Priority Medicines for Europe and the World

Update 2013 report

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World Health Organization

Background (1)

* Priority Medicines Report 2004 commissioned by Dutch MoH
  * TI Pharma established
  * Used by EC for calls in Framework Programmes
* December 2010: Council of the EU invites EC and MSs to "*take the initiative to update the 2004 Priority Medicines report in cooperation with WHO experts*"
* Update started June 2012, first full draft submitted 28 March 2013, final report will be launched July 9th 2013

Background history (2)

* WHO commissioned by EC (DG Enterprise and Industry)
* Close involvement of
  * DG Research and Innovation & DG Health and Consumers
  * International Project Advisory Group, including among others MSs, EFPIA members, NGOs, EC & WHO experts
* Collaboration with
  * Boston University (Chapters 1-6)
  * Utrecht University (Chapters 7 and 8, commissioned by Dutch MoH)
  * Individual authors for Background Papers

Objectives of 2013 Update

* Provide a methodology for identifying pharmaceutical "gaps" from a public health perspective for Europe and the World

* Provide a public health based pharmaceutical R&D agenda for use by the EC (Horizon 2020) and IMI
* Identify opportunities for innovation to address gaps

* One Report, but many detailed Background Papers

Priority setting (1)

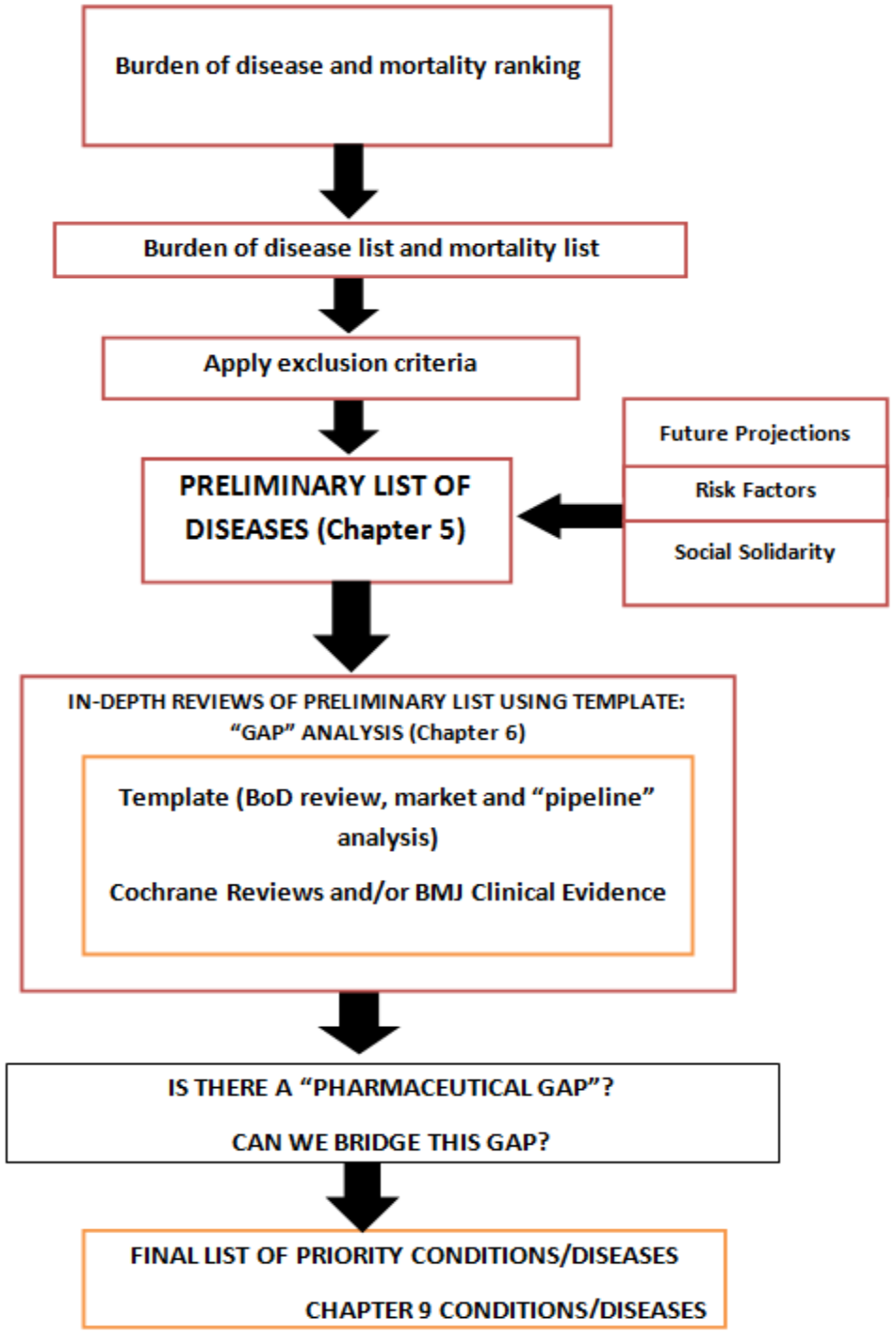
- Definition of Priority Medicines:
  - Medicines which are needed to meet the priority health care needs of the population but which have not yet been developed
- Four inter-related criteria have been applied:
  1. The estimated European and global burdens of disease
  2. The prediction of disease burden trends, based on epidemiological and demographic changes in Europe and the world
  3. The principle of "social solidarity" applied to diseases for which there are currently no market incentives to develop treatments
  4. The common risk factors amenable to pharmacological intervention that have an impact on many high-burden diseases

Methodology

Data sources:

- WHO Global Burden of Disease Database (projections for 2008)

- 2010 Global Burden of Disease Study (Lancet, December 2012)

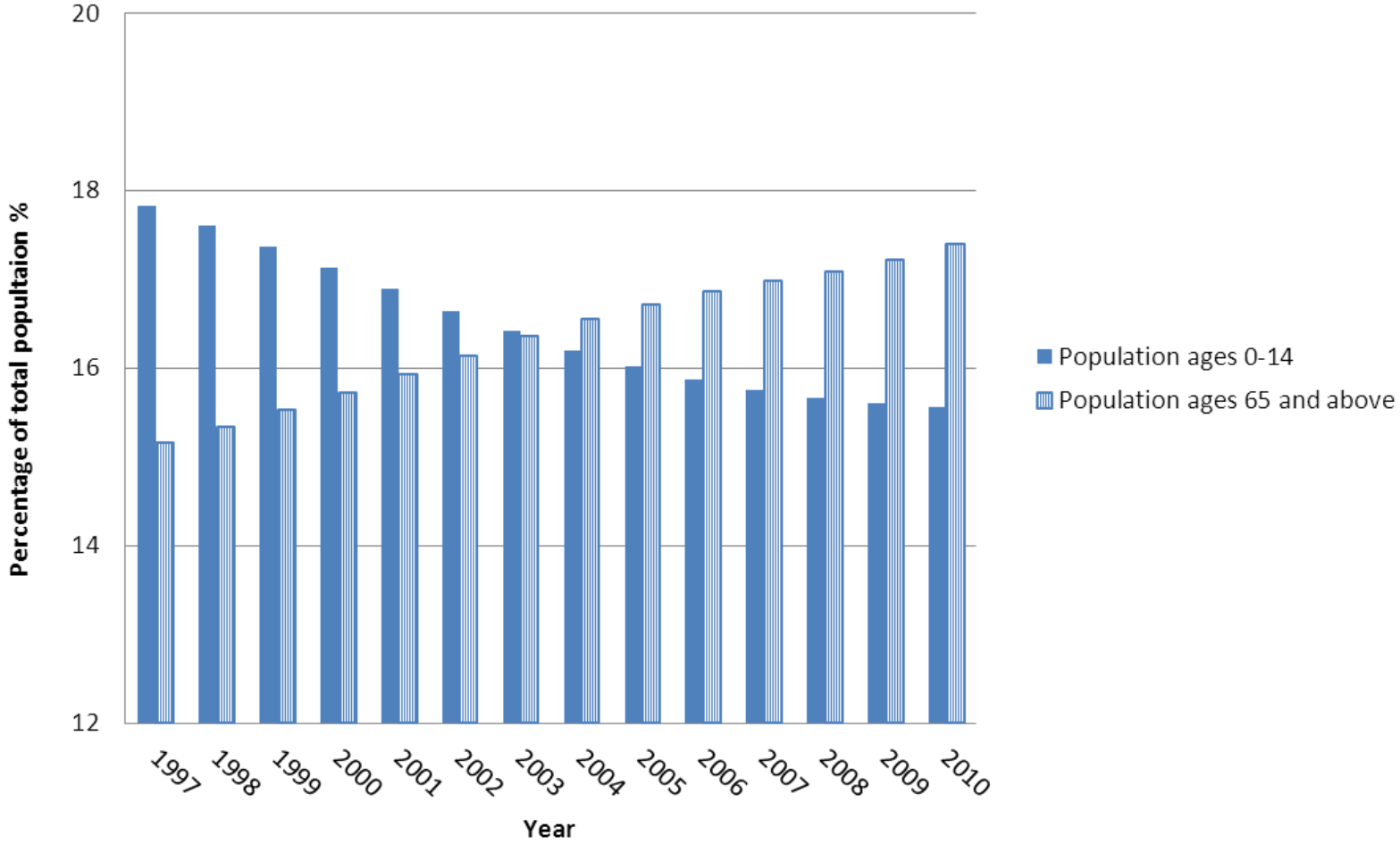


Methodology (2)

* Three different types of gaps:
  1. Treatment(s) exist but will soon become ineffective
  2. Treatment(s) exist but the pharmaceutical delivery mechanism or formulation is not appropriate for the target population
  3. Treatment does not exist OR is not sufficiently effective

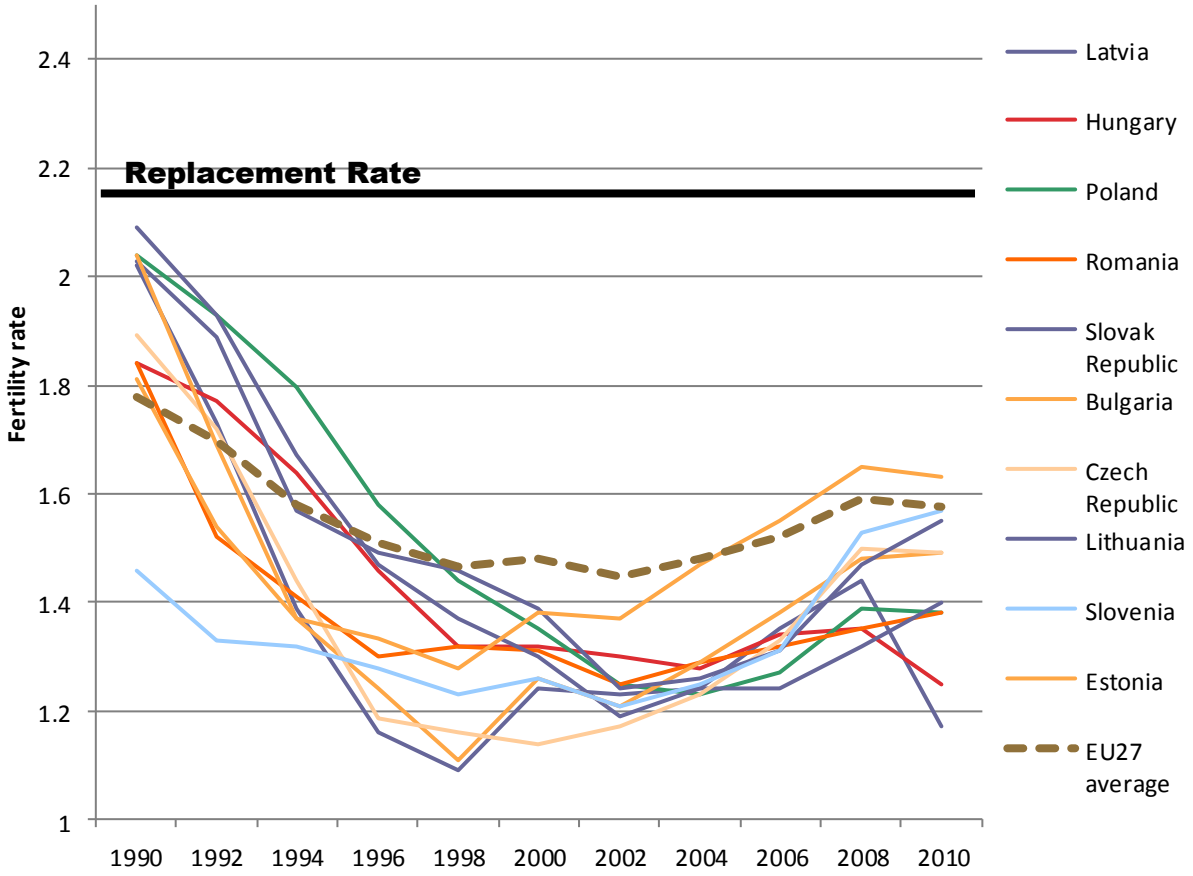
* Also look at contextual factors to foster innovation (e.g. policy reform)

Results (2)
Europe is Aging!



Source: Data from *the World Bank. World Development Indicators.* Available at: http://databank.worldbank.org

Results (3)
Fertility Rate



Source: Data from *the World Bank. World Development Indicators.* Available at: http://databank.worldbank.org

Results (4)

Table 5.4: Top 20 causes of projected burden of disease (DALYs) for the year 2008 for WHO European Region and the world[a]

Commonality of interest indicated with shade

Cause[c]	WHO European Region[b] DALYs	% of total	Cause	World DALYs	% of total
Ischaemic heart disease	16,377,272	11.3	*Lower respiratory infections*	78,870,694	5.4
Cerebrovascular disease	9,310,100	6.4	*Unipolar depressive disorders*	68,895,978	4.7
Unipolar depressive disorders	8,380,707	5.8	*HIV/AIDS*	64,661,516	4.4
Other cardiovascular diseases	4,915,183	3.4	*Ischaemic heart disease*	64,242,816	4.4
Alcohol use disorders	4,753,251	3.3	Diarrheal diseases	55,970,960	3.8
Other unintentional injuries	4,313,276	3.0	*Cerebrovascular disease*	47,529,750	3.3
Hearing loss, adult onset	3,896,935	2.7	*Other unintentional injuries*	46,764,884	3.2
Road traffic accidents	3,405,803	2.4	*Road traffic accidents*	45,932,901	3.1
Alzheimer and other dementias	3,286,741	2.3	Prematurity and low birth weight	40,719,981	2.8
Trachea, bronchus, lung cancers	3,210,541	2.2	Birth asphyxia and birth trauma	38,592,986	2.6
Osteoarthritis	3,138,042	2.2	Neonatal infections and other conditions	37,902,638	2.6
Other digestive diseases	2,950,725	2.0	*Chronic obstructive pulmonary disease*	33,144,764	2.3
Chronic obstructive pulmonary disease	2,911,003	2.0	Malaria	32,342,149	2.2
Self-inflicted injuries	2,904,536	2.0	*Hearing loss, adult onset*	28,858,571	2.0
Cirrhosis of the liver	2,712,366	1.9	Tuberculosis	28,697,686	2.0
Diabetes mellitus	2,638,147	1.8	*Refractive errors*	28,646,307	2.0
HIV/AIDS	2,598,495	1.8	*Alcohol use disorders*	24,163,164	1.7
Other malignant neoplasms	2,478,251	1.7	Childhood-cluster diseases	23,193,908	1.6
Refractive errors	2,311,894	1.6	*Other cardiovascular diseases*	22,228,033	1.5
Lower respiratory infections	2,178,547	1.5	Other infectious diseases	22,072,984	1.5
Total of top 20 causes	88,671,815	61.4	Total of top 20 causes	833,432,668	57.1
Overall total	**144,413,392**	100.0	Overall total	**1,460,140,289**	100.0

[a] Source: The Global Burden of Disease: 2004 update, World Health Organization

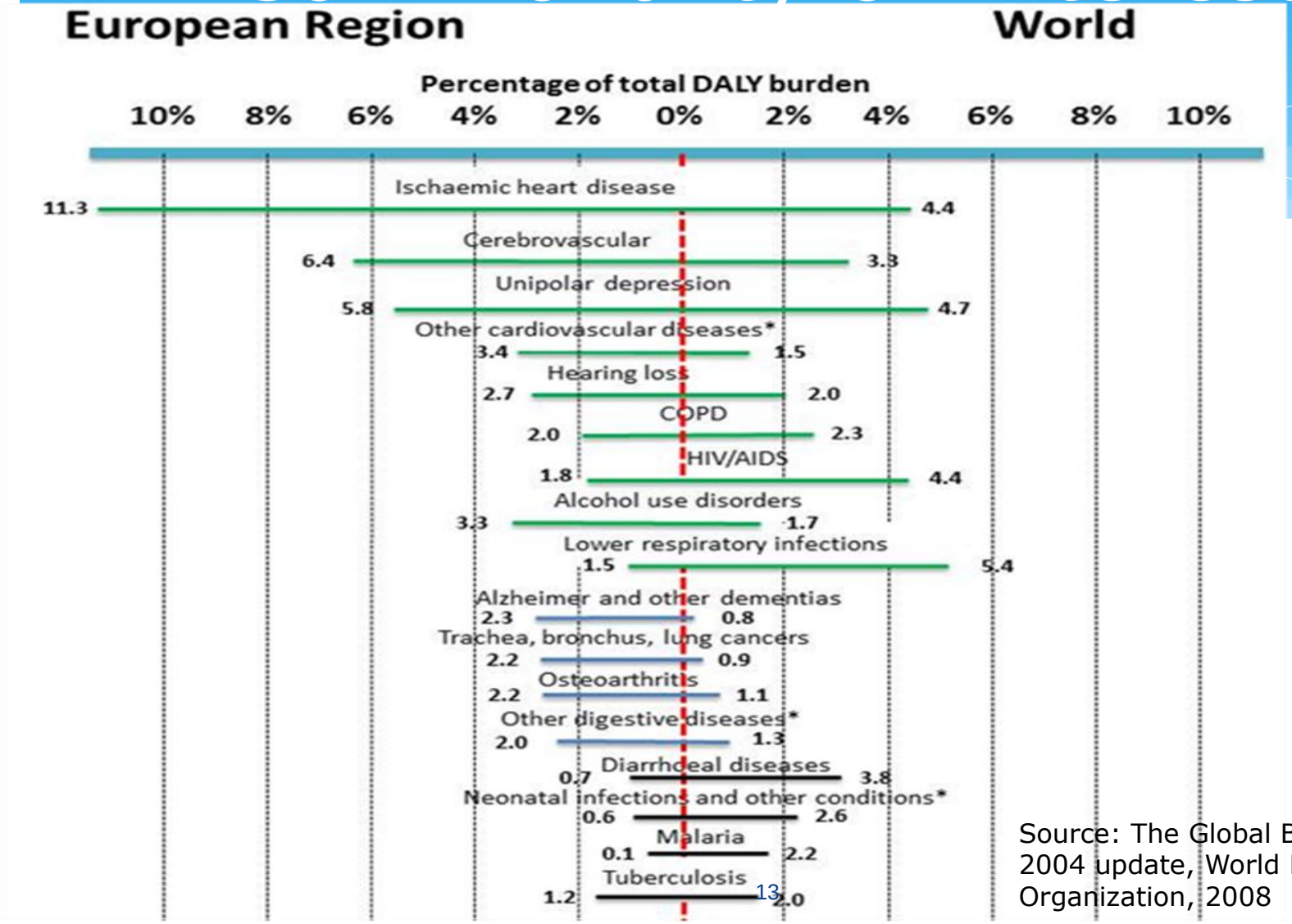
Results (5)

Table 5.2: The leading risk factors for the Burden of disease, 2004, ranked in order of percent of total DALY[a]

WHO European Region[b]		World	
Risk factor	*%*	***Risk factor***	*%*
Tobacco use	11,7	Underweight	5,9
Alcohol use	11,4	Unsafe sex	4,6
High blood pressure	11,3	Alcohol use	4,5
Overweight and obesity	7,8	Unsafe water, sanitation, hygiene	4,2
High cholesterol	5,9	High blood pressure	3,7
Physical inactivity	5,5	Tobacco use	3,7
High blood glucose	4,8	Sub-optimal breastfeeding	2,9
Low fruit and vegetable intake	2,4	High blood glucose	2,7
Occupational risks	1,7	Indoor smoke from solid fuels	2,7
Illicit drug use	1,6	Overweight and obesity	2,3

[a] Source: Global Burden of Disease, 2004 update, World Health Organization.

Results (6)
Commonality of Interest



Source: The Global Burden of Disease: 2004 update, World Health Organization, 2008

Results (7)

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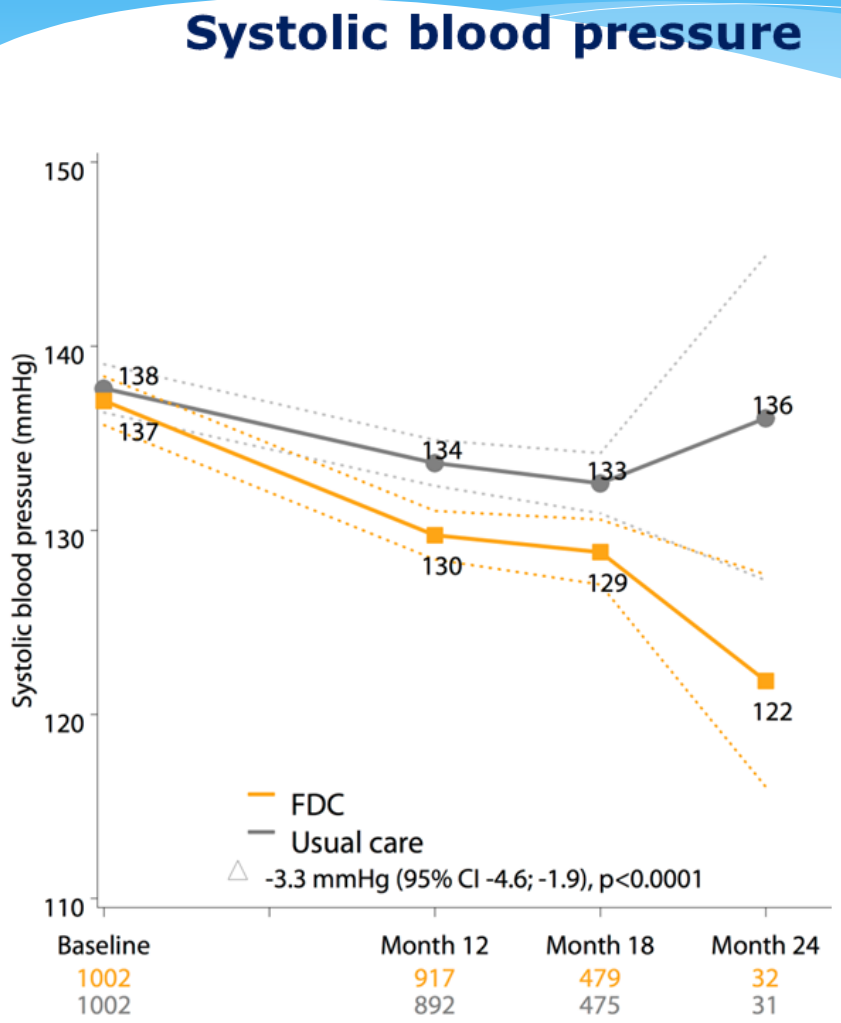
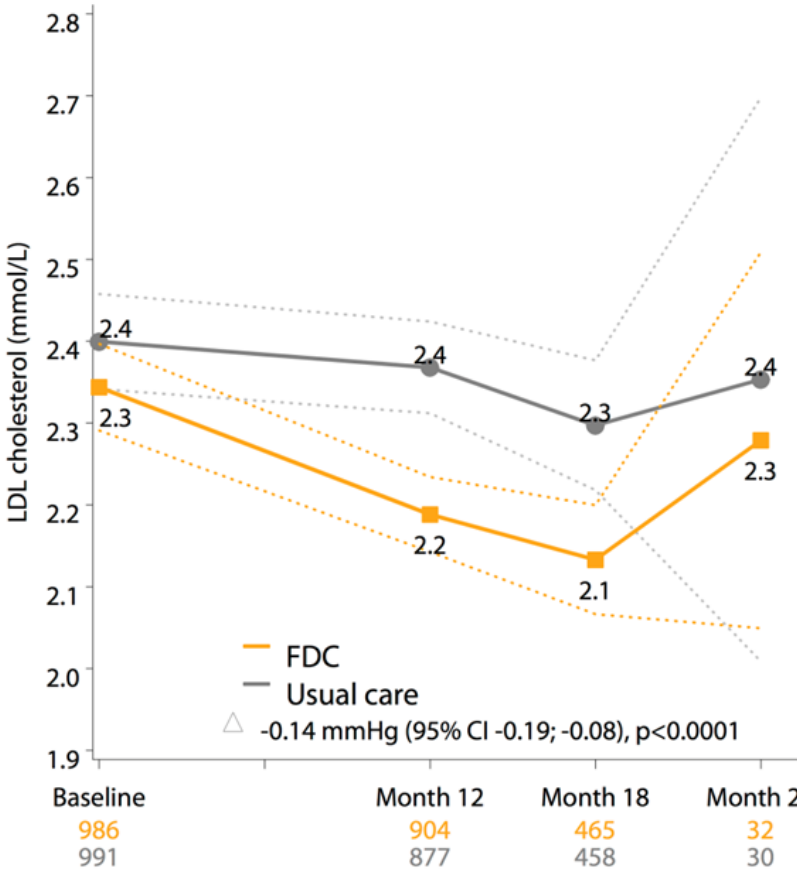
6.19 Rare diseases 138
6.20 Diarrhoea 141
6.21 Hearing loss 145
6.22 Pneumonia 147
6.23 Neonatal conditions 150
6.24 Low back pain 155

Ch 6 – Summary of disease or risk factor results

- Treatment(s) exist but will soon become ineffective
  - Antibacterial resistance, pandemic flu
- Treatment(s) exist but the pharmaceutical delivery mechanism or formulation is not appropriate
  - CVD, HIV, cancer, depression, diabetes, pneumonia, diarrhea, neonatal diseases, malaria, tuberculosis, NTD, postpartum hemorrhage
- Treatment does not exist OR is not sufficiently effective
  - Stroke, osteoarthritis, Alzheimer and other dementias, COPD, hearing loss, low back pain, ODs

Systolic blood pressure and LDL-cholesterol by treatment group over follow-up in the FP7-funded UMPIRE trial



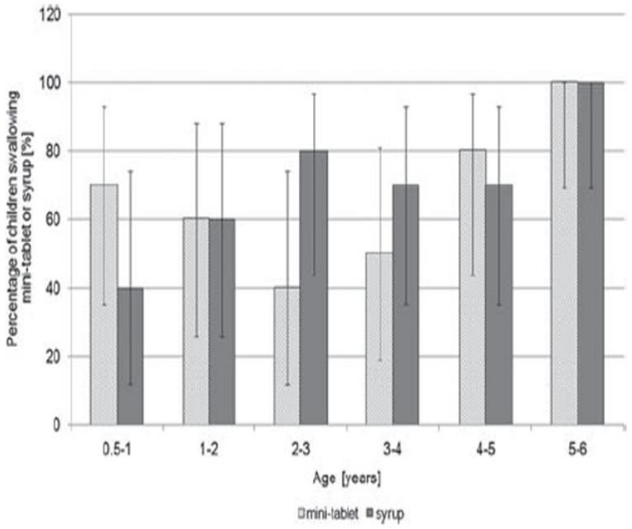


Focus for Chapter 7

	Topics/focus
7.1 - Children	Trends in drug use/burden of disease, formulations for children, regulations (PIP), off-label use, research.
7.2 - Women	Trends in drug use, pregnancy and lactation (incl. birth defects), gender issues in trials and treatment, access to (emergency) contraception
7.3 - Elderly	Trends in drug use, formulations for elderly & packaging, polypharmacy, ADRs, elderly in clinical trials, adherence, underuse, integrated care, medication management
7.4 – Stratified medicine	Diagnostics, biomarkers, pharmacogenomics & other -omics, implementation in practice. Current developments and challenges.

Ch 7.1 – Children (1)

* Scope:
  * Children are not small adults.
  * Little data on the appropriate delivery and use of medicines in children
  * Optimal medicines use in children is limited by the lack of commercial incentives, a dearth of clinical trials on paediatric medicines, delays in licensing medicines for children and the absence of suitable formulations for children



Source: Spomer N *et al*. *Arch Dis Child*, 2012

Ch 7.1 – Children (2)

* Main recommendations:
  * Stimulate additional research into the development of age-appropriate medicines
  * Study the impact of formulations development and paediatric regulations on patient and public health outcomes
  * Increase the efficiency of the regulation with a focus on genuine paediatric needs
  * Facilitate the collection, linkage and use of data on medicines use in children Europe-wide; and improve (information on) the rational use of paediatric medicines

Ch 7.2 – Women (1)

* Scope:
  * Female (maternal) health has been one of the top health priorities
  * Use of specific medicines
  * Issues related to overall medicines use, pharmaco-kinetics and pharmacodynamics (gender bias?)
  * Key priorities in 2004: inclusion of more women in clinical trials; appropriate risk management strategies to monitor the long-term effects of female medicine therapies; global collection of data on birth defects and on women's exposure to medicines during pregnancy.

Ch 7.2 – Women (2)

* Main recommendations:
  * Use existing (real life) data to their full potential
    * Insight into gender-specific benefit-risk profiles and underutilisation of medicines
    * Pregnancy registries should be further strengthened and collaboration encouraged
  * Strengthen informed decision making
    * Improve knowledge and attitudes towards (emergency) contraceptives by stimulating better education of women, doctors and pharmacists.
    * Assess the impact of strategies to achieve better knowledge levels, also on important health outcomes such as unintended pregnancies.

Ch 7.3 – Elderly (1)

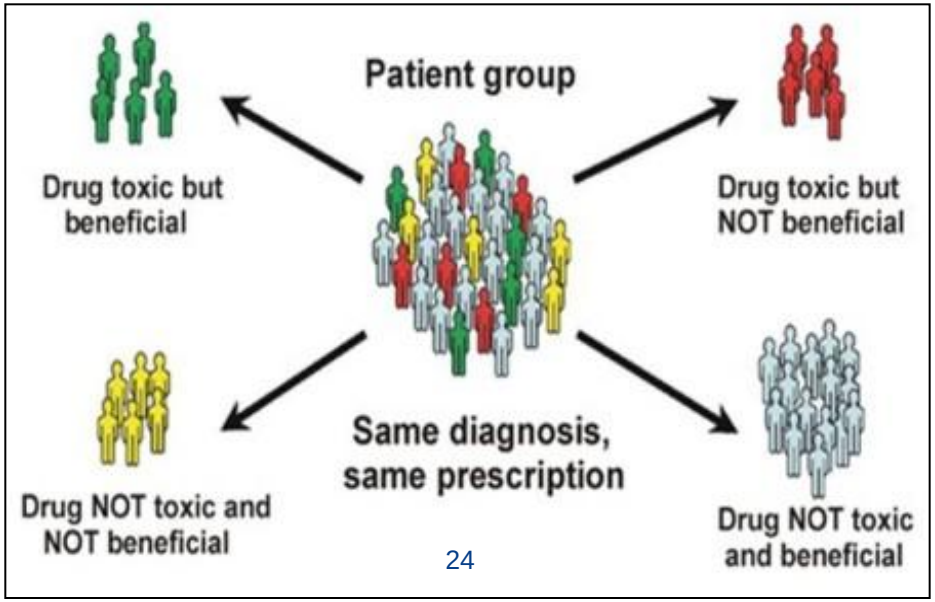
* Scope:
  * Ageing of the population
  * The incidence of certain diseases therefore increasing and polypharmacy is common, often leading to medicine-related problems
  * The elderly live in different care settings → need for integration of care and for better self-management of medication
  * As with children, many medicines are used off-label by the elderly

Ch 7.3 – Elderly (2)

* Main recommendations:
  * Development and evaluation of adapted formulations for the elderly and alignment with pediatric formulations;
  * Better use of electronic health records to obtain data on safety and effectiveness in the elderly; and approaches to translate age-specific information into practical age-specific recommendations;
  * Evaluation of the (cost-)effectiveness of interventions to increase appropriate prescribing and use with a focus on important clinical outcomes;
  * Develop approaches that support further integration of care (e.g. sharing of information, communication, electronic solutions) and medication self-management

Ch 7.4 – Stratified medicine (1)

* Scope:
  * From one-size-fits-all to targeted treatments
  * Rapidly developing technologies (pharmacogenomics and other –omics)



Ch 7.4 – Stratified medicine (2)

* Main recommendations:
  * Stimulate pharmacogenomic approaches to existing drugs
  * Stimulate use of multi-dimensional analyses in which biomarkers generated from different technologies are combined with clinical parameters.
  * Establish a Research Network and catalogue of (harmonised) pharmacogenomic datasets
  * Adapt regulatory guidelines and reimbursement procedures
  * Develop harmonized training and education programmes
  * Investigate the ethical, legal, economic and social implications of stratified medicine

Focus for Chapter 8

	Focus
8.1 - Public-private partnerships	PPPs and PDPs, both in a developed and developing country setting. Especially lessons from initiatives such as IMI and TI Pharma.
8.2 - Stimulating innovation through redesigning the regulatory system	Possibility for regulatory innovation, including e.g. measures on orphan drugs/pediatrics. Include points on prevention within the regulatory framew.
8.3 - Pricing and reimbursement to advance innovation	The integration of priorities with pricing and reimbursement (P&R) procedures. Incentives that can be used to stimulate innovation.
8.4 – Real-life data and learning from practice to advance innovation	Using observational and real-life data as an input for priority setting and stimulating innovation
8.5 – Models for stakeholder involvement, including patients and citizens	Focuses on how patients and citizens can be involved in decision making around pharmaceutical innovation/priority setting.

Ch 8.1 – PPPs (1)

* Scope:
  * Considerable progress in PPPs and PDPs since 2004
  * Early stage R&D: TI Pharma and IMI
  * Product development: focus on concrete drugs to assess diseases mainly occuring in developing world, e.g. Medicines for Malaria Venture (MMV) or Drugs for Neglected Disease Initiative (DNDi)

Ch 8.1 – PPPs (2)

* Main recommendations:
  * Need to learn more about the most succesful models
    * most useful indicators (structural, process, output or outcome)?
    * project sustainability?
  * Research possibilities for stakeholder involvement, particularly patient and citizen involvement

Ch 8.2 – Regulatory system (1)

* Scope:
  * The system has been successful in ensuring that valuable medicines with a positive Benefit-Risk profile have reached the market
  * However, there are important challenges to be met if the regulatory system is to ensure a continuous flow of the new medicines most needed by society

  * Find the right balance in three key areas:
    1. Cautiousness
    2. Incentive structure
    3. Comprehensiveness

Ch 8.2 – Regulatory system (2)

* Main recommendations:
  * Research on promising instruments to optimize regulatory requirements (e.g. the use of surrogate outcome measures and an adaptive study design) and on quantitative instruments supporting more standardization of benefit-risk assessment
  * Clearly identify expectations and key performance indicators for new regulations and set up prospective studies
  * Establish constructive collaborations and dialogues with key actors
  * Invest in sharing and analysis of regulatory datasets for system evaluation and strengthen methodologies

Ch 8.3 – Pricing policies (1)

* Scope:
  * Pricing and reimbursement decisions are prerogatives of the MSs, but rules and regulations at the EU level also influence pricing and reimbursement policies at the MS level.
  * The policies have to address a number of interacting and sometimes conflicting elements. These include:
    * Incentives for innovation - controlling costs
    * Role of the EU - role of Member States
    * Medicinal products – health care services
    * Influence of policies on other Member States

Ch 8.3 – Pricing policies (2)

* Main recommendations:
  * Research the broader environment of pricing and reimbursement (e.g. perception of innovation, Willingness to Pay, financial crisis)
  * Develop and assess methods used for pricing and reimbursement policies (e.g. value-based pricing)
  * Build appropriate research infrastructure

Ch 8.4 – Real-life data (1)

* Scope:
  * Increasing need to bridge bench and clinical research with real-world practice
  * Electronic Health Records most important source and widely available

Ch 8.4 – Real-life data (2)

* Main recommendations:
  * Invest in good (research) infrastructure at the EU level, finding ways to integrate results
  * Establish a Research Network for comparative effectiveness and health policy evaluation
  * Focus on the development of new statistical models for the systematic measurement of data quality
  * Development of methods to predict long-term risks in EHR databases
  * Create a European database to make explicit the uncertainties in routinely used interventions and to help prioritize new research

Ch 8.5 – Patient involvement (1)

* Scope:
  * 2004: patient and citizen participation in priority setting was uncommon and knowledge about and experience of the impact of such participation was limited
  * Today, the involvement is supported by legal and regulatory requirements
  * There is substantial literature on the topic

Two stakeholder workshops (September 2012 & Ferbruary 2013), supported by government of Belgium (INAMI/RIZIV)

Ch 8.5 – Patient involvement (2)

* Main recommendations:
  * Develop a model or a framework for meaningful involvement
  * Build capacity to ensure the meaningful involvement in priority setting for pharmaceutical innovation
  * Assure structural outcome assessment of initiatives to involve patients and citizens

Key findings & recommendations (1)

* Ageing population → marked increase in diseases of the elderly (e.g. Alzheimer, osteoarthritis, hearing loss)
* High disease burden of NCDs → new medicines and improvement of existing medicines
* CVD + stroke → optimise secondary prevention (polypill) **Large clinical trials needed**
* Identification of biomarkers for many diseases → identify potential products, diagnose and monitor disease progression, assess treatment effects

Key findings & recommendations (2)

* Coordinated international efforts AMR and pandemic flu → new diagnostic tests, new R&D models, prevention through vaccination
* Malaria and TB → same as AMR/pandemic flu. Resistance will remain threat until primary prevention (vaccination) occurs
* Diarrhea, pneumonia, neonatal conditions and maternal mortality → Improvement of diagnosis and treatment, including reducing costs

Key findings & recommendations (3)

* NTDs and rare diseases → new mechanisms to promote translation of basic research into products
* Research needed on pharmacological interventions to target important risk factors
* Assess use of EHRs to deliver needed information on safety and effectiveness in special populations
* Develop appropriate formulations for children and elderly and assess their impact

Key findings & recommendations (4)

* Research stratified medicine
* Innovation in MA and pricing & reimbursement decesion-making is needed
* Use of EHRs should be further optimalised
* PPPs → reconciling tension between short-term funding and long-term development periods is needed
* Role of patients → further development needed, exact role and mechanisms to be defined

Final steps

* Official launch July 9th in Brussels
* All documents (report and background papers) will be available through WHO website

Thanks to all involved

* Catherine Berens DG (ENTR)
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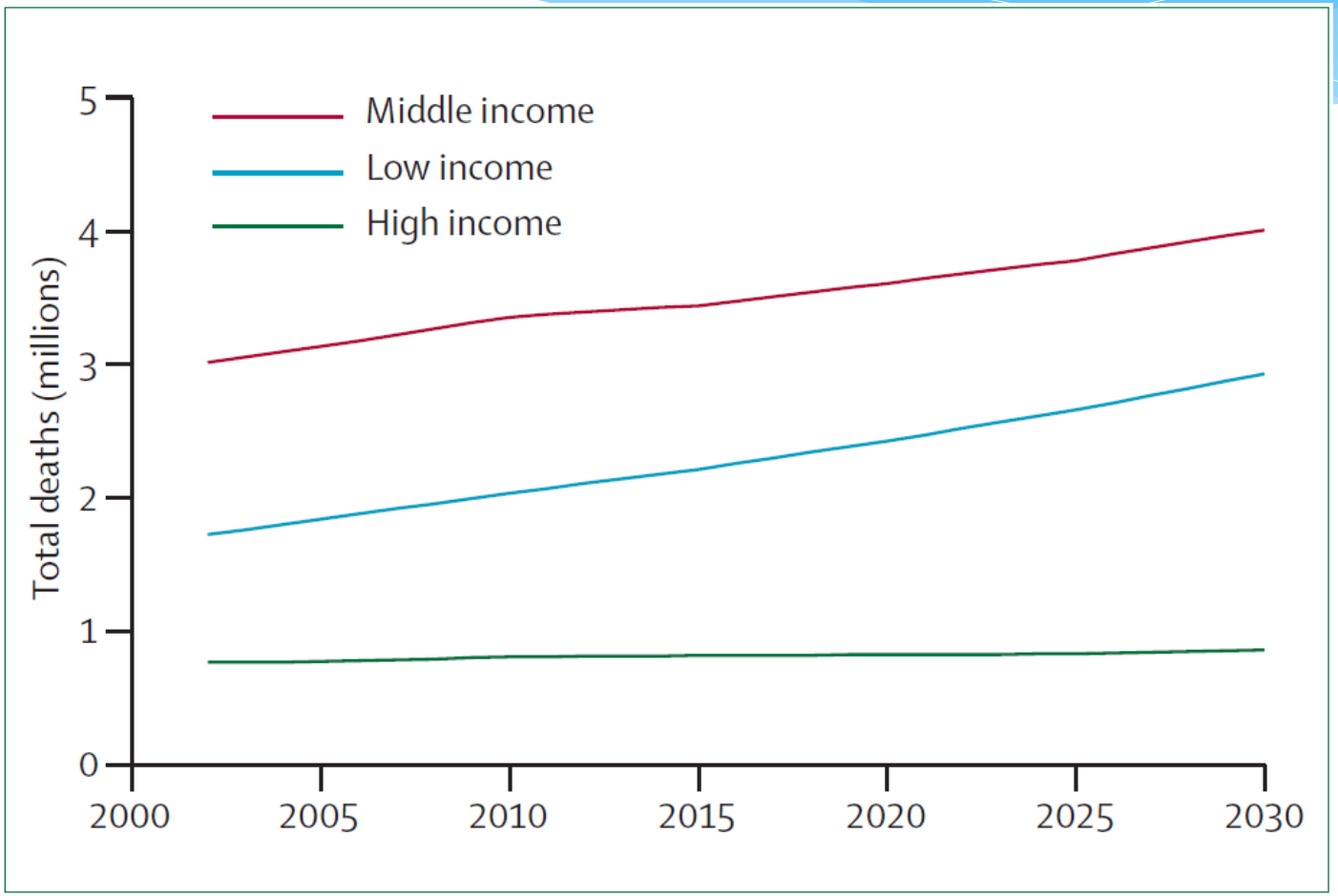
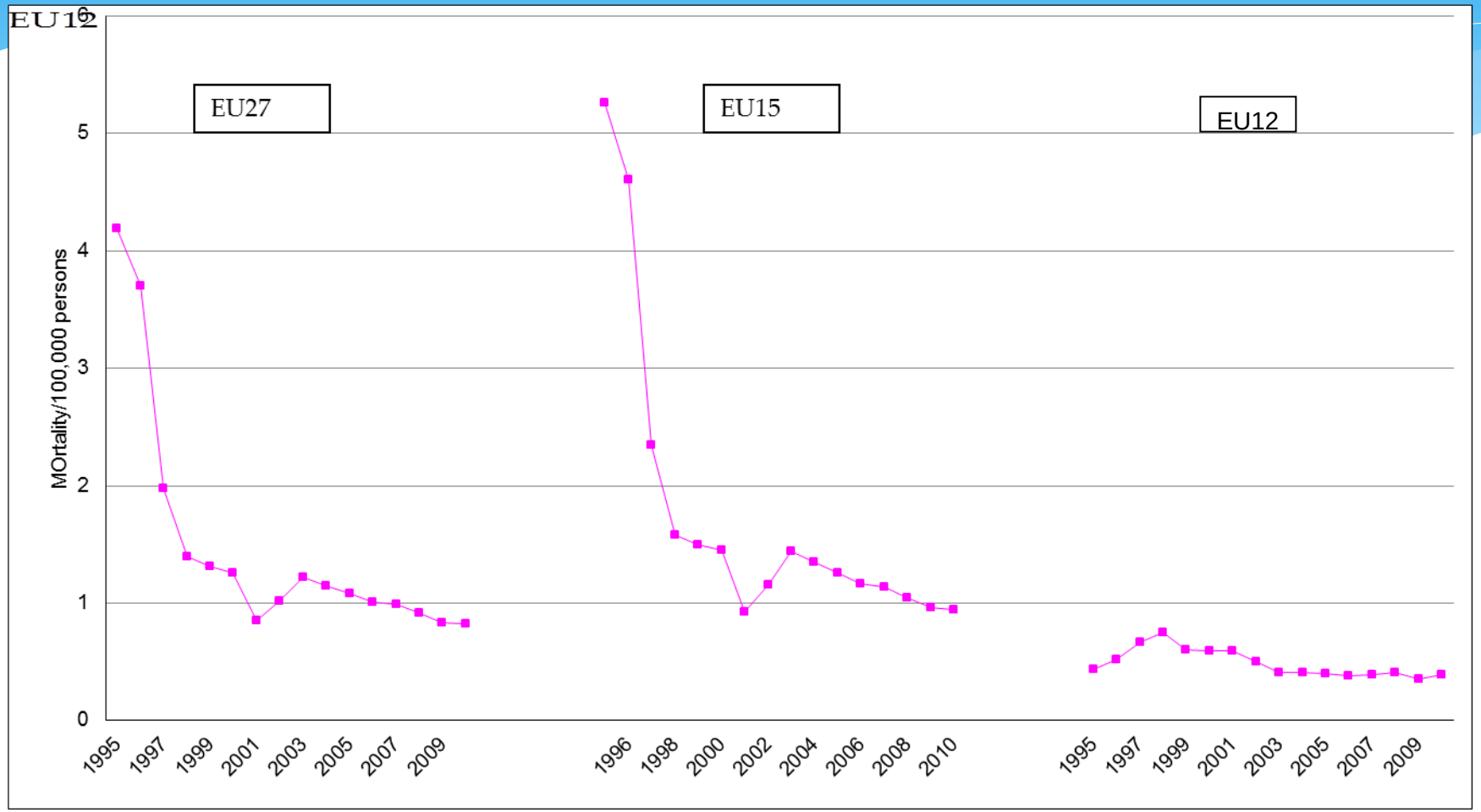
* Erdem Erginel DG (SANCO)
* Magda Chlebus EFPIA
* Therese Delatte (NIHDI)
* Advisory Group members
* Authors (40+)
* Reviewers (100+)
* WHO Technical Departments & Brussels office
* PPPs especially MMV, DNDi, IMI etc
* Many interns and volunteers in Geneva, Utrecht, Groningen and Boston

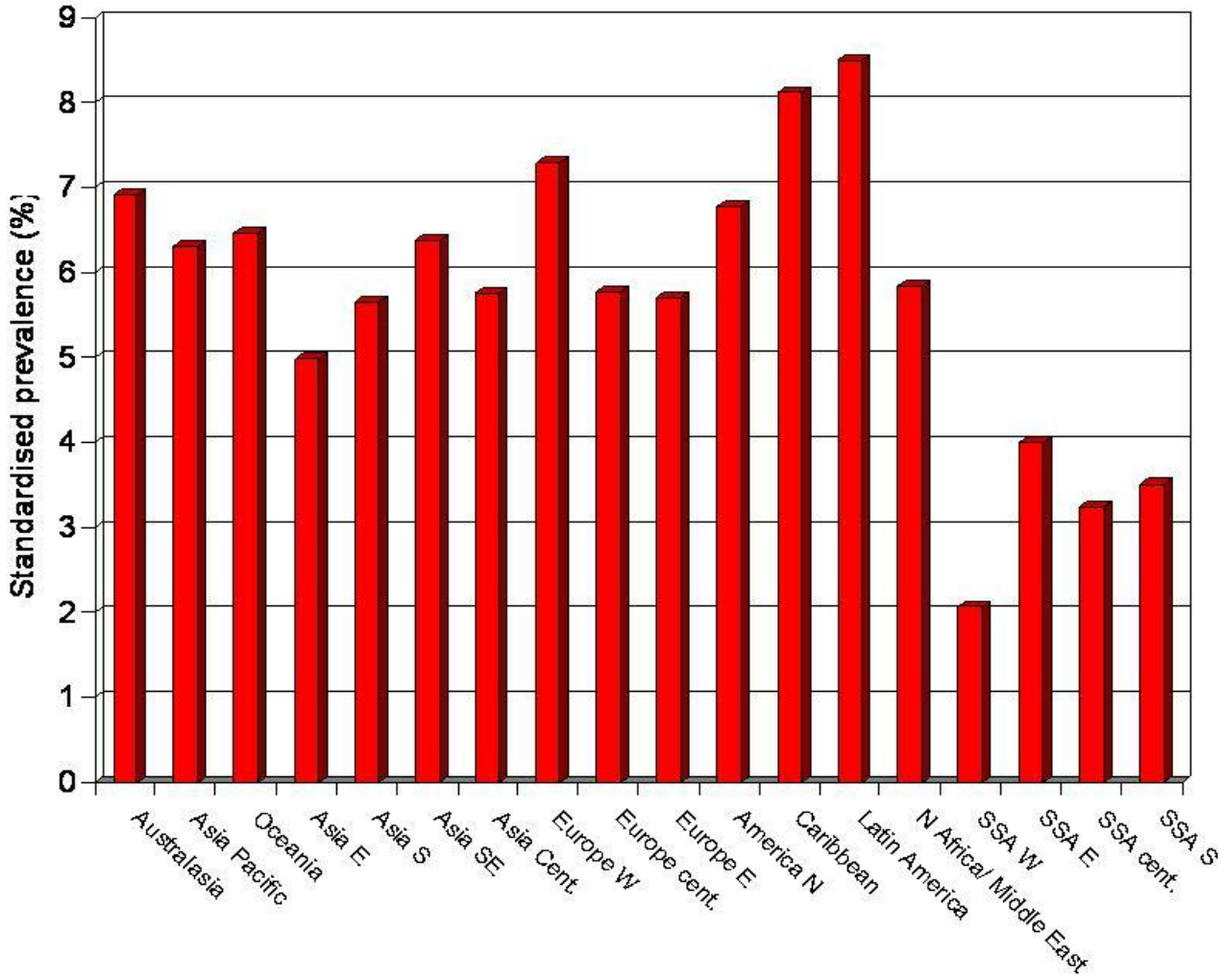
Projected trends for stroke deaths by World Bank income group 2002-30



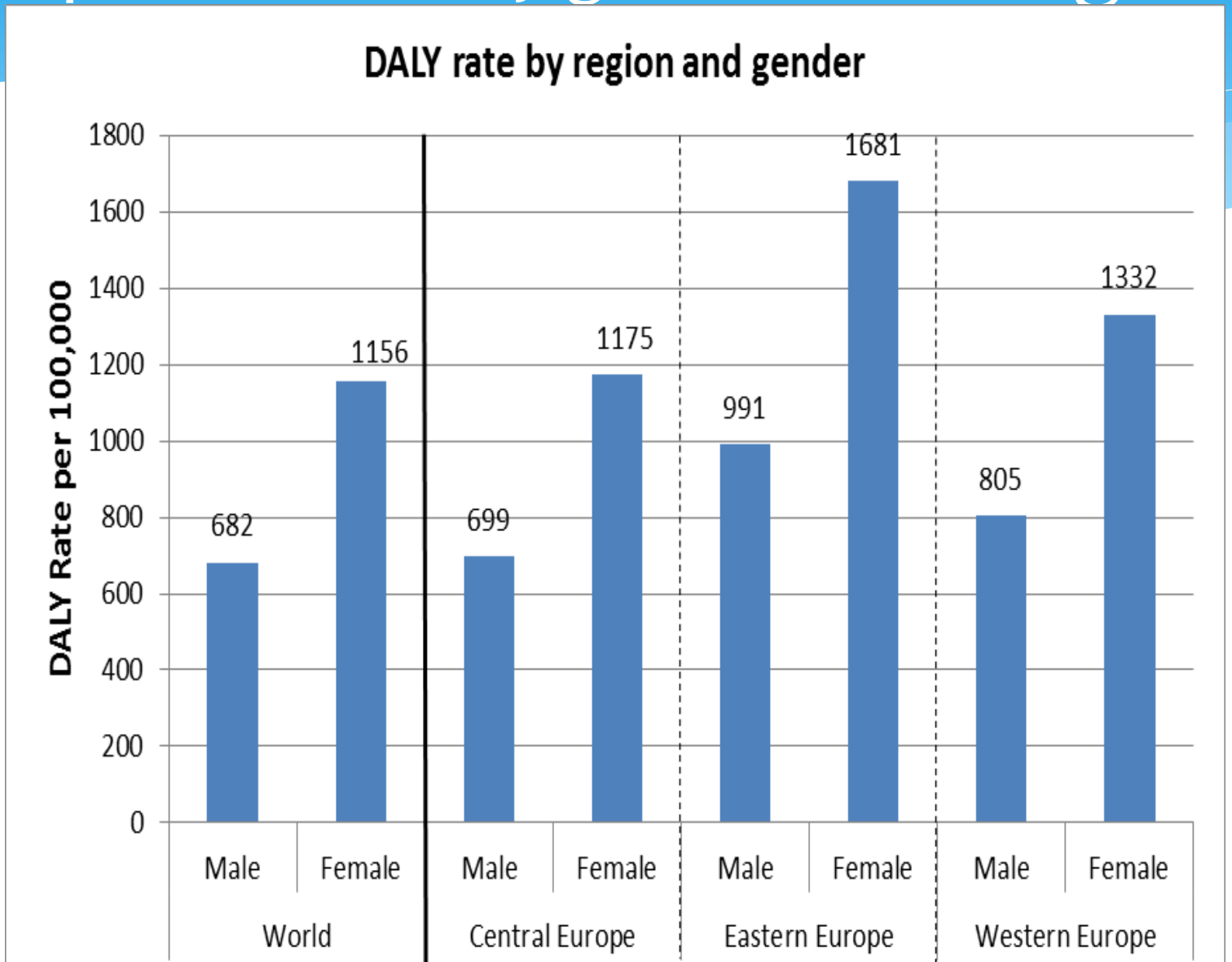
Standardized death rates (per 100 000 people) for HIV/AIDS among country-components of the European Union



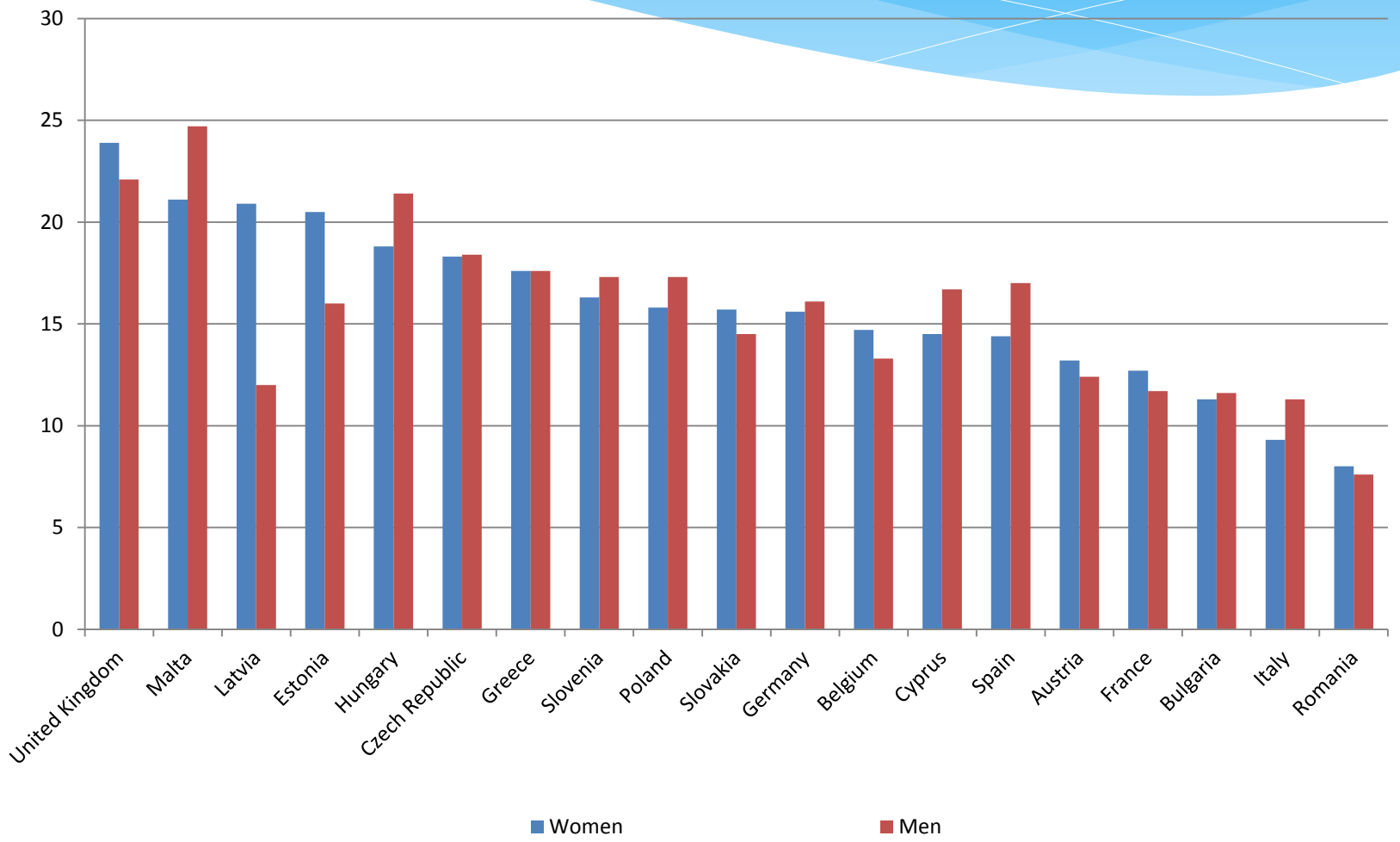
Estimated prevalence of dementia for people aged 60 and over, standardized to Western Europe population



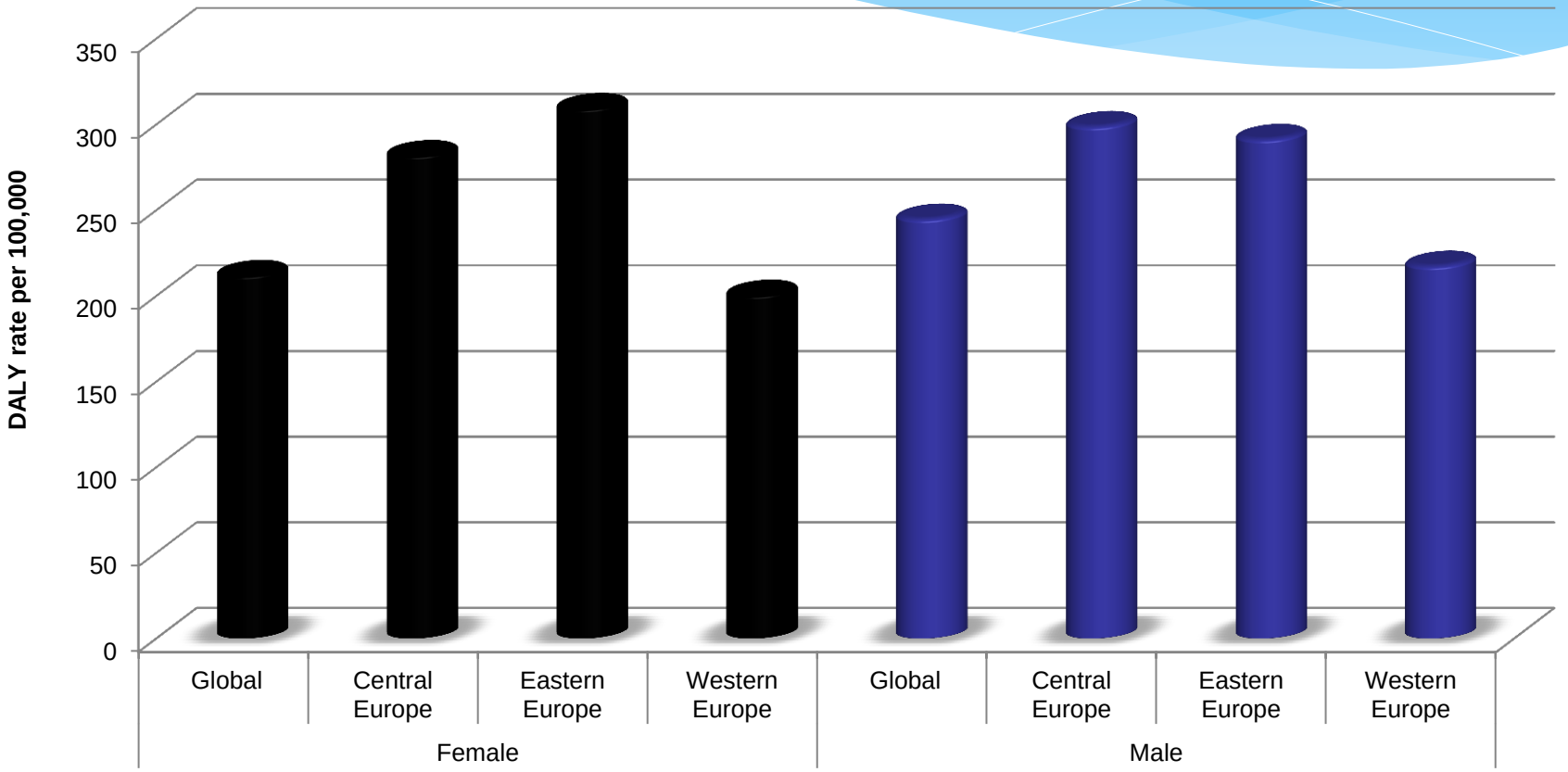
DALY rate for Major Depressive Disease per 100,000 by gender and region.



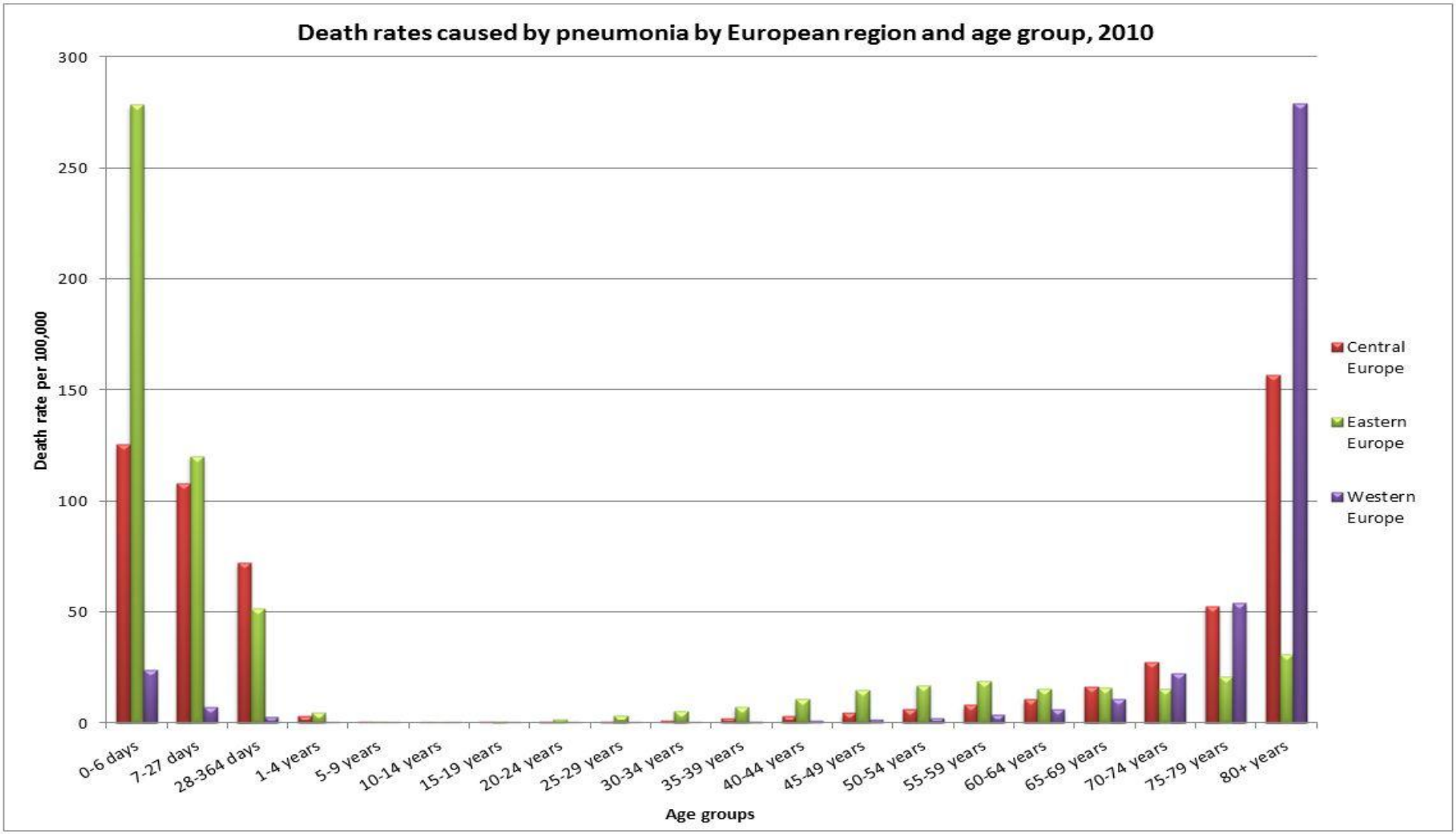
Percentage of population with Body Mass Index (BMI) > 30, age-standardized estimate, based on available data for EU Member States 2008-2009



DALY rates caused by hearing loss by sex and region



Death rates caused by pneumonia by European region and age group, 2010



Global causes of child deaths in 2010