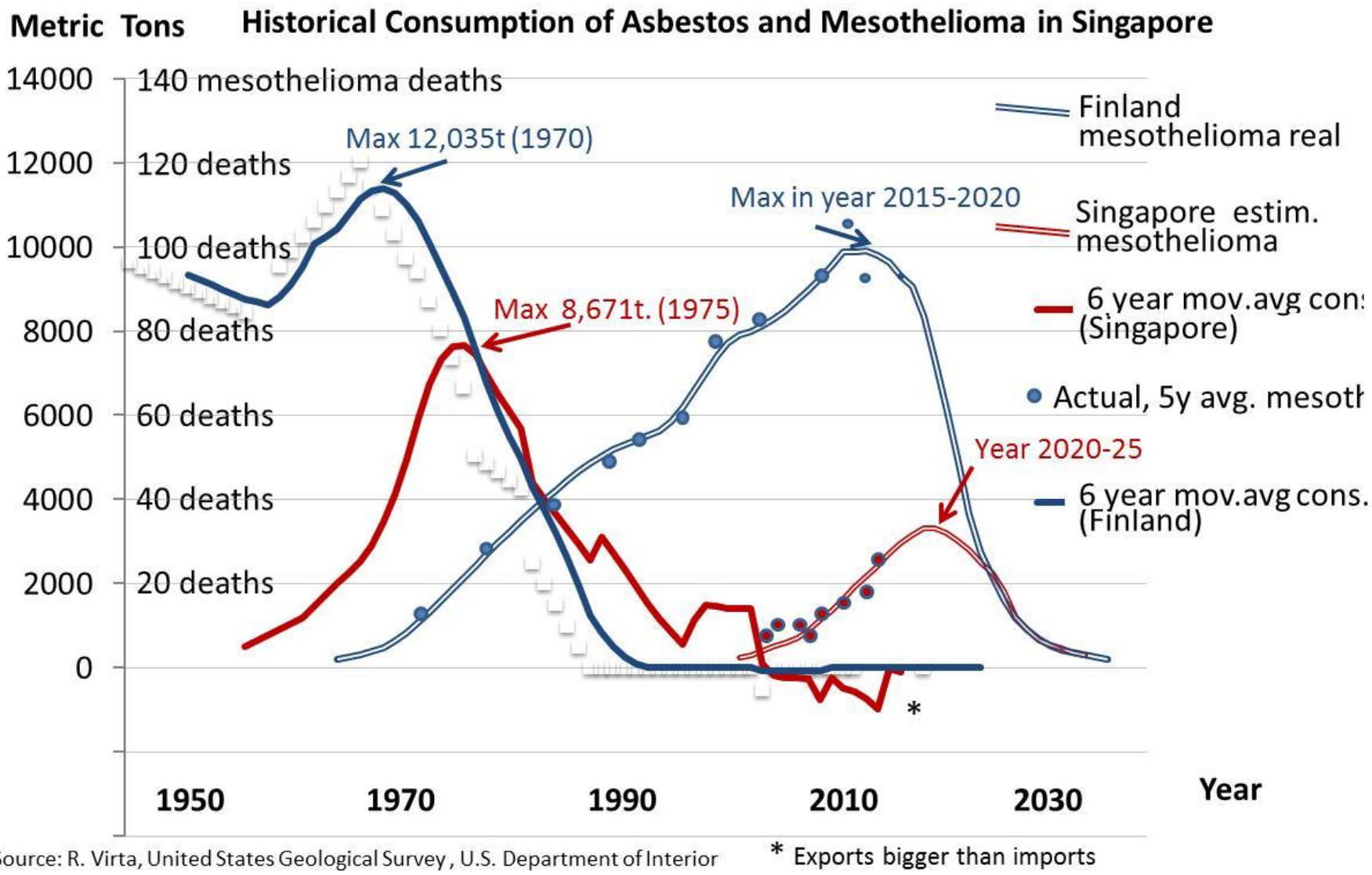
http://goo.gl/hnEKnC

Mesothelioma in the U.K., Real Numbers

Figure 1 – Mesothelioma annual deaths, IIDB cases and projected future deaths to 2030 in GB



Consumption of asbestos in Singapore and in Finland and expected mesothelioma cases some 45-50 years later



Source: R. Virta, United States Geological Survey , U.S. Department of Interior

* Exports bigger than imports

New Estimates of silica caused cancer deaths based on adjusted numbers of exposed population and global cancer death estimates							
	% of exposed	N* of Exposed	Estimate by share of lung cancer	Estimate by share of all cancers	IHME/GBD	Estimate by share of occupat. cancer, 5% of ILO data	
EU-28 2013	**2.354**	**5,285,000**	**6,991**	**7,182**	**846.64**	**5%**	**5125**
U.K.(control est.)	2.256	669,000	964	786	85.73	5%	667
USA	2,114	2,998,000	3,876	2,995	513.74	5%	3268

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Country lung cancer deaths caused by silica, EU in 2010-2040

Country	2010	2020	2030	2040
	Attributable Deaths			
Austria	101	116	124	117
Belgium	0	0	0	0
Bulgaria	99	102	103	92
Cyprus	7	8	9	9
Czech Republic	227	259	279	264
Denmark	106	125	130	115
Estonia	28	30	33	31
Finland	62	76	88	83
France	1,027	1,052	995	844
Germany	763	866	886	799
Greece	176	196	211	202
Hungary	184	196	205	189
Ireland	26	29	32	31
Italy	348	398	439	438
Latvia	41	42	46	44
Lithuania	64	68	76	74
Luxembourg	15	17	19	19
Malta	0	0	0	0
Netherlands	243	298	327	304
Poland	517	577	612	564

	2010	2020	2030	2040
Portugal	168	187	200	191
Romania	213	225	238	221
Slovakia	38	44	50	48
Slovenia	38	45	52	50
Spain	963	1,327	1,926	2,406
Sweden	78	86	89	78
United Kingdom	985	966	855	639
TOTAL	6,870	7,715	8,373	8,087

Source: Cherrie et al.2011

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Strategies in preventing Occupational Cancer

- **Evidence**
  science, research, knowledge on work life, sustainability
- **Ethics**
  socially sustainable solutions, quality of work life, equal treatment , defend the vulnerable in the world of work
- **Engagement**
  openly engage in dialogue with policy makers, all stakeholders, interested parties, all members
- **Enforcement** based on regulatory measures
- **Economics,** show that prevention pays

Example of costs of fatal occupational cancer cost calculation with existing data

1. EU: **102,500** fatal cases in (ILO)
2. Average years of life lost 15.13 years (YLL from GBD)
3. GDP in EU 28: 18,460,646 million USD (Wiki); Employed 218,050,300 (ILO)
4. GDP/employed: 84,662 USD/year
5. Calculation:

$$\frac{[\,(15.13 * 102{,}500 * 84{,}662\ \text{USD}]}{18{,}460{,}646 * 10^{6}\ \text{USD}}$$

=

$TOTAL_{GBD}$ $115.2 * 10^{9}$ EUR, or 0.71 % of GDP_{EU28}

Years Lived with Disability, YLD need to be added to this

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Costs of asbestos-related disorders in EU28

Disability adjusted Life Years, DALY's, for cancer and asbestosis caused by asbestos from http://vizhub.healthdata.org/gbd-compare/

979 989.95 years based on 66 899.67 deaths in EU28 in 2015, includes mesothelioma, lung cancer, larynx and ovary cancers.
DALY caused by asbestosis 12 095.77 based on 986.37 deaths in EU 28

TOTAL DALY : 992 076.77 years
Employment: 218 336 000 persons, or person years if no loss

Lost DALY's of the total maximum years:

992 076.77/218 336 000 = 0.4544%

The GDP of EU28 was 18,460,646 $*10^6$ USD
of which 0.4544% makes

$83.9 * 10^9$ USD, or $77.67 * 10^9$ EUR

Strategies for Preventing Occupational Cancer contnd.

- (i) advocate measurable and continuous reduction of exposures to gradually eliminate occupational cancer.
- (ii) An international programme *'Elimination of occupational cancer'* should be launched
- (iii) The EU must be a key driver for such programme, collaborating with ILO and WHO and all relevant organisations, including professional organisations,

Strategies for Preventing Occupational Cancer contnd.

- (iv) CAREX should be updated, new major model Burden of Occupational Cancer by Canada

www.occupationalcancer.ca/2011/burden-of-occupational-cancer/

- (v) Exposure limit values should be updated:

- USA reduced the exposure limit for silica dust from 0.1 mg/m3 to 0.05 mg/m3. OSHA/USA expects to eliminate 60% of the silica caused fatalities with this measure

Occupational exposure to carcinogen
European Union

Pirjo Kauppinen, Jouni Toikkanen, David Pedersen, Randy Young
Paolo Boffetta, Johnni Hansen, Hans Kromhout, Jeronimo Maque
Nils

Table 4 The most common carcinogen exposures (in thousands) by country in 1990–3

Agent	*A*	*B*	*D*	*DK*	*E*	*F*	*FIN*	*GB*	*GR*	*I*	*IRL*	*L*	*NL*	*P*	*S*
Solar radiation	240	200	2400	180	1100	1500	180	1300	460	560	110	14	290	370	240
Tobacco smoke, environmental	180	190	2000	100	670	1200	110	1300	170	770	58	11	350	210	210
Silica, crystalline	100	74	1000	59	400	110	83	590	87	280	29	7	170	83	86
Diesel exhaust	79	67	720	71	270	410	39	470	79	550	21	4	110	73	81
Radon	72	86	820	0	280	520	49	560	66	38	24	4	0	92	99
Wood dust	82	55	680	51	400	180	65	430	51	320	18	4	95	86	84
Lead and its compounds	37	30	460	23	100	140	13	250	24	290	9	3	49	33	35
Benzene	49	21	470	49	90	70	14	300	55	190	11	2	43	43	34
Asbestos	15	10	160	9	57	140	7	95	15	680	6	1	14	16	12
Ethylene dibromide	46	17	440	27	81	10	1	280	33	170	10	2	19	40	31
Formaldehyde	17	16	130	90	71	310	11	94	10	180	3	0.6	16	36	11
PAH	19	17	210	13	55	12	6	110	13	350	4	2	26	21	18
Glasswool	23	19	250	14	92	130	12	140	17	150	6	2	34	19	20
Tetrachloroethylene	19	12	210	11	47	140	3	120	14	180	5	1	21	21	16
Chromium (VI) compounds	18	19	260	25	5	70	10	130	10	130	5	1	29	21	21
Sulphuric acid mist	7	10	100	4	20	380	2	42	3	120	2	1	10	5	8
Nickel compounds	12	15	200	11	43	50	8	85	6	79	3	1	19	12	17
Styrene	6	10	110	36	28	50	3	54	4	66	2	0.5	12	7	9
Methylene chloride	2	3	29	23	7	60	1	15	1	130	1	0.2	3	3	2
Trichloroethylene	2	2	33	7	6	110	1	16	1	90	1	0.1	3	2	2
Total, exposures	1100	910	11100	880	4000	6000	650	6600	1100	5600	330	63	1400	1200	1100
Total, exposed workers	790	730	8300	680	3100	4900	510	5000	910	4200	260	48	1100	970	820
Exposed/employed (%)	25	21	24	24	25	23	24	22	27	24	24	25	17	24	20

A=Austria; B=Belgium; D=Germany; DK=Denmark; E=Spain; F=France; FIN=Finland; GB=Great Britain; GR=Greece; I=Italy; IRL=Ireland; L=Luxembourg; NL=The Netherlands; P=Portugal; S=Sweden.

Strategies for Preventing Occupational Cancer contnd.

- New exposure limits ? Diesel exhaust, Chromium VI…
- European Commission new proposal, reduces silica exposures and 100,000 lives saved in 50 years, 2,000 year;
- If new USA new limit followed, another 100,000 lives saved
- Dutch Expert Committee on Occupational Safety (DECOS) has proposed that the occupational exposure limits (OELs) for asbestos be reduced from 10,000 fibres/m^3 (all types) to 420 fibres/m^3 for amphibole asbestos, 1,300 fibres/m^3 for mixed asbestos fibres, and 2,000 fibres/m^3 for chrysotile asbestos.

Strategies for Preventing Occupational Cancer contnd.

- A comprehensive set of recommendations are given in : https://osha.europa.eu/en/tools-and-publications/publications/reports/report-soar-work-related-canc

Exposure to carcinogens and work-related cancer: A review of assessment methods

European Risk Observatory Report

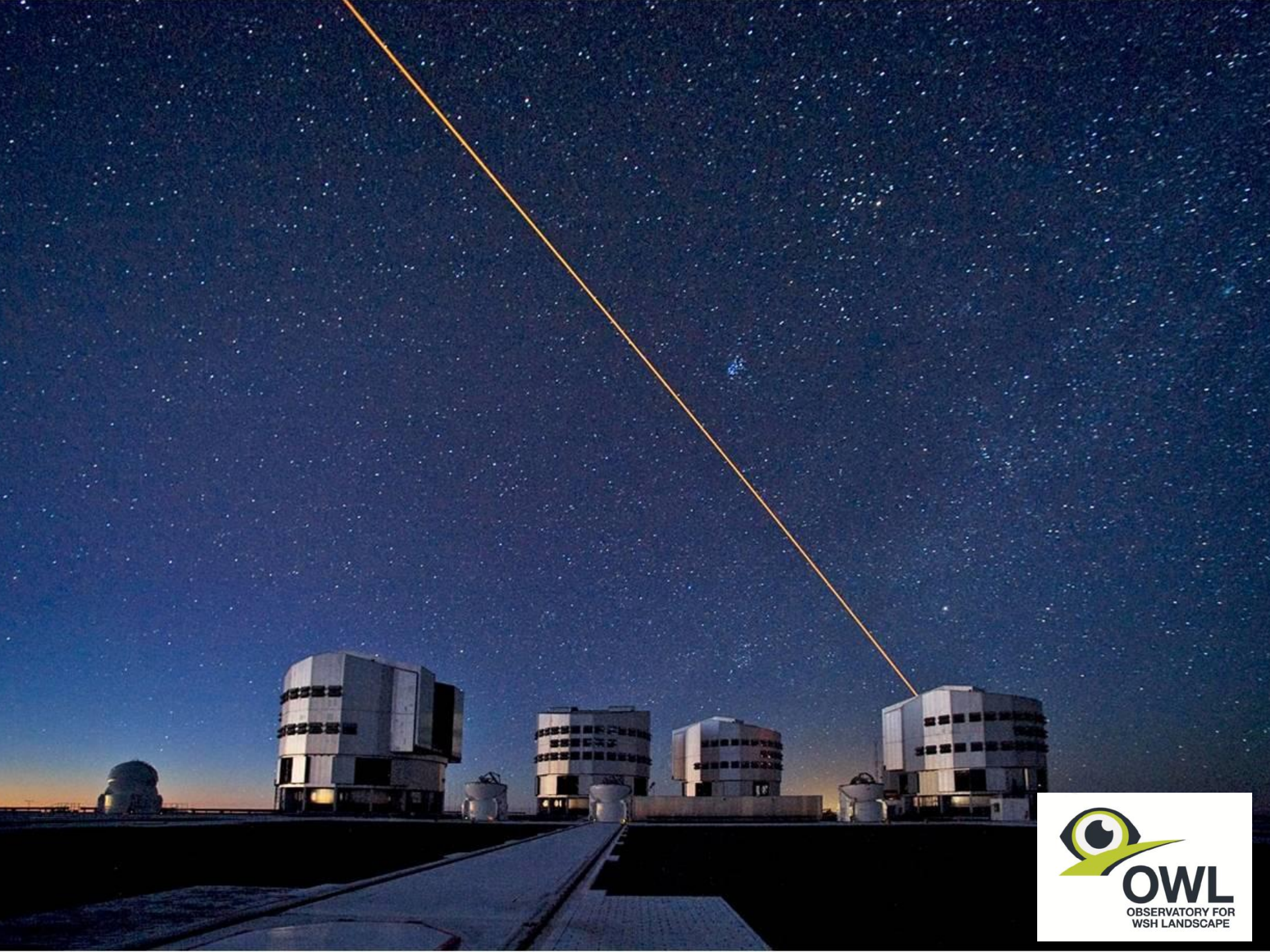
European Agency for Safety and Health at Work

Summary

- Exposures until today determine future trends, exposure elimination/limitation has been poor and cancer cases go up;
- Most changes in future exposures depend on structural changes and new technological processes, not (yet) initiated by preventive measures;
- One cannot fight cancer at work in general, it must be based on detailed measures for limiting each individual exposures;
- Ramazzini: “May I ask what is your occupation?”
- CAREX – Cancer exposure Register - by occupation;

Summary

- Priority order is important, 50 exposure limits;
- Hierarchy of control is vital, elimination substitution..;
- Most people think that the asbestos problem is solved.. Another wave of exposures/cancers may be coming from today's and near future demolitions, removal and related exposures. Such work is not properly done in most countries in the EU today;
- Capacity of Member states;
- EU Campaign and programme on occupational cancer


OWL
OBSERVATORY FOR
WSH LANDSCAPE

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Concrete steps

(i) Establish an international action programme, including regional action – for example, in the EU – to eliminate cancer at work through the identification and elimination of exposures to carcinogenic, mutagenic and teratogenic substances and agents, and modification of related work processes.

(ii) Mobilise ILO, WHO and EU member states to set up similar country programmes in collaboration with all relevant stakeholders and, in particular, involving workers and employers and their organisations.

(iii) Propose the ILO and the WHO to join the programme using the same models as past ILO/WHO programmes.

(iv) The European Agency for Occupational Safety and Health and the European Commission should jointly support such action in the EU.

Concrete steps contnd.

(v) Draft scientific papers, guidance and reports on occupational cancer and ways to reduce and eliminate exposures. Rather than relying on individual researchers of institutions a network of collaborators should be established to contribute.
(vi) Once reasonable findings are complete, these need to be endorsed by credible research bodies, authorities and organisations to provide sufficient weight for further action. These include key institutes, government administrations, workers and their organisations, including trade unions, employers' organisations, sectoral industry associations, and international and regional players, environmental NGOs and associations, such as ICOH, IOHA, AIHA, ISSA, IOSH, IALI, Collegium Ramazzini.
(vii) A group of focal points and interested bodies and experts will be needed to participate in drafting and/or peer reviewing the outputs. Any interested stakeholder may identify such network members.

Strategies for Preventing Occupational Cancer contnd.

- The Dutch Expert Committee on Occupational Safety (DECOS) has proposed that the occupational exposure limits (OELs) for asbestos be reduced from 10,000 fibres/m^3 (all types) to 420 fibres/m^3 for amphibole asbestos, 1,300 fibres/m^3 for mixed asbestos fibres, and 2,000 fibres/m^3 for chrysotile asbestos.

Risk level	Chrysotile (fibres/ml)	Mixed exposure up to 20% amphibole (fibres/ml)	Amphibole (fibres/ml)
$4x10^{-3}$	0.2	0.13	0.042
$4x10^{-5}$	0.002	0.0013	0.00042

Example of poor emphasis on work exposures

Combined effect of exposures to asbestos and smoking on lung cancer

Applicable to selected other carcinogens

Age-standardized lung cancer death rates

Death rate (per 100,000)	Non-smoker	Smoker
No asbestos	11	123
Asbestos	58	602

Attributable Fraction, AF is based on risk ratio, RR

AF = (RR-1)/ RR

AF Principle

GBD/IHME

Hammond EC, Selikoff IJ, Seidman H. Asbestos exposure, cigarette smoking and death rates. Ann N Y Acad Sci 1979;330:473-90.

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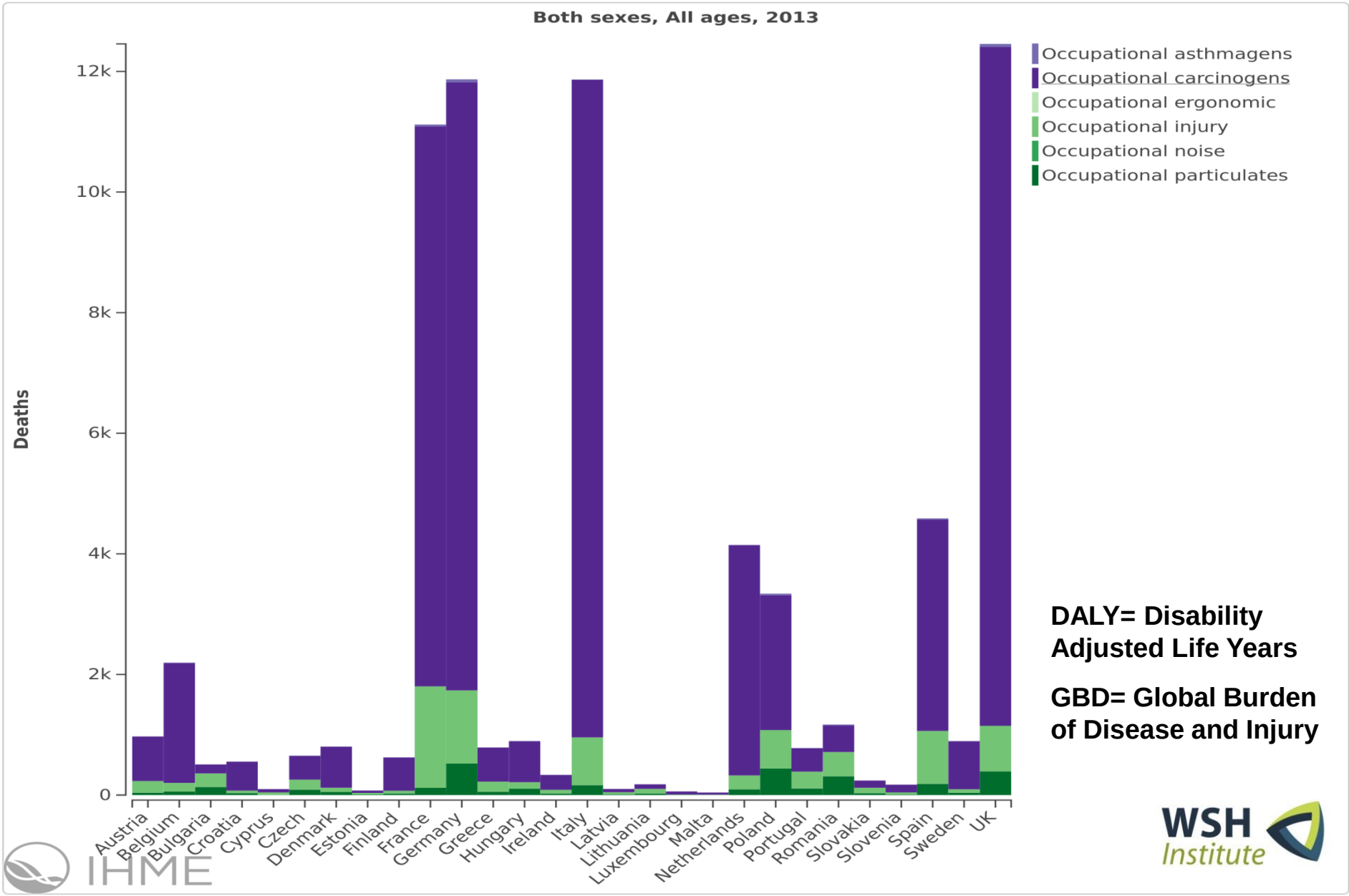
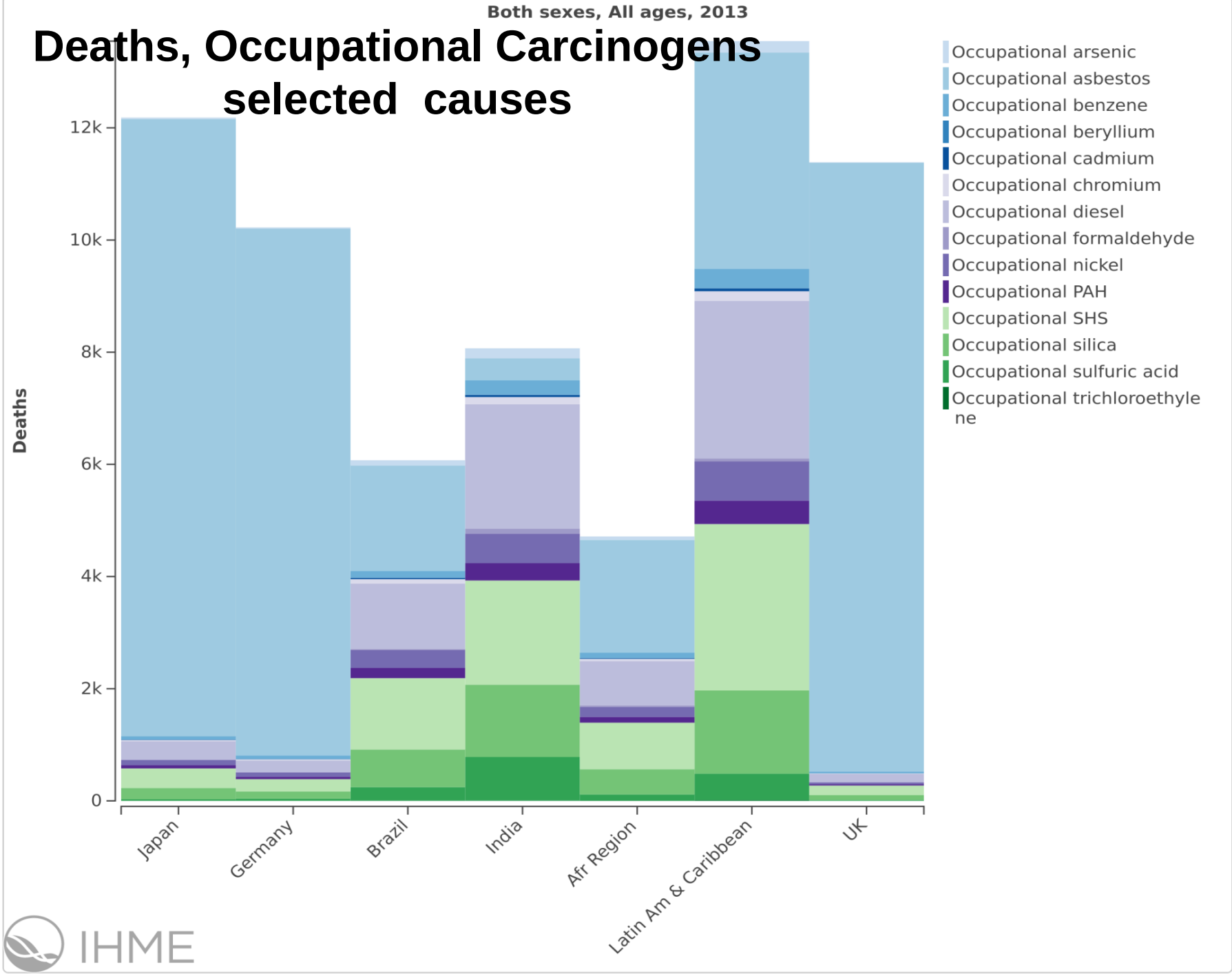
Deaths caused by selected risks EU 2013 GBD/IHME



DALY= Disability Adjusted Life Years

GBD= Global Burden of Disease and Injury

Deaths, Occupational Carcinogens selected causes



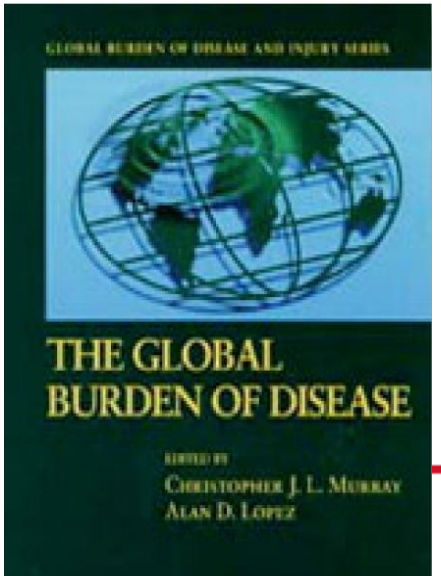
IHME

THE UNIVERSITY OF SYDNEY

What is the GBD?

GLOBAL, COMPARABLE, EVIDENCE-BASED information on injuries and diseases and associated risk factors

"A response to the need for comprehensive, consistent and comparable information on diseases and injuries at global, regional and national levels" (WHO)



Slide source: Tim Driscoll, University of Sydney

Concepts for measuring the Burden

YLL = N x L

Years of Lost Life, N=deaths, L = lost years

\+

For cancer (UK): 19.8 years (average age ~60 years)
For injuries(UK): 45.3 years (average age ~35 years)

YLD = I x DW x L

Years Lived with Disability
Measure of the burden due to early loss of full function

=

I = Number of incident cases
DW = Disability weight (0…1)
L = Average number of years affected

DALY = YLL + YLD

Disability Adjusted Life Years

Concepts designed and accepted by:

World Health Organization

International Labour Organization

WSH Institute

How to calculate the Burden$_{work}$

YLL = N x L

\+

YLD = I x DW x L

=

DALY = YLL + YLD

-We can easily count the lost years from GBD/IHME from the two numbers per country/region: all deaths and YLLs

-Number of fatal cases either from statistics and registers, such as mesothelioma deaths, or

-Using Attributable Fraction, AF_{work} for each disease/ disorder and apply that to best all deaths number to the disorder concerned

-Take all YLD's from GB/IHME

- Apply AF_{work} to these YLD's, note that $AF_{work\ morbidity}$ may be somewhat different from those of $AF_{work\ mortality}$

Disability Adjusted Life Years

GBD/IHME: http://www.healthdata.org/data-visualization/gbd-cause-patterns

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Complete Summary

- The solid, quantifiable evidence of future impact caused by carcinogens is limited to only a few areas of studies, in particular, those on asbestos, silica, and ETS (passive and smoking),
- What we know from exposures until today provides some hints of future trends, which is that exposure limitation efforts have been poor and cancer cases go up;
- Most changes in future exposures depend on structural changes (economic structures) and changes in technological processes not initiated by preventive measures;
- Shift work and night work – a different animal from others- continue to grow due to society interests and 24/7 service expectations – not always necessary;
- One cannot fight cancer at work in general, it must be based on detailed measures for limiting each individual exposures;
- Priority order is important, the six major factors are more important than all the rest combined – asbestos, shift work, mineral oils, solar radiation, silica and diesel exhaust;
- The GBD slides are useful but to some extent misleading, they cover only a few selected carcinogens (shift work, mineral oils, solar radiation, painters, dioxins, radon, welders not covered), and asbestos covering well over 90% due to underestimation in the IHME GBD process so far.
- Hierarchy of control is vital, elimination of carcinogen use whenever possible, so far the only fairly successful use of this method is the asbestos ban, a model for many others;
- For asbestos most people think that the problem is solved. Maybe in the (in particular in the western part of) EU, but more globally far from that, also another wave of exposures/cancers may be coming from today's and near future demolitions, removal and related exposures. Such work is not properly done in most countries in the EU today.