



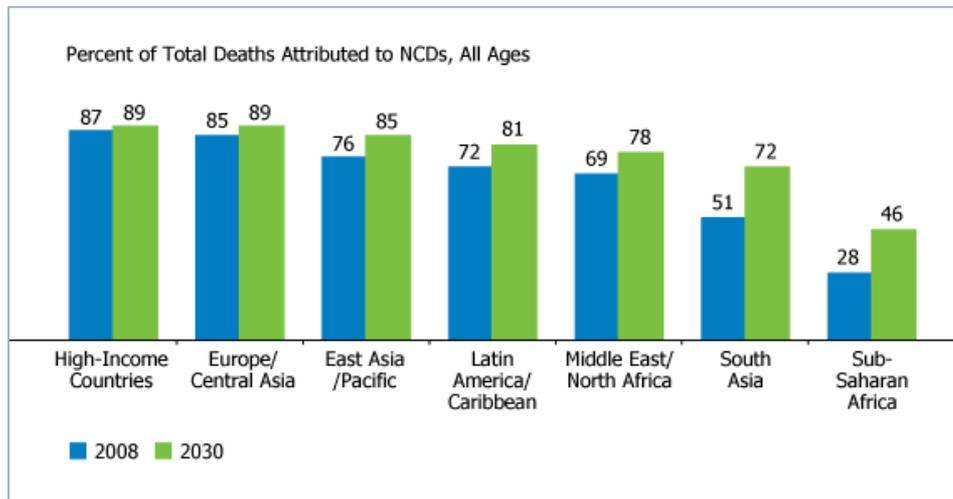
# ECONOMICS OF NCDs AND IMPLICATIONS IN HEALTH CARE

Dogan Fidan  
RESCAP-MED Symposium

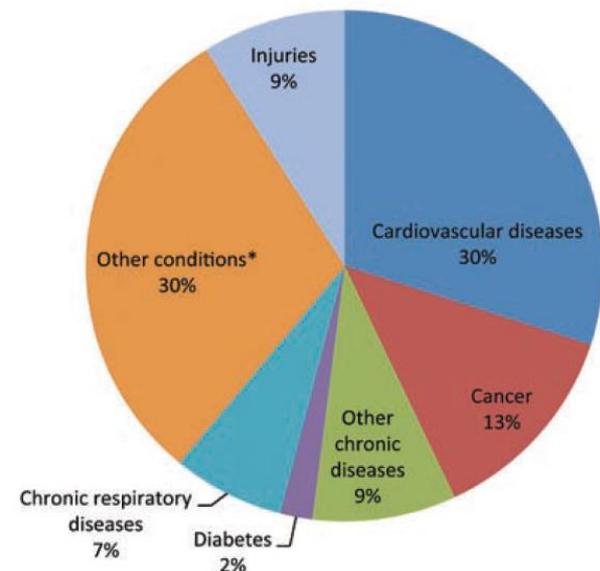
Istanbul, May 6<sup>th</sup>, 2013

# NCDs impose a major clinical and cost burden globally

- More than 60% of all deaths globally are due to NCDs.
- They account for 48% of the healthy life years lost (in DALYs) worldwide
- The impact on NCDs in low & middle income countries is rising steeply
  - ▣ In 2008, 4 in 5 NCD related deaths occurred in these countries, versus only 2 in 5 in 1990.



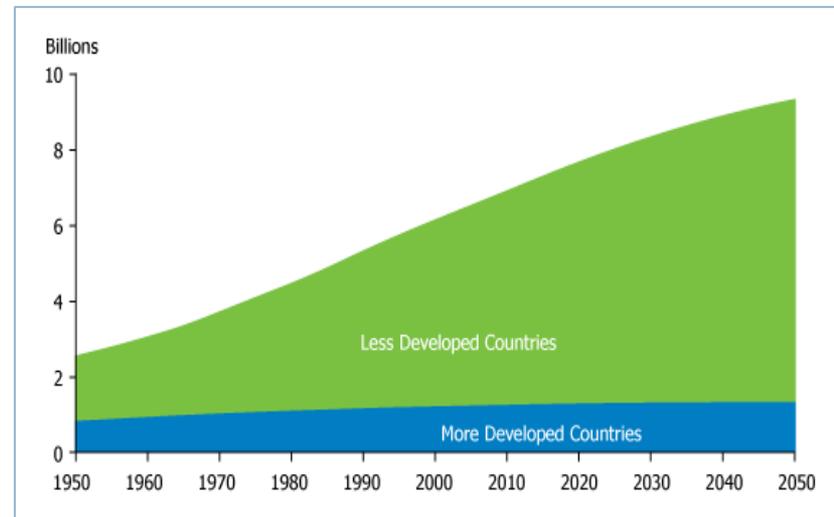
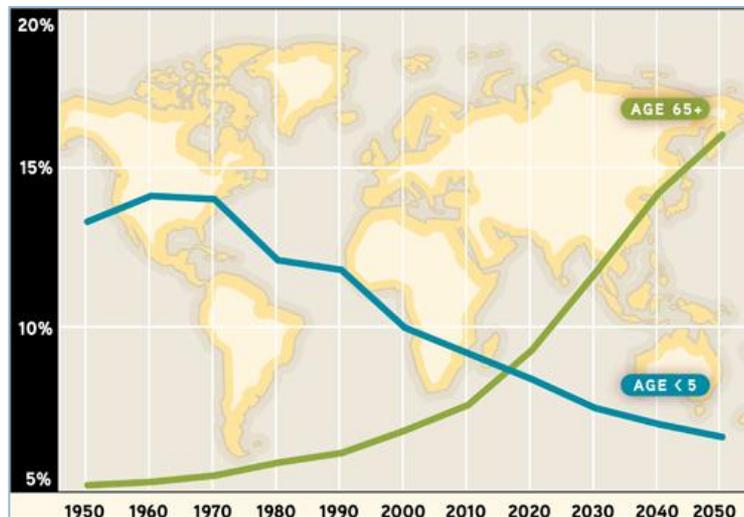
**Source:** Nikolic IA et al. "Chronic Emergency: Why NCDs Matter," *World Bank Health, Nutrition and Population Discussion Paper* (2011).



\* "Other conditions" comprises communicable diseases, maternal and perinatal conditions and nutritional deficiencies.

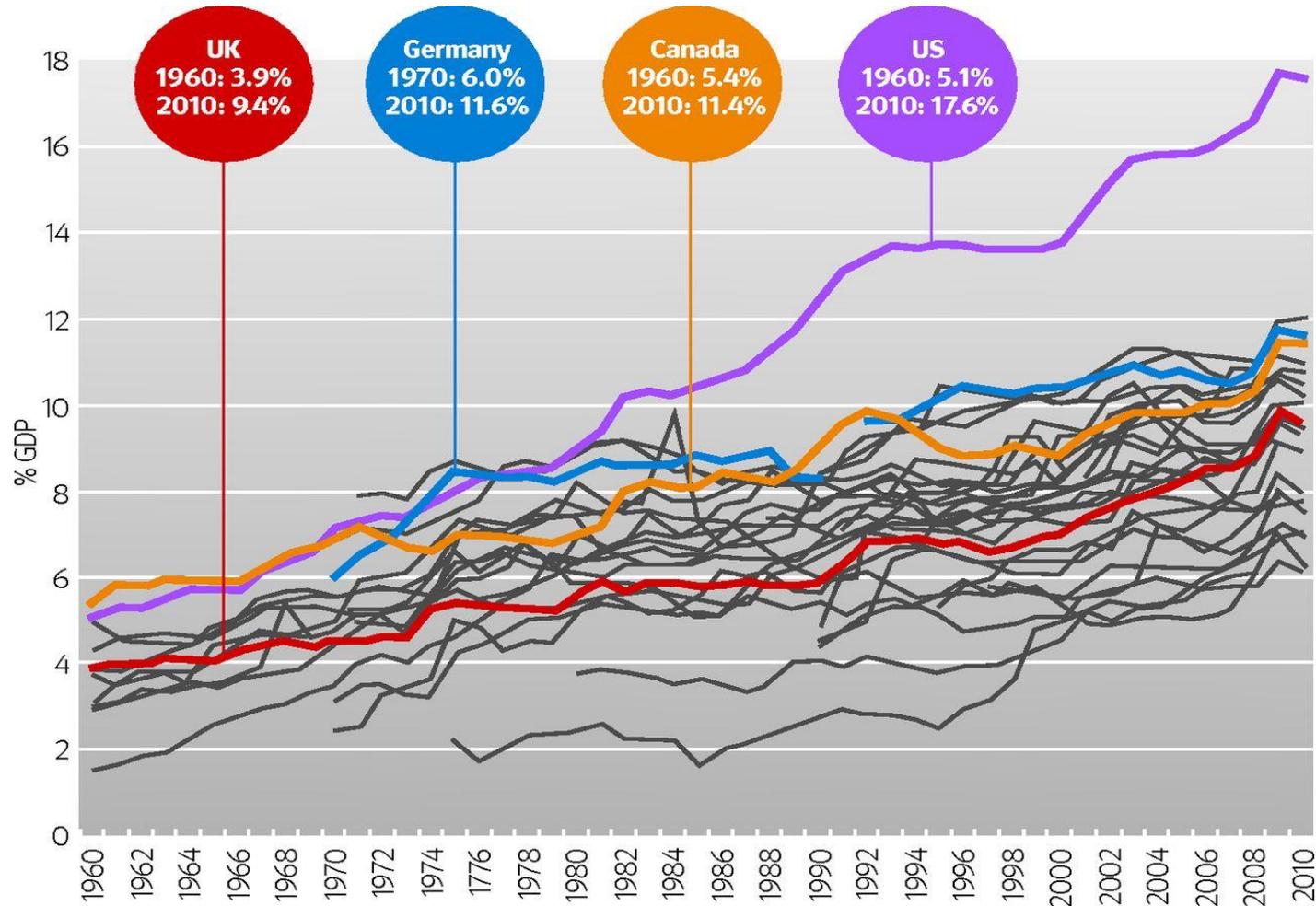
# Aging world population will lead to dramatic increases in NCD burden

- NCDs disproportionately affect the elderly group.
- Due to increased life expectancy in all geographies, the share of >65 year is increasing significantly, shifting the demographic balances.
- Furthermore, world population is still growing, despite at reduced rates
- Consequently, the global burden due to NCDs is expected to increase in the coming decades



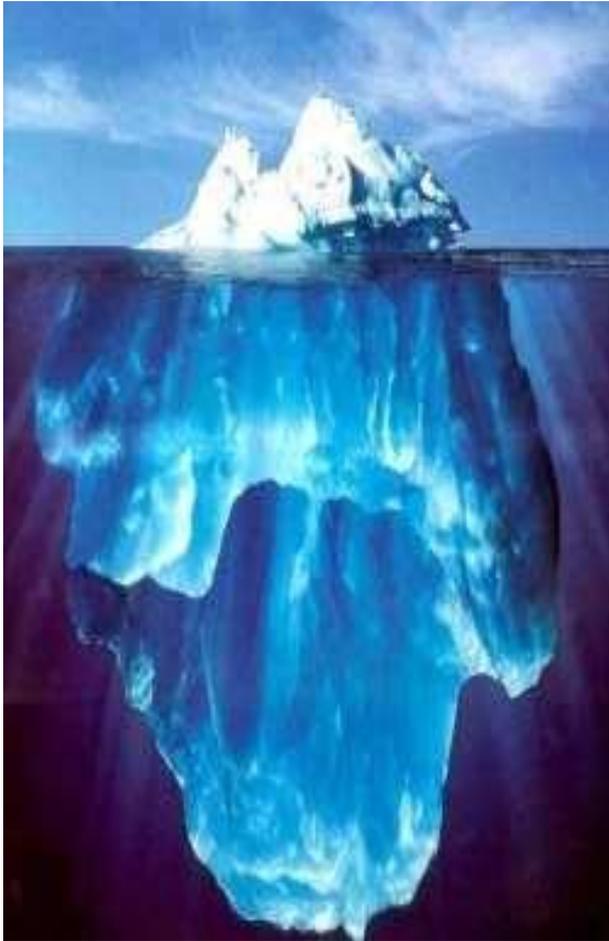
Refs: 1) US Department of State (<http://2001-2009.state.gov/documents/organization/81775.pdf>)  
2) Population reference bureau ([www.prb.org](http://www.prb.org))

# Rise in healthcare expenditure is unstoppable



Source: Appleby, J. *BMJ* 2012;345:e7127

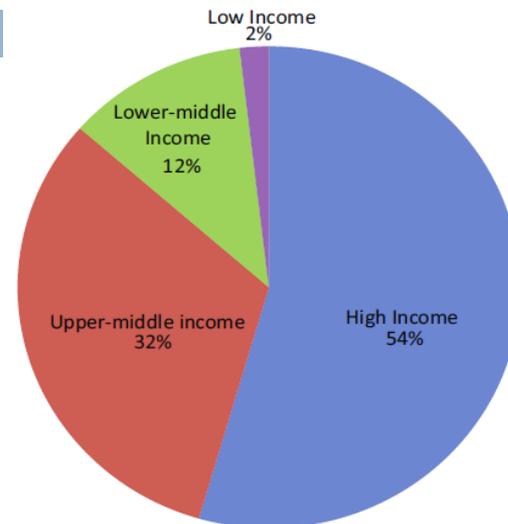
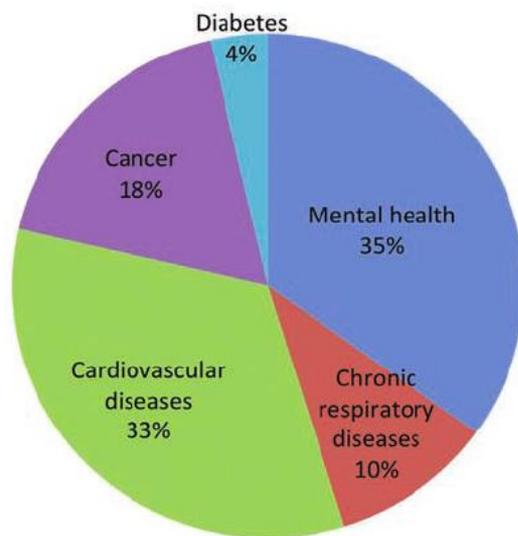
# NCDs impose burden on economies in multiple fronts



- Direct costs to the health system due to treatment of health care consequences (cost of health care personnel, medications, infrastructure etc.)
- Out of pocket expenses by patients / carers (medications, co-payments, transport, home improvement etc.)
- Costs of social services (nursing homes, disability benefits etc.)
- Indirect costs due to loss of productivity of patients
- ..... PLUS, the similar costs for the carers (due to health care consequences, and to lost productivity)
- *Cumulative losses in global economic output due to NCDs will total \$47 trillion by 2030\*.*

# Economic burden of NCDs, 2011-2030

(trillion US \$)



Country income group	Diabetes	Cardiovascular diseases	Chronic Respiratory diseases	Cancer	Mental Illness*	Total
High	0.9	8.5	1.6	5.4	9.0	25.5
Upper-middle	0.6	4.8	2.2	2.3	5.1	14.9
Lower-middle	0.2	2.0	0.9	0.5	1.9	5.5
Low	0.0	0.3	0.1	0.1	0.3	0.9
<b>LMIC</b>	<b>0.8</b>	<b>7.1</b>	<b>3.2</b>	<b>2.9</b>	<b>7.3</b>	<b>21.3</b>
<b>World</b>	<b>1.7</b>	<b>15.6</b>	<b>4.8</b>	<b>8.3</b>	<b>16.3</b>	<b>46.7</b>

Reference: "The Global Economic Burden of Non-communicable Diseases – prepared by the World Economic Forum and the Harvard School of Public Health (2011)"

# Estimated cost of NCDs 2010-2030

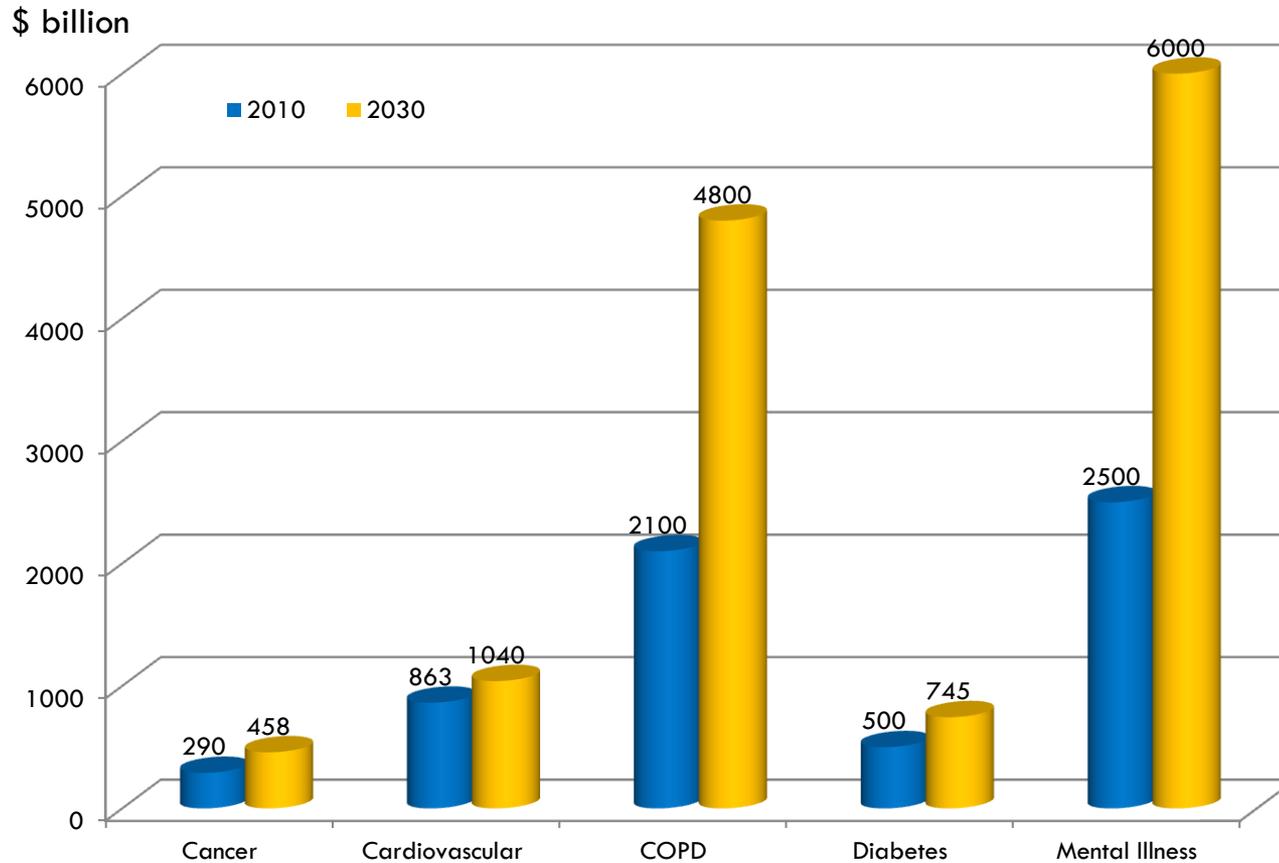
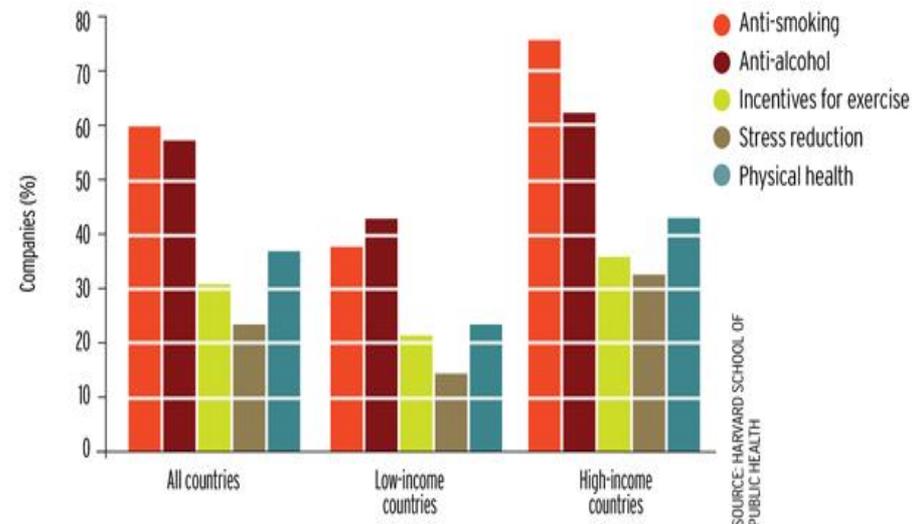


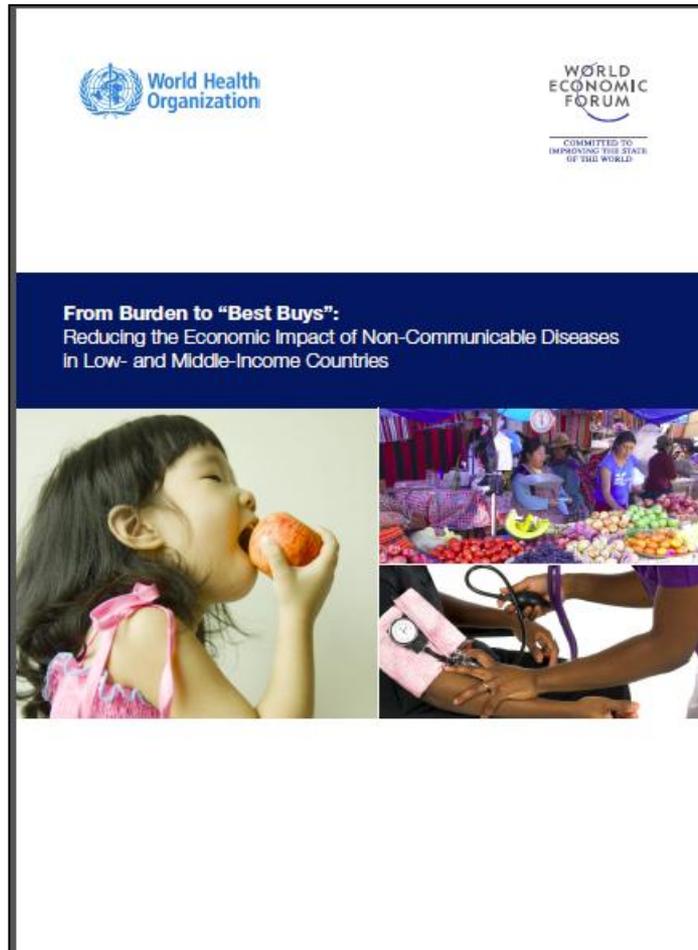
Figure based on data from “*The Global Economic Burden of Non-communicable Diseases – prepared by the World Economic Forum and the Harvard School of Public Health (2011)*” (Cost-of-Illness approach)

# Perspectives from businesses

- The World Economic Forum's Annual Executive Opinion Survey included questions related to NCDs in 2010 for the first time (in the context of competitiveness).
- 13,000 business executives from 139 countries responded.
- Half of the executives took part expected that NCDs have serious, somewhat serious, or moderate impact in their companies
- NCD related concerns were the highest in the low-income countries, and the lowest in high-income countries. Among regions South Asia was the most concerned.
- Two-thirds of companies in Latin America had anti-smoking initiatives, nearly two-thirds in Middle East and North Africa had programmes against alcohol use, and in East Asia and Pacific lead the way with exercise, stress-reduction and physical health programmes.



# How to tackle with this burden ?



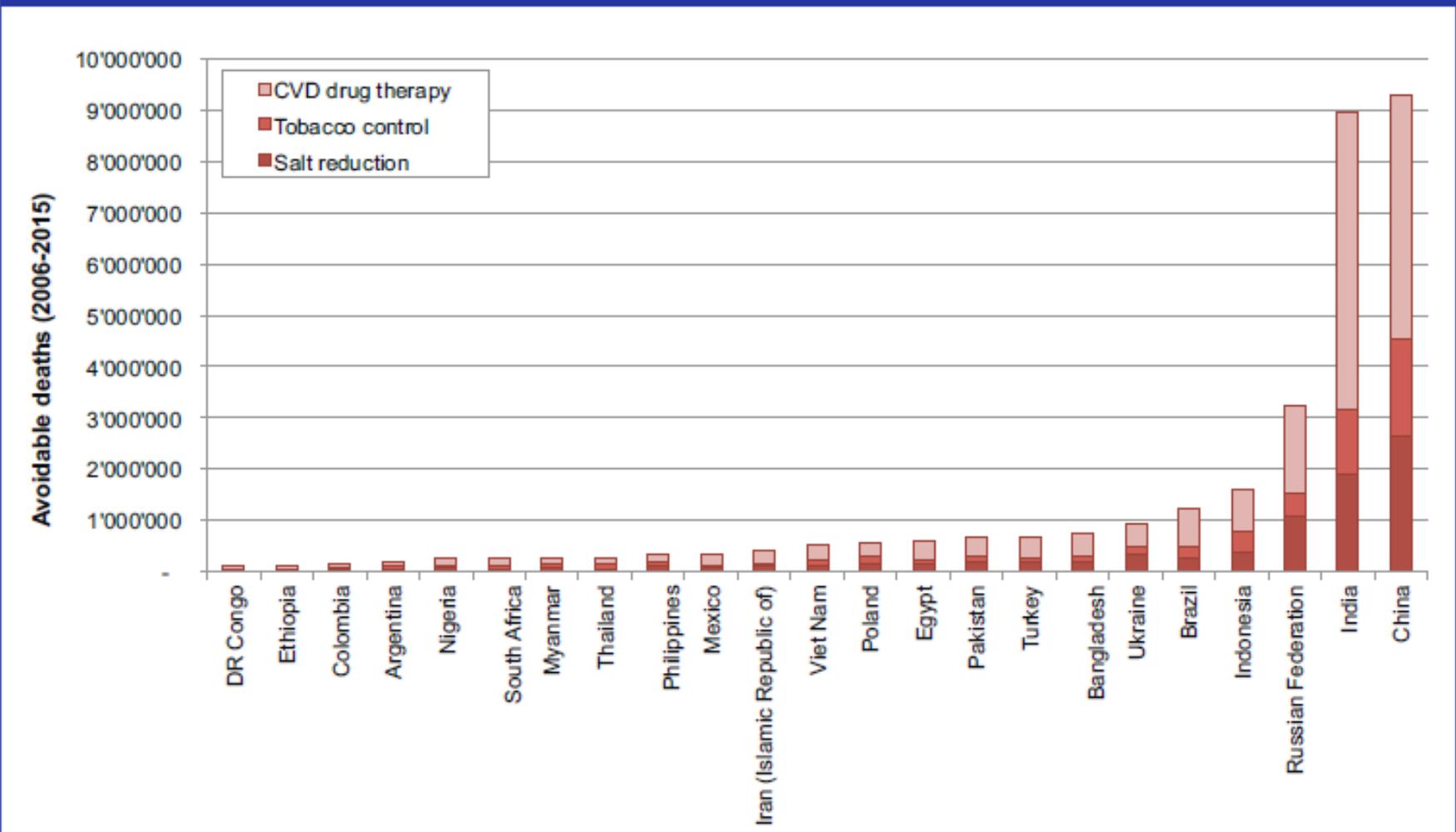
- Prior to UN High-Level Meeting in September 2011, WHO assembled and published the evidence on interventions that they consider “best buy”.
- These interventions are considered as cost-effective, feasible and appropriate particularly for low to middle income countries.

# Recommended “Best Buys”\*

Risk factor / disease	Interventions
<b>Tobacco use</b>	<ul style="list-style-type: none"> <li>• Tax increases</li> <li>• Smoke-free indoor workplaces and public places</li> <li>• Health information and warnings</li> <li>• Bans on tobacco advertising, promotion and sponsorship</li> </ul>
<b>Harmful alcohol use</b>	<ul style="list-style-type: none"> <li>• Tax increases</li> <li>• Restricted access to retailed alcohol</li> <li>• Bans on alcohol advertising</li> </ul>
<b>Unhealthy diet and physical inactivity</b>	<ul style="list-style-type: none"> <li>• Reduced salt intake in food</li> <li>• Replacement of trans fat with polyunsaturated fat</li> <li>• Public awareness through mass media on diet and physical activity</li> </ul>
<b>Cardiovascular disease (CVD) and diabetes</b>	<ul style="list-style-type: none"> <li>• Counselling and multi-drug therapy for people with a high risk of developing heart attacks and strokes (including those with established CVD)</li> <li>• Treatment of heart attacks with aspirin</li> </ul>
<b>Cancer</b>	<ul style="list-style-type: none"> <li>• Hepatitis B immunization to prevent liver cancer (already scaled up)</li> <li>• Screening and treatment of pre-cancerous lesions to prevent cervical cancer</li> </ul>

\* Reference: *Scaling up action against non-communicable diseases: How much will it cost?* – prepared by the World Health Organization (2011). <http://www.who.int/nmh/publications>

**Avoidable deaths from a scaled-up chronic disease intervention package in 23 low- and middle-income countries (2006-2015)**



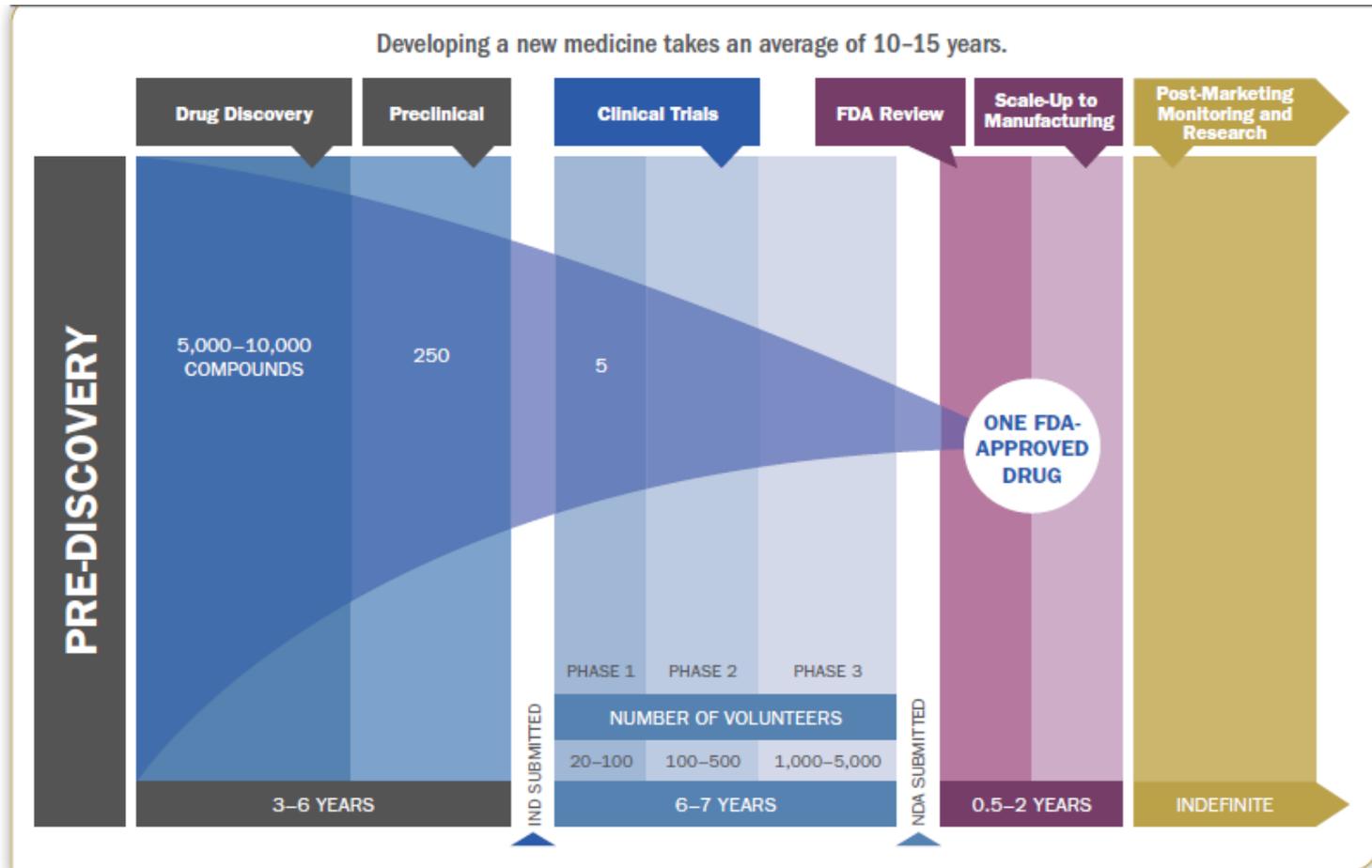
\* Reference: *Scaling up action against non-communicable diseases: How much will it cost?* – prepared by the World Health Organization (2011). <http://www.who.int/nmh/publications>

# Pharma Perspective



Personal view

# Drug development is long, risky and costly process

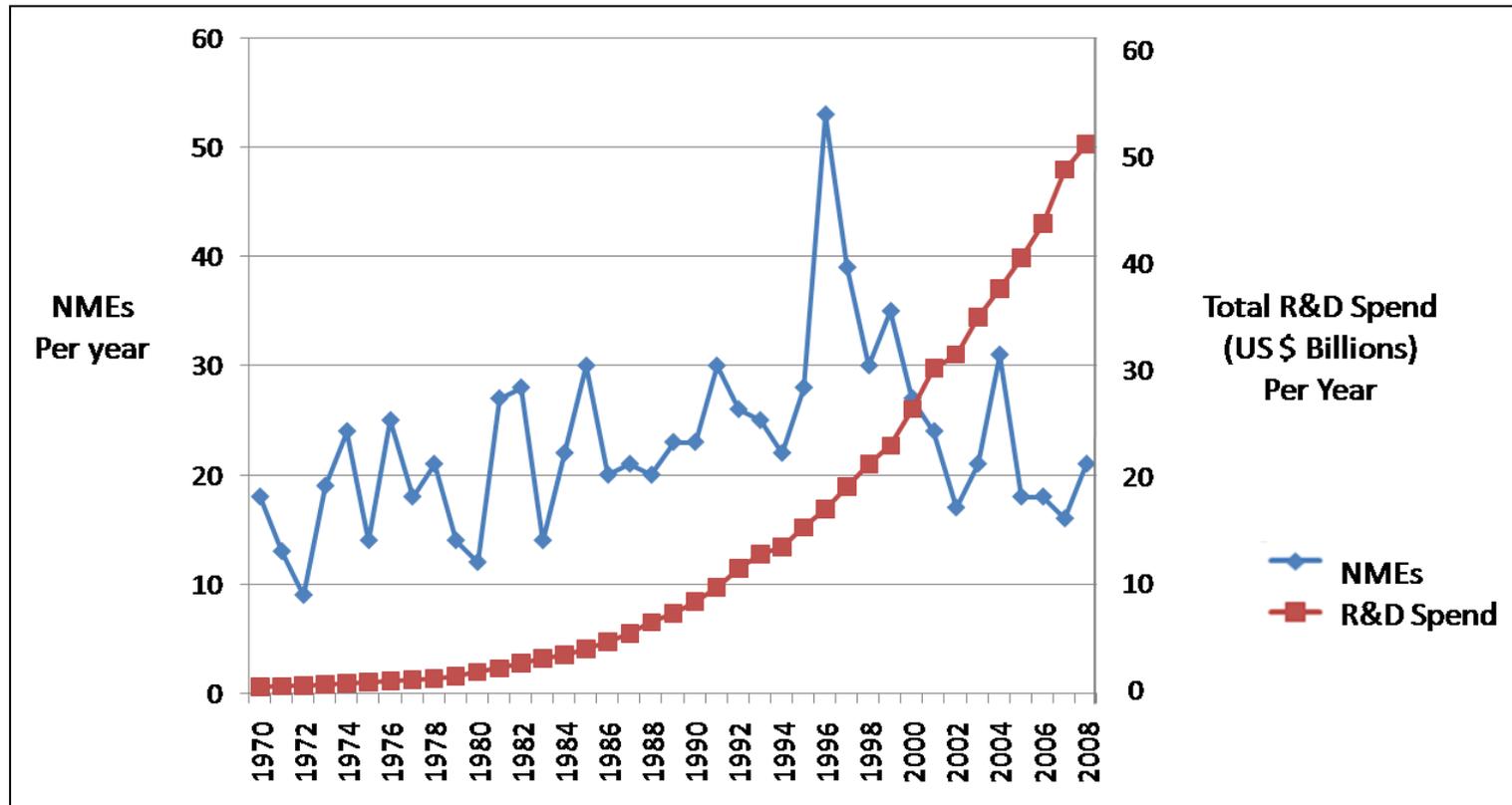


SOURCE: Pharmaceutical Research and Manufacturers of America, Drug Discovery and Development: Understanding the R&D Process, [www.innovation.org](http://www.innovation.org).

# Current issues pharma industry is facing

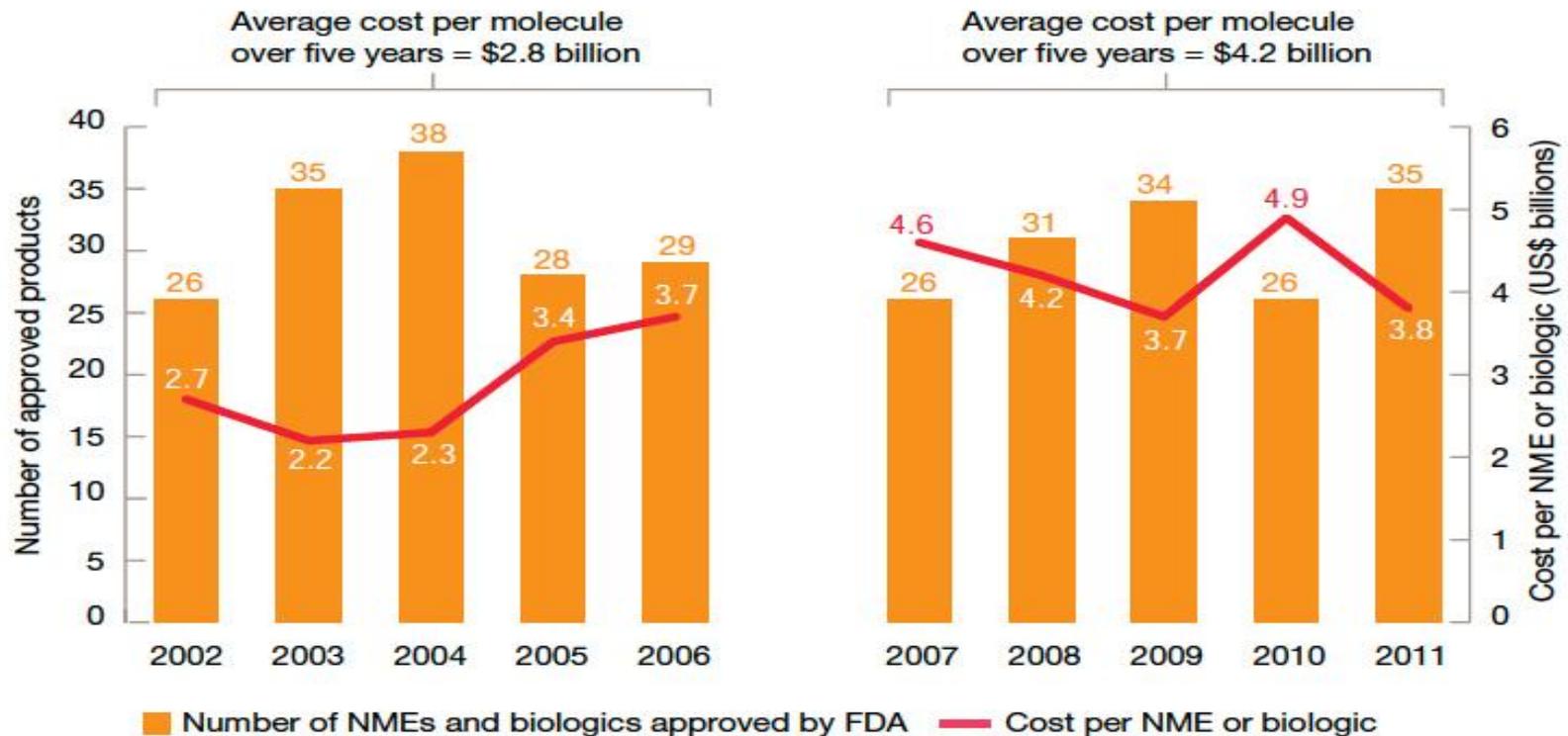
- Decreased productivity / lack of disruptive innovation
- Longer and costlier drug development
  - ▣ Increased data requirements from Regulators
    - Bigger and longer clinical trials
    - Costly post-approval commitments
    - Increasing risk-averse attitude
  - ▣ Increased review periods
- Decrease marginal return of medical care (and research) on areas where unmet need is reduced
- Hostile pricing and reimbursement environment
- Patent cliff (and risks around patent protection)
- ..... *current economic crisis*

# NMEs per year versus total R&D spend in Billions of Dollars (US\$ 2008)



Source: PHRMA "Pharmaceutical Industry Profile 2009", [www.pharma.org](http://www.pharma.org).

# Average cost per molecule over 5 years

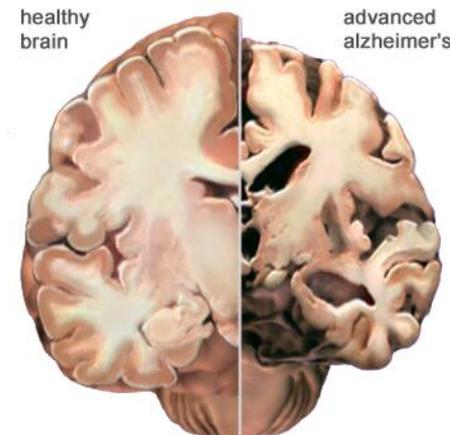


Sources: EvaluatePharma & PwC analysis

Notes: (1). R&D expenditure on newly approved medicines is clearly historic, but comparing annual investment with annual output over a 10-year period provides an accurate picture of the direction in which costs are moving. (2). We have not taken account of expenditure on line extensions, which varies significantly from one company to another.

# Alzheimer's challenge

- Alzheimer's disease is the most common type of dementia.
- It is a devastating condition characterised by progressive cognitive, functional and behavioural impairment
- More than 36 million people living with dementia worldwide<sup>1</sup>
  - >5 million patients in US alone (11% of >65, and 32% of all >85 yo)<sup>2</sup>.
  - It will increase to 66 million by 2030 and 115 million by 2050.
  - Nearly two-thirds live in low and middle income countries
- Alzheimer's disease is officially listed as the sixth-leading cause of death in the US.
- Estimated global cost in 2010 was \$604 billion<sup>1</sup>.
  - In 2012, an estimated 17.5 billion hours of unpaid care provided to Alzheimer's patients in the US, valued at over \$216 billion<sup>2</sup>.



1) 2011 Alzheimer's Disease Facts and Figures report  
2) 2012 World Alzheimer's report (<http://www.alz.co.uk/research/>)

# Annual cost of an Alzheimer's patient in the US (2013 RAND Study\*)

**Table 2. Yearly Cost per Person Attributed to Dementia, in 2010 Dollars.**

Variable	Yearly Cost per Person (95% CI)	
	Unadjusted	Adjusted for Demographic Characteristics and Coexisting Conditions
	<i>dollars</i>	
Care purchased in marketplace		
Total out-of-pocket spending	6,838 (4,854–8,821)	6,194 (4,522–7,866)
Total Medicare spending	5,226 (3,086–7,365)	2,752 (1,116–4,389)
Net formal home care	6,888 (4,775–9,000)	5,678 (3,739–7,618)
Nursing home care (excluding payments by Medicare and out-of-pocket spending)	14,377 (10,016–18,739)	13,876 (9,769–17,983)
<b>Total</b>	<b>33,329 (24,223–42,434)</b>	<b>28,501 (20,881–36,122)</b>
Informal home care		
Caregiving time valued according to replacement cost	30,839 (23,578–38,099)	27,789 (21,112–34,466)
Caregiving time valued according to cost of forgone wages	14,591 (10,910–18,273)	13,188 (9,636–16,740)
Grand total		
Care purchased in marketplace plus caregiving time valued according to replacement cost	64,168 (48,406–79,928)	56,290 (42,746–69,834)
Care purchased in marketplace plus caregiving time valued according to cost of forgone wages	47,920 (35,433–60,406)	41,689 (31,017–52,362)

\*Reference: Hurd MD et al: *N Engl J Med* 2013;368:1326-34.

# Projected costs of Alzheimer's care in the US until 2040 (RAND Study\*)

**Table 3. Projected Total and Per-Person Annual Monetary Costs of Dementia in the United States, in 2010 Dollars.\***

Cost and Year	Care Purchased in Marketplace	Total Cost According to Valuation of Cost of Informal Care	
		Replacement Cost (95% CI)	Cost of Forgone Wages (95% CI)
Total cost (billions of \$)			
2010	109 (86–132)	215 (171–259)	159 (126–192)
2020	129 (102–156)	255 (204–306)	189 (150–228)
2030	183 (145–221)	361 (289–434)	267 (212–322)
2040	259 (204–314)	511 (408–615)	379 (300–457)
Total per-person cost (\$)			
2010	464 (416–511)	915 (825–1006)	678 (610–746)
2020	498 (445–550)	983 (882–1083)	728 (652–804)
2030	640 (569–712)	1,264 (1,128–1,400)	936 (833–1,039)
2040	831 (733–929)	1,641 (1,455–1,826)	1,215 (1,074–1,356)

\*Reference: Hurd MD et al: *N Engl J Med* 2013;368:1326-34.

# Despite huge investment, but no breakthrough yet

- Only two licensed molecules, both for symptomatic treatment
- The pathophysiological pathways remain unclear (Tau vs Amyloid hypothesis)
- Still no clear biomarker strategy emerging
- More than 100 drugs with >40 different mechanisms tested, with >20 drugs (reached and) failed in Phase 3 stage\*.
- Only in 2012, two drugs failed at Phase 3 (final) stage of development (bapineuzumab, Pfizer, J&J and solanezumab, Lilly)



- The total cost is hard to estimate, but so far tens of billions were spent in Alzheimer's research
- Several big public initiatives to support Alzheimer's research: BRAIN initiative of Obama (\$100m) , NIH, EU Initiatives, France Alzheimer's plan (€1,6b).
- Increased trend in private-public and private – private partnerships

\*Reference: Becker RE et al. Curr Alzheimer Res. 2008 August; 5(4): 346–357

# Conclusion

- The clinical and economic impact of NCDs is significant, and rising dramatically.
- The impact in economies is much wider than treatment costs
- Low & middle income countries will be particularly affected in the next few decades.
- Disruptive treatment innovation, at affordable costs to all, seems unlikely
- The most cost-effective strategies include preventative measures, especially around life style modification.
- Private-public, and sector-academia partnerships are crucial to success



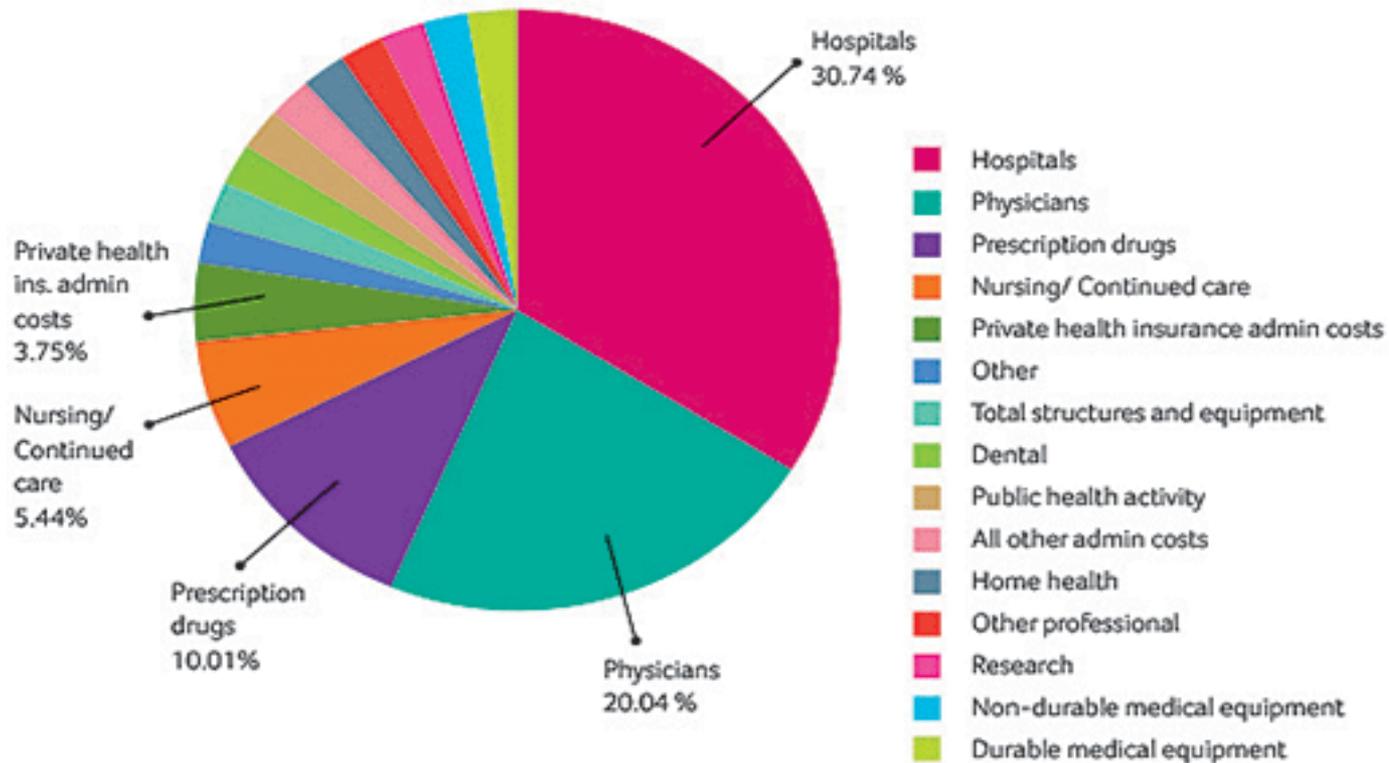
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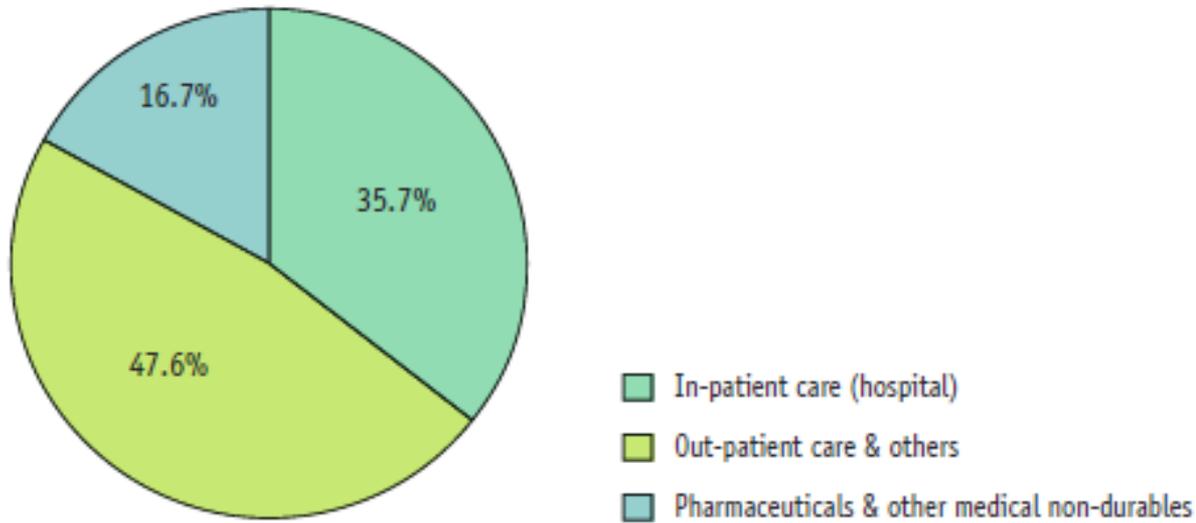
# BACK UP SLIDES

# US Healthcare Spending Breakdown in 2010



Source: Center For Medicare and Medicaid Services

# Breakdown of Total Health Expenditure in Europe (2009)



Source: OECD Health Data 2011 – EFPIA calculations (non-weighted average for 24 EU & EFTA countries)

# Patent cliff

