

# Cost of dementia in Switzerland

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## Summary

**Questions under study:** The aim of this study was (a) to estimate the cost of dementia in Switzerland, (b) to compare the average annual cost for people with dementia who live at home and those living in an institution and (c) to analyse how the average cost per person with dementia who lives at home increases with the severity of dementia.

**Methods:** This prevalence-based cost-of-illness study from a societal perspective combined top-down and bottom-up approaches and included both direct and indirect costs of dementia. Cost estimations were based on Swiss national statistics and surveys, as well as international reviews and expert interviews.

**Results:** The total annual cost of dementia amounted up to CHF 6.3 billion for the year 2007. Together, institutional and informal care accounted for over 90% of the cost. The average annual cost was estimated at CHF 55'300 per person with dementia who lives at home and at CHF 68'900 per person who lives in an institution. The cost per person living at home with severe dementia was nearly five times the cost per person with mild dementia.

**Conclusions:** The present study indicates that dementia imposes a considerable economic burden on Swiss society. The cost of dementia is dominated by the costs of care. Diagnosis and treatment related costs are minor. These findings are consistent with contemporary international studies on the subject. The contribution of informal caregivers is substantial since they account for 44% of the total cost of dementia (based on market cost valuation). Given demographic developments in Switzerland, healthcare decision making should have an interest in securing this potential for the future.

**Key words:** dementia; cost; cost of illness; economic burden; Switzerland

## Introduction

Dementia refers to a group of diseases characterised by a progressive and irreversible decline of brain functions with symptoms such as memory loss, disorientation, cognitive decline and inappropriate social behaviour. Given that the prevalence of dementia rises steeply after the age of 65, the number of people with dementia in Switzerland is expected to increase significantly in the future due to the growing elderly population [1]. Dementia will thus represent an increasing burden on Swiss society.

The economic and social cost of dementia has been analysed for various OECD countries [2–8]. Recently published systematic reviews, which compare findings from studies in various countries and settings, show that informal care accounts for a significant share of the total cost of dementia [9, 10]. Furthermore, the reviews report that the cost of dementia increases with the severity of the illness, with costs of severe dementia being more than double the costs of mild dementia. In the mild and moderate stages of the disease, the average cost per person with dementia living at home is lower than the average cost of an institutionalised dementia patient. The opposite holds true for the severe stage due to very high informal costs.

The present study aimed to estimate the overall cost of dementia in Switzerland and to analyse the average annual cost per person with dementia, differentiated by the residential status (at home or in an institution) and the severity of the disease. The results were compared with international findings.

## Data and methods

This study used the cost-of-illness method and estimated direct and indirect costs of dementia from a societal perspective [11, 12]. Following a prevalence-based approach, the study assessed the cost of dementia for the year 2007 (most recent year for which data was available). The intangible costs of pain and suffering were omitted because of the difficulty in accurately quantifying them in monetary terms.

The cost estimation was based on a combination of top-down and bottom-up techniques, meaning that national data from publicly available databases as well as survey data and expert opinions were used. All cost calculations were based on Swiss data sources, except for the number of

hours of informal care per person, which stemmed from a synthesis of 27 international studies.

Necessary assumptions were validated in expert interviews and final results were reviewed by a group of specialists in various disciplines (see Acknowledgements). The present study took a conservative approach, and thus provides a rather lower-bound estimate of the cost of dementia in Switzerland.

### Prevalence of dementia

The prevalence of dementia is crucial information when studying the cost associated with this disease. In Switzerland, epidemiological studies of dementia are rare [13, 14]. Therefore, we applied prevalence rates based on Harvey et al. [15] for people under 65 years of age and prevalence rates reported in the EURODEM meta-analysis, from a number of European prevalence studies, for people older than 65 years of age [16]. An application of these well accepted European prevalence rates to Switzerland suggested that, in 2007, nearly 103'000 people suffered from dementia (table 1). EUROCODE, a current collaborative analysis using completely new data, came to very similar results as EURODEM with the exception of prevalence rates for women aged 85 years or older [17]. Dementia rates in this group are higher than previously reported. The EUROCODE prevalence figures result in a greater, overall number of demented people. According to the EUROCODE prevalence rates, the estimated number of people in Switzerland with dementia would be 120'725.

Following a conservative approach, we applied prevalence rates based on Harvey et al. and EURODEM rates in the base case of this study. The sensitivity analysis shows to what extent the use of EUROCODE prevalence figures would alter the result.

### Data on residential status, degree of need for care and diagnostic status of people with dementia in Switzerland

Based on data from Gostynski et al. (1998) and Gutzwiller (1999), the proportion of people with dementia who live in an institution (nursing home or congregate senior living) is estimated at 58% compared to 42% who live at home [18, 19].

The degree of need for care of people who live at home with dementia has been estimated by the Swiss Alzheimer Association with reference to Henderson (1994) as 43% needing occasional support, 47% needing daily support, and 10% needing day and night care [20].

A survey conducted by ALZ/gfs.bern (2004) with a national sample of 5'495 general practitioners, 1'505 nursing homes and 744 community care services (Spitex) provides valid estimations concerning the diagnostic status of people with dementia in Switzerland: one third of the people with dementia, according to prevalence data, have been diagnosed by a general practitioner or a memory clinic, one third are under suspicion of dementia and for one third the illness remains undetected [21].

### Direct costs

Direct costs considered in this paper include in-patient treatment (acute, psychiatric and geriatric hospitals), insti-

tutional care (nursing homes and homes for the elderly), community care (Spitex), visits to and from general practitioners, interdisciplinary diagnostic services (memory clinics) and medication. Due to lack of data, not all direct costs could be considered: direct costs within the health sector, which were omitted in this study, are costs for day care services and therapies. Furthermore, the additional cost for prolonged hospitalisation of people with dementia when treated for other illnesses (due to complications such as delirium or depression) was omitted. Direct costs outside the health care sector, which were omitted, were costs for equipment and home modifications, and research costs.

The costs of in-patient, institutional and community care (Spitex) were based on information obtained from the Swiss Federal Statistical Office (SFSO).

**In-patient** data was gathered from the Hospital Statistics database. The SFSO selected all cases with a principal diagnosis of dementia (based on ICD-10 codes F000, F001, F002, F009, F010, F011, F012, F013, F018, F019, F020, F022, F023, F028, F03, G300, G301, G308, G309) and supplied the number of days these cases were admitted in different categories of hospitals (including acute, psychiatric and geriatric care). The number of days was then multiplied with the average costs per hospital day for the corresponding category of hospital, also available from the Hospital Statistics [22]. This cost estimation is rather conservative as it does not take into account the increased length of stay of people with dementia in comparison to other patients when treated for other diagnoses [23].

The average yearly cost of a **nursing home place** (CHF 83,271) was provided by the Statistics on Socio-Medical Institutions (Somed) [24]. Ideally, costs should be calculated on a net basis. Therefore we deducted costs for basic requirements of a person in a two-person household according to the SKOS guidelines 04/05 (CHF 739.35/month) [25] and accommodation costs (CHF 500/month).

The total cost per hour of **community care** (CHF 98) [26] was provided by the Community Nursing Statistics. The national survey of ALZ/gfs.bern (2004) reports that 13% of the community care clients have a dementia diagnosis or are suspected of having dementia [21]. 53% of those clients need assistance almost every day and 47% need only occasional support. For the first group, we estimated that 45 minutes of help are required for two thirds of the days in a year (182.5 h). For the latter group, we used annual average hours per case from the Community Nursing Statistics (42 h).

The cost of outpatient **visits to and from general practitioners** was estimated bottom-up, based on information from general practitioners on the frequency and duration of visits of people with dementia. It was assumed that people with a dementia diagnosis or who are suspected of having dementia have a 30-minute consultation with their medical doctor once every three months. For the cost calculation, we used the corresponding points published in the Swiss tariff list (TARMED, version 1.04.00, valid in 2007) and multiplied them by the average value per point based on the arithmetic mean of the tax point values across all cantons of Switzerland for 2007 (CHF 0.87) which were obtained from SantéSuisse [27].

The cost of **interdisciplinary diagnostic services** was estimated with a bottom-up approach as well. The annual capacity of Swiss memory clinics for differential diagnostic investigations was assumed to be 3'000 in 2007 (according to an unpublished survey of the Memory Clinic Basel, conducted among 16 Swiss memory clinics in 2004). The average cost per investigation was estimated at CHF 2'500 according to data of the Memory Clinic Basel.

According to Interpharma in 2007, anti-dementia **medication** worth CHF 27.6 million was sold.

### Indirect costs

When a societal perspective is adopted, informal care needs to be incorporated into the cost estimation. However, monetary valuation of the time invested in informal care is a controversial issue and various methods have been discussed in the literature [28]. The opportunity cost method and the replacement cost method are most commonly used in cost-of-illness studies. The opportunity cost method values the informal caregiver's benefits forgone due to time spent by providing informal care, in general, approximated by the individual's market wage. The replacement cost method in turn values time spent on informal care at the market price of a close market substitute (e.g. the wage of a home caregiver), regardless of whether informal care by relatives leads to restraints on their working time or their leisure time. In other words, this method puts a price on the time spent on informal care by considering the actual cost that would arise if relatives could no longer take care of the person with dementia.

As in most international studies on the cost of dementia, we applied the replacement cost method. We approximated the market price of informal care with the average gross-gross equivalent wage per hour for medical, nursing and social activities published by the SFSO to value support for care-dependent members of the household (CHF 38.80, 2004, adjusted to 2007 with the Swiss Wage Index) [29]. As there is no Swiss data on the number of hours of informal care provided to people living at home with dementia that takes into account different degrees of need for care, we used values from a synthesis of 27 studies by Wimo et al. (2007) [30]: The estimate for support in personal activities of daily life (PADL: i.e. bathing, dressing, eating) is 1.6 hours per day. Support in instrumental activities of daily life (IADL: i.e. preparing food, shopping, laundry) takes 2.1 hours per day and supervision/surveillance takes 3.7 hours per day. We assumed that people with dementia who need occasional support get PADL (1.6 h),

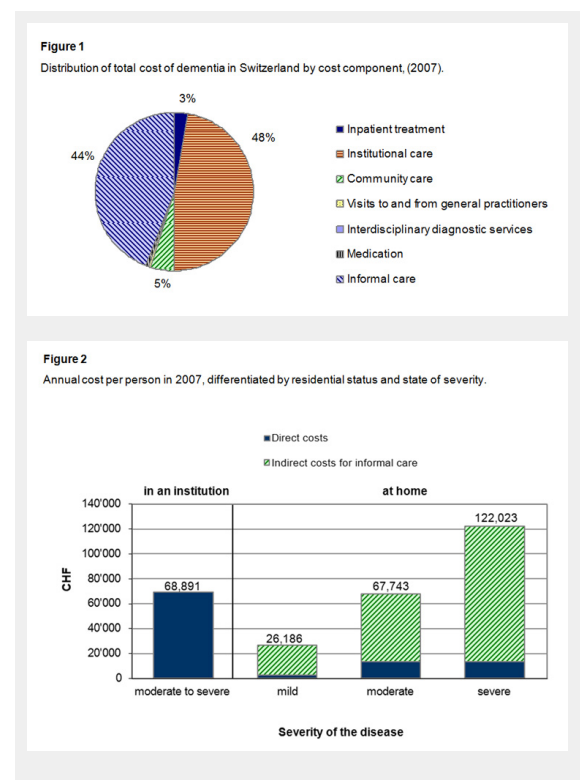
people who need daily support get PADL and IADL (3.7 h), and people who need day and night care get PADL, IADL and supervision/surveillance (7.4 h). Based on these assumptions, informal care was estimated to account for 68.8 million hours of unpaid care provided to people with dementia living at home. The informal care for people with dementia living in nursing homes was neglected in this study due to a lack of data.

Since dementia is largely confined to retired individuals aged 65 or over, we abstained from estimating a monetary value for the life years lost in productivity terms.

## Results

### Base case

In the base case, the total cost of dementia in Switzerland was estimated at CHF 6.26 billion (table 2). Institutional care represents the biggest share of costs (47%), followed by informal care (44%) (see fig. 1). Cost of dementia is hence dominated by care expenses. Table 3 summarises the details of the calculation.



Age	Prevalence rates		Population 2007		No. of people with dementia		
	Male	Female	Male	Female	Male	Female	Total
30–64	0.07%	0.07%	1,894,368	1,886,672	1,269	1,264	2,533
65–69	2.20%	1.10%	167,196	183,848	3,678	2,022	5,700
70–74	4.60%	3.90%	132,895	160,025	6,113	6,241	12,354
75–79	5.00%	6.70%	103,633	143,472	5,182	9,613	14,795
80–84	12.10%	13.50%	69,333	116,649	8,389	15,748	24,137
85–89	18.50%	22.80%	36,115	73,604	6,681	16,782	23,463
90+	31.90%	34.10%	15,113	43,277	4,821	14,757	19,578
<b>Total</b>			<b>2,418,653</b>	<b>2,607,547</b>	<b>36,133</b>	<b>66,427</b>	<b>102,560</b>

### Sensitivity analysis

The robustness of the results was assessed with a sensitivity analysis (table 4).

If EUROCODE prevalence rates were used instead of the EURODEM prevalence figures, the number of people with dementia increases by nearly one fifth. The cost increases by CHF 1 billion to CHF 7.27 billion (cost increases by less than one fifth, as not all cost estimations are based on prevalence rates).

Based on an American study that evaluated more than 20'000 records of acute hospital patients over 60 years of age, we could estimate the additional cost for prolonged hospitalisation of people with dementia when treated for other illnesses [23]. If we were to account for 25'000 cases of dementia being hospitalised 4 days longer than average patients, the cost rises by CHF 0.14 billion to a total of CHF 6.40 billion.

If the proportion of people with dementia in nursing homes is – as many experts claim – 70% instead of 49% in the base case, the annual cost of dementia is CHF 6.65 billion instead of CHF 6.26 billion.

Assuming that people with dementia who need community care almost every day receive 30 instead of 45 minutes of help, the total annual cost is decreased by CHF 0.09 billion to a total of CHF 6.17 billion.

If we assume that people with dementia living in institutions are under the care of a nursing home practitioner and have no additional costs for general practitioners (as the cost for the nursing home practitioner is included in the cost of a nursing home place), the total costs of dementia are reduced by CHF 10 million to CHF 6.25 billion instead of CHF 6.26 billion.

If informal care is valued with the equivalent wage for cleaning, tidying up and making beds instead of the equivalent wage for medical, nursing and social activities, the total cost of dementia declines from CHF 6.26 billion to CHF 5.44 billion.

Not surprisingly, this analysis shows that the prevalence rate is highly relevant for the overall result. Monetary value assigned to informal care also has a great impact on total cost of dementia.

### Cost per person

When calculating the average cost per person with dementia, we distinguished between people living at home and people living in an institution. While costs for institutional care are fully assigned to the estimated 43'075 institutionalised dementia patients, costs for inpatient treatment, community care, interdisciplinary diagnostic services and informal care are assigned to the 59'485 people who live

at home with dementia. Based on expert opinions, we assumed that nursing home residents are very rarely hospitalised due to the principal diagnosis of dementia, neither are they likely to receive diagnostic services in a memory clinic. Costs of visits to and from general practitioners, and medication affect both groups.

As shown in table 5, the average cost per person with dementia at home (CHF 55'301) is lower than the shown average cost of an institutionalised person (CHF 68'891) even if informal care is valued. However, this result does not allow a judgement on the efficiency of these two forms of care. Therefore, the severity of dementia of the people being cared for needs to be considered.

The available data only allows for a rough approximation of the cost of dementia per person according to the state of severity. For people living in an institution, we assumed that they suffer from moderate to severe dementia. For people with dementia at home, we had estimates on the degree of their need for care (described above). We concluded that people needing occasional support suffered from mild dementia (25'578 people), people needing daily support suffered from moderate dementia (27'958 people), and people needing care day and night suffered from severe dementia (5'948 people).

Table 6 presents the cost per person by different states of severity of the disease. For community and informal care, the cost estimation was based on varying degrees of need for care. In-patient treatment was assigned to people with moderate and severe dementia. Interdisciplinary diagnostic services were assigned to people with mild and moderate dementia, as such services are usually provided before the disease progresses to the severe stage. Costs of visits to and from general practitioners and medication apply to all people with dementia independent of the severity of the disease.

Figure 2 illustrates that the cost of dementia increases considerably with severity. Persons with severe dementia who live at home receive more than 50 hours of informal care per week. Due to the dramatic increase in informal care, the cost per person with dementia in the severe stage is lower in an institution than at home.

### Discussion

This study uses a variety of different data sources to estimate the cost of dementia in Switzerland from a societal perspective. More than 90% of the total cost of CHF 6.26 billion is due to institutional and informal care. Informal care accounts for 44% of the total cost. This result is not surprising, as it corresponds with the findings of a recently

**Table 2**  
Total annual cost of dementia in Switzerland, (2007).

		CHF million/year	%
Direct Costs	Inpatient treatment	179.8	2.9%
	Institutional care	2'946.3	47.1%
	Community care	302.2	4.8%
	Visits to and from general practitioners	23.2	0.4%
	Interdisciplinary diagnostic services	7.5	0.1%
	Medication	27.3	0.4%
Indirect costs	Informal care	2'770.8	44.3%
<b>Total</b>		<b>6'257.1</b>	<b>100%</b>

published review of international cost-of-illness studies of dementia. The reviewed studies all show that across different stages of the disease, informal care accounts for more than half of the total costs [10]. The current results concerning cost per person, which differentiate by residential status and severity of disease, are comparable to the findings of studies in other countries. International studies on the cost of dementia are generally difficult to compare because of considerable differences in the methods used, the forms of dementia included and the cost components considered. Despite these difficulties, a systematic review

shows the spectrum of results in 28 international studies (see table 7 [10]). The results in these studies generally confirm our findings. While persons in a mild or moderate state of dementia can be cared for less costly at home than in an institution, the opposite is true for persons in a severe state of dementia. In absolute values, our results are at the top end of this spectrum or even beyond. This difference can mainly be attributed to the higher level of prices in Switzerland. In conclusion, cost figures indicate that both institutional care settings and home care settings are needed for the care of people with dementia.

	Quantity input		Cost input		Total cost	
	No.	Unit	No.	Unit	CHF million	
Inpatient treatment	Hospital days of patients with dementia as principal diagnosis:					
	Central hospitals	18'560	days/year	1'584	CHF/day	29.4
	Basic care hospitals	15'697	days/year	1'226	CHF/day	19.2
	Psychiatric clinics	171'107	days/year	639	CHF/day	109.4
	Rehabilitation clinics	4'332	days/year	570	CHF/day	2.5
	Other specialist clinics	18'936	days/year	1'018	CHF/day	19.3
					<b>179.8</b>	
Institutional care	People with dementia living in an institution	43075	people	68'399	CHF/year/ nursing home place	<b>2'975</b>
Community care	Clients with dementia: – every day support	12'560 x 42	people x hours/year	98	CHF/hour	<b>302.2</b>
	– occasional support	14'006 x 182.5	people x hours/ year			
Visits to and from general practitioners	People with a dementia diagnosis or under suspicion of dementia	68'373	people	338.80	CHF/year	<b>22.9</b>
				(cost of four consultations of 30 min)		
Interdisciplinary diagnostic services	Capacity of Swiss memory clinics for differential diagnostic investigations	3'000	per year	2'500	CHF/ investigation	<b>7.5</b>
Medication				27.6	CHF million sold	<b>27.6</b>
Informal care	Replacement costs	68.8 mio.	hours/year	40.30	CHF/hour	<b>2'770.9</b>

Alternatives	CHF billion/year
0 Base case	6.26
1 With EUROCODE prevalence rates	7.27
2 Cost of inpatient treatment incl. dementia related to longer LOS in hospital	6.40
3 Percentage of demented people in nursing homes 70% instead of 49%	6.65
4 30 instead of 45 minutes of assistance by community care services	6.17
5 No visits from general practitioners for demented people in nursing homes	6.25
6 Lower monetary value for informal care	5.44

Residential status		In an institution	At home
		CHF/year	CHF/year
Direct costs	Inpatient treatment	–	3'022
	Institutional care	68'399	–
	Community care	–	5'080
	Visits to and from general practitioners	226	226
	Interdisciplinary diagnostic services	–	126
	Medication	266	266
Indirect costs	Informal care	–	46'581
<b>Total cost per person</b>		<b>68'891</b>	<b>55'301</b>

The results were also compared to those of a bottom-up study of the cost of Alzheimer's disease in Switzerland undertaken in 1998 [31]. Although it employed a different methodology, both studies have similar results regarding the ratio of the average cost per person living in a nursing home to the average cost per person living at home (including informal care).

Our analysis suffers from the usual problem associated with cost-of-illness studies – the lack of good data. Dementia-related data in Switzerland is very rare which is why a number of assumptions have to be made. Our assumptions follow a conservative approach and are likely to lead to an underestimation rather than an overestimation of costs. The possible underestimation of the cost of dementia is also due to missing data for many cost components. Probably the most important limitation of this study is that it does not account for the additional cost of dementia as a result of treatment and care for people with dementia being more demanding and time-consuming. Furthermore, we are not able to quantify the “hidden cost of informal care” such as negative health effects for informal caregivers.

Despite these limitations, the estimate provided by this study offers a valid approximation of the cost of dementia in Switzerland.

The burden of dementia would be considerably underestimated if there was not a monetary value put on informal care. The valuation according to the replacement cost method expresses the expected increase in health care expenditure if this unpaid work were to be replaced by formal care. Demographic developments in Switzerland are likely to result in an increase in demand for formal and informal care. From an economic point of view, informal care is, to a certain extent, a substitute for formal care expenditures. It should therefore be an important concern to the Swiss healthcare system to provide support and respite to the family caregivers so that the potential of informal care will be secured in the future.

Based on the medium scenario of the latest population projections for Switzerland by the SFSO, the number of

people aged over 80 will triple by 2050 and their relative proportion will increase from 4% of the total population in 2004 to 12% in 2050. Even in the low scenario, their relative proportion rises to nearly 10% [32]. With prevalence rates of dementia being very high for this age group, the burden of dementia on the Swiss society is expected to grow substantially in the future.

In conclusion, the present study indicates that dementia imposes a considerable economic burden on Swiss society. CHF 3.5 billion out of the total cost of CHF 6.3 billion are direct costs to the Swiss healthcare system, corresponding to a proportion of 6.3% of total health expenditure in Switzerland in 2007 [33]. Indirect costs of informal care amount to CHF 2.8 billion. In order to better understand the impact of dementia on the society and to improve decision-making regarding future strategies, there is a strong need for more dementia specific data and further analysis.

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Residential status		In an institution	At home		
			Mild	Moderate	Severe
State of severity		Moderate to Severe	Mild	Moderate	Severe
		CHF/year	CHF/year	CHF/year	CHF/year
Direct Costs	Inpatient treatment	–	–	5'302	5'302
	Institutional care	68'399	–	–	–
	Community care	–	2'021	7'388	7'388
	Visits to and from general practitioners	226	226	226	226
	Interdisciplinary diagnostic services	–	140	140	–
	Medication	266	266	266	266
Indirect costs	Informal care	–	23'533	54'420	108'840
<b>Total cost per person</b>		<b>68'891</b>	<b>26'186</b>	<b>67'743</b>	<b>122'023</b>

Residential status of persons in the sample	No. of studies	State of severity		
		Mild	Moderate	Severe
At home	11	7'100–24'600	13'400–31'700	19'800–68'000
Mixed: at home and in an institution	15	4'000–35'300	14'200–34'900	21'200–56'100
In an institution	2	23'900–42'300	32'200–45'700	37'800–49'000

Source: Compiled by the authors based on the findings in Quentin/Riedel-Heller/Luppa/Rudolph/König (2009), [10].

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