



The worldwide costs of dementia: an overview

Anders Wimo, MD, PhD, professor
Alzheimer's Disease Research Center,
Karolinska Institutet, Stockholm, Sweden



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Conflicts of interest Anders Wimo

- **Drug companies:** Lundbeck, Pfizer, Merz, Forest, Novartis, Janssen-Cilag, Astra-Zeneca, Sanofi, Neurochem, Wyeth, Lilly
- **Authorities and similar:** National board of health and welfare, Social Ministry, Medical Products Agency, Swedish Council on Health Technology Assessment (SBU), Swedish Reimbursement Authority (LFN), Local drug committees, municipalities, county councils, OECD, EU
- **Patient/caregiver organisations:** Swedish Alzheimer Association, Alzheimer Europe, Alzheimer Association (USA)

The cost of illness race in Sweden (Wimo, Johansson, Jönsson)

Disorder/Disease	Cost of illness (billions US\$)
Dementia	8.4
Reumatic diseases	6.3
Psychiatric diseases	6.0
Cancer	5.5
Heart/vascular disorders	4.3
Alcohol	3.5
Stroke	2.1
Diabetes type 2	1.3
Osteoporosis	0.8

The cost of illness race in Europe (Brain disorders) (EBC)

Disorder/Disease	Prevalence (millions)	Cost of illness (billions US\$) 2005	Per case (US\$) 2005
Affective disorders	20.8	134,823	4882-7759
Addiction	9.2	73,078	4878-7446
Dementia	4.9	70,401	13,681
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Stroke	1.1	27,937	21,141

COI-studies, Europe (US\$ per demented, 2005)

(Jönsson, Wimo, in press)

Country	Mild	Moderate	Severe	All	Informal care	Source(+ et al)
Belgium	8680	14360	29228	18262	+	Scuvee-Moreau
France	5953	NA	9698	7642	+	Souetre
France	7890	19865	66678	28575	+	Rigaud
Germany	4571	12595	24202	14985	+	Schulenberg
Italy	NA	NA	NA	65225	+	Cavallo
Italy	NA	NA	NA	35709	-	Trabucchi Kronborg Andersen
Denmark	12587	18741	28030	13382	-	Jönsson
Nordic	6165	18685	38061	17472	+	Jönsson
Sweden	6151	25590	50008	33898	-	Jönsson
Finland	9546	11531	20409	41486	NA	Francois
Spain	22790	29275	39527	34345	+	Boada

COI-studies, UK (US\$ per demented, 2005)

Country	All	Informal care	Source(+ et al)
UK	38,536	+	Alzheimer Soc.
UK	80,185	+	Souetre
UK	40,410	-	Wolstenholme
UK	43,918	NA	Livingston
UK	30,506	+	Kavanaugh
UK	25,121	-	Schneider
UK	6,420	-	Smith
UK	28,565-42,422	+	Holmes
UK	19,935	-	McNamee
UK	19,153-37,682	+	Lowin
UK	14,213	+	EBC
UK	20,000-45,000	+	Wimo

COI-studies, USA (US\$ per demented, 2005)

Country	All	Informal care	Source(+ et al)
USA	29,000	+	Alzheimer Assoc, 2007
USA	34,500	+	Hay, 1987
USA	37,300	+	Huang, 1988
USA	27,000	-	Schneider, 1990
USA	60,200	+	Rice, 1993
USA	26,200	+	Manton, 1993
USA	60,500	+	Ernst, 1994
USA	24,900-50,000	+	Wimo, 2007

COI-studies, other countries (US\$ per demented, 2005)

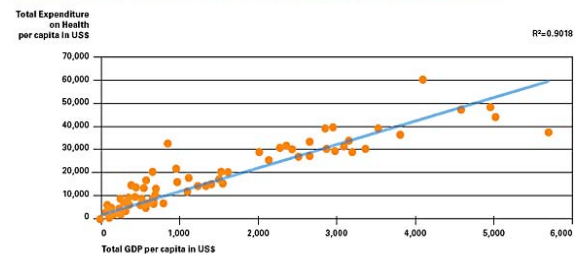
Country	Mild	Moderate	Severe	All	Informal care	Source(+ et al)
Argentina	9198	11550	19576		+	Allegrì
Turkey	2080	4528	5807		+	Zencir
Korea				9459	+	Suh
China	1587		2213	1899	+	An

COI studies

Country	Medical care	Formal non medical care	Informal care	Source (+ et al)
Belgium	56%	36%	8%	Scuvee-Moreau
Spain	10%	12%	77%	Boada
UK	8%	56%	36%	Alzheimer Society
USA	61%	14%	25%	Alzheimer Association
Sweden	5%	85%	10%	Wimo

Gross Domestic Product (GDP) and Expenditures on health per capita

WEALTH AND HEALTH EXPENDITURE ARE CORRELATED 2003



Worldwide cost model: assumptions for direct costs in base case

- Age specific dementia prevalence is similar worldwide
- Ratio between direct cost of dementia per person and GDP per person is similar worldwide: 44%
- Cost data from "key countries" are used for imputation to countries where data are missing
- Design: prevalence based, direct costs and informal care
- Time transformations: CPI (Consumer Price Index)
- Currency transformations: PPPs (purchase power parities)

Worldwide cost model: assumptions for informal care in base case

- Average wage (figures for 87%)
- Personal/basic ADL (1.6 hours per day base option) similar worldwide
- Instrumental ADL and supervision not included in base option
- Living at home 73-90%

Worldwide total costs of dementia US\$ 2005

	Direct costs Billions	Informal care Billions	Total costs	Per cent (%)	Per case
Europe	80.5	39.9	120.4	38	15,000
North America	60.5	23.1	83.6	27	24,500
Latin America	7.8	6.0	13.8	4	7,000
Asia	56.7	32.0	88.7	28	6,000
Africa	1.9	2.5	4.4	1	3,000
Oceania	3.0	1.5	4.5	2	18,500
TOTAL	210	105	315	100%	100%

Wimo, Jönsson, Winblad, Alzheimer's & Dementia, 2007
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Prevalence and costs of dementia 2005

	Directs Costs	Informal care	Prevalence
UN: More developed regions (MDR)	80%	71%	46%
Less developed regions (LDR)	20%	29%	54%
WEO/IMF: Advanced economies	75%	65%	38%
Other emerging market and developing countries	25%	35%	62%

Worldwide informal care costs: sensitivity analysis

Billions US\$ 2005	Base option (PADL 1.6h/d)	PADL+ IADL (3.7h/d)	PADL+ IADL+ supervision (7.4h/d)	99% at home in other emerging market & developing countries	50% at home in advanced economies
Europe	39.9	92.3	184.6	40.6	29.5
North America	23.1	53.5	107.0	23.1	15.8
Latin America	6.0	13.8	27.6	6.6	6.0
Asia	32.0	73.9	147.9	34.1	28.5
Africa	2.5	5.8	11.6	2.8	2.5
Oceania	1.5	3.5	7.1	1.5	1.1
TOTAL	105	243	485	109	83

Comparisons

- Dementia 315 billions US\$ in 2005 (Wimo, Jönsson, Winblad, Alzheimer's & Dementia, 2007)
- Diabetes 56 billions US\$ in 2005 (44 billions US\$ in 1997, Logminiene et al. 2004)
- Smoking 265 billions US\$ in 2005 (200 billions US\$ in 1994, WHO)
- Worldwide military budgets in 2002 = 794 billions US\$ (SIPRI)

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CONCLUSIONS

- Costs of dementia are enormous
- Cost of illness methodology is complicated

Are COI studies useful?

- Policy making - the higher the better?
- Skip the COI-race – no information of cost effectiveness of treatment

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National level

- Distribution of costs and burden on different payers/players
- Changes over time

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International level/comparisons

- Changes over time
- Changes/differences in care systems
- Impact of informal care
- Distribution of resources on care? Equity?

COI-checklist

- Is the study transparent?
- Basic design: Prevalence based/incidence based? Top-down/bottom up
- Included cost categories
- Unit costs
- Currency transformations (PPPs?)
- Year of costs. Time transformations (CPI?)
- Informal care: types, quantification, costing
- Dementia or AD?
- Prevalence



Game over!

Acknowledgements
Bengt Winblad
Linus Jönsson

Worldwide total costs: sensitivity analysis (1) 2005

Billions US\$ 2005	Base option	Prevalence Eurodem	Health exp per capita
Europe	120.4	118.8	110.6
North America	83.6	81.5	109.9
Latin America	13.8	13.9	11.8
Asia	88.7	89.2	63.5
Africa	4.4	4.5	3.6
Oceania	4.5	4.4	4.4
TOTAL	315	312	304

Direct costs of dementia per person as proportion of GDP (per capita)

- Ernst and Hay, USA 46%
- Ostbye, Canada 43%
- Wimo, Sweden 46%
- Schulenberg, Germany 44%
- Cavallo, Italy 39%

Burden in terms of DALYs

	DALYs (x1000)	DALYs per 100 000 persons	DALYs per 1000 demented
More developed regions (MDR)	4741	395	350
Less developed regions (LDR)	5597	107	354
Least developed countries (part of LDR)	422	57	363

Economic impact of prevalence figures

- Policy making - the higher the better?
- COI – figures – the higher the more costly
- Cost effectiveness: the higher, the greater potential for cost savings??

Worldwide total costs: sensitivity analysis 2005

WHO Region	Prevalence Ferri et al	Costs Ferri et al
AFR D-E	0.5	1.5
AMR A.B.D	5.8	102.8
EMR B/D	1.2	4.7
EUR A-C	8.2	116.8
SEAR B	0.9	3.4
SEAR D	3.5	31.8
WPR A	0.2	3.9
WPR B	6.9	38.5
ALL	27.2	303.5