



**Alzheimer's Disease
International**

The global voice on dementia

World Alzheimer Report 2015

The Global Impact of Dementia

AN ANALYSIS OF PREVALENCE, INCIDENCE, COST AND TRENDS

EXECUTIVE SUMMARY



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All the authors and investigators of dementia studies who
provided us more specific data from their work.

Foreword

Today, over 46 million people live with dementia worldwide, more than the population of Spain. This number is estimated to increase to 131.5 million by 2050.

Dementia also has a huge economic impact. Today, the total estimated worldwide cost of dementia is US \$818 billion, and it will become a trillion dollar disease by 2018. This means that if dementia care were a country, it would be the world's 18th largest economy, more than the market values of companies such as Apple (US\$ 742 billion), Google (US\$ 368 billion) and Exxon (US\$ 357 billion).

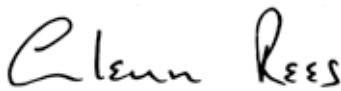
In many parts of the world, there is a growing awareness of dementia, but across the globe it remains the case that a diagnosis of dementia can bring with it stigma and social isolation. Today, we estimate that 94% of people living with dementia in low and middle income countries are cared for at home. These are regions where health and care systems often provide limited or no support to people living with dementia or to their families.

The 2015 World Alzheimer Report updates data on the prevalence, incidence, cost and trends of dementia worldwide. It also estimates how these numbers will increase in the future, leaving us with no doubt that dementia, including Alzheimer's disease and other causes, is one of the biggest global public health and social care challenges facing people today and in the future.

The two organisations we lead are ADI, the only worldwide federation of Alzheimer associations and global voice on dementia, and Bupa, a purpose-driven global health and care company that is the leading international provider of specialist dementia care, caring for around 60,000 people living with dementia each year. Together, we are committed to ensuring that dementia becomes an international health priority. We believe national dementia plans are the first step towards ensuring all countries are equipped to enable people to live well with dementia, and help to reduce the risk of dementia for future generations. There is now a growing list of countries which have such provision in place or which are developing national dementia plans, but it's not enough.

Given the epidemic scale of dementia, with no known cure on the horizon, and with a global ageing population, we're calling on governments and every part of society to play an active role in helping to create a world where people can enjoy a better quality of life today, and also help reduce the risk of dementia for future generations. It is our belief that this report will help sustain the momentum of recent global collaboration, mobilising governments, policy makers, health care professionals, researchers, Alzheimer associations, and businesses, to work together on a solution for the global challenge of dementia.

Providing a better quality of life for people with dementia can be a reality, but only if governments and societies make it an urgent priority. We're committed to making this happen.



Glenn Rees
Chairman
Alzheimer's Disease
International



Stuart Fletcher
CEO
Bupa

INFOGRAPHIC

The global impact of dementia

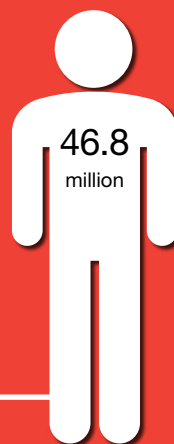


Around the world, there will be 9.9 million new cases of dementia in 2015,

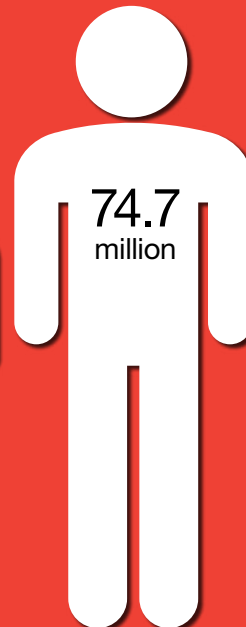
**one every
3 seconds**

46.8 million people worldwide are living with dementia in 2015.

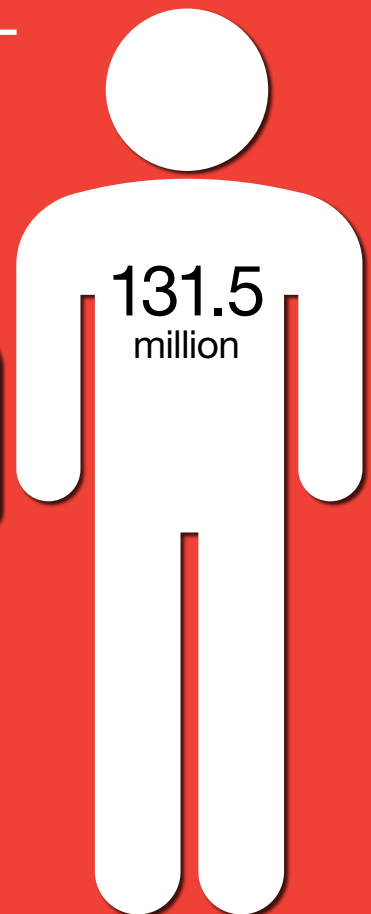
This number will almost double every 20 years.



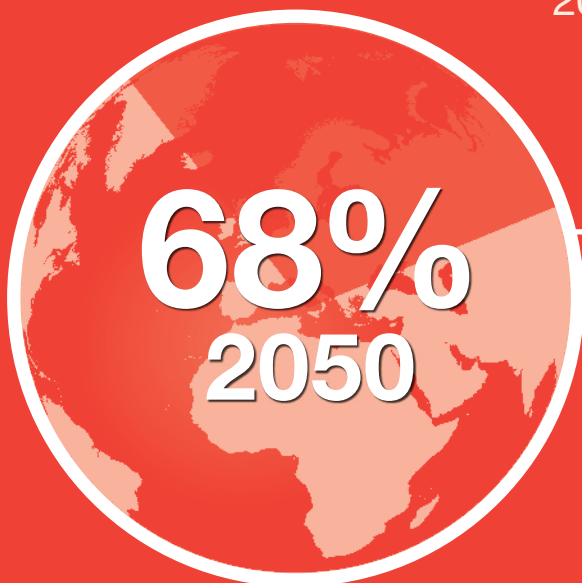
2015



2030



2050



Much of the increase will take place in low and middle income countries (LMICs): in 2015, 58% of all people with dementia live in LMICs, rising to 63% in 2030 and 68% in 2050.



2015

2018

The total estimated worldwide cost of dementia in 2015 is US\$ 818 billion.

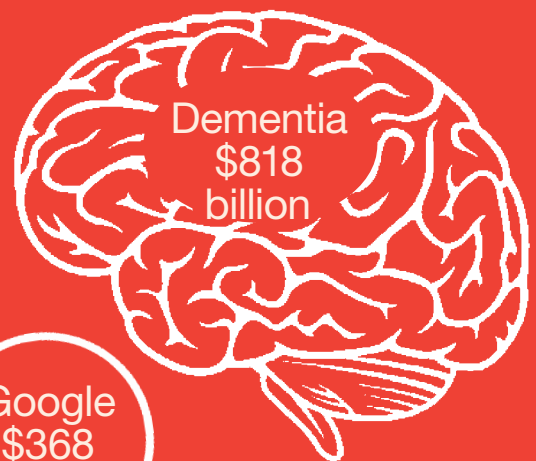
By 2018, dementia will become a trillion dollar disease, rising to

US\$ 2 trillion
by 2030

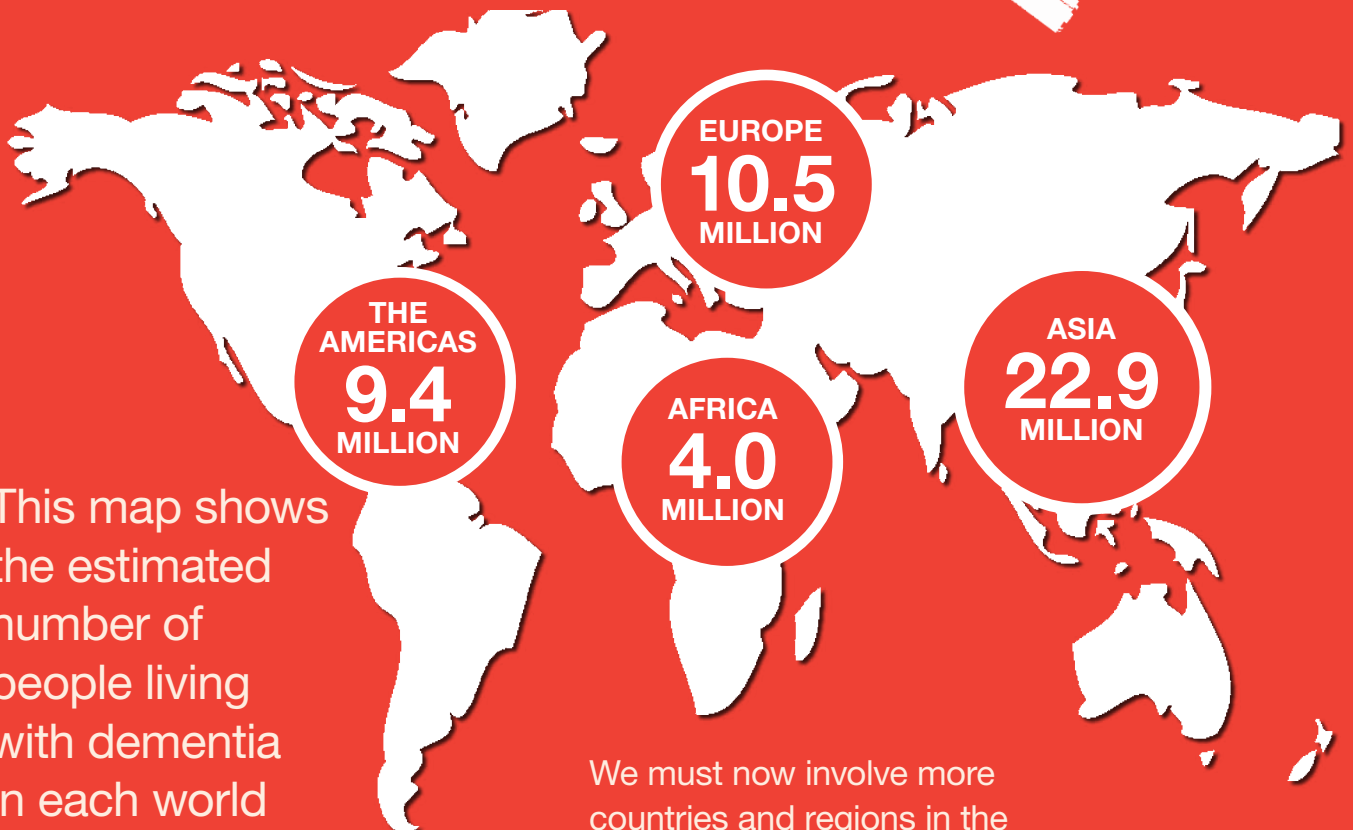
If global dementia care were a country, it would be the

18th largest economy

in the world exceeding the market values of companies such as Apple and Google



(source: Forbes 2015 ranking).



This map shows the estimated number of people living with dementia in each world region in 2015.

We must now involve more countries and regions in the global action on dementia.

Alzheimer's Disease International

World Alzheimer Report 2015

The Global Impact of Dementia

AN ANALYSIS OF PREVALENCE, INCIDENCE, COST & TRENDS

The Global Observatory for Ageing and Dementia Care

The Global Observatory for Ageing and Dementia Care, hosted at the Health Service and Population Research Department, King's College London, was founded in 2013. Supported by Alzheimer's Disease International, and King's College London, the Observatory has a tripartite mission:

1. To build upon ADI's 10/66 Dementia Research Group program of population-based and intervention research in low and middle income countries, maximising the impact that research findings from our data can have upon policy and practice.
2. To develop, evaluate, and promote primary care and community interventions for people with dementia.
3. To synthesise global evidence for policymakers and public, in particular, continuing and developing our role in the preparation of high impact evidence-based reports for Alzheimer's Disease International (World Alzheimer Reports 2009, 2010, 2011, 2013 and 2014, and Nutrition and dementia), the World Health Organization (Dementia: a public health priority, 2012) and other relevant intergovernmental organisations.

The World Alzheimer Report 2015 was independently researched and authored by Prof Martin Prince, Prof Anders Wimo, Dr Maëlen Guerchet, Gemma-Claire Ali, Dr Yu-Tzu Wu and Dr Matthew Prina, with contributions from others as listed. The evidence reported in Chapters 1-6, and the inferences drawn, are the responsibility of the authors alone. Chapter 7 was developed by the Global Observatory and Alzheimer's Disease International.

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EXECUTIVE SUMMARY

This brief report provides a synopsis of the findings of detailed evidence-based reviews presented by the authors in the full World Alzheimer Report 2015. In the interests of brevity, all references from the full report have been omitted in this summary version. The full version of the report includes, as well as references and additional data, a more detailed exposition and discussion of results. It can be downloaded from www.alz.co.uk/worldreport2015

CHAPTER 1

Dementia and ageing in a developing world



The World Alzheimer Report 2015 comprises an overview of current knowledge regarding the evolution of the dementia epidemic worldwide. For this purpose, we have updated our previous estimates of global prevalence and numbers affected (previously published in the World Alzheimer Report 2009), global incidence (WHO/ADI report 2012), and global economic impact (World Alzheimer Report 2010). As a new feature, we have included a systematic review of the evidence for and against recent trends in prevalence and incidence of dementia over time. We have also reviewed the broader societal impact of dementia, compared with that of other chronic diseases, and how this is best measured.

There are almost 900 million people aged 60 years and over living worldwide. Rising life expectancy is contributing to rapid increases in this number, and is associated with increased prevalence of chronic diseases like dementia. Between 2015 and 2050, the number of older people living in higher income countries is forecast to increase by 56%, compared with 138% in upper middle income countries, 185% in lower middle income countries, and by 239% (a more than threefold increase) in low income countries. Older people also constitute an increasing proportion of total population, as the rise in life expectancy is being accompanied by declining fertility rates in most countries.

Poorer countries have fewer economic and human professional resources to meet the health and social care needs of their rapidly growing older populations. Many of these countries face the challenge of a 'double burden' of persistently high rates of maternal, childhood and infectious diseases, combined with a growing epidemic of chronic non-communicable diseases. Even with the unprecedented benefits of double digit annual economic growth, rapidly developing countries in Asia and Latin America have struggled to establish comprehensive and effective systems of social protection for older people, failing to guarantee adequate income and universal access to health and social care. Overall economic growth at the national level can conceal gross inequities in income distribution, and older people are often among the least likely and the last to benefit directly from economic development.

CHAPTER 2

The global prevalence of dementia



We have updated our 2009 systematic review of the global prevalence of dementia, bringing the total number of studies to 273. This is 116 more than we found in 2009. Our regional estimates of dementia prevalence in people aged 60 years and over now range from 4.7% in Central Europe to 8.7% in North Africa/Middle East, though all other regional estimates

lie in a relatively narrow band between 5.6 and 7.6%. When compared to our 2009 estimates, prevalence estimates are higher in East Asia and Africa. Estimated prevalence for all those aged 60 years and over, standardised to the Western European population structure, can be compared directly between the 21 GBD regions and between our 2009 and 2015

Figure 1
Estimated prevalence of dementia for those aged 60 and over, standardised to Western Europe population, by GBD region

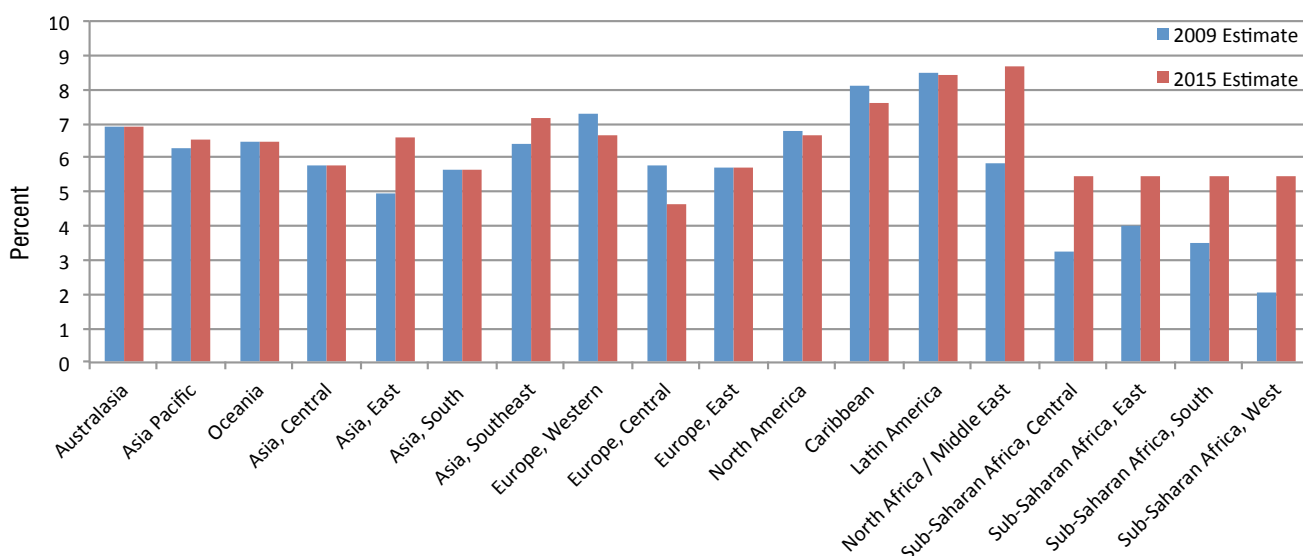


Table 1

Total population over 60, crude estimated prevalence of dementia (2015), estimated number of people with dementia (2015, 2030 and 2050) and proportionate increases (2015-2030 and 2015-2050) by GBD world region

GBD Region	Over 60 population (millions, 2015)	Crude estimated prevalence (% , 2015)	Number of people with dementia			Proportionate increases (%)	
			2015	2030	2050	2015-2030	2015-2050
ASIA	485.83	4.7	22.85	38.53	67.18	69	194
Australasia	5.80	6.7	0.39	0.62	1.02	59	163
Asia Pacific High Income	52.21	7.0	3.64	5.68	7.81	56	115
Oceania	0.64	3.5	0.02	0.04	0.09	83	289
Asia, Central	7.43	4.2	0.31	0.44	0.88	43	184
Asia, East	218.18	4.5	9.77	16.60	28.64	70	193
Asia, South	139.85	3.7	5.13	8.61	16.65	68	225
Asia, Southeast	61.72	5.8	3.60	6.55	12.09	82	236
EUROPE	176.61	5.9	10.46	13.42	18.66	28	78
Europe, Western	107.89	6.9	7.45	9.99	14.32	34	92
Europe, Central	26.92	4.0	1.07	1.39	1.90	30	78
Europe, East	41.80	4.6	1.94	2.03	2.44	4	26
THE AMERICAS	147.51	6.4	9.44	15.75	29.86	67	216
North America	74.88	6.4	4.78	7.28	11.74	52	145
Caribbean	5.78	6.5	0.38	0.60	1.07	60	183
LA, Andean	5.51	6.1	0.34	0.64	1.43	88	322
LA, Central	26.64	5.8	1.54	2.97	6.88	93	348
LA, Southern	9.88	7.6	0.75	1.15	2.05	52	172
LA, Tropical	24.82	6.7	1.66	3.11	6.70	88	305
AFRICA	87.19	4.6	4.03	6.99	15.76	74	291
North Africa / Middle East	38.93	6.0	2.34	4.35	10.04	86	329
SSA, Central	4.78	3.3	0.16	0.26	0.54	60	238
SSA, East	19.86	3.5	0.69	1.19	2.77	72	300
SSA, Southern	6.06	3.9	0.24	0.35	0.58	46	145
SSA, West	17.56	3.1	0.54	0.85	1.84	58	241
WORLD	897.14	5.2	46.78	74.69	131.45	60	181

Abbreviations: LA = Latin America; SSA = Sub-Saharan Africa

estimates (Figure 1). It should be stressed that differences cannot be assumed to indicate a temporal trend in dementia prevalence. They may result from other factors, such as improvements in the evidence base with more and better studies, and changes in the diagnostic criteria used.

The prevalence of dementia increases exponentially with age in all regions. Prevalence doubles with every 5.5 years of age in North America, 5.7 years in Asia Pacific, 5.9 years in Latin America, 6.3 years in East Asia, 6.5 years in West and Central Europe, 6.6 years in South Asia, 6.9 years in Australasia, 7.2 years in the Caribbean and sub-Saharan Africa, and 10.6 years in Southeast Asia. A statistically significant independent effect of gender was observed in five regions – East Asia, Asia South, the Caribbean, Western Europe and Latin America – where predicted prevalence for men was between 14 and 32% lower than that for women. An interaction was noted between age and gender, with a tendency in all regions for the divergence in prevalence between men and women to increase with increasing age, but this was only statistically significant in the Asia Pacific and Latin America regions.

Applying our age-specific, or age- and gender-specific prevalence estimates to the UN population projections, we estimate that 46.8 million people worldwide are living with dementia in 2015. This number will almost double every 20 years, reaching 74.7 million in 2030 and 131.5 million in 2050. These new estimates are 12–13% higher than those made for the World Alzheimer Report 2009 (41.5m in 2015, 65.7m in 2030 and 115.4m in 2050). Table 1 summarises the estimated number of people living with dementia in each GBD region, along with projected increases through to 2050.

According to our revised estimates for 2015, East Asia is the world region with the most people living with dementia (9.8 million), followed by Western Europe (7.4 million). These regions are closely followed by South Asia (5.1 million) and North America (4.8 million). At the

country level, ten countries are home to over a million people with dementia in 2015, with China having the largest number (9.5 million).

Much of the projected increase in numbers of people living with dementia is predicted to take place in low and middle income countries (LMIC), as demonstrated by Figure 2. We estimate that 58% of all people with dementia live in countries currently classified by the World Bank as low or middle income countries. The proportion of people with dementia living in these same countries is estimated to increase to 63% in 2030 and 68% in 2050.

Proportionate increases in the number of people living with dementia will be much steeper in low and middle income countries than in high income countries (HIC). Between 2015 and 2050, the number of people living with dementia in what are now high income countries will increase by 116%. This compares to a 227% increase in upper middle income countries, 223% in lower middle income countries, and 264% in low income countries.

Regions that stand out as persistently lacking in research are Central Asia, Eastern Europe, southern Latin America, and eastern and southern sub-Saharan Africa. Despite reasonable coverage in terms of numbers of studies, the evidence-base for South and Southeast Asia is still sparse with respect to population size. In our 2009 report, we noted a marked decrease in dementia prevalence research in high income countries since the 1990s. This trend has not been reversed, and the evidence-base in many of these countries is becoming out of date. Quality issues identified in 2009 are still apparent in recent studies. We urge researchers conducting prevalence studies to ensure that two-phase study designs are correctly applied and analysed, and to include an informant interview in their diagnostic assessment.

Figure 2
The growth in numbers of people with dementia (millions) in high income (HIC) and low and middle income countries (LMIC)

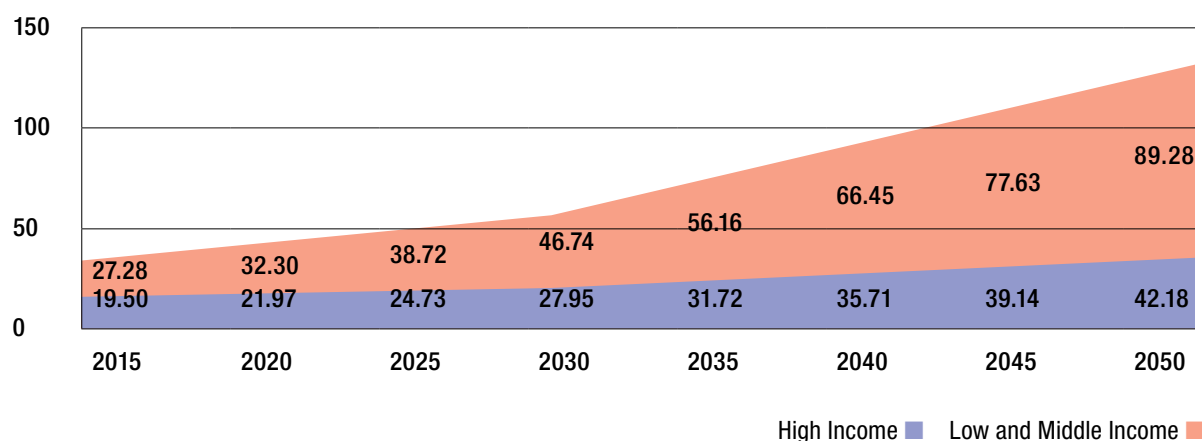


Table 2
Estimated annual numbers of incident cases of dementia, by age group and world region

Region	60-64	65-69	70-74	75-79	80-84	85-89	90+	Total
Australasia	5,302	7,963	9,970	13,142	15,871	16,734	16,098	85,081
Asia Pacific High Income	39,964	68,251	95,253	135,498	175,788	168,684	136,890	820,329
Oceania	952	1,059	1,140	1,115	895	505	307	5,973
Asia Central	13,845	11,839	10,615	17,134	12,287	7,805	4,243	77,767
Asia East	374,859	355,070	343,826	362,013	312,414	176,473	74,229	1,998,885
Asia South	248,166	238,021	245,465	229,362	173,095	98,859	55,871	1,288,840
Asia Southeast	105,806	99,019	100,042	102,452	85,281	57,518	36,835	586,953
ASIA	788,893	781,223	806,311	860,715	775,632	526,580	324,474	4,863,827
Europe Central	24,550	32,715	39,657	61,567	77,122	65,186	46,693	347,489
Europe Eastern	41,880	45,376	54,177	117,578	97,717	94,641	55,523	506,891
Europe Western	77,053	121,116	169,166	266,762	339,361	343,308	305,006	1,621,773
EUROPE	143,483	199,207	263,000	445,907	514,200	503,135	407,221	2,476,154
North America High Income	80,601	110,721	131,327	159,018	189,253	185,889	147,345	1,004,154
Caribbean	7,893	8,953	10,857	12,187	11,118	8,148	6,846	66,001
Latin America Andean	7,967	9,003	10,283	11,202	9,863	6,302	2,822	57,442
Latin America Central	37,194	40,078	45,438	45,695	42,095	29,051	14,507	254,059
Latin America Southern	12,577	15,517	18,717	20,695	20,592	15,549	7,873	111,520
Latin America Tropical	36,707	40,754	43,609	47,986	41,267	31,747	19,290	261,361
THE AMERICAS	182,939	225,026	260,231	296,784	314,187	276,687	198,683	1,754,536
North Africa / Middle East	70,550	66,606	67,520	68,282	57,115	29,324	12,140	371,538
Sub-Saharan Africa Central	8,904	9,352	9,115	7,827	5,285	2,430	816	43,729
Sub-Saharan Africa East	35,780	38,398	37,179	33,648	25,931	13,126	5,103	189,165
Sub-Saharan Africa Southern	10,863	11,324	10,775	10,358	8,161	6,512	1,719	59,713
Sub-Saharan Africa West	33,931	35,414	33,779	27,014	16,159	6,173	1,492	153,962
AFRICA	160,030	161,095	158,368	147,129	112,651	57,563	21,271	818,106
WORLD TOTAL	1,275,345	1,366,550	1,487,911	1,750,534	1,716,669	1,363,965	951,650	9,912,623

CHAPTER 4

Current and future trends



Almost all current projections of the coming dementia epidemic assume that age- and gender-specific prevalence of dementia will not vary over time, and that population ageing alone drives the projected increases. In reality, future prevalence could be affected by changing incidence and disease duration. The prevalence of any condition is a product of its incidence and the average duration of the disease episode. Changes in either or both of these indicators could lead to changes in age-specific prevalence. Trends in the two indicators may not move in the same direction; for example, reductions in incidence might be accompanied by increases in duration of survival with dementia, or vice versa, the one effect tending to cancel out the other in terms of their overall impact on prevalence.

Studies of secular trends in dementia prevalence, incidence and mortality were identified through a scoping review of the literature. Findings across the identified studies (mostly conducted in high income countries) are currently too inconsistent to reach firm and generalisable conclusions regarding underlying trends. Three studies report significant or non-significant declines in the prevalence of dementia (MRC-CFAS (UK), Zaragoza (Spain) and HRS (USA)),

while others from Sweden and the USA indicate stable prevalence. Another Swedish study and two Japanese studies of trends in dementia prevalence report that prevalence has increased.

Evidence for a decline in dementia incidence is marginally stronger. Statistically significant reductions were reported in two US population-based studies (Indianapolis and Framingham), while a non-significant reduction was observed in the Rotterdam Study (Netherlands). Stable incidence was observed in population-based studies in Chicago (USA) and Ibadan (Nigeria). The two USA studies suggest that the decline in incidence may be greater in younger age groups, implying that dementia incidence may be being deferred to older age.

Very few longitudinal studies have considered or reported trends in dementia mortality, or differences in mortality rates between cohorts with and without dementia. Two studies found that the mortality ratio remained relatively stable over time (HRS (US) and Stockholm (Sweden)), suggesting that, if mortality rates were falling among those without dementia, there would have been similar rates of decline for those living with dementia. In Stockholm and Indianapolis, findings are consistent with the assumption that declining

incidence is occurring alongside stable prevalence due to declining dementia mortality (and therefore increased duration of life with dementia).

There has been a general trend in many high income countries towards less smoking, lower cholesterol and blood pressure, and increased physical activity. On the other hand, the prevalence of obesity and diabetes has been increasing. To the extent to which these factors are causally associated with dementia, one would expect to see corresponding changes in dementia incidence. In many low and middle income countries, the trends in cardiovascular health among older people are in an adverse direction, with a pattern of increasing stroke, and ischaemic heart disease morbidity and mortality, linked to an epidemic of obesity, and increasing blood pressure levels. This could result in upward trends in the incidence and prevalence of dementia in LMIC.

Most public health interventions to reduce dementia incidence also help to reduce incidence and mortality from other chronic diseases. One should therefore expect that prevalence reductions arising from reduced incidence of dementia may be offset, at least to some extent, by reduced mortality and longer survival with dementia. One indicator of successful dementia risk reduction is deferral of dementia incidence to older ages. By increasing the average age of onset, dementia mortality may increase and duration of survival with dementia fall, without changing age-specific mortality for people with dementia. This phenomenon – described by Langa as ‘the compression of cognitive morbidity’ – is a desirable outcome for public health and individual quality of life, as it represents dementia onset occurring closer to the ‘natural’ end of life.

Studies that use a fixed methodology to estimate changes in dementia prevalence, incidence and mortality over time, in defined populations, are uniquely valuable assets. It is important in the future that more such studies are commissioned. Previous modelling exercises have sought to predict future trends in dementia prevalence, given our best estimates of risk associations and changes in risk factor profiles over time. In the light of the current review, these estimations appear over-optimistic. An alternative approach is to observe and correlate actual changes in risk factor profiles and dementia incidence over time. Similar studies could, in the future, be carried out to monitor the impact of prevention programs on the future scale of the dementia epidemic.

CHAPTER 5

The impact of dementia worldwide



The impact of dementia can be understood at three inter-related levels: the individual with dementia, their family and friends, and wider society. While dementia does shorten the lives of those affected, its greatest impact is upon quality of life, both for individuals living with dementia, and for their family and carers. The Institute of Health Metrics and Evaluation (IHME) vignettes for dementia (see box right) demonstrate the debilitating impacts of dementia and the associated burden on family and carers. Dementia is typically associated with particularly intense needs for care, exceeding the demands associated with other conditions. In the USA, caregivers of people with dementia were more likely than caregivers of people with other conditions to be required to provide help with getting in and out of bed (54% vs. 42%), dressing (40% vs. 31%), toileting (32% vs. 26%), bathing (31% vs. 23%), managing incontinence (31% vs. 16%) and feeding (31% vs. 14%).

One approach for assessing the impact of dementia and comparing it with other health conditions is to use the Global Burden of Disease (GBD) estimates. These provide information on the relative impact of different health conditions worldwide, and have influenced prioritisation for policymaking and planning nationally, regionally and internationally. The impact is referred to as 'burden' and expressed in terms of associated disability and mortality. GBD estimates express disease 'burden' in terms of associated disability and mortality. The key indicator – disability adjusted life years (DALYs) – is calculated as the sum of Years Lived with Disability (YLD) and Years of Life Lost (YLL), thus reflecting disease effect on both quality and quantity of life.

Dementia is among the top 10 most burdensome conditions among older people worldwide. In contrast with other conditions, its impact comes mainly from years lived with disability, rather than years of life lost from premature mortality. Revised GBD estimates

IHME vignettes for mild, moderate and severe dementia health states

Mild dementia: The person has noticed deterioration in their memory, particularly for recent events. For example, they may forget that their daughter had visited the previous day, or when or whether they had taken their last medication. They also find it difficult to concentrate, think flexibly, plan, and take decisions. They are likely to feel bewildered, anxious and sad. They may become angry and defensive when others point out errors.

Moderate dementia: The person has severe memory problems. Only early memories are retained. Recent events are not remembered, or rapidly forgotten. They may not know the day, date or time of day. They often do not know where they are. They cannot communicate clearly, having problems finding the right word and using the wrong words. They may hear voices or see things that are not there, and can develop false beliefs, for example that children are entering their house and stealing things. They are likely to be anxious, sad, bewildered, and can become agitated or aggressive.

Severe dementia: The person has complete memory loss. They may no longer recognise their close family. They have severe speech difficulties or are unable to communicate. They may be apathetic and totally inactive, but at times can be agitated and verbally and physically aggressive. They cannot coordinate their physical movements; may have lost the ability to walk and feed themselves and have difficulty swallowing. They are likely to be incontinent of urine and faeces.

Table 3

The 10 leading contributors to Disability Adjusted Life Years burden among people aged 60 years and over, according to the WHO GBD (2004) and IHME GBD (2010) methodology

WHO GBD (2004)			IHME GBD (2010)		
Condition	Million DALYs (% contribution to total)	Rank order	Condition	Million DALYs (% contribution to total)	Rank order
Ischaemic heart disease	67.6 (15.0%)	1	Ischaemic heart disease	77.7 (13.5%)	1
Stroke	55.4 (12.3%)	2	Stroke	66.4 (11.6%)	2
Chronic obstructive pulmonary disease	33.1 (7.3%)	3	Chronic obstructive pulmonary disease	43.3 (7.5%)	3
Visual impairment	30.9 (6.9%)	4	Diabetes	22.6 (3.9%)	4
Dementia	18.8 (4.2%)	5	Low back pain	19.1 (3.3%)	5
Diabetes	13.9 (3.1%)	6	Trachea, bronchus or lung cancer	18.6 (3.2%)	6
Hearing loss	13.0 (2.9%)	7	Falls	12.4 (2.2%)	7
Trachea, bronchus or lung cancer	12.8 (2.8%)	8	Visual impairment	10.4 (1.8%)	8
Hypertensive heart disease	9.7 (2.2%)	9	Dementia	10.0 (1.7%)	9
Osteoarthritis	8.1 (1.8%)	10	Tuberculosis	9.2 (1.6%)	10
Total (all conditions)	450.9		Total (all conditions)	574.4	

using Institute of Health Metrics and Evaluation (IHME) disability weights (roughly 2/3 lower than those used for the WHO GBD) have caused dementia to fall from 5th to 9th most burdensome condition for people aged 60 years and over (see Table 3). While burden from years of life lost (YLL) remains stable across the two methodologies, there has been a substantial reduction in the estimation of years lived with disability attributed to dementia, with a knock-on effect on the DALY estimates. Per capita, the IHME GBD estimates of YLL are 0% lower than WHO GBD estimates, YLD 65% lower, and DALYs consequently 54% lower. This is, for the most part, because of changes to the disability weights rather than changing estimates of disease prevalence.

For low and middle income countries, population-based surveys carried out by the 10/66 Dementia Research Group have shown clearly that disorders of the brain and mind (dementia, stroke and depression) make the largest independent contribution to disability and dependence. These findings are consistent with a large body of pre-existing evidence from population-based studies conducted in Canada, the USA, Sweden, and Hong Kong SAR. The current and future costs of long-term care will be driven to a very large extent by the coming epidemic of dementia.

The most important critique of the GBD estimates is that they fail to capture the full impact of chronic diseases on disability, needs for care, and attendant societal costs. This limitation is most significant for

older people and for conditions like dementia, where most of the impact comes from disability rather than associated mortality. Failure to reflect societal impacts of dementia relative to other chronic diseases makes the GBD estimates an unreliable tool for prioritising research, prevention, and health or social care among older people.

As Dr Margaret Chan, Director-General of the World Health Organization expressed in her opening remarks at the First WHO Ministerial Conference on Global Action Against Dementia (Geneva, 15th March 2015):

"I can think of no other disease that has such a profound effect on loss of function, loss of independence, and the need for care. I can think of no other disease so deeply dreaded by anyone who wants to age gracefully and with dignity. I can think of no other disease that places such a heavy burden on families, communities, and societies. I can think of no other disease where innovation, including breakthrough discoveries to develop a cure, is so badly needed."

CHAPTER 6

The worldwide costs of dementia



The estimates of global societal economic costs of dementia provided in this report have been generated using the same general approach as for the World Alzheimer Report 2010. Costs are estimated at the country level and then aggregated in various combinations to summarise worldwide cost, cost by Global Burden of Disease world region, cost by World Bank country income level, and cost for G7 and G20 countries. The global costs of dementia have increased from US\$ 604 billion in 2010 to US\$ 818 billion in 2015, an increase of 35.4%. Our current estimate of US\$ 818 billion represents 1.09% of global Gross Domestic Product (GDP), a slight increase from our 2010 estimate of 1.01%. Excluding informal care costs, total direct costs account for 0.65% of global GDP.

The global societal economic cost of dementia, US\$ 818 billion, is an enormous sum; similar in magnitude to the GDP of countries like Indonesia, the Netherlands and Turkey, the 16th to 18th largest economies in the world. The global costs are also larger than the market

values of companies such as Apple (US\$ 742 billion), Google (US\$ 368 billion) and Exxon (US\$ 357 billion). Total costs are estimated to cross the US\$ 1 trillion threshold in 2018, and to reach US\$ 2 trillion by 2030 (see Figure 4).

Interpreting these cost increases is complex given the multiplicity of plausible underlying explanations. Increases in aggregated costs can arise from increased numbers of people with dementia and/or increased per person costs. Our exploratory analyses suggest that these two elements each contribute around half of the total increase. Despite the 4.9 million (14%) increase in the estimated numbers of people with dementia in 2010 when applying the World Alzheimer Report 2015 prevalence estimates, the total cost for 2010 has increased only marginally, from US\$ 604.0 billion to US\$ 606.7 billion. This is because most of the upward adjustment in numbers of people with dementia occurred in LMIC (where per capita costs are low), while there were some downward adjustments in

Figure 4
Forecasted global costs of dementia 2015-2030

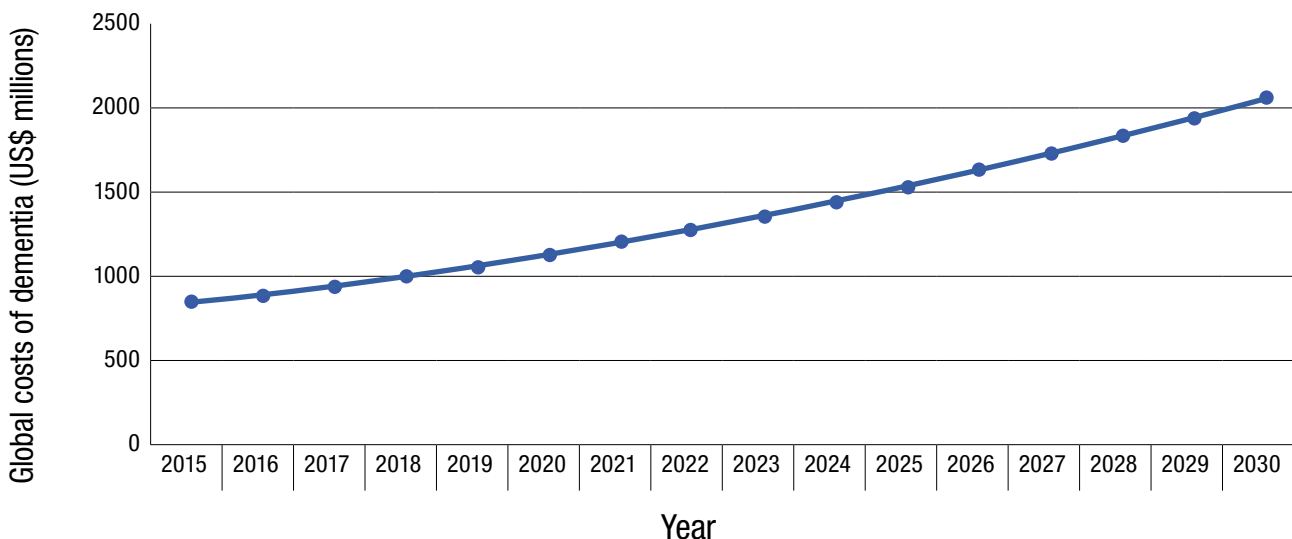


Table 4
Costs of dementia in 2010 and 2015 (billion US\$, and percent of worldwide costs), by Global Burden of Disease world region classification

Year for cost estimates (basis for prevalence estimates)	2010 (WAR 2009)		2015 (WAR 2015)		2010-2015
	US\$ (billions)	Per cent	US\$ (billions)	Per cent	Per cent change
Australasia	10.1	1.7%	14.1	1.7%	39.6%
Asia Pacific High Income	82.1	13.6%	109.9	13.4%	33.9%
Oceania	0.1	0.0%	0.2	0.0%	59.0%
Asia Central	0.9	0.2%	1.2	0.1%	28.6%
Asia East	22.4	3.7%	42.9	5.2%	91.7%
Asia South	4.0	0.7%	4.5	0.5%	11.8%
Asia Southeast	4.0	0.7%	7.3	0.9%	81.9%
Europe Central	14.2	2.3%	15.0	1.8%	5.7%
Europe Eastern	14.3	2.4%	23.5	2.9%	64.3%
Europe Western	210.1	34.8%	262.6	32.1%	25.0%
North America High Income	213.0	35.3%	268.9	32.9%	26.3%
Caribbean	3.0	0.5%	3.5	0.4%	18.2%
Latin America Andean	0.9	0.2%	1.1	0.1%	27.0%
Latin America Central	6.6	1.1%	15.9	1.9%	140.8%
Latin America Southern	5.1	0.8%	10.1	1.2%	98.7%
Latin America Tropical	7.3	1.2%	15.6	1.9%	113.8%
North Africa / Middle East	4.5	0.7%	16.7	2.0%	270.7%
Sub-Saharan Africa Central	0.1	0.0%	0.3	0.0%	198.6%
Sub-Saharan Africa East	0.4	0.1%	1.5	0.2%	267.4%
Sub-Saharan Africa Southern	0.7	0.1%	2.3	0.3%	221.7%
Sub-Saharan Africa West	0.2	0.0%	0.8	0.1%	298.6%
Total	604.0	100.0%	817.9	100.0%	35.4%

HIC (e.g. USA, Germany, UK) where per capita costs are high.

According to the Global Burden of Disease regional country classification, the regional distribution of costs has not changed markedly from that published in 2010. Cost estimates have increased for all world regions (see Table 4). The greatest relative increase occurred in the African and in East Asia regions, largely driven by the upwards revision of the prevalence estimates for those regions.

For each country, we have estimated cost per person (per capita), which is then multiplied by the number of people estimated to be living with dementia in that country. Per capita costs are divided into three cost sub-categories: direct medical costs, direct social care costs (paid and professional home care,

and residential and nursing home care) and costs of informal (unpaid) care. Informal care is valued using an opportunity cost approach, valuing hours of informal care by the average wage for each country. Distribution of costs between the three major sub-categories (direct medical, social care, and informal care) has not changed substantially. As reported in 2010, direct medical care costs are modest, accounting for roughly 20% of global dementia costs, while direct social sector costs and informal care costs each account for roughly 40%. As country income level increases, the relative contribution of direct social care sector costs increases and the relative contribution of informal care costs decreases. The relative contribution of informal care is greatest in the African regions and lowest in North America, Western Europe and some South

Table 5

Costs of dementia in 2015 (US\$ billions), by Global Burden of Disease region classification. Costs in cost categories. Percentages of each GBD region class costs

Cost sub-category	Direct medical costs		Direct social sector costs		Informal care costs	
	US\$ (billions)	Per cent	US\$ (billions)	Per cent	US\$ (billions)	Per cent
GBD World region						
Australasia	1.0	6.9%	7.1	50.3%	6.0	42.8%
Asia Pacific High Income	7.0	6.3%	56.4	51.3%	46.5	42.4%
Oceania	0.0	17.4%	0.0	8.6%	0.1	74.0%
Asia Central	0.3	29.6%	0.3	25.3%	0.5	45.1%
Asia East	2.2	5.2%	10.2	23.8%	30.5	71.0%
Asia South	0.5	10.7%	0.1	3.3%	3.8	86.0%
Asia Southeast	2.7	36.8%	1.3	18.2%	3.3	45.0%
Europe Central	2.8	18.8%	3.1	20.4%	9.1	60.8%
Europe Eastern	5.7	24.1%	4.9	20.7%	13.0	55.2%
Europe Western	50.8	19.3%	113.0	43.0%	98.9	37.6%
North America High Income	61.1	22.7%	115.5	43.0%	92.3	34.3%
Caribbean	0.8	21.3%	0.8	21.8%	2.0	56.9%
Latin America Andean	0.2	17.8%	0.4	32.6%	0.6	49.5%
Latin America Central	6.2	39.2%	5.5	34.3%	4.2	26.5%
Latin America Southern	2.8	27.8%	2.6	25.2%	4.8	47.0%
Latin America Tropical	5.7	36.8%	5.2	33.4%	4.7	29.9%
North Africa / Middle East	8.5	50.7%	1.2	7.2%	7.0	42.0%
Sub-Saharan Africa Central	0.1	28.5%	0.0	14.1%	0.2	57.3%
Sub-Saharan Africa East	0.3	20.8%	0.2	10.3%	1.0	68.9%
Sub-Saharan Africa Southern	0.4	16.4%	0.2	8.1%	1.7	75.6%
Sub-Saharan Africa West	0.2	22.8%	0.1	11.3%	0.5	66.0%
Total	159.2	19.5%	327.9	40.1%	330.8	40.4%

American regions, while the reverse is true for social sector costs (see Table 5).

These new estimates should be seen as a partial update of the previous (2010) estimates, rather than a full-scale revision. We did not carry out a fully systematic review of service utilisation and cost of illness studies, but these estimates do benefit from a fully systematic review of dementia prevalence studies, and we have identified several important cost of illness studies published since 2010. From high income countries, we have included new cost estimates from the USA, UK, Germany, Norway, Sweden and Ireland. For middle income countries, there is more information available regarding costs of dementia care, and their distribution between sub-categories, from seven countries surveyed by the 10/66 Dementia Research

Group: China, India, Cuba, Peru, Venezuela, Dominican Republic and Mexico.

It is our hope that more service utilisation and cost of illness studies will be carried out, improving the overall quality, coverage and recency of the evidence base. Coupled with an ongoing commitment to monitor trends in prevalence and numbers, this will enable us to estimate global costs and trends with greater accuracy. Our first outstanding task is to address the limitations of the current estimates, in particular by completing and documenting a fully systematic review of relevant studies, and exploring more effective ways of capturing cost inflation. We are eager to integrate this work within plans for a Global Observatory to be coordinated by the World Health Organization, and to provide regular updates accessible and analysable through a web interface.

CHAPTER 7

Conclusions and recommendations



We estimate that there are now 46.8 million people living with dementia worldwide, with numbers projected to almost double every 20 years. There will be an estimated 9.9 million new cases of dementia in 2015, equivalent to one every 3.2 seconds. The 2015 global societal economic cost of dementia will be an estimated US\$ 818 billion, with huge quality of life impacts both for individuals living with dementia and for their families and carers.

In December 2013, the UK government used its presidency of the G8 (now the G7) to launch a Global Action Against Dementia. The outcome of the first summit was an impressive commitment to identifying a cure or disease-modifying therapy for dementia by 2025. This was supported by a series of initiatives linked to research: increase funding, promote participation in trials, and collaborate to share information and data. Over the course of four 'Legacy Events', this agenda has broadened substantially. The broader agenda comprises five key elements: a global approach to a global problem; the need for 'care now, if cure later'; a public health orientation (awareness, accessible services, and prevention); a focus on equity and rights; and a rational approach to research prioritisation.

Earlier this year, as a final event linked to the G7 Global Action Against Dementia, the World Health Organization convened a 'First WHO Ministerial Conference on Global Action Against Dementia'. The resulting 'call for action' identifies eight overarching

principles and eleven action points for the global fight against dementia (these are listed in the full report).

Alzheimer's Disease International:

- Applauds the action taken by the G7 in launching a 'Global Action Against Dementia' and recognises the considerable efforts of the Global Dementia Envoy, the World Dementia Council, and the G7 governments over the past 18 months.
- Hopes and expects that this initiative will now be continued, with a broader agenda and a wider representation of countries and regions most affected by the ongoing epidemic.
- Would support and advocate for a transfer of political leadership to the G20 group of nations, assuming continued commitment and engagement of the G7 nations to the cause.
- Wholeheartedly endorses all aspects of the 'call for action' issued at the WHO first Ministerial Conference for Dementia.
- Welcomes the leadership role outlined for WHO in the 'call for action' and will continue to work closely with this body and its member states to ensure that people with dementia and their families are put at the centre of all policies, in pursuit of equitable access to comprehensive services for all people with dementia worldwide, and the realisation of the full potential for living well with dementia.
- Believes work on the quality of care should be a priority and applauds OECD's commitment to

- evaluate dementia care models and make outcomes measurable and transparent.
- Recognises the need for the 'call for action' to be translated into an operationalised 'Global Dementia Action Plan', with clear targets and deliverables, and will both advocate for and support interested Member States to propose motions to the World Health Assembly.
 - Proposes that the elements of planning for dementia at the global and country level that has the objective of supporting the person with dementia to stay in the community for as long as possible include;
 - a) Awareness raising of dementia
 - b) Creation of dementia friendly communities that reduce stigma associated with the disease
 - c) Promotion of risk reduction measures
 - d) Measures to improve diagnosis and reduce the average length of diagnosis
 - e) Support for family carers including through information, social support, respite and counselling
 - f) Access to long term community and residential dementia care services and to enhanced care for people dementia in hospitals
 - g) A commitment to person centred care and to care that minimises the use of medical and physical restraint
 - h) Workforce strategies including training
 - i) The use of technology to assist the person with dementia in the home and to extend service reach in rural areas
 - j) Recognition that people with dementia deserve good quality end-of-life care with respect to their dignity and personal wishes.
 - Calls for a focus on strengthening primary health care as the key part of the health system to respond to the dementia challenge.
 - Calls for risk reduction for dementia to be made an explicit priority with linked actions, including setting of some targets and indicators, in the general work stream on non-communicable diseases that is led by the World Health Organization.
 - Calls for a significant upscaling of research investment, proportionate to the societal cost of the disease, and for a balanced investment in research into prevention, treatment, care and cure, with a specific work stream for lower and middle income countries, developing programmes to raise awareness and improve health system responses with the inclusion of partners from those countries.
 - Supports the need for a Global Dementia Observatory, coordinated by WHO to; support and monitor policy development; monitor the scale of the epidemic; assess opportunities for prevention, their implementation and impact; and monitor progress towards increasing the available resources for treatment and care, and their coverage worldwide.
 - Recommends that every country should develop its own national dementia plan or strategy as a framework for action across government sectors; and monitor the results and renew the plan on a regular basis.



**Alzheimer's Disease
International**

About ADI

Alzheimer's Disease International (ADI) is the international federation of Alzheimer associations throughout the world. Each of our 83 members is a non-profit Alzheimer association supporting people with dementia and their families.

ADI's vision is an improved quality of life for people with dementia and their families throughout the world. ADI aims to make dementia a global health priority, to build and strengthen Alzheimer associations, and to raise awareness about dementia worldwide. Stronger Alzheimer associations are better able to meet the needs of people with dementia and their carers.

What we do

- Support the development and activities of our member associations around the world.
- Encourage the creation of new Alzheimer associations in countries where there is no organization.
- Bring Alzheimer organizations together to share and learn from each other.
- Raise public and political awareness of dementia.
- Stimulate research into the prevalence and impact of Alzheimer's disease and dementia around the world.
- Represent people with dementia and families in international platforms at the UN and WHO

Key activities

- Raising global awareness through World Alzheimer's Month™ (September every year).
- Providing Alzheimer associations with training in running a non-profit organization through our Alzheimer University programme.
- Hosting an international conference where staff and volunteers from Alzheimer associations meet each other as well as medical and care professionals, researchers, people with dementia and their carers.
- Disseminating reliable and accurate information through our website and publications.
- Supporting the 10/66 Dementia Research Group's work on the prevalence and impact of dementia in developing countries.
- Supporting global advocacy by providing facts and figures about dementia, and monitoring as well as influencing dementia policies.

ADI is based in London and is registered as a non-profit organization in the USA. ADI was founded in 1984 and has been in official relations with the World Health Organization since 1996. You can find out more about ADI at www.alz.co.uk.



About Bupa

Bupa's purpose is longer, healthier, happier lives.

As a leading global health and care company, we offer health insurance, medical subscription and other health and care funding products; we run care homes, retirement and care villages, primary care, diagnostic and wellness centres, hospitals and dental clinics. We also provide workplace health services, home healthcare, health assessments and long-term condition management services.

We have 29m customers in 190 countries. With no shareholders, we reinvest our profits to provide more and better healthcare and fulfil our purpose.

We employ almost 80,000 people, principally in the UK, Australia, Spain, Poland, New Zealand and Chile, as well as Saudi Arabia, Hong Kong, India, Thailand and the USA.

For more information, visit bupa.com.

About Bupa's social care services around the world

Bupa is committed to tackling the toughest challenges in healthcare, including dementia. We want to set the standard for person-centred care and be recognised as a global leader in helping people live well with dementia and Alzheimer's disease.

Bupa has significant expertise and networks, with approximately three-quarters of residents in our care homes living with dementia, making us the leading international provider of specialist dementia care. During a given year, we care for more than 65,000 people in over 450 care homes and retirement villages in the UK, Spain, Australia, New Zealand and Poland.

We combine experience and expertise to care for our residents living with dementia. Our philosophy of care is based on a 'person first' approach which revolves around each person's background, experiences, values, hobbies and what makes them happy, and seeks to understand who they are and the reality in which they are living.

We are committed to shaping a world where people can live well with dementia today, and reduce the risk of dementia for future generations. That is why we are proud to partner with ADI, and together we have outlined for the first time what we believe are the rights of people living with dementia, wherever they are in the world. Our joint Global Dementia Charter 'I can live well with dementia' has been endorsed by people living with dementia, and together with ADI we intend to make it a reality.

To download the charter and find out more, visit www.bupa.com/dementia

Alzheimer's Disease International:
The International Federation
of Alzheimer's Disease and
Related Disorders Societies, Inc.
is incorporated in Illinois, USA,
and is a 501(c)(3) not-for-profit
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**Alzheimer's Disease
International**