International comparisons of cost of illness

International Comparisons of Cost of Illness

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Cover photo: Elsbeth Tijssen
Location: Lairesse Apotheek, Amsterdam

Een publicatie van het
Rijksinstituut voor Volksgezondheid en Milieu
Postbus 1
3720 BA Bilthoven

RIVM-rapportnummer: 270751016
ISBN-10: 90-6960-156-7
ISBN-13: 978-90-6960-156-4

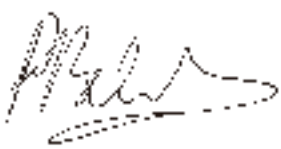
VOORWOORD

In 2003 is er volgens het CBS in de gezondheidszorg €57,5 miljard uitgegeven, zo'n 12% van het bruto binnenlands product. Deze feitelijke constatering daagt uit tot een verdiepende analyse. Wordt al dit geld collectief gefinancierd? Hoe is dit bedrag verdeeld over leeftijdsgroepen? Kosten vrouwen meer dan mannen? Op welke leeftijd nemen de zorgkosten van mensen substantieel toe? Maken ouderen vooral veel ziekenhuiskosten of juist veel thuiszorgkosten? Welke aandoeningen kosten het meest? Op al deze vragen en nog veel meer geeft de nieuwe studie Kosten van Ziekten in Nederland 2003 een antwoord.

Deze editie van de Kosten van Ziektenstudie omvat acht rapporten en een website. In deze rapporten wordt steeds door een andere bril naar de zorgkosten gekeken. Zo ontstaat een veelkleurig en genuanceerd beeld dat van betekenis is voor de discussies over de kosten van de gezondheidszorg.

Dit rapport bevat een internationale vergelijking van kosten van ziekten. Dit is een belangrijk onderwerp gelet op de internationale verschillen in zorgkosten en de toenemende aandacht voor vergelijkingen tussen landen. Dit rapport laat zien dat kosten van ziekten cijfers helpen om het inzicht in internationale verschillen te verbeteren. Ook blijkt dat Nederland in de vergelijking met andere welvarende landen niet uit de toon valt. Het rapport onderstreept tevens het belang van eenheid in definities en afbakeningen van de gezondheidszorg. Op dat terrein vallen nog belangrijke verbeteringen te behalen.

Ik beschouw het cijfermateriaal dat het RIVM aandraagt als een bijzonder waardevol fundament voor tal van discussies in Den Haag, maar vooral ook daarbuiten. Spreken over de toekomst van de AWBZ en de houdbaarheid van de solidariteit (om niet meer te noemen) kan niet zonder kennis te nemen van het voorliggende materiaal. Juist omdat dergelijke discussies ook in het zorgveld gevoerd moeten worden, is het van belang dat de onderliggende data in brede kring bekend en beschikbaar zijn. Daarom is het goed dat al het cijfermateriaal beschikbaar is via de vernieuwde internetsite www.kostenvanziekten.nl. Zo kan de meest veeleisende gebruiker precies die informatie vinden die hij of zij zoekt. Met deze website is een infrastructuur gebouwd waarmee het mogelijk is om in de toekomst sneller met een nieuwe 'update' van de cijfers te komen. Daarvoor moet wel de gegevensvoorziening in de gezondheidszorg goed op orde zijn. In de periode 1999-2003 is op dit punt een goede vooruitgang geboekt, maar nog steeds geldt dat voor sommige sectoren weinig gegevens beschikbaar zijn en soms ook de kwaliteit van de gegevensvoorziening onder druk staat. Dit vergt blijvende aandacht.



Mr. R. Bekker
Secretaris-Generaal Ministerie van Volksgezondheid, Welzijn en Sport

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INTERNATIONALE VERGELIJKINGEN VAN KOSTEN VAN ZIEKTEN

Steeds meer landen binnen en buiten Europa publiceren studies op het gebied van kosten van ziekten, de zogenaamde KVZ-studies. Daarmee ontstaat ook behoefte aan een internationale vergelijking van deze studies. Dit rapport geeft een globale vergelijking van de kostenramingen van tien landen en daarnaast een meer gedetailleerde vergelijking voor Australië, Canada, Duitsland, Frankrijk en Nederland. De Nederlandse cijfers die in dit rapport gebruikt worden, zijn gebaseerd op de KVZ-cijfers over 2003. Deze cijfers gaan uit van het System of Health Accounts (SHA). Dit is een door de Organisation for Economic Cooperation and Development (OECD) geïntroduceerde standaard voor internationale vergelijkingen van zorgkosten.

Bevindingen

Kosten per diagnosegroep ongeveer gelijk

In tien landen zijn inmiddels één of meerdere KVZ-studies verschenen. Naast Nederland betreft het de landen Duitsland, Frankrijk, Verenigd Koninkrijk, Spanje, Verenigde Staten, Canada, Australië en Japan. Tussen deze studies zijn grote verschillen. Niet alleen het peiljaar varieert (van 1991 tot 2003). Ook het aandeel van de zorgkosten dat aan ziekten werd toegewezen, verschilt. Een overeenkomst is echter dat alle studies – uitgezonderd die van het Verenigd Koninkrijk – de ziekten hebben ingedeeld volgens de internationale classificatie (ICD) van de World Health Organisation (WHO). De zeventien hoofdgroepen uit de ICD volgen in grote lijnen hetzelfde patroon voor de verdeling van de kosten: hoge kosten voor hart- en vaatziekten, psychische stoornissen, aandoeningen aan de luchtwegen, het spijsverteringsstelsel en het bewegingsstelsel, en lage kosten voor infectieziekten, bloedziekten, pre- en postnatale aandoeningen en aangeboren afwijkingen. Er zijn ook uitzonderingen: hoge kosten voor kanker in Japan en verhoudingsgewijs lage kosten voor psychische stoornissen in Canada.

Internationale verschillen

Ondanks de overeenkomsten in de kostenverdeling over ziekten, zijn de studies niet direct vergelijkbaar. Zo staan in de meeste landen hart- en vaatziekten wel bovenaan, maar het hoogste kostenaandeel varieert van 8,1% voor Canada tot 25,7% voor het Verenigd Koninkrijk. Ook bij andere diagnosen wordt een aanzienlijke spreiding aangetroffen. Zo varieert het kostenaandeel voor psychische stoornissen van 5,6% in Canada tot 15,6% in Nederland en 18,4% in Zweden. Daarbij is het Nederlandse cijfer al naar beneden bijgesteld volgens de internationale standaarden in het SHA. De percentages voor aandoeningen aan de luchtwegen wisselen van 4,1% in Canada tot 13,5% in Spanje. De lage cijfers voor Canada houden verband met het geringe deel van de kosten dat aan diagnosen werd toegewezen (54,6%), waardoor belangrijke zorgvoorzieningen buiten beeld zijn gebleven. Ook andere landen hebben bepaalde zorgvoorzieningen niet meegenomen. Zo zijn in de Franse studie ziektepreventie en volksgezond-

Tabel 1: Kosten van ziekten in tien landen (aandeel ICD-hoofdstukken in totale kosten, %)

	AUS	CAN	FRA	DUI	JAP	NED	SPA	ZWE	VK	VS	Var[1]
	2000	1998	1998	2002	1999	2003	1993	1991	1993	1995	
Infectieziekten	2,1	1,1	2,1	1,7	3,0	2,4	3,1	2,0	3,7	2,3	31,7
Nieuwvormingen	5,1	2,9	5,3	6,6	11,0	5,0	5,8	5,6	8,3	5,4	35,9
Endocriene, stofwisselingsziekten	4,2	1,9	2,8	5,8	6,6	2,6	4,5	3,4	2,9	4,3	37,9
Bloedziekten	-	0,3	0,4	0,6	0,6	0,5	0,6	0,5	1,6	0,6	61,1
Psychische stoornissen	6,5	5,6	9,4	10,0	6,8	15,6	4,0	18,4	14,4	9,4	43,6
Zenuwstelsel	8,6	3,4	7,4	7,9	7,4	7,3	5,7	5,8	3,4	8,4	29,8
Hart- en vaatziekten	9,6	8,1	10,7	15,8	22,9	10,9	14,8	16,9	25,7	16,9	37,7
Ademhalingsstelsel	6,5	4,1	6,2	5,5	8,6	4,6	13,5	7,7	9,8	7,8	37,3
Spijsverteringsstelsel	10,9	4,2	10,5	13,9	7,4	10,2	8,7	4,6	8,3	11,4	33,6
Urogenitaal systeem	3,6	3,1	5,2	4,0	7,1	3,6	5,0	3,8	6,8	4,8	29,1
Zwangerschap	2,3	1,5	2,8	1,7	0,9	3,3	7,0	1,6	-	0,5	80,7
Huidziekten	2,4	1,8	1,4	1,8	1,9	1,9	2,9	2,0	3,1	2,4	24,7
Bewegingsstelsel	8,1	3,2	6,2	11,3	7,7	7,7	3,3	5,4	7,3	6,4	35,8
Congenitale afwijkingen	0,4	0,2	0,4	0,6	0,3	0,6	0,4	1,2	-	0,6	56,0
Perinatale ziekten	0,6	0,4	0,6	0,4	0,4	0,8	0,7	0,6	-	0,4	28,1
Symptomen, onvolledig omschreven ziekten	9,7	2,1	3,5	5,5	0,9	9,4	13,1	5,6	-	3,0	69,3
Ongevallen	-	-	-	-	-	3,6	-	5,6	-		30,7
Blessures, vergiftiging	7,0	3,8	5,6	4,7	6,6		7,0	-	-	9,1	27,8
Additioneel	-	6,9	2,8	2,3	-	0,8	-	-	-	6,3	69,3
Niet gealloceerd	12,5	45,4	16,9	-	-	9,3	-	9,2	-		82,0
Totale kosten	100,1	100,0	100,2	100,0	100,1	100,0	100,1	99,9	95,3	100,0	

[1] Var.coeff. = variatie coëfficiënt = standaard deviatie / gemiddelde

heid buiten beschouwing gelaten. In de Canadese studie werd de paramedische sector niet meegenomen.

Verschillen in de definitie van gezondheidszorg

De diverse landen hanteren een verschillende definitie van de gezondheidszorg. Sommige landen rekenen bijvoorbeeld gehandicaptenzorg en thuiszorg niet mee. Dit heeft een grote invloed op de KVZ-resultaten. Deze verschillen moeten worden weggewerkt. Pas dan kan een goede analyse van kostenverschillen worden gemaakt. Hiervoor zijn twee zaken van belang. Ten eerste dient het achtergrondmateriaal van de KVZ-studies voor de afzonderlijke landen beschikbaar te zijn. Daarnaast is er een standaard voor de indeling van zorgkosten naar sectoren nodig. Een dergelijke standaard biedt het SHA, dat meerdere actoren onderscheidt die in de verschillende landen in verschillende organisatorische settings werkzaam kunnen zijn. Hoewel van de KVZ-studies alleen de Nederlandse studie over 2003 geheel is toegesneden op deze SHA-standaard, was het wel mogelijk om aan de hand van achtergrondrapporten voor vier andere landen - Australië, Canada, Duitsland en Frankrijk - een min of meer vergelijkbare dataset te construeren.

Kosten voor curatieve zorg zijn redelijk te vergelijken

Wanneer onder curatieve zorg (geneeskundige zorg, vaak kortdurend en gericht op herstel of genezing) de uitgaven aan ziekenhuiszorg (inclusief psychiatrische ziekenhuizen), artsen, tandartsen en medisch specialisten worden samengebracht met de uitgaven aan geneesmiddelen, ontstaat tabel 2. Hieruit blijkt een afname van de variatie in de verdelingen van kosten over ziekten en aandoeningen ten opzichte van tabel 1. Ook valt op dat de bedragen per hoofd van de bevolking veelal van een vergelijkbare grootte zijn. Dit geldt voor het totaal van alle ICD-hoofdgroepen – waarbij de studies uit een recenter peiljaar hogere kosten laten zien dan de studies uit een eerder peiljaar – maar ook voor de afzonderlijke diagnosecategorieën. Uiteraard gaat het hierbij om een globaal beeld.

Wederom valt een aantal zaken op. Zo heeft Duitsland hogere kosten voor stofwisselingsziekten (waaronder diabetes), hart- en vaatziekten, aandoeningen aan het spijsverteringsstelsel en het bewegingsstelsel. Nederland en Frankrijk hebben hogere uitgaven aan psychische stoornissen en Australië heeft hogere kosten voor aandoeningen aan de luchtwegen. Bij een nadere analyse blijken de sectoren ziekenhuizen en artsen de meeste internationale verschillen te veroorzaken. Daarnaast vormt het grote aantal tandartsen in Duitsland een verklaring voor de hogere uitgaven voor aandoeningen aan het spijsverteringsstelsel in dat land.

Kosten voor verpleging en langdurige zorg zijn niet vergelijkbaar

De KVZ-cijfers voor verpleging en langdurige zorg zijn, in tegenstelling tot de curatieve zorg, juist erg verschillend. Niet alleen valt Nederland op met veel hogere uitgaven, ook de verdeling over de diagnosen levert geen consistent beeld op (tabel 3). In de Canadese studie werden de kosten zelfs helemaal niet aan diagnosegroepen toegewezen. Nederland valt op met hoge cijfers, zelfs na aanpassing van de kosten aan de SHA-definitie van verpleging en langdurige zorg. Een belangrijke conclusie

Tabel 2: Verdeling van de totale kosten van curatieve zorg (ziekenhuiszorg, artsen en medisch specialisten, tandartsen en geneesmiddelen) naar hoofdgroepen van de ICD-9. Kosten per inwoner in vijf landen (aandeel in %, US$ PPP).

	AUS	2000	CAN	1998	FRA	1998	DUI	2002	NED	2003	Var[1]
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.	
Infectieziekten	2,6	39	1,6	25	2,4	40	2,0	36	3,0	51	22,4
Nieuwvormingen	6,3	97	4,5	67	6,3	101	7,1	132	6,0	103	15,9
Endocriene, stofwisselingsziekten	5,3	82	2,9	44	3,2	51	6,4	120	2,9	50	39,5
Bloedziekten	0,0	0	0,4	6	0,4	7	0,6	11	0,6	11	24,9
Psychische stoornissen	6,1	95	8,7	132	11,1	179	8,2	153	13,1	225	28,5
Zenuwstelsel	4,5	70	5,2	79	5,1	83	6,4	121	5,9	101	13,7
Hart- en vaatziekten	11,3	175	12,6	191	12,1	196	15,9	297	12,2	210	13,7
Ademhalingsstelsel	7,7	118	6,4	97	7,0	112	6,1	114	5,6	96	12,2
Spijsverteringsstelsel	14,7	227	18,2	276	13,2	213	16,3	305	13,9	240	13,2
Urogenitaal systeem	4,9	76	4,8	73	5,6	91	4,7	89	4,0	69	12,0
Zwangerschap	3,2	50	2,4	37	3,6	58	2,0	38	3,3	57	22,5
Huidziekten	2,6	40	2,7	42	1,5	25	2,0	37	2,4	41	22,2
Bewegingsstelsel	8,0	124	4,9	74	6,0	97	10,8	202	7,6	131	29,8
Congenitale afwijkingen	0,4	7	0,3	5	0,5	8	0,5	10	0,7	11	25,2
Perinatale ziekten	0,9	13	0,6	9	0,7	12	0,5	9	1,1	19	33,8
Symptomen, onvolledig omschreven ziekten	12,4	191	3,3	50	3,5	57	3,6	67	10,8	186	66,9
Ongevallen	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	
Blessures, vergiftiging	9,0	138	6,0	91	5,9	95	4,5	84	4,1	70	32,5
Additioneel	0,0	0	10,8	163	3,2	52	2,4	45	0,0	0	84,2
Niet gealloceerd	0,0	0	3,6	54	8,7	141	0,0	0	2,7	47	64,9
Totaal 4 SHA groepen	100,0	1543	100,0	1512	100,0	1617	100,0	1871	100,0	1719	
Alle SHA groepen		2406		2291		2234		2915		3022	

[1] Var = Variatie coëfficiënt= Standaard deviatie / gemiddelde

Tabel 3: Uitgaven aan verpleging en langdurige zorg (SHA HP.2). Kosten per inwoner in vijf landen (aandeel diagnosegroepen in %., US$ PPP)

	AUS[1]		CAN		FRA		DUI		NED		Var
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.	
Nieuwvormingen	0,9	1	-	-	2,6	2	9,3	20	1,6	6	107
Psychische stoornissen	**58,2**	97	-	-	16,9	12	31,3	66	**51,7**	184	48
Dementie		81	-	-						154	
Zenuwstelsel	6,8	11	-	-	12,2	8	8,3	18	6,2	22	32
Hart- en vaatziekten	13,5	22	-	-	21,8	15	21,8	46	15,6	56	24
Ademhalingsstelsel	2,3	4	-	-	5,4	4	1,2	3	2,4	9	64
Spijsverteringsstelsel	0,9	1	-	-	3,9	3	0,8	2	2,4	9	73
Bewegingsstelsel	**12,4**	21	-	-	2,6	2	5,5	12	2,1	7	84
Urogenitaal systeem	0,4	1	-	-	8,3	6	0,3	1	0,5	2	166
Subtotaal	95,4	158			73,7	51	78,5	166	82,5	294	
Totaal		166		222		69		212		356	

die hieruit volgt, is dat landen niet alleen verschillen in de omvang van de langdurige zorg. Ook de wijze waarop de langdurige zorg in het SHA is geoperationaliseerd blijkt niet eenduidig.

Invloed epidemiologie nagenoeg niet waarneembaar

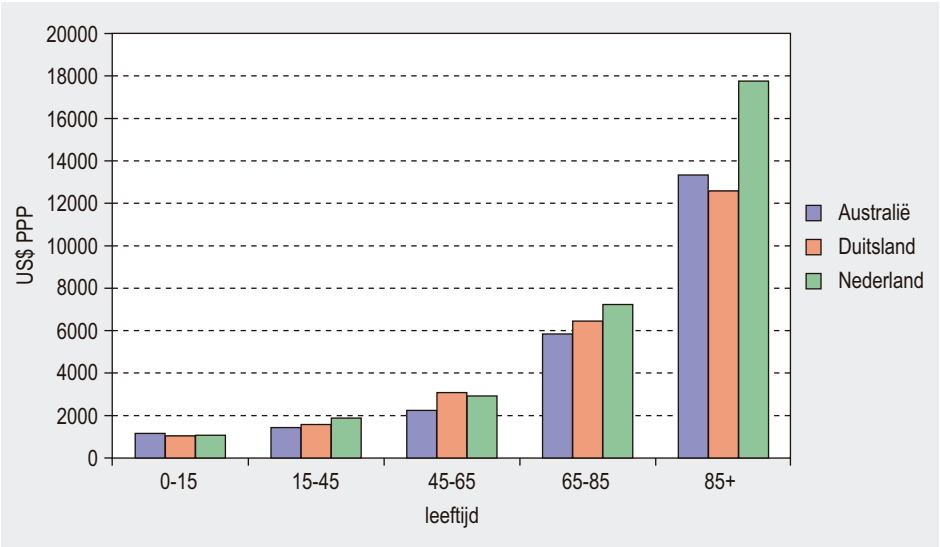
De KVZ-cijfers voor de curatieve zorg brengen een aantal belangrijke verschillen aan het licht. Of deze kostenverschillen ook door epidemiologische verschillen worden veroorzaakt blijft helaas nagenoeg duister. Een dergelijke analyse is niet eenvoudig en levert weinig resultaten op. Voor de meeste ziektecategorieën ontbreken namelijk internationaal vergelijkbare cijfers over incidentie (aantal nieuwe ziektegevallen) of prevalentie (totaal aantal ziektegevallen). Alleen voor kanker (nieuwvormingen) zijn er betrouwbare cijfers. Deze laten echter nauwelijks verschillen tussen landen zien. Hieruit volgt dat de relatief hogere kankerkosten in Duitsland hun oorzaak niet hebben in een groter aantal kankerpatiënten. Wel zijn er op basis van sterftecijfers aanwijzingen dat Duitsland meer mensen met hart- en vaatziekten telt, hetgeen mogelijk een verklaring biedt voor de hogere zorguitgaven aan deze ziekten. Het algemene beeld is echter dat de gevonden kostenverschillen tussen landen niet gerelateerd kunnen worden aan epidemiologische verschillen.

Dit wil uiteraard niet zeggen dat er tussen de ziektelast in termen van ziekten en aandoeningen geen relatie is met het zorggebruik en de zorgkosten. De KVZ-cijfers voor curatieve zorg geven in ieder geval voor de vijf landen die in detail zijn bekeken – Australië, Canada, Duitsland, Frankrijk en Nederland – aanleiding tot twee stellingen. De eerste is dat KVZ-cijfers een indicatie vormen voor een epidemiologische situatie die op hoofdlijnen vergelijkbaar is. De tweede stelling is dat westerse landen een vergelijkbare epidemiologie hebben, die aanleiding geeft tot een vergelijkbare zorgvraag, waarbij de KVZ-cijfers aantonen dat ook de zorgkosten voor deze ziekten en aandoeningen op hoofdlijnen gelijk zijn, ongeacht de manier waarop het zorgstelsel is vormgegeven.

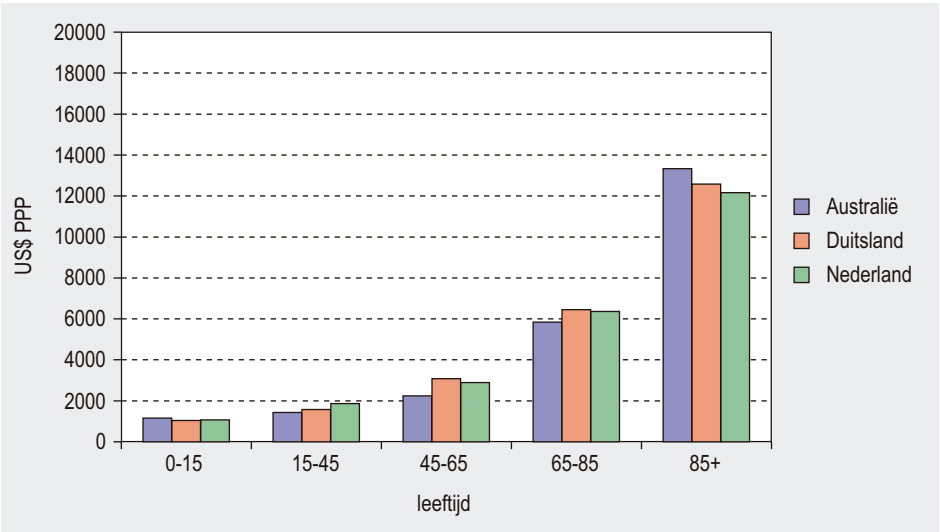
Demografische cijfers brengen belangrijke kostenverschillen aan het licht

Naast epidemiologie biedt demografie – de omvang en samenstelling van de bevolking – een belangrijke verklaring voor zorggebruik en zorgkosten. Oudere mensen gebruiken meer zorg dan jongeren en dus zijn de zorguitgaven voor die groep hoger. Voor drie landen – Nederland, Duitsland en Australië – was het mogelijk om na enige correcties de totale zorgkosten volgens de SHA-definitie uit te splitsen naar vijf leeftijdscategorieën. Figuur 1 laat zien dat voor vrijwel alle leeftijdsgroepen de gemiddelde zorguitgaven per inwoner redelijk vergelijkbaar zijn. Alleen bij de 85-plussers komen belangrijke verschillen aan het licht. Vooral de Nederlandse cijfers laten hier veel hogere kosten zien. Dit houdt waarschijnlijk verband met de hogere uitgaven aan langdurige zorg (zie boven). Daarom is in figuur 2 in beeld gebracht hoe hoog de kosten in Nederland zouden zijn wanneer het niveau van langdurige zorg hetzelfde zou zijn als in beide andere landen (namelijk 7% in plaats van 12% van de totale kosten in de SHA-definitie). In dat geval zijn de zorgkosten voor Nederlanders van 85 jaar en ouder mogelijk iets lager dan voor de inwoners van Duitsland en Australië. Ten opzichte van Duitsland zou een verklaring kunnen worden gevonden in het feit dat de Nederlandse bevolking minder vergrijsd is. Ten opzichte van Australië, dat een jongere bevolking heeft, is die verklaring er niet.

Aanvullende analyses laten zien dat de totale zorgkosten in Duitsland ruim 6% lager zouden zijn wanneer de bevolkingsopbouw gelijk was aan die in Nederland. In Australië zouden de zorgkosten dan met ruim 3% toenemen. Hieruit volgt dat het van groot belang is om bij een internationale vergelijking rekening te houden met verschillen in de leeftijdsopbouw van de bevolking.



Figuur 1: Totale kosten van ziekten per inwoner (US$ PPP) voor 5 leeftijdsgroepen en drie landen. Feitelijk gerapporteerde cijfers overeenkomstig KVZ-studies en totale uitgaven in de definitie van het SHA



Figuur 2: Totale kosten van ziekten per inwoner (US$ PPP) voor 5 leeftijdsgroepen en drie landen, waarbij voor Nederland een vergelijkbaar niveau van langdurige zorg (HP.2 in het SHA) als in beide andere landen is verondersteld.

Geen grote verschillen door behandelvariatie

Hiervoor kwam de uitgebreide tandheelkundige zorg al ter sprake als oorzaak van de hogere zorguitgaven voor aandoeningen aan het spijsverteringsstelsel in Duitsland. Algemeen geldt dat verschillen in het (cultureel bepaalde) medisch handelen een belangrijke oorzaak van kostenverschillen zijn. Bij internationale vergelijkingen ligt de nadruk daarbij uiteraard op substantiële, systematische verschillen. Voor Nederland, Duitsland en Frankrijk konden vergelijkingen worden gemaakt van de ziekenhuiszorg op basis van de Hospital Data Set die in een Europese studie werd samengesteld. Uit de analyse volgen aanzienlijke verschillen in de gemiddelde opnameduur. Mogelijk verklaart dat een deel van de kostenverschillen tussen deze landen, met name bij psychische stoornissen en aandoeningen aan het bewegingsstelsel. Ook werden grote verschillen gevonden in het aantal klinische opnamen en dagbehandelingen. In Duitsland bleek het aantal dagopnamen verhoudingsgewijs laag te zijn, terwijl in Nederland het aantal klinische opnamen naar verhouding laag is. Deze verschillen hangen uiteraard samen met de bevolkingsdichtheid en de organisatie van de gezondheidszorg. Zo werken in Duitsland veel medisch specialisten buiten het ziekenhuis. Het ligt dan ook voor de hand dat het lagere aantal dagbehandelingen gepaard gaat met een omvangrijkere poliklinische en eerstelijnszorg. Bovendien is het aantal klinische opnamen groter dan in Nederland, zowel qua aantal als gemiddelde duur. Over de poliklinische zorg geeft de Hospital Data Set helaas geen uitsluitsel. Op dit moment zijn dus geen omvattende en eenduidige conclusies mogelijk.over de invloed van behandelvariatie op verschillen in kosten van zorg en ziekten. Mogelijk gaat ook hier de eerder genoemde stelling op: de ziektelast in de verschillende landen geeft aanleiding tot zorg, die op verschillende manieren georganiseerd kan worden zonder dat dit de verdeling van kosten over diagnosen beïnvloedt.

Conclusies en aanbevelingen

Uit deze bevindingen volgt dat KVZ-studies een goed instrument zijn om:
1. internationale verschillen in zorgkosten nader te identificeren ten behoeve van meer gedetailleerde vergelijkingen;
2. de kostenontwikkeling van landen ten opzichte van elkaar te monitoren;
3. het effect van stelselwijzigingen op de sectorale en totale zorgkosten te bekijken vanuit ziekte en leeftijd en dat te vergelijken met landen waar die wijzigingen niet zijn doorgevoerd.

KVZ-studies kunnen deze ambities alleen waarmaken wanneer de volgende aanbevelingen worden opgevolgd:
1. het System of Health Accounts (SHA) van de OECD wordt verbeterd, zodat nog bestaande definitieverschillen, in het bijzonder op het terrein van de langdurige zorg, tot het verleden behoren.
2. KVZ-studies sluiten volledig aan op het SHA van de OECD.
3. KVZ-studies maken gebruik van meerdere dimensies uit het SHA, namelijk actoren (providers), zorgfuncties en financiering.
4. KVZ-studies onderscheiden naast diagnose ook leeftijd en geslacht.
5. KVZ-studies gebruiken dezelfde diagnoseclassificatie (ICD-9 of ICD-10) en leeftijdscategorieën.
6. KVZ-studies maken gebruik van een gestandaardiseerde methode die ruimte biedt om optimaal gebruik te maken van de specifieke gegevens die voor ieder land beschikbaar zijn.
7. KVZ-studies worden periodiek geactualiseerd waarbij bepaalde peiljaren voor alle landen beschikbaar zijn.
8. KVZ-studies maken bij de constructie van tijdreeksen onderscheid tussen ontwikkelingen in prijs en volume.

Een algemene voorwaarde hiervoor is de beschikbaarheid van een adequate gegevensinfrastructuur. Dit geldt zowel voor de hoogte van de zorgkosten – per actor én in de aansluiting op het System of Health Accounts – als de gegevens over het zorggebruik die nodig zijn om de kosten toe te wijzen aan ziekten en demografische kenmerken. Uniforme, internationale definities en een standaard methodologie voor de kostentoewijzing kunnen hierbij de vergelijkbaarheid van KVZ-studies aanzienlijk bevorderen.

Nationaal belang en internationale coördinatie

De aanbevelingen vereisen een internationale coördinatie door onder meer de OECD, Eurostat en de WHO. Deze organisaties werken al nauw samen op het terrein van het SHA. Niet alle wensen kunnen echter op korte termijn voor alle landen worden gerealiseerd. Het RIVM adviseert daarom te werken vanuit een groeimodel. Daarin zou in ieder geval de curatieve zorg (gestandaardiseerd volgens het SHA) moeten worden uitgesplitst naar sector, diagnose en leeftijd. Dit alles volgens een uniforme methode voor een vastgesteld peiljaar, en bij voorkeur voor alle landen van de Europese Unie. Vanuit

deze basis kan vervolgens aan uitbreiding worden gewerkt, waarbij ook kan worden gedacht aan de uitbreiding met OECD-landen buiten Europa.

Een dergelijke aanpak vereist ook een nationaal belang. Gezien de hoeveelheid werk en de benodigde gegevens zullen KVZ-studies altijd ingebed moeten zijn in het nationale zorgonderzoek van de afzonderlijke landen. Het zorgbeleid is immers hoofdzakelijk nog steeds een aangelegenheid van nationale overheden. Dit betekent dat KVZ-studies altijd te maken zullen hebben met de vertaling en aansluiting bij landelijke en internationale kaders. Precies daar ligt ook de sleutel voor zinvolle internationale vergelijkingen van zorgkosten.

1 INTRODUCTION

Rising costs in health care are a source of debate in a lot of countries these days. Most countries spend a considerable part of their national income on health care. But before judging the height of these health care costs it is useful to describe them and find out what their determinants might be.

Cost of illness (COI) studies can be used for this purpose. COI studies illustrate the economic burden of diseases in a country. Cross-country comparisons of COI can show how these cost patterns differ between countries and are therefore one way of finding out the determinants of health care spending. An important question in a cross-country comparison is why differences occur and what can be learnt from these differences as determinants of health care costs.
COI studies first of all can provide insight into the effect of epidemiology and its trends on health care use and health care cost. Is for example a higher prevalence of cancer in Australia of a big influence on its health care use and cost? Time trends can be useful in these to see how cost patterns change over time, because of epidemiological or other changes.
Another example is that more women are having lung cancer in the Netherlands the last ten to fifteen years (because of a rising smoking rate; Knol et al., 2005). To see how this will effect the Dutch health care system COI studies can be used. An international survey can compare the Dutch situation with another country already having a high prevalence of this disease. What was the effect in that country and what will it be in the Dutch situation?
COI studies can also examine demographic changes. Demographic explanations of COI can for example give an understanding of the effects of ageing. Countries that are in different “ageing stages” can be compared for this purpose. What is the impact of a more aged population on health care use? Furthermore which health care sectors are burdened and which diseases play a role when a rising part of the population is ageing? With this information the “less-aged” countries can make better projections on the influence of ageing in their country and use the information for making health care policy.

COI studies can also serve as input for priority setting in health prevention and intervention. These policies need information on health care costs. This is not the only information needed, among other things information on health effects of prevention and intervention is important too. COI studies can serve as input on the cost-side. International comparisons of COI can investigate (on a long term) what results health prevention and other health care policies can have on health care cost. With these results countries can learn from each others’ policies.
With general COI studies, describing all diseases and health sectors (*section 2.1*), the impact on the whole health system can be studied.

The questions and subjects mentioned above are examples of questions COI studies and international comparisons of COI studies can address.

Polder et al. (2005) compared COI in six countries (Australia, Canada, England, Germany, the Netherlands and Sweden). In this study some large differences were found. However, exact explanations of these differences in COI could not be made. This was mostly due to the incomparability of the different COI studies. Some general conclusions were: higher cost of cancer and skin diseases in Australia, because of a higher prevalence, higher cost of endocrine diseases in Germany because of a higher prevalence of diabetes. The cost of accidents in Australia and Germany were high because of more accidents. But for the rest explanations were lacking, because of substantial differences in definitions of health care, health care sectors and health care cost.
In this study some more recent COI studies were compared which will reveal whether the comparability has improved and following from this whether differences can be better explained.

Thinking of what drives health expenditure, there are more factors besides the ones set out above.
Section 1.1 therefore describes possible determinants of differences in health care cost and the role of COI in these. *Section 1.2* describes the international comparison of COI studies and the further aims and objectives of this report.

1.1 Determinants of health care spending

Determinants of health care spending have been studied in various ways and from various perspectives. National income or Gross Domestic Product (GDP) plays a significant role in most studies on health care expenditure (Gerdtham et al., 1996). The general belief in these studies is that national income is the main driver behind differences in expenditure on health. Wealthier countries tend to spend more on health and therefore will have relatively higher expenditure. But countries with rather similar GDP levels can still have diverging health expenditures. In these countries other factors might determine the level of expenditure.

Next to national income technology has a major influence on expenditures. Using more advanced technology might be more expensive and raise cost. Further, when advancing technology improves treatment this will raise health care demand and in this way also raise cost. Technology can be cost-saving as well, when it makes treatment more efficient.
Prices are also important as total costs are a function of volume and prices. In most countries governments influence the height of prices in health care. This might result in diverging prices and costs. Wage developments are also important here.

Other factors include for example institutional differences. These are differences in health systems concerning organisation, structure and financing. Regarding financing,

every country has its own system of tax-based, social insurance (premiums) based or a mix of different financing systems. These different systems might influence expenditure. But the exact role is probably hard to define because most countries have financing systems that are mixtures of these.
Differences in health system coverage can also influence health expenditure. What kinds of services are covered by for example social insurance? A wider coverage might lead to different expenditure, due to moral hazard for example. Coverage can also be viewed from another perspective: how many people are covered?

Furthermore differences in who is actually paying health care might have influence. Public payment might induce patients and providers to spend as much as they want, because they do not have to pay for it directly. Some countries introduced supply and demand side co–payments, meaning that a larger part of the expenditures has to be paid privately. These are incentives that need to lower health care spending.
Another institutional factor can be differences in provider payment. Physicians can be paid on a fee for service basis, meaning remuneration for every service they provided. This method might induce the provider to provide more and more services, resulting in higher health care use and higher expenditures. Capitation payment is a different method, giving the provider a payment per patient for a certain period. This should be an incentive for the provider not to provide as much services as he wants. It can therefore be a restraint on health expenditure.

The position of the General Practitioner (GP) is also noticed as a possible explaining factor behind differences in expenditures. The position of the GP as gatekeeper is sometimes mentioned as a factor that diminishes health expenditure, because the GP has a controlling position that would result in a more efficient use of health care services (Gerdtham et al).
Next to this there might be differences in the definition of a GP: what is a GP and what kind of services does the GP provide? This question can also be raised in other health care areas as there are cross-national differences in the definition of health care in general.

All the institutional factors mentioned above can have an influence on health expenditure. They might tell something about the level of health expenditure. But besides income and institutional factors there might be other important elements. In the beginning of the introduction epidemiological and demographic differences were already mentioned. COI studies can describe what diseases might induce more health care use (and expenditures) than others and among which groups (demographically) these costs are concentrated.
Other differences that should be mentioned are differences in treatment methods. An example of this is how long people are kept in hospital. When a treatment takes more hospital days in one country than the other this can affect differences in hospital costs. Treatment variations can be caused by cultural differences.
Table 1 shows determinants that influence health expenditure. As mentioned before this report will focus on the final three: demography, epidemiology and treatment variation. At the end a short notion will be given on some of the other factors.

Table 1: Determinants of health care spending

Economic
National income
Technology
Prices
Health care specific
Health system coverage / private or governmental payment
Type of provider payment
Role of General Practitioner
Cost of illness
Demography
Epidemiology
Treatment variation

One has to keep in mind that all these factors can affect costs at the same time and therefore it will be hard to disentangle all different factors and their individual influence on costs. However it is possible to give indications/estimations of the role of different factors by examining them one by one.

In conclusion, the central question of this report is: "To what extent and why do COI estimates differ internationally?"

This central question can be divided into six more specific questions:

1. How do COI patterns compare across countries and which disease groups have the largest cross-country cost differences?
2. What is the role of health care definitions with respect to differences in COI estimations?
3. How do differences in allocation methods influence the comparison?
4. What is the role of epidemiology, demography and treatment variation in explaining differences in cost estimates across countries and across diseases?
5. Viewing the comparison and the analysis of explaining factors; does it give an answer to the questions in a satisfactory way?
6. Is it useful to repeat this analysis in the future and what information is needed to improve the analysis further?

How these questions will be analyzed is pointed out in the next section which shows the further setup of this report.

1.2 Report setup

This report will continue in *chapter 2* with a more detailed explanation of COI studies. *Section 2.1* describes theoretical issues as COI studies are performed in different ways. *Section 2.2* shows the discussion about the use of COI studies. Experts have been discussing the usefulness of COI studies several times.

After this theoretical chapter, *chapter 3* describes the COI studies found for this report. In *section 3.1* an overview will be given of most recent COI studies found for various countries and their primary results. COI studies have been performed in a number of countries. Out of the countries that provided COI results five countries were finally compared: Australia, Canada, France, Germany and the Netherlands. The other countries were excluded because their studies were outdated or no background information was available. *Chapter 3* furthermore describes characteristics of these countries (e.g. what percentage of GDP is spent on health care) and also some characteristics of the content of the COI studies in particular *(section 3.3)*.

Chapter 4 addresses the problem of data comparability. Differences in definition of (total) health expenditure namely influence the comparability of COI studies. The different studies might include or exclude different health care activities and sectors. This problem might be solved by using the System of Health Accounts (SHA). The Organisation for Economic Co-operation and Development (OECD) developed this system to make international comparisons of health expenditure possible. It should be a framework for the OECD-countries to provide their health accounts. Comparing the content of the COI studies with SHA numbers (from OECD Health Data) can clarify the international comparability of the studies.
Chapter 4 describes the five countries that are studied. First it gives for every country an overview of what their health system looks like. Hereafter it describes differences in included and excluded health care compared to national and SHA accounts.

The following chapter overviews differences in allocation methods. The costs might be assigned to diseases in different ways. For example country A uses number of days (spent in a health care facility) as criterion and country B uses an expert opinion to allocate expenditure to diseases. Some countries furthermore use weights to correct for the intensity of care, because health care for one disease might be more intensive than the other. It was impossible to correct for these differences in allocation methods due to constraints on data availability. The differences in methods will be outlined in the first section of chapter five.
The second section of *chapter 5* will shortly examine some trends in COI. Australia, Canada, Germany and the Netherlands already performed more COI studies and their results will be compared to show some time trends.
The final section of *chapter 5* will show COI across SHA chapters. COI can not be shown for all SHA chapters, because not all SHA chapters are fully included in the COI studies. The included parts in *section 5.3* are hospitals, physicians, general practitioners, prescribed medicines and dental care. For each of these categories the allocation of total

costs to diseases will be compared. In this section the most important disease groups, with respect to costs, are selected to focus a little more on these groups.

Chapter 6 tries to explore determinants of cost of illness differences. As mentioned in the former section epidemiological differences might cause differences in expenditure. Next to epidemiological differences, demographic differences also play a role, as aged countries might have different cost patterns than 'younger' countries. These are elements behind the demand for health (care) and are examined in the first two sections of this chapter. In these sections not all disease groups are examined. A selection has been made by looking at data availability (important in the section on epidemiology) and the importance of disease groups with respect to costs.
Section 6.3 examines the determinant treatment variation and focuses on treatment in hospitals. In one country patients may be kept in hospital longer resulting in higher health care costs. A relation between hospital expenditures and the length of stay in hospitals is examined for this purpose.

The final section of *chapter 6* will shortly address two other determinants, namely technology and prices. The former section already showed that these can be important. With respect to prices it should be noted that in this report health care costs are reported in so-called Purchasing Power Parities (PPP). PPPs control for differences in price levels between countries, because it is possible that the purchasing power of a euro is different in e.g. France and the Netherlands. The PPPs however are generic and represent the whole economy, not just health care prices. They might be related, but this is unclear. Health specific PPPs are available at this moment (OECD Health Data); these are however only based on prices of a set of pharmaceutical products. Furthermore health care prices are not always a result of demand and supply as governments often play a role in determining health care prices (of e.g. pharmaceuticals).
The aspects technology and prices are explained shortly as a detailed analysis is beyond the scope of this report, but have to be mentioned as they can be influential with respect to COI (*table 1*).

Having explored all factors mentioned above, the report will end with a conclusion and some recommendations for future work.

2 COST OF ILLNESS (COI)

- Cost of illness (COI) studies estimate the economic burden of one or more diseases.
- COI studies are performed in various ways. This report compares general, top-down, prevalence based COI studies, describing only direct costs.
- Since the introduction of COI studies there has been much debate about their usefulness. These discussions, however, mostly addressed national, disease specific studies, whereas this report focuses on an international comparison of general COI studies.

COI studies can be viewed as part of a broad area of work performed by health economists. Health economists analyse for example health care systems, demand and supply of health care, the behaviour of different agents in the health care sector and evaluate health care costs and effects. The economic evaluation of health care costs and effects and its methods have been described by Drummond (1997), who introduced a framework showing several types of economic evaluation including for example cost-description, outcome description and cost-effectiveness analysis (*appendix A*). According to Drummond COI studies can be placed in the area of cost description, because only costs are examined and no different alternatives are compared.

This chapter will describe the theory of these descriptive COI studies. *Section 2.1* shows some important aspects of its methods and *section 2.2* reflects whether COI studies should be performed at all. The usefulness of COI studies has been discussed several times since its introduction and these discussions will be reviewed here.

2.1 Nature and methods

The first COI studies were performed during the 1960's. Their goal was, and still is, to estimate the economic burden of diseases. COI studies try to value the total burden of diseases in monetary terms. COI studies are performed in various ways, using various methods.

The first important distinction to make is the distinction between *disease specific* and *general* COI studies. In a disease specific study the costs of a single disease are estimated. General COI studies try to measure the costs of all diseases in one study. Disease specific COI studies are performed most often (Koopmanschap, 1998). In this report general COI studies are compared.

Disease specific COI studies mostly calculate total costs using a *bottom-up* strategy. This bottom-up strategy estimates total costs by multiplying the average costs of a certain diagnosis with the average health care use by that diagnosis. Data on health care use and prices are usually collected at the patient level (Polder, 2001). An often mentioned

risk with respect to disease specific studies is the risk of double counting. Some specific studies include co-morbidity or disease-related problems that might be determinants of other diseases too. Certain costs therefore might be included more than once in different disease specific studies and if the costs of various diseases are summed up, this might overestimate the total costs of all diseases.

General COI studies in contrast start with all health care costs in a country and divide them over various diseases: the *top-down* method. This method first uses estimated costs for all health care areas (e.g. hospitals, physicians) and divides them over diseases by using certain allocation keys. With these allocation keys, e.g. number of hospital days, the resource use of each disease group can be defined within each health care area (or provider). In top-down studies costs are allocated to the primary diagnosis and all costs are therefore represented just once in all cost by disease. This solves the problem of double counting associated with the bottom-up studies. However by ignoring co-morbidity some diagnoses might be underestimated. For example elderly are often suffering from more diseases at the same time. In this case the allocation of costs to only one disease or diagnosis might become a little arbitrary (Polder, 2001). Furthermore determinants of diseases will not be exposed (for example diabetes causing cardiovascular problems), because costs are only allocated to the main or final diagnosis.

Another difference is that some studies are *prevalence* and others *incidence* based. Prevalence based studies compile all disease cases in a year. Incidence based studies only use all new cases in a single year. Incidence based studies therefore include the moment of disease occurrence.
General COI studies are all prevalence based, whereas disease specific studies are sometimes prevalence and sometimes incidence based.
In choosing prevalence or incidence based figures, data availability and the goal of the study are important. Incidence based figures might be more useful for calculating costs and effects of prevention/intervention activities for example. This type of study needs an estimation of new cases (and costs) that can be avoided with prevention. Prevalence based studies might be useful when costs and/or effects of the whole health system should be considered.

A final note should be made on the type of costs included. These can be divided into *direct* and *indirect* costs. Some studies only take direct costs into account, while others also (or only) provide information on indirect costs. Direct costs are the costs that directly relate to diseases. These are for example cost of resources used in health care, like manpower, drugs and housing. Direct costs can also relate to informal care, which are (direct) costs for the supporting family/acquaintances. Informal care costs are often not included in general COI studies and therefore not examined in this report.
Indirect costs are costs that do not directly relate to health care. Indirect costs can be extra health care costs during prolonged lifetime (after treatment). Indirect costs can also be associated with costs outside health care. Economists often consider indirect costs as costs that appear due to lost productivity and not being able to work, because of illness. To estimate these costs data are needed on these aspects (extra health care

costs, lost productivity etc). Of the studies compared in this report only one also examined indirect cost, therefore indirect COI are beyond the scope of this report.

2.2 Application and debate

This section will describe the discussion about the usefulness of COI studies. There has been a lot of debate among health economists (and others) since its introduction. Throughout the years there have been several discussions on what to do with COI studies. Can they assist (health) policy makers in decision making or not?

Alan Shiell et al. (1987) were among the first to write down serious criticism about COI studies. This was a reaction on a (general) COI study performed in Germany. The German study based its COI methodology on the first COI works from Dorothy Rice during the 1960's.
Shiell et al. based their critique predominantly on the opinion that the COI methodology has many shortcomings. They further remark that COI studies estimate the "benefits of the unattainable". What they mean here is that the costs described can only be saved when diseases are completely eradicated and this is unattainable (for most diseases). They argue furthermore that COI studies do not provide information on the effects of health care policy. According to them cost benefit analyses (CBA) provide better information that can be used in policy directly.
With this view Shiell provoked response. Behrens and Henke (1987) and Hodgson (1989) had different opinions with respect to COI studies. Behrens and Henke predominantly point out the disadvantages that CBA analysis has. They find it impossible to do CBA analyses for all diseases and their treatments and it might be hard to compare different diseases in CBA. Therefore the dominant method proposed by Shiell, CBA, might be as useful (or useless) as COI studies.
They furthermore indicate that it should not be a decision of doing COI or CBA analysis. Both methods have their advantages and disadvantages and both provide useful information for health policy.
Hodgson also states that there are some fallacies in the article of Shiell. Most important is Shiell's argument that COI and/or CBA analyses should be policy making, whereas they should be policy informing according to Hodgson. Furthermore the information on COI can be used as input for CBA studies.

The discussion has been picked up various times after this first involvement by Shiell. Wiseman and Mooney (1998), in line with Shiell et al., pointed out that priority setting is the most important issue of health care policy making. In priority setting Wiseman and Mooney found no need to know the size of a problem (disease), described by COI. To them the need is to know the (marginal) effects of changes in resource allocation and they do not find this information in COI studies. However their explanation of what the best alternative is remains rather vague.

Koopmanschap (1998) sees more possibilities for COI studies. To his opinion COI studies can reveal policy relevant information. Priority however should be pointed towards general COI studies as they provide better comparisons between diseases in a broader perspective. Koopmanschap furthermore argues that COI studies should be incidence based rather than prevalence based. Incidence based studies would suit better in economic evaluation.
Rice (2000), one of the inventors of COI methodology, cannot be missing in this discussion. In one of her reactions she explains that with the complex health systems and complex health problems of these days: "we need to bring to bear a wide array of quantitative approaches and solutions to these problems". Furthermore, as most other supporters of the COI methods, she does not exclude the use of cost-effectiveness studies and cost benefit studies. There should be a role for both in informing health care management and policy.

Besides these arguments it is interesting to see how COI studies are performed and what can be concluded from their results. The comparability of COI studies and their results has been researched by Bloom et al. (2001). Bloom et al. tried to compare various disease specific COI studies, which were based on a clearly defined US sample or national population (finally 110 studies were compared). They found a wide array of cost estimations for the same diagnosis. According to Bloom et al. this variety in results "raises questions of comparability, accuracy, validity and usefulness of (these) COI studies". Because of this they underline the importance of a better (or more standardized) methodology.

Next to this theoretical discussion about the use of COI studies, health care policy makers seem to be interested in this type of information. The Dutch government for example appears to be very interested in the information that comes out of the Dutch general COI study. Furthermore the WHO and World Bank are providing information on the burden and COI and use this information for setting policy directions (Byford et al., 2000). Also Eurostat and the OECD showed their interest in this field. This illustrates the fact that COI studies provide useful information for health policy. However the fact that governments and organizations like WHO and OECD use COI information, in itself does not mean that it is the only or best information.

The discussion above mostly concerns disease specific COI studies and their usefulness on a national level. In theory well and comparably performed COI studies can be useful on an international level too (see introduction). The question is whether this is realizable in practice.
Polder et al. (2005) concluded that (general) COI studies were only useful at the national level. A decent international comparison could not be conducted and the use of foreign COI studies was very limited. Major impediments were the lack of standardized methods and standard definitions of health care supply. This report will examine whether or not the possibilities for comparing COI studies internationally have improved since then and why.

3 COI IN DIFFERENT COUNTRIES

- COI studies from different countries show high cost of diseases of the circulatory system, digestive system, respiratory system and mental disorders in all countries.
- However there appears a substantial variation per disease group.
- Furthermore studies differ in base-year, proportion of total costs that could be allocated to diseases and ICD-version used.
- National and international definitions of total health expenditure are different. Following the international (OECD) definition, the five countries for which more detailed comparisons were possible (Australia, Canada, France, Germany and the Netherlands) spend between 9-11% of their GDP on health care or US$ PPP 2,234 - 3,022 per inhabitant.

This chapter will overview the COI studies that were found. In *section 3.1* the first (general) differences between COI in the various countries are shown. In *section 3.2* some countries are eliminated for reasons of comparability and furthermore different ways of measuring and presenting health expenditure are compared. Health expenditure can for example be measured as percentage of GDP or as per capita expenditure. *Section 3.3* provides some further characteristics of the different studies.

3.1 Overview of COI in 10 countries

COI studies were performed for eight countries: Australia (Goss, 2005), Canada (Health Canada, 2002), France (Paris et al., 2003), Germany (Böhm et al., 2004), Japan (OECD Health Data), the Netherlands (Slobbe et al., 2006), Spain (OECD Health Data) and the USA (Hodgson and Cohen, 1999).
From the countries Australia, Canada, Germany and the Netherlands somewhat older results were already reported in an earlier study by Polder et al. (2005). This report furthermore showed results for Sweden (Jacobson, 1996) and the UK (NHS, 1996). The first four will be mentioned shortly in *section 5.2* (comparing COI over time) and the latter two are included in this section.
In *table 2* the results for these ten countries are shown. The table shows the percentage of total costs allocated to each disease group for each of the ten countries.

There appears a large variability between countries. Excluding the unallocated costs and additional categories, seven out of ten countries had diseases of the circulatory system as their primary cost component. Percentages of total costs allocated to circulatory diseases range from 8.1% for Canada to 25.7% for the UK. In two other countries circulatory diseases were second and in Canada third. There are three other disease groups that are often in the top three in these countries. These are mental and behavioural disorders, diseases of the respiratory system and diseases of the digestive system. Cost of mental and behavioural disorders were particularly high in the Netherlands

(15.6%) and Sweden (18.4%). Cost of diseases of the respiratory system were relatively high in Spain (13.5%). The countries with the lowest percentages for this group were Canada and the Netherlands (4.1 and 4.6% respectively). Cost of diseases of the digestive system were highest for Germany (13.9%). Other countries with high percentages for these groups were the USA, France and Australia. Another notable difference is found in diseases of the musculoskeletal system. Germany has a relative high percentage for this disease group (11.3%).
The disease groups with low costs are the same for most countries. These are congenital malformations, perinatal conditions and diseases of the blood and blood-forming organs.

The variation in costs (see: variation coefficient) ranges from 24.7% for diseases of the skin and subcutaneous tissue to 82% for the unallocated group. Among the diseases with highest costs mental and behavioural disorders show the highest variation. The diseases with lower costs show more variation, for example congenital malformations.
Another group with high variation is pregnancy and childbirth. A large dispersion is found here mainly because of Spain where 7% of total costs was allocated to pregnancy and childbirth. This is remarkably high compared to the other countries.

There are however some important notifications to make: for the UK a considerable number of groups is missing, which affects its comparability. Canada seems to spread its costs more equally over disease groups. This is however mainly caused by a large amount of total costs (45.4%) that could not be allocated to diseases and therefore influences the other percentages.
The percentage that could not be allocated to diseases differs a lot between countries. Some countries do not report an unallocated part at all (which is probably because they are kept outside the study). The countries that do report an unallocated part show percentages that are a substantial part of total costs, ranging from 9.2% in Sweden to 45.4% in Canada.
Another important note is that some disease groups could not be reported in some countries: only two countries report the category accidents and only four countries have ‘additional categories‘. The group injury and poisoning is missing in three countries. Therefore the comparison of these groups should be guided with extra caution.

A final thing to note is that the percentages do not sum up to 100% in all cases. In most cases this is due to rounding errors. In the UK this will not be the case, because the difference there is too large.

In order to study some details behind these numbers and to perform a more comprehensive comparison a selection out of these countries was made. This was done according to the following criteria: base-year used (around the end of the 1990’s, for reasons of comparability) and the availability of background material.
The first criterion was met by Australia, Canada, Germany, Japan, the Netherlands and France.

Table 2: COI for ten countries, as percentage of total health care costs.

	AUS 2000	CAN 1998	FRA 1998	GER 2002	JAP 1999	NETH 2003	SPA 1993	SWE 1991	UK 1993	USA 1995	Var. coeff.[6]
Infectious diseases	2,1	1,1	2,1	1,7	3,0	2,4	3,1	2,0	3,7	2,3	31,7
Neoplasms	5,1	2,9	5,3	6,6	11,0	5,0	5,8	5,6	8,3	5,4	35,9
Endocrine, nutritional and metabolic diseases[1]	4,2	1,9	2,8	5,8	6,6	2,6	4,5	3,4	2,9	4,3	37,9
Diseases of the blood / blood-forming organs	-	0,3	0,4	0,6	0,6	0,5	0,6	0,5	1,6	0,6	61,1
Mental and behavioural disorders	6,5	5,6	9,4	10,0	6,8	15,6	4,0	18,4	14,4	9,4	43,6
Diseases of the nervous system[2]	8,6	3,4	7,4	7,9	7,4	7,3	5,7	5,8	3,4	8,4	29,8
Diseases of the circulatory system	9,6	8,1	10,7	15,8	22,9	10,9	14,8	16,9	25,7	16,9	37,7
Diseases of the respiratory system	6,5	4,1	6,2	5,5	8,6	4,6	13,5	7,7	9,8	7,8	37,3
Diseases of the digestive system[1]	10,9	4,2	10,5	13,9	7,4	10,2	8,7	4,6	8,3	11,4	33,6
Diseases of the genitourinary system	3,6	3,1	5,2	4,0	7,1	3,6	5,0	3,8	6,8	4,8	29,1
Pregnancy and childbirth[3]	2,3	1,5	2,8	1,7	0,9	3,3	7,0	1,6	-	0,5	80,7
Diseases of the skin and subcutaneous tissue	2,4	1,8	1,4	1,8	1,9	1,9	2,9	2,0	3,1	2,4	24,7
Diseases of the musculoskeletal system	8,1	3,2	6,2	11,3	7,7	7,7	3,3	5,4	7,3	6,4	35,8
Congenital malformations and chromosomal abnormalities[4]	0,4	0,2	0,4	0,6	0,3	0,6	0,4	1,2	-	0,6	56,0
Certain conditions originating in the perinatal period	0,6	0,4	0,6	0,4	0,4	0,8	0,7	0,6	-	0,4	28,1
Symptoms, signs and ill-defined conditions	9,7	2,1	3,5	5,5	0,9	9,4	13,1	5,6	-	3,0	69,3
Accidents	-	-	-	-	-	3,6	-	5,6	-		30,7
Injury and poisoning	7,0	3,8	5,6	4,7	6,6		7,0	-	-	9,1	27,8
Additional categories[5]	-	6,9	2,8	2,3	-	0,8	-	-	-	6,3	69,3
Unallocated	12,5	45,4	16,9	-	-	9,3	-	9,2	-		82,0
Total cost	100,1	100,0	100,2	100,0	100,1	100,0	100,1	99,9	95,3	100,0	

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; JAP=Japan; NETH=Netherlands; SPA=Spain; SWE=Sweden; UK=United Kingdom; USA=United States of America.

[1] In the Australian study oral health was separated from diseases of the digestive system. The same happened with diabetes that was separated from endocrine diseases.

[2] Diseases of the nervous system includes for Germany diseases of the eye and ear, reported separately in the German study. Furthermore for Australia all dementia and Alzheimer's disease expenditure were included in diseases of the nervous system.

[3] For Australia some categories originally had different names. Pregnancy and childbirth was called maternal conditions and the perinatal period was called neonatal in the Australian study. This difference in definition however has not influenced the percentage of expenditures allocated to these disease-groups.

[4] Congenital malformations in ICD-10 includes Down's syndrome (this counts for Australia, France and Germany). For the Netherlands (and the rest), this group is included in mental disorders.

[5] Additional categories for Canada consits of 3,8% "Others" and 3,1% "Well patient care"; for Germany these were called "Factors influencing health status and contact with health services". The French called this group "autres motifs".

[6] Variation coefficient = standard deviation / average

Further characteristics of these countries and their COI studies are shown in table 3.

Table 3: Characteristics of the countries and COI-studies

		AUS	CAN	FRA	GER	JAP	NETH
		2000	1998	1998	2002	1999	2003
1	Total health exp in NCU[1] million	61.661	83.738	134.318	234.966	-	57.529
2	OECD total health expenditure[2]	60.368	82.480	121.186	230.592	37538,34	45.113
3	(1) in US$ million[3]	35.849	56.580	149.242	221.666	-	64.639
4	(2) in US$ million	35.098	55.730	134.651	217.540	274.605	50.530
5	per capita health exp (1) in US$	1872	1870	2556	2687	-	3984
6	per capita health exp (1) in US$ PPP[4]	2458	2326	2476	2970	-	3854
7	per capita health exp (2) in US$	1833	1842	2306	2637	2168	3124
8	per capita health exp (2) in US$ PPP	2406	2291	2234	2915	1752	3022
9	GDP in NCU million	671.120	900.350	1.305.852	2.110.400	507224,3	454.276
10	health exp (1) as % of GDP	9,20%	9,30%	10,30%	11,10%	-	12,70%
11	health exp (2) as % of GDP	9,00%	9,20%	9,30%	10,90%	7,10%	9,90%
12	Total COI in NCU mln.	60.897	83.955	110.429	223.612	24013,2	45.113
13	(12) in US$ million	33.312	56.726	122.699	210.955	183,4	50.689
14	allocated to disease NCU	50.146	45.821	91.813	223.612	-	38.915
15	% of total COI expenditure	82,30%	54,60%	83,10%	100,00%	-	86,30%
	Other characteristics of COI studies						
16	ICD-version used in COI study	ICD-10	ICD-9	ICD-9 / ICD-10	ICD-10	ICD-9	ICD-9
17	Number of (main)sectors	(7) 20	(5) 24	(6) 29	(8)19	-	(21)81
18	Number of age groups	10	6	-	6	-	21
19	Male/female ratio in expenditure[5]	44/56	45/55	-	40/60	-	42/58

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; JAP=Japan; NETH=Netherlands.

[1] NCU = National Currency Unit; Source: AUS: Australian Institute of Health and Welfare / CAN: Canadian Institute for Health Information / GER: Federal Statistical Office Germany / NETH: CBS (Statistics Netherlands)/ FRA: Ministère de la Santé (DREES)

[2] Source: OECD Health Data 2005 or COI study (Neth)

[3] 1 US$ = 1.72 AUD ('00) / 1.48 CAD ('98) / €1.06 ('02) / 130.91 YEN ('99) / €0.94 ('99) / €0.9 EUR ('98); Source: OECD Health Data 2005

[4] PPP based on OECD-PPP data 2005 (PPP for GDP), based on national inflation levels; 1 US$ = 1.31 AUD ('00) / 1.19 CAD ('98) / €0.96 GER ('02) / 162 YEN ('99) / €0.93 NETH ('99) / €0.93 FRA ('98)

[5] All male/female ratios are based on total direct COI per sex.

3.2 Relation with health expenditure

Total COI (*table 2* and *table 3*: row 12) differs in all countries from total health expenditure, as measured by the OECD and national institutions. Large differences between the two therefore might indicate that some expenditures are missing in the COI studies.

There is not only a difference between COI and health expenditure. Health expenditure in itself is also measured differently in various cases. Health expenditure measured nationally (*table 3*: row 1), out of national health accounts/national statistics) can differ from health expenditure according to the OECD (*table 3*: row 2). In all cases OECD health expenditure is lower than the national computation. This is caused by a difference in defining what health expenditure actually is.
The OECD defines health expenditure as: the sum of expenditure on activities that—through application of medical, paramedical, and nursing knowledge and technology—has the goals of:

- promoting health and preventing disease;
- curing illness and reducing premature mortality;
- caring for persons affected by chronic illness who require nursing care;
- caring for persons with health-related impairments and disabilities who require nursing care;
- assisting patients to die with dignity;
- providing and administering public health;
- providing and administering health programmes, health insurance and other funding arrangements.

Source: OECD Health Data 2005, Definitions, Sources and Methods.

Activities such as food and hygiene control, health research and development, and training of health workers are considered health-related, but are not included in OECD health expenditure. These are causes of differences between national and OECD measurements. In *chapter 4* these differences will be studied in more detail.
The largest differences are found for the Netherlands and France. Their definition of health expenditure seems to deviate more from the OECD definition. Australia, Canada and Germany show relatively small differences. For Japan no national health expenditure estimation could be found.

In *table 3* (rows 3 and 4) total health expenditure is converted into US$. This is however a limited measure of comparison. In comparing health care expenditure internationally it is more interesting to look at converted expenditure in per capita amounts, because this corrects for differences in number of inhabitants.
Per capita expenditure (*table 3*: rows 5 and 7) ranges from US$ 1872 in Australia to US$ 3,973 in the Netherlands (OECD: US$ 1,833 to US$ 3,124). Next to Australia, Canada also has relatively low health expenditure. France, Germany and especially the Netherlands have higher health expenditure (*table 3*: row 5). The numbers for France and the Netherlands however significantly go downwards when using the OECD standards.

A problem with these per capita measures is that the reference year is different in all these studies. This makes a comparison of nominal measures more difficult. The different base-years are used, because these are the base-years of the different COI studies. As there is no information on changes in health care use within sectors and by diseases over years for these countries an adjustment would require too many assumptions and probably weaken the results. Because of this problem the COI estimations in

percentages should be the main focus of the comparison and after that the per capita amounts.

The relatively high per capita cost of Germany and the Netherlands might therefore be caused by the use of a more recent base-year. However in other studies, using one base-year, Germany has relatively high total health expenditures too (e.g. Orosz and Morgan, 2004). The next figure shows per capita health expenditure between 1975 and 2003. Germany has the highest health expenditure for almost all years, followed by Canada and France. However in the final years expenditures seem to converge. Japan has lowest expenditures for all years.
It shows that the relatively high expenditures for the Netherlands are influenced by the use of a more recent base-year. If expenditures of for example 1999 would be used, the picture would be different for the Netherlands (considering the steep rise in expenditures in recent years).

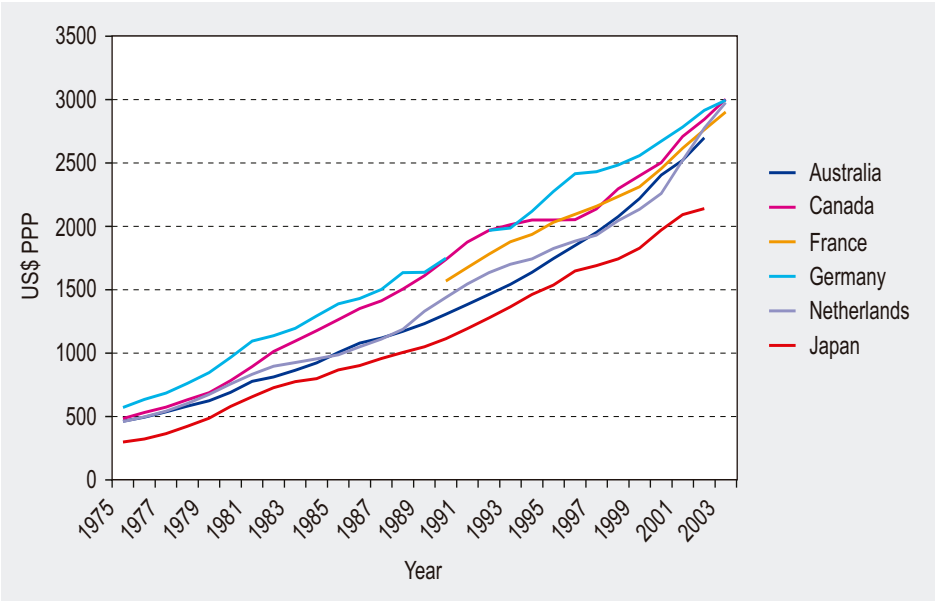


Figure 1: Per capita health expenditure in six countries, 1975-2002 (US$ PPP)
Source: OECD Health Data 2005

Figure 1 shows health expenditure using Purchasing Power Parities (PPP). This measure removes the problem that health expenditure converted by an exchange rate does not take differences in relative prices into account. What you can buy for one US dollar in e.g. USA or Australia can differ a lot. Furthermore the exchange rate is highly sensitive for fluctuations in the US$. Therefore health expenditure in dollars might be incomparable between different years.
The PPPs do correct for price differences. Calculating expenditure through PPP changes per capita expenditure for most countries (*table 3*: rows 6 and 8). France shows a small

drop, but health expenditure for Japan decreased significantly (this means that goods in Japan are relatively expensive). Australia, Canada and Germany all experience a significant rise in per capita expenditure due to this correction, showing that goods in these countries are relatively cheap. For the Netherlands there is hardly any difference.
A disadvantage of the PPP is its composition. The value of the PPP depends on the goods that are put into the PPP conversion rate. If health care goods are not or only partially included (which is often the case), health care price differences will be omitted. Therefore differences in health care prices are shortly addressed at the end of this report (*section 6.4*)

Another way of presenting health expenditure is health expenditure as percentage of GDP. Most countries spend around 9 or 10% of their GDP on health, using the OECD definition (*table 2*: row 11). Germany has the highest health expenditure as percentage of GDP (10.9%). *Table 2* also shows that it is important to note what definition of health expenditure is used. If the definition of health expenditure for the Netherlands according to the National Health Accounts (NHA) is used this will increase the percentage to 12.6%.
Japan has lowest health expenditure/GDP, namely 7%. This is also caused by a relatively high GDP in Japan.
In the rest of the study, when looking at cost of specific disease and age groups, the relation of costs to GDP will be dropped. First of all these western countries are on a relatively similar income level, therefore per capita amounts can be compared without looking at the income level. Furthermore a division of expenditure over GDP on disaggregated levels of expenditure would lead to very small and less useful/comparable numbers than per capita expenditure.

3.3 Details of COI studies

The COI studies use the ICD-classification system to classify diseases. The ICD-system was developed by the World Health Organization (WHO) to classify diseases into different categories. In the COI studies two different versions are in use: the ICD-9 and ICD-10 version. Australia and Germany used the ICD-10, Canada, Japan and the Netherlands used the ICD-9 (*table 2* is based on the ICD-9 order) and France used a combination of both. The ICD classification first separates ICD-chapters (disease groups) as in *table 2* and each chapter in itself contains specific diseases. For example the ICD-chapter neoplasms includes specific diseases like lung cancer, breast cancer et cetera.
Some diseases in ICD-9 have shifted to another disease group in ICD-10. From mental disorders in ICD-9 Alzheimer dementia moved to diseases of the nervous system (this is however only used in the Australian study, as Germany kept dementia in mental disorders). Procreative management like e.g. in vitro fertilization and artificial insemination moved from diseases of the genitourinary system to a new group: “Factors influencing health status and contact with health services”. Another switch was contraception (incl. e.g. sterilization) moving from pregnancy and childbirth to Factors influencing

health status and contact with health services (the latter group is included in Additional categories in *table 2*).
The change of Alzheimer dementias is of significant importance for the Australian figures. The other changes have relatively minor effects. Furthermore because of the level of aggregation (the comparison will be mostly performed on national or disease group level) the actual influence of these changes might be diminished.

All studies, except France and Japan, included an allocation of COI to gender and age. The number of age groups (and therefore the range of these age groups) differs. The countries that estimated gender differentiation in costs show similar results. In Germany the difference between men and women is largest, namely 40% of total cost for men and 60% for women. In the other countries the 'male-part' is a few percentage-points higher. The higher proportion of costs for women in Germany is probably related to a demographic difference as the proportion of women in the population is 51.1% in Germany compared to 50.5% in the Netherlands and 50.4% in Australia. This difference is mainly caused by a relatively high proportion of women in the oldest age groups in Germany. In the 85+ group Germany are 3.2 times more women than men (FedStat), whereas in the Netherlands the fraction is 2.8 (CBS) and in Australia 2.2 (ABS).

Unfortunately for Japan no background material could be found. Most of the characteristics in *table 3* were therefore unavailable. For this reason Japan was dropped in the rest of the analysis.
From this overview chapter can be concluded that the COI studies show diverging results for the various countries. Polder et al. (2005) gives six reasons why differences might occur. These are differences in health supply, differences in the definition of health expenditure, differences between COI and total health expenditure, different data and methods used for allocation to disease, epidemiological and demographic differences and finally cross-national variations in treatment methods. In the introduction these factors were already mentioned and will be worked out in the next chapters.

It will be useful to know more about health care in the countries first. In the next chapter therefore the five countries (Australia, Canada, Germany, the Netherlands and France) will be studied in more detail. With a closer look at the health care system, how it is financed and what sectors and providers are included in the COI estimates, a better comparison of COI data might be reached.

4 HEALTH SYSTEMS AND HEALTH EXPENDITURE

- There are significant differences in the organisation and financing of health care systems across countries.
- Australia and Canada have a universal tax-based insurance system, with a large role for local authorities. The French statutory health insurance system is partly premium and partly tax-based. The French government has an important role in defining premiums and tariffs. In the German system the sickness funds are important players: they purchase care and set insurance premiums. Application is mandatory up to a certain income level. This is relatively similar to the (former) Dutch system which had a mix of national, social and private insurance. The public share in total expenditures is relatively low for the Netherlands
- In all countries hospitals comprise the largest part of all health care costs. Hospital expenditures are mostly covered by national or social insurance in these countries.
- Differences between COI, national and international estimations of health expenditure appear to be small. Most differences between national and international estimations are found outside providers of curative care, mainly in long-term care.

In this chapter each country is studied in the same way. First a (short) description of the health system is given, with a main look at the way it is financed (public versus private), what kind of health care is financed and to what extent. In the second part of each country's section the COI study is compared to health expenditure as reported in national accounts. Most countries (through governments and statistical offices) give an overview of all health expenditure through national accounts. These results are compared with the COI studies, focusing mainly on the provider breakdown in expenditures (different providers, e.g. hospitals, physicians). The names of the sectors can vary somewhat between the countries.
Finally these national accounts are compared to the OECD data on health expenditure. This shows whether the national figures on health expenditure can be compared internationally and what sectors might be in- or excluded in the studies in order to make them more comparable.

The OECD studies health expenditure using the System of Health Accounts (SHA). The OECD developed the SHA to get a framework that provides "a set of comprehensive, consistent and flexible accounts" (...) "for enhancing the comparability of data over time and across countries" (OECD 2000; p.3).
The SHA has three different dimensions: health expenditure by functions of health care, by providers of health care and by source of funding. In this study the provider classification is used, because it has the best link with the content of the COI studies (*appendix B-E* for the SHA-provider categorisation).

The countries compared in this study all fall in the group that closely follows the SHA guidelines in reporting their national health accounts. However the comparability is still not optimal, especially in estimating long-term nursing care (OECD Health Data 2005, Definitions Sources and Methods). First of all long-term nursing care is in most countries (partly) financed by sources outside health financing. Long-term care is often included in social security. Furthermore there exist some differences in estimating long-term care expenditure. Related to this is the, sometimes hard to find line between what can be defined as health care and what as social care.
According to Orosz and Morgan (2004) differences in calculating long-term care expenditure can result in differences in total health expenditure up to 10%. Orosz and Morgan also mention that services financed by non-profit institutions and organizations might be excluded from total expenditures and data on investments and capital formation might be incomplete. They estimate an influence on total health expenditure of the latter two of 1 or 2%.

Van Mosseveld (2003) mentions some possible drawbacks in comparing health expenditure data with the SHA: activities are the basis of the SHA and therefore international differences in performed activities by each provider may cause incomparability. Some providers might provide health and non-health related services together, with health care as their primary or secondary objective. This can create problems in defining what should be included in their expenditure. Van Mosseveld states however that the SHA overall has improved comparability of health expenditure across countries.

4.1 Australia

Health system
In the early 70's national health insurance was introduced in Australia. This so-called "Medibank" scheme had to provide universal health insurance and was tax-funded. However in the late 70's a switch was made to more private health insurance. This resulted in the fact that more and more people became uninsured (for e.g. hospital treatment). A new government in the 80's responded to this with the 're-introduction' of a universal tax-based health insurance system, Medicare, which still exists.
Medicare covers health care in public hospitals, most (free to choose) general practitioner (GP) care and some specialist services (e.g. radiology/pathology testing, eye-tests). The use of these services has no limit. Treatment in private hospitals is mostly partially covered. Medicare does not cover e.g. dental care, ambulance services and home nursing.

The Commonwealth is the body that collects all taxes used for Medicare. There exists a special "Medicare levy" (up to a maximum of 1.5% of taxable income) but this is just a small part of total public funding (8.5 % of total health expenditure while total public tax-funding lies around 70%, Hilless and Healy., 2001). Another important scheme

administered by the Commonwealth in financing health care is the Pharmaceutical Benefits Scheme (PBS). The PBS scheme subsidizes the acquisition of pharmaceuticals. Aged residential care is another area in health care subsidized by the Commonwealth.

There are two groups with special funding schemes; the veterans and the inherent Australians. The veterans and their dependents get health care insurance through the Veterans Affairs. The inherent Australians have a special fund for additional primary care.

According to OECD estimates (Ingham et al., 2004) in 2000 68.8% of total health expenditure was financed publicly (of which 68% by central government and 32% by states). The rest was privately financed (via out of pocket payments (OOP), private or corporate). The national government in the late '90s has tried to stimulate private insurance. For example in 1999 a subsidy was introduced for people who take private health insurance.

Ingham et al. found that in 2000 governmental financing went for a reasonable part to hospitals (42.1%) and ambulatory care (31.8%). Furthermore private financing was mostly used for ambulatory care and 'retail sale and other medical goods'. The OOP payments were mainly used for 'retail sale and other medical goods' (mostly the ones that fall outside the PBS) and ambulatory care. E.g. 73% of dental services, not included in Medicare, is covered by private OOP.

The Australian government focuses on seven disease-areas that are regarded as having the biggest influence on the burden of disease in Australia. These are the so-called National Health Priority Areas (NHPA). The NHPA contain cardiovascular health, cancer control, injury prevention and control, mental health, musculoskeletal conditions, diabetes mellitus and asthma. These seven areas account for 45.3% of disease-allocated health expenditure (Goss, 2005).

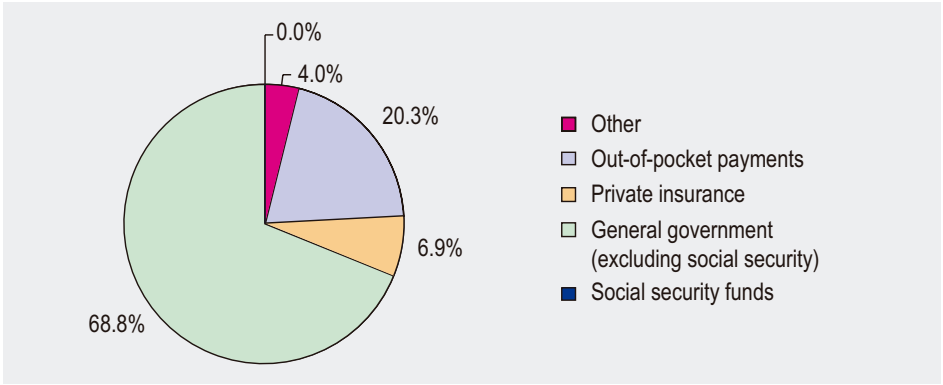


Figure 2: Total health expenditure in Australia in 2000 (AUD$ 60,368 million) by financing agent AUD=Australian Dollars Source: Ingham et al., 2004

Next to these NHPA there has also been a focus on cost-containment in health care. The main focus was on medical (Medicare) and pharmaceutical benefits (PBS), hospital case-mix funding and price/volume agreements with providers. The government for example tried to keep drug prices within the PBS relatively low.

In addition to the national government the six states and two Territories Australia consists of, are also responsible for the funding and provision of health care (State level). The states are funded by the Commonwealth, but are also able to create their own funds (e.g. extra tax levies). The states have the autonomy to organize health care inside their state. They make their budgets and define the allocation of their resources. This results in differences between states in health policy and organization.
There are significant differences in expenditures between the different states that might be a result of these different policies. The Northern Territory e.g. has large per capita expenditures compared to the other states (in 1997: AUS $1,390 compared to AUS $643- AUS $786 for the other states, Hilless and Healy).

Not only the public sector, but also the private sector has significant influence in Australia. This is more in the field of provision than financing. Most important in private care are the physicians (mostly funded through Medicare), private hospitals (in 1998 30% of hospitals was private, Hilless et al.), diagnostic services and private insurers.

COI compared to other sources
Next to the COI study health expenditure data for Australia are collected by the Australian Institute of Health and Welfare (AIHW, 2004) and the OECD (Ingham et al.). The AIHW stores data on health and welfare on various health related topics. (The COI study is also performed by someone from the AIHW (Goss), but to prevent confusion it will be named COI).

In *table 4* the expenditure data from the AIHW and the COI-study are compared. There seems to be a very good match between the two data sources. This is probably caused by the fact that a part of the COI groups/sectors are based on the AIHW expenditures.

The expenditures on some sectors in the COI study were based on surveys, e.g. Bettering the Evaluation and Care of Health (BEACH) survey. This can be a further explanation (next to the reported footnotes) of differences between the two sources. Actual expenditures can differ from expenditure estimates from surveys.
The two different national health expenditure data are almost similar. This means that the COI data are a reasonable representation of national health expenditure.

For international comparability the AIHW and OECD data are examined. *Table 5* shows the link between the AIHW study and SHA data (for a more detailed classification to providers see *appendix B*). Like the national comparison (*table 4*), *table 5* also shows a reasonable match between the AIHW figures and, this time, the SHA data.
The provider groups HP.1 until HP.4 (in both cases responsible for 95% of total current expenditure on health) are almost equal; there are some small differences (see also

Table 4: Australian comparison AIHW/COI health expenditure 2000 (AUD$ million)

	AIHW	COI6
Hospitals[1]	20.377	20.377
High level residential care[2]	4.153	3.899
Ambulance	1.002	994
Medical services[3]	10.255	10.107
Other professional services	2.456	2.440
Pharmaceuticals	8.085	8.085
Aids and appliances	2.217	2.108
Dental services[4]	3.448	3.084
Administration	1.924	1.924
Research	1.114	1.182
Other services[5]	3.029	3.096
Total (excl. capital)	**58.060**	**57.296**
Capital formation	3.601	3.601
Total health expenditure	**61.661**	**60.897**

AIHW=Australian Institute of Health and Welfare; AUD=Australian Dollars

[1] Hospital costs in COI study were originally AUD$ 22030 million. These included services provided to private in-patients in hospitals. In the AIHW figures these are included in medical services. Therefore the difference of (22030-20377 =) AUD$ 1653 million was re-allocated in the COI estimates to medical services.

[2] High level residential care in the COI study mainly includes aged care.

[3] Medical services in COI equals AUD$ 8454 + AUD$ 1653 = AUD$ 10107 million (see footnote 1).

[4] Dental services in the AIHW study also includes maxiofacial surgery items listed in the Medical Benefits Schedule.

[5] Other services in the AIHW study include the AIHW categories Community health and Public health. Other services in the COI are the COI categories Community mental health. Public health cancer screening and Other community and public health.

[6] AUS$ 7150 million of AUD$ 57296 million in the COI study could not be allocated to diseases. This consists of Ambulance, Aids and appliances, Administration and a part (AUD$ 2124 million) of Other services.

appendix B). Long-term care/HP.2 in Australia is defined using the Residential Classification Scale. The facilities with residents being most dependant, levels 1 to 4 (out of 8) on the scale, are included in this group. The other levels are non-health expenditure.

A relatively large difference is found in HP.5, where the expenditures on public health according to the OECD are relatively small. This might be due to a more general definition of public health employed by the AIHW, which is also the case for general health administration and insurance. The differences of these two groups might be related to each other.

Expenditures on research are not included in the OECD estimation of total health expenditure. The AIHW and COI study do include this item. In addition both studies do not include HP.7 and HP.9.

Overall the COI numbers for Australia match well with the national and OECD accounts.

Table 5: Australian comparison OECD/AIHW health expenditure 2000 (AUD$ million)

SHA provider classification		OECD	AIHW
HP.1	Hospitals	20.376	20.377
HP.2	Nursing and residential care facilities	4.153	4.153
HP.3	Providers of ambulatory care	19.281	19.297
HP.4	Retail sale and other providers of medical goods	10.303	10.302
HP.5	Provision and administration of public health	24	893
HP.6	General health administration and insurance	2.630	1.924
HP.7	Other industries (rest of the economy)	-	-
HP.9	Rest of the world	-	-
Total current expenditure on health		**56.767**	**56.946**
	Capital formation of health care provider institutions	3.601	3.601
	Research	-	1.114
Total health expenditure		**60.368**	**61.661**

AIHW=Australian Institute of Health and Welfare; AUD=Australian Dollars; SHA=System of Health Accounts; HP=Health Provider classification

4.2 Canada

Health system

The basic structure of the Canadian health care system is often compared with other publicly funded systems as e.g. Australia. Like Australia, the Canadian system is often mentioned as a national health system (Klatt, 2000). It is funded through taxation and should, according to national law, meet the following criteria: accessibility, comprehensiveness, portability, public administration and universality (Canada Health Act, 1984).

Like Australia it is not just the federal government but also provincial and local governments that play an important role in health care. The exact actors in the public sector in Canada are government, provincial government, municipal governments (municipals of provinces) and social security funds (e.g. workers' funds).

The provincial governments have the responsibility to organise and plan health care. These provinces are also able to raise extra (provincial) taxes for health care purposes. Each province has to meet the five criteria mentioned before (accessibility etc.) to get full possible federal support.

Per capita health care costs do not differ a lot between the provinces and territories. They range from CAD$ 2,500 to CAD$ 3,200, with one exception namely the Northwest Territories. This province has per capita health care costs of CAD$ 5,244 (CIHI, 2004).

The Canadian Medicare system covers almost all hospital and (primary) physician care. Compared to the Australian system however there is very little coverage for pharmaceuticals. Other care providers as dentists and optometrists fall almost wholly outside the public health insurance.

The Canadian government finances about 70% of total health expenditure (CIHI). Almost 92% of this public sector financing comes from provincial governments, but includes funds originally collected by the national government. These transfers to support provincial governments fall since 1996 under the Canada Health and Social Transfer (CHST). The CHST transfer is one payment from federal to provincial government that should support provinces in reaching the Health Act goals. (The CHST is nowadays split up into five major categories).
Governmental insurance takes care of universal coverage for 'medically necessary' hospital and medical services. The largest part of provincial financing is used for hospital care (in 1998 42%, CIHI) and physician care (in 1998 20%, CIHI). About 10% of provincial financing is used for care in other institutions (residential care facilities). The direct federal government expenditures are mostly in the area of public health (research, promotion, protection).
Figure 3 shows how health expenditures for Canada in 1999 are divided over different financing agents, according to OECD estimations.

The private sector entails OOP and private (commercial and not-for-profit) insurance (about 30% of total expenditures). Notable here is that private insurance consists for 90% of so-called private social insurance. This private social insurance exists of so-called private insurance 'group plans'. These are group-insurances mostly provided through employers.

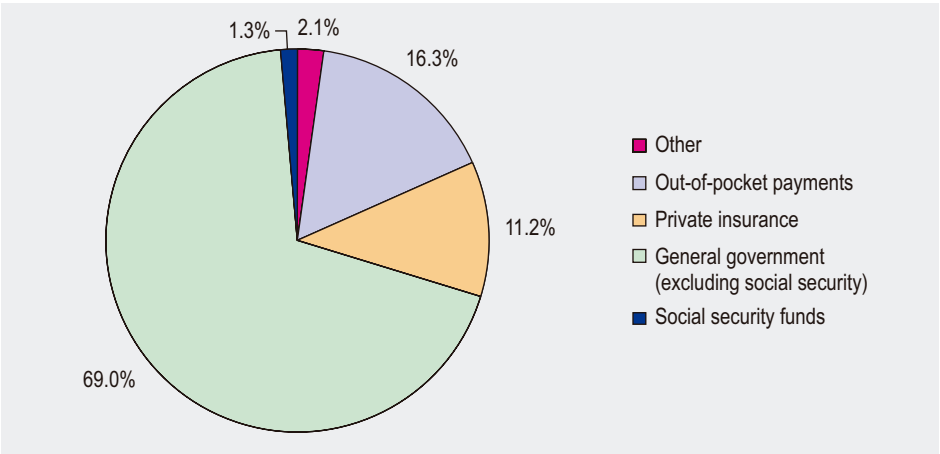


Figure 3: Total health expenditure in Canada in 1999 (CAD 87,089 million) by financing agent
CAD=Canadian Dollars
Source: Fortin G, 2004

Private insurance is mostly additional to public insurance and covers the care not covered by public funds. The largest part of private sector financing (OOP, private social insurance and non-consumption) is used for pharmaceuticals (34%, CIHI) and dental services (25%, CIHI). More than half of the OOP-payments is used for medical goods (Fortin, 2004).
Furthermore there is a so-called 'non-consumption' portion in private financing. This includes e.g. donations, health research funded by the private sector and private investment in capital (2.1% of total health expenditure). Private health insurance has been promoted in recent years by federal government through subsidies on private insurance.
The private sector also has its role in the provision of health care. Most important in these are the physicians who often work in private practice. The provision of hospital care in contrast is almost entirely public, a very small percentage is privately owned. Hospitals are also almost completely financed by the public sector (approximately 90%, Fortin).

COI compared to other sources
The COI data can easily be compared with national data from the Canadian Institute for Health Information (CIHI). The COI data for the different sectors are mostly based on these national health expenditure numbers.

Table 6 shows that both reports have very similar expenditures for all areas. Other services expenditure in the CIHI report were not differentiated further. This caused some small problems in the comparison with the international SHA classification (see *table 7*).

The OECD (OECD Health Data, 2005) only reports data for the main provider categories for the year 1998. A further separation (see *appendix C*) was not made. The main differences between OECD and CIHI estimations of expenditure are in HP.4 and the extra category Undistributed. In HP.4 the difference lies in the fact that CIHI does not include expenditures on hearing aids and other appliances here. This category is included in Undistributed. The category Undistributed includes areas out of the CIHI category "Other services" (see *table 6*).
HP.3 also has a (small) difference. This is caused by the fact that home health care and medical transport expenditures are included in Undistributed and not in HP.3. Expenditure on the group Rest of the World was not included. In general there is also for Canada a good match between the different national and international data.

Table 6: Canadian comparison CIHI/COI health expenditure 1998 (CAD$ million)

	CIHI	COI[4]
Hospitals	27.082	27.638
Other institutions[1]	7.983	8.045
Physicians	11.716	11.686
Dental services	6.278	6.350
Vision care services	2.275	2.311
Other professionals	1.528	1.579
Pharmaceuticals	12.536	12.385
Public health & Administration[2]	5.217	4.883
Research	1.194	1.070
Other services[3]	5.631	5.821
Total	**81.440**	**81.768**
Capital formation	2.298	2.186
Total health expenditure	**83.738**	**83.954**

CAD=Canadian Dollars; CIHI=Canadian Institute for Health Information

[1] Other institutions expenditures are mainly (95%) for nursing homes for the aged, the others are e.g. facilities for alcohol/drug addiction and psychiatrically disabled.

[2] Public health and administration in the COI study only exists of public health (no administration expenditures).

[3] Other services in CIHI includes pre-payment administration and other health spending (medical transportation, hearing aids and appliances, occupational and voluntary health associations and explicitly identified home care). Other services in COI also includes training of health workers and some of the administration not included in Public health and Administration. The exact classification in COI is Ambulance, Home Care, Pre-payment administration and All other health expenditures.

[4] In the COI study 45.4% of total health expenditure could not be allocated to diseases. These are the entire sectors Other institutions, Dental services, Vision care services, Other professionals, Public health and administration and Other services. Furthermore 5% of Hospitals (CAD$ 1353 million), 25% of Pharmaceuticals (CAD$ 3067 million), 16% of Physicians (CAD$ 1895 million) and 60% of Research (CAD$ 644 million) are not allocated to disease.

Table 7: Canadian comparison OECD/CIHI health expenditure 1998 (CAD$ million)

SHA provider classification		OECD	CIHI
HP.1	Hospitals	27.082	27.082
HP.2	Nursing and residential care facilities	7.983	7.983
HP.3	Providers of ambulatory care	22.860	21.797
HP.4	Retail sale and other providers of medical goods	14.702	12.536
HP.5	Provision and administration of public health	5.232	5.217
HP.6	General health administration and insurance	1.471	1.471
HP.7	Other industries (rest of the economy)	237	-
HP.9	Rest of the world	-	-
Total current expenditure on health care		**79.567**	**76.086**
	Capital formation of health care provider institutions	2.298	2.298
	Research	-	1.194
	Undistributed[1]	614	4.160
Total health expenditure		**82.479**	**83.738**

CAD=Canadian Dollars; CIHI=Canadian Institute for Health Information; SHA=System of Health Accounts; HP=Health Provider classification.

[1] Undistributed expenditures in CIHI include e.g. ambulance and home care. In the CIHI report Undistributed is classified as 'other' in Other health spending.

4.3 France

Health system

The health system of France cannot be defined very easily. Health insurance in France is part of its social security system covering illness, disability, maternity, old age and death. Insurance funds started (after World War II) as primary health insurers. They provided coverage for workers through wage-related premiums. During the last three decades there have been some reasonable changes. In a search for universal health insurance the government tried to gain more and more control over health insurance funds and health care in general. The government took control over insurance premium levels and prices of medical goods. It furthermore enlarged the coverage of health insurance to a universal level.

Easy access to care is an important issue in French health care. This is reflected in the freedom of choice for patients with respect to their health care provider and a large supply of doctors.

In 1996 the Juppé-reforms made a substitution to partly tax-based funding and more control for the French parliament in health care organization. Sandier et al (2004) describe the situation as follows: "The division of power between the state and the health insurance funds has always been problematic" and "the division of responsibilities remains unclear".

Health insurance nowadays is statutory and covers all French residents. It is mainly based on the residents' profession, resulting in three leading insurance schemes: the Régime général (employees in industry and students/unemployed/elderly), the agricultural scheme, and the self-employed/non-agricultural workers fund.

Financing of statutory health insurance was (until the mid 90's) based on contributions from employers and employees. As mentioned, in the mid-90's a tax-based contribution was introduced (General social contribution) taking care of 35% of statutory insurance nowadays (employer/employee contributions now cover 55%, compared to 95% before the tax-introduction, Sandier et al.).

The statutory insurance system (partially) covers a wide range of health care services: on average 90% of hospital care costs, outpatient care varying from 35% reimbursement of dental care costs to around 75% for GPs and specialists. Reimbursement of pharmaceutical expenditure ranges from 35% to 100% and is on average for around 60% covered by public insurance (Sandier et al).

Health expenditures that are not reimbursed by statutory health insurance are covered by voluntary health insurance (VHI) or out of pocket payments. VHI is governed by private for profit, private non-profit and so-called mutual insurance associations.

In the OECD Health Data (see *figure 4*) these voluntary health insurance institutions are wholly grouped in private insurance. According to the OECD the social security funds (statutory health insurance) cover almost ¾ of total health expenditure. Voluntary health insurance and OOP-payments cover the rest of health expenditures.

At the provider side health professionals practice within national agreements set for periods of about four or five years. These agreements are determined by health pro-

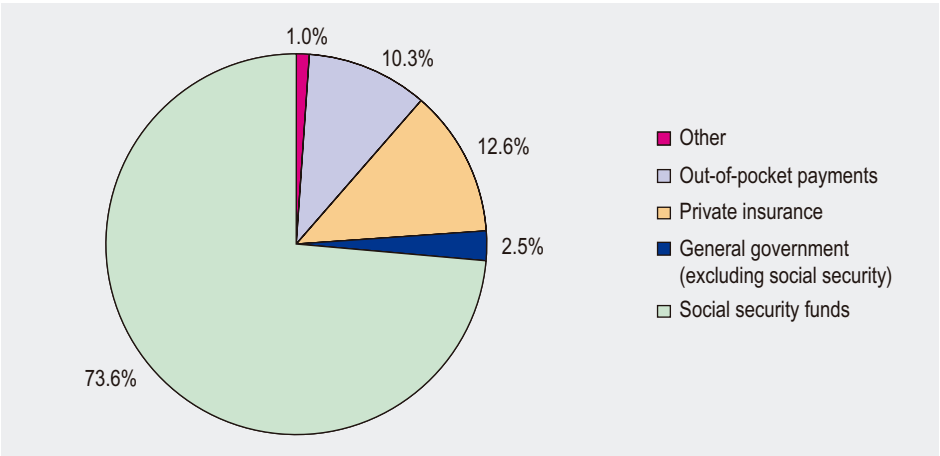


Figure 4: Total health expenditure in France in 1998 (€121,186 million) by financing agent
Source: OECD Health Data 2005

fessionals and health insurance funds and form the tariffs health professionals can charge. Hospitals are only for 25% public, but these public hospitals cover 75% of all hospital beds. Public hospitals are divided into general, regional and local hospitals (in numbers respectively: 560, 30, 350, Sandier et al.). Local hospitals are unable to do surgery treatment or do treatments in case of childbirth. Residential care and care for the elderly are divided into social and health care.

COI compared to other sources

In *table 8* health expenditures according to the COI study are compared to data from the French Ministry of Health (Direction de la recherche, des études, de l'évaluation et des statistiques, DREES; Fenina and Geoffroy, 2005). Differences occur in a number of categories (see footnotes). These are mostly due to the calculation method of health expenditures for a certain year, which takes three years. The COI study based its results on the first (preliminary) results and the DREES results are based on the definitive numbers.

Table 8 shows that (long-term) hospital-care for elderly is included in Hospitals in the COI-study, but is part of aged care in DREES. There are also some categories in the DREES study that are not included in the COI report, causing a relatively large gap in total health expenditures. These are: administration, prevention and the group "extra" (see footnote). There appeared to be double counting in the DREES report: a part of expenditures on pharmaceuticals was also reported in Research. This part was removed by means of the item double counting. *Table 9* demonstrates the comparison with the SHA from the OECD Health Data. *Appendix D* gives a detailed description of the categories.

Table 9 shows that there are some differences between what DREES includes in health expenditure and what is included according to the SHA. Some categories had to be set apart of current health expenditure (e.g. Research and education). The difference in hospital expenditures might be similar to the difference in hospital expenditures

Table 8: French comparison DREES/COI health expenditure 1998 (€ million)

	DREES	COI[7]
Hospitals[1]	50.576	52.576
Aged care[2]	2.595	-
Ambulance	1.608	1.557
Physicians	13.977	14.254
Other health professionals[3]	5.547	5.699
Pharmaceuticals	20.522	21.591
Aids and appliances	4.466	5.145
Dental services	6.415	6.265
Administration[4]	10.435	-
Prevention	3.806	-
	DREES	**COI**
Other services[5]	2.816	3.344
Extra[6]	13.607	-
Total	**136.370**	**110.429**
double counting	-2.052	-
Total health expenditure	**134.318**	**110.429**

DREES= Direction de la recherche, des études, de l'évaluation et des statistiques.

[1] Hospitals in DREES includes: short-term and long-term stays, rehabilitation, and psychiatric care. In COI there are furthermore expenditures on aged living in so-called "sections medicalisées" (€1,622 million). In 2001 final estimation: €52,345 million (€52,576 million is used for COI).

[2] Aged care in DREES consists of: home nursing, long term care in hospital care and care in homes for elderly. Nursing care is €454 million of this aged care. In the COI some aged care is included in hospital expenditures.

[3] Other health professionals are: Nurses (including home care COI), Orthoptists, Physiotherapists and Speech-therapists.

[4] Administration in DREES is actually called cout de gestion de la santé, meaning health management.

[5] Other services in COI include: Laboratory (€2,510 million) and Cures thermales (€834 million). DREES includes the same for respectively €2,537 million and €279 million.

[6] Extra includes Research (€4,246 million), Education of health professionals (€754 million), "Aide aux maladies" (compensation for wage loss during illness: €7,065 million) and "Subvention au systéme de soins (social contributions of physicians, paid by government: €1,542 million).

[7] Allocation to diseases could be performed for 83% of €110,429 million. For the different sectors this was: hospitals 92%, ambulatory care (physicians, dentists and other) 76%, ambulance 99%, pharmaceuticals 78% and aids and appliances only 56%.

between DREES and COI. This is related to the inclusion of some long term care in hospitals in DREES included in HP.2.

A significant difference is fo und for HP.6, which might be due to a broader concept of administration in the DREES report, where this group is defined as "Health management (gestion)".

Table 9: French comparison OECD/DREES health expenditure 1998 (€ million)

SHA provider classification		OECD	DREES
HP.1	Hospitals	52.909	50.576
HP.2	Nursing and residential care facilities[1]	1.622	2.595
HP.3	Providers of ambulatory care	30.271	30.363
HP.4	Retail sale and other providers of medical goods	26.724	24.988
HP.5	Provision and administration of public health	3.060	3.806
HP.6	General health administration and insurance	2.188	10.435
HP.7	Other industries (rest of the economy)	1.549	-
HP.9	Rest of the world	-	-
Total current expenditure on health care		**118.323**	**122.763**
	Capital formation of health care provider institutions	2.862	-
	Research		4.246
	Education		754
	Subvention au systeme de soins		1.542
	Aide aux maladies		7.065
	Double-counting		-2.052
Total health expenditure		**121.185**	**134.318**

DREES= Direction de la recherche, des études, de l'évaluation et des statistiques; SHA=System of Health Accounts; HP=Health Provider classification.

[1] Later on in this report this will be slightly adjusted (advised by French COI author). Hospitals namely includes an amount of €2,105 million long-term stays arranged for the elderly and therefore should be moved into HP.2

4.4 Germany

Health system

Germany is often mentioned as the first country that introduced a (statutory) social insurance system (or "Bismarck system"). The German statutory insurance scheme can be divided into four areas: statutory health insurance (SHI), statutory retirement insurance, statutory accident insurance and statutory long-term care insurance. This statutory insurance system is based on contributions from employers and employees to sickness funds that are the actual purchasers of health care. The contributions are wage-related. The sickness funds have the responsibility to set these contribution rates and furthermore to collect contributions and negotiate with providers about payment and prices. People used to be assigned to a sickness fund on the basis of region of residence or on the basis of job characteristics. Since 1996 however people have the right to choose their sickness fund (except the farmers', minors' and sailors' funds where employees are not free to opt out). For employees application to SHI is mandatory up to a certain income level. Above this income level people usually take some form of private health insurance.

The coverage of SHI is regulated in German law and relates to certain packages of health care services. These packages include: prevention of disease, screening of disease, hospital care, dental care, ambulatory medical care, nursing care at home, pharmaceuticals and patient transport. Benefits are all provided as in-kind benefits. The sickness funds furthermore provide cash benefits to employed people becoming sick.

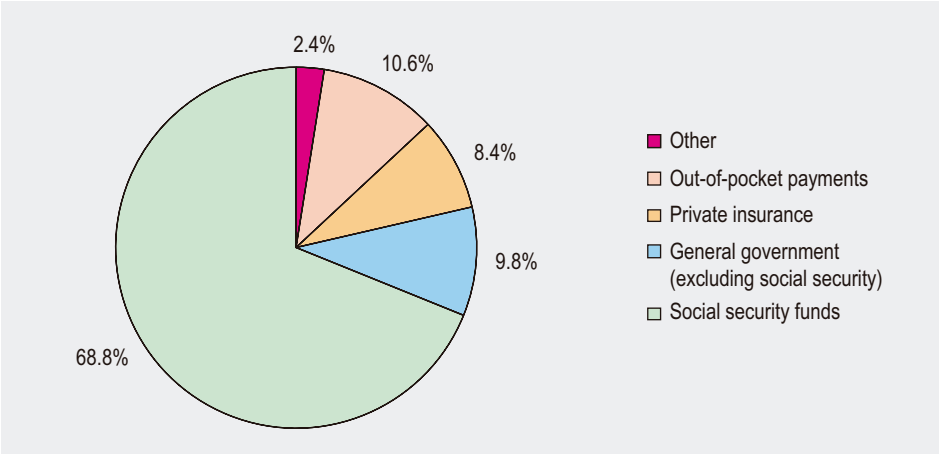


Figure 5: Total health expenditure in Germany in 2001 (€222,003 million) by financing agent
Source: Zifonun, 2004

These are based on the latest salary and range from a minimum of 70% to a maximum of 90%. Total expenditures on benefits in cash are small in proportion to benefits in kind. In 2002 these expenditures were respectively €10.3 billion and €133 billion (Busse and Riesberg, 2004).

The whole statutory insurance scheme finances about 69% of all health expenditures (Zifonun, 2004). The largest part (about 85%) of statutory insurance is borne by statutory health insurance. The rest is divided into 10% long-term care insurance and 2.5% accident and retirement insurance. *Figure 5* shows the division of total health expenditures by financing agent for 2001.

Figure 5 shows that the general government finances almost 10% of total health expenditure. This part is funded through taxes and used for e.g. hospital investments, research and education. They are also used to (partially) take over health care contributions of artists, students, unemployed and governmental employees as police, military and other officials.
Another responsibility of the federal government is the development of a risk-adjustment scheme. This risk-adjustment scheme (or: risk-compensation scheme) is an important feature of the German health care system. The risk-adjustment scheme (in practice the sickness funds) "collects" the contributions from people assigned to SHI and re-allocates contributions over the sickness funds. This re-allocation compensates certain sickness funds for having a population that is more likely to use health care. The compensation is based on differences in age, sex and disability of the insured people of each sickness fund. In this way all sickness funds will get the resources they need to be able to purchase care for the group they insure.
Private health insurance is used to cover health care that falls outside the SHI and in addition to cover health care to people with an income above the SHI-limit. Out-of-

pocket payments (based on a total of €222,003 million, Zifonun 2004) were mainly used for pharmaceuticals and aids and appliances (48% of OOP payments).

Important in the provision of (ambulatory) care are contracts between sickness funds and health care providers. Patients are in principle free to choose their physician, dentist and pharmacist. Ambulatory care is mainly provided by private for-profit providers. In the hospital sector this is different with 92% of all hospital beds provided by public and non-profit making organizations.

COI compared to other sources

The Federal Statistical Office Germany (FedStat) is the German institution that reports the national health accounts. Besides they are also the providers of the COI data. In table 10 data from the national accounts (Fedstat, 2005) are compared with data from the COI study. There are differences in estimations for hospitals and Other services.
Expenditures on education, research and investment were not included in the COI totals. They are however included in the Fedstat numbers. This can be seen in the category capital formation and the difference in hospital expenditure. The latter is completely attributable to the expenditures on research and education. In the national accounts research and education expenditure are completely allocated to hospitals, as it is assumed that the other providers do not do research or education. This assumption is caused by a lack of further information (Statistisches Bundesamt, 2005).

Table 10: German comparison FedStat/COI health expenditure 2002 (€ million)

	FedStat	COI[4]
Hospitals	64.126	60.187
Nursing homes	16.809	16.762
Other (semi-)stationary care[1]	9.097	9.088
Ambulance	2.339	2.328
Physicians	31.530	31.438
Other health professionals[2]	13.452	13.435
Pharmaceuticals	32.275	32.241
Aids and appliances	16.487	16.474
Dental services	14.797	14.759
Administration	13.623	13.627
Health protection	4.410	4.328
Other services[3]	9.407	8.944
Total	**228.352**	**223.611**
Capital formation	6.614	-
Total health expenditure	**234.966**	**223.611**

FedStat=Federal Statistical Office Germany

[1] Includes preventive care/rehabilitation facilities and facilities of occupational retraining/social rehabilitation

[2] Includes offices of para-medicals, home nursing care and other ambulatory care

[3] Includes other providers and private household and rest of the world (Imports)

[4] All COI (€223,611 million) costs could be allocated to diseases.

The COI expenditures (€223,116 million) could be completely allocated to diseases. This is different from the Australian and Canadian study where costs were only partly allocated. The COI study furthermore does not include expenditure on capital formation.

Table 11 shows the comparison with the OECD data. The group Hospital is again (as in *table 10*) significantly different between two data sources. This is due to the inclusion of preventive care/rehabilitation facilities and facilities of occupational retraining/social rehabilitation (total €9,097 million) in the OECD classification. These expenditures are excluded in hospital expenditures (included in Extra) according to Fedstat. Furthermore there is an inclusion of Research and education expenditures (of around €4,000 million) in the Fedstat data, not included in the OECD figures.
The OECD has no data on expenditure to non-residents (rest of the world). Orosz and Morgan (2004) reported that the data on long term care for Germany may include expenditure on social care where they could not be separated. Except the differences in hospital expenditure there are hardly any differences in health expenditure according to COI, Fedstat and OECD data.

Table 11: German comparison OECD/FedStat health expenditure 2002 (€ million)

SHA provider classification		OECD	Fedstat
HP.1	Hospitals	69.351	64.126
HP.2	Nursing and residential care facilities[1]	16.809	16.809
HP.3	Providers of ambulatory care	62.084	62.118
HP.4	Retail sale and other providers of medical goods	48.763	48.762
HP.5	Provision and administration of public health	4.410	4.410
HP.6	General health administration and insurance	13.623	13.623
HP.7	Other industries (rest of the economy)	8.938	8.964
HP.9	Rest of the world	-	443
Total current expenditure on health care		**223.978**	**219.255**
	Capital formation of health care provider institutions	6.614	6.614
	Extra[2]	-	9.097
Total health expenditure		**230.592**	**234.966**

FedStat=Federal Statistical Office Germany; SHA=System of Health Accounts; HP=Health Provider classification.
[1] Nursing care in Fedstat is called stationary/semi-stationary nursing homes
[2] Extra includes preventive care/rehabilitation facilities and facilities of occupational retraining/social rehabilitation

4.5 The Netherlands

Health system
The Dutch health system is described as it was before the recent change (early 2006) because the Dutch and all other studies were performed before this reform.
The Dutch health care system is a mix of national, social and supplementary insurance. It is best described by its three "compartments" (Den Exter et al., 2004). The first

compartment is a national health insurance scheme covering all exceptional medical expenses (Algemene Wet Bijzondere Ziektekosten, AWBZ). This is the national insurance part covering, with a few exceptions, the entire Dutch population. The first compartment is funded by contributions (on taxable income) and government funds. All AWBZ payments go into a fund, which is managed by the Health Care Insurance Board (College voor Zorgverzekeringen, CVZ). This board distributes the fund over the different (sickness) insurance funds that purchase this exceptional medical care. Exceptional medical care can be long-term hospital care or domestic, personal care for people having a physical or mental handicap. The specific content of AWBZ benefits has changed a few times during the 90's. To be entitled to benefits from the AWBZ a request for AWBZ-care needs to be approved by a Regional Indication Body. Care funded by the AWBZ can be taken at the provider having a contract with the insurance fund.
In the second compartment "necessary medical care" is covered. Sickness funds and private insurance take care of the expenditures in this compartment. People with an income up to a certain income ceiling are (mandatory) enrolled in sickness funds falling under the Sickness Fund Act (Ziekenfondswet, ZFW). Dependants are often included (in total around 75% of the Dutch population is covered by sickness funds). The ZFW is funded through contributions and government funds. Contributions are divided over employers and employees where the contribution of employees is a flat-rate payment to the sickness funds. Employers transfer a percentage of the employees' income to the sickness fund. There are exemptions for people not having an employer. What health care falls under the Sickness Fund Act benefits has changed regularly in the last 15 years. The care covered under the ZFW entails e.g.: medical treatment by GPs, some dental care (for children), pharmaceuticals (up to a certain limit), hospital care and patient transport. People with an income above the ceiling find their coverage for necessary medical care in private health insurance (under the Health Insurance Access Act or Wet Toegang Ziektekostenverzekeringen, WTZ).
The third compartment is a voluntary scheme that covers health care not covered by the first two compartments. This coverage is provided by both sickness funds and private insurance.
Other sources of health care financing are taxes (mostly spend on public health and research) and OOP-payments (being co-payments in the first and second and direct payments in the third compartment).

Figure 6 illustrates the division of total health expenditure by financing agent. The numbers are from 2001 (so not the base-year of the last COI study); they however illustrate the Dutch financing structure. The figure is based on a total of €39,384 million. This includes all kinds of social care e.g. nursing homes, home care institutions, homes for the elderly and care for the handicapped. If the OECD approach of total health expenditure is used (see *table 13*), a large part of this social care will be removed from total health expenditure. Van Mosseveld and Smit (van Mosseveld and Smit, CBS 2004) also show the division by financing agent when all social care is excluded. Total health expenditure is then €24,966 million. When all social care is excluded the percentage of total health expenditure financed by social security funds and private insurance changes. Private insurance then finances almost 21% of total expenditure and social

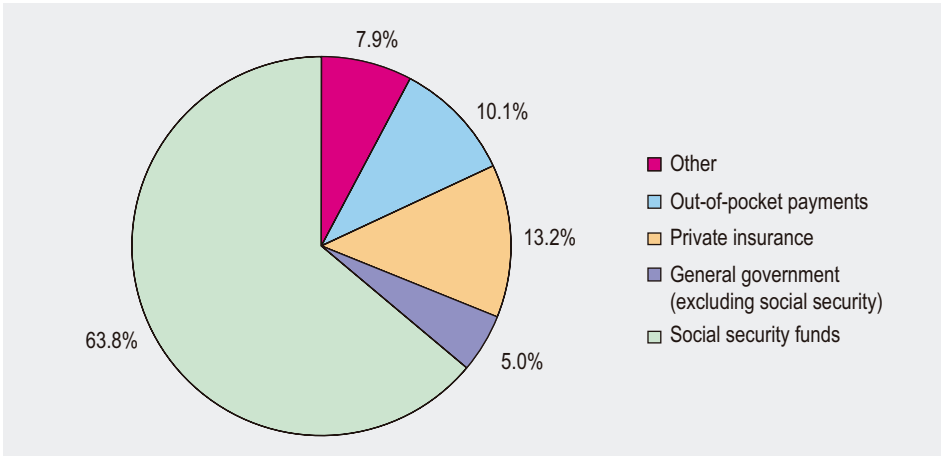


Figure 6: Total health expenditure in The Netherlands in 2001 (€39,384 million) by financing agent Source: van Mosseveld and Smit, 2004.

security only 55%. The other percentages roughly stay the same. Compared to other countries the public share in health expenditure is relatively low.

Public health expenditure (social care included) mostly goes to hospitals and nursing and residential care facilities (both around 32% of public expenditure, van Mosseveld and Smit, CBS 2004). Most private insurance expenditure is spent on hospitals, nursing and residential care and medical goods. Half of OOP payments are used for medical goods.

In the provision of health care the general practitioner (GP) plays an important role as gatekeeper. The GP is often a patients' first contact with health care. The GP sometimes treats the patient by him-/herself and in other cases patients are referred to secondary or tertiary health care. GPs used to work on an individual basis, but are nowadays more and more working in group-practices (Den Exter et al.). Hospitals are for a large part private and non-profit. About 10% of hospitals are public hospitals (Den Exter et al.). Most specialists work in these hospitals, but are self-employed.

COI compared to other sources

Statistics Netherlands (Centraal Bureau voor de Statistiek, CBS) provides yearly data on health and social care expenditure. In table 12 different provider groups are shown. All expenditures are already related to the CBS data in the COI study and also reported in this way. They are therefore shown in one column underneath.

Table 13 describes Dutch health expenditures in the System of Health Accounts setting. The COI data were related to the Dutch accounts, but furthermore completely fitted in the OECD framework, therefore also here only one column is shown. The main difference with the CBS definition of health expenditures is that homes for the elderly,

playgrounds for toddlers and care for persons with disabilities (among other social care in *table 12*) do not fit in the SHA and are therefore excluded in these figures.

Another difference is found in the hospital provider group. This is caused by the inclusion of mental health hospitals in the SHA definition, whereas they fall outside hospital expenditure according to the Dutch health accounts.

Table 12: Dutch health expenditure by providers 2003 (€ million)

	CBS/COI
Hospitals	13.572
Physicians	2.015
Dental services	1.826
Other health professionals	1.158
Specialists	1.785
Pharmaceuticals	5.250
Aids and appliances	2.305
Nursing homes[1]	4.720
Homes for the elderly[2]	3.760
Other social care	14.589
Administration	1.837
Total	**52.817**
Capital formation	2.200
Extra	2.512
Total health expenditure	**57.529**

CBS=Centraal Bureau voor de Statistiek
[1] Nursing homes = "verpleeghuizen"
[2] Homes for the elderly = "verzorgingshuizen"

Table 13: Dutch health expenditure 2003 by SHA providers (€ million)

SHA provider classification		OECD
HP.1	Hospitals	16.037
HP.2	Nursing and residential care facilities	5.313
HP.3	Providers of ambulatory care	9.980
HP.4	Retail sale and other providers of medical goods	7.229
HP.5	Provision and administration of public health	772
HP.6	General health administration and insurance	1.837
HP.7	Other industries (rest of the economy)	1.284
HP.9	Rest of the world	442
Total current expenditure on health care		**42.893**
	Capital formation of health care provider institutions	2.220
Total health expenditure		**45.113**

CBS=Centraal Bureau voor de Statistiek; SHA=System of Health Accounts; HP=Health Provider classification.

The main problems with the Dutch health care data were described by van Mosseveld and Smit (2004). They noticed that social care and non-health care services are integrated in national accounts. They however do not fit in the SHA framework, because they do not fit in the health care definitions of the OECD. In addition van Mosseveld mentions problems with the 'purity' of functions as the function of providers might be different between countries.

5 ALLOCATION METHODS, TRENDS AND ADJUSTED COI

- In general COI studies use similar allocation methods. Data availability, however, forces the application of second best methods in some specific fields. A correction for this is impossible, which results in the recommendation to use standardized data and methods in future COI research.
- Breaking down health expenditures into SHA categories reveals the need to restrict the comparison to a number of SHA groups, namely: hospitals, physicians, prescribed medicines and dentists.
- The comparability of COI for these four categories is rather good for Australia, Canada, Germany, France and The Netherlands.
- A number of interesting differences remain. For example: high cost of circulatory, endocrine and digestive diseases in Germany, high cost of mental disorders in the Netherlands and France and high cost of respiratory diseases in Australia. Most of these differences originate in hospital care and the area of physicians.
- The comparability of nursing and residential care expenditures is troublesome, also within the SHA boundaries.

This chapter is meant to work towards a more comparable set of COI data. The former chapter has shown differences between health expenditure using national and international definitions. The SHA definitions will be used as the central framework of the comparison.

At first *section 5.1* will give an overview of differences in allocation methods used. It is useful to discuss these first before going further into the comparison, because they can influence the results. *Section 5.2* will compare for Australia, Canada, Germany and the Netherlands the latest studies with former studies performed. In France only one study has been performed yet. The final section will show COI along SHA categories and will finally end with a more comparable set of COI.

5.1 Allocation methods

In principal all studies use a similar methodology: they are top-down (see *section 2.1*), prevalence based and only include direct costs. It is however possible that there are differences in type and quality of data sources used. Furthermore the definition of this resource use defined by the allocation key (e.g. number of visits) can vary across countries. This affects the comparability of COI studies. This section will therefore show, for the main provider groups in each country, which data were used and how these were allocated to disease groups. Germany will be skipped in this section, because the German reports did not contain a description of data and methods.

Hospitals

All countries use several data sources to estimate hospital expenditures by disease. In some cases different data sources are used for different types of hospital care, like acute and short-term care, psychiatric hospital care and rehabilitative care.

Total hospital expenditures in Australia are based on the Australian Hospital Statistics 2001-02. The allocation key used is number of days spent in hospital, corrected for treatment intensity. A correction for treatment intensity is made, because some diseases require more intensive resource use than others. The Australian researchers use so-called Diagnostic Related Groups (DRG) weights for this purpose. Furthermore they adjust expenditures for the hospital where the treatment takes place, because one hospital might imply higher average costs than others.

Canadian hospital expenditures were formed in the National Health Expenditure Trends (NHEX, CIHI, 2004). Like the Australian study it weighs the inpatient cases for each diagnose (using Resource Intensity Weights) based on a system familiar to the DRGs, namely Case Mix Groups.

The French COI estimates for hospitals were formed by the Programme de Médicalisation des Systèmes d'Information (PMSI) which covers all acute and short-term hospital cases. The PMSI puts all hospitalizations in Groupes Homogènes de Malades (GHM-codes) and these are matched to ICD-codes in the COI study. Hospital stays are also in this case weighed using a DRG-like system, here called ISA (Indice Synthétique d'Activité). Expenditures on mental health hospitals are allocated completely to mental disorders as there were no data available to allocate costs to other disease groups (if needed).

In the Netherlands the LMR (Landelijke Medische Registratie) registration is one of the main data sources used for the allocation of hospital expenditures. The Dutch study is the only one not weighing hospital stays with DRG-type weights. It however estimated the cost of interventions in hospitals separately from other hospital costs which can be seen as a different way of correcting for variation in treatment intensity.

General practitioners and physicians

Total general practitioner and physician expenditures in Australia come from the medicare and AIHW health expenditure database. They are allocated to diseases using the BEACH (Bettering the Evaluation and Care of Health) survey. This is a survey among GPs and specialists, including around 300,000 encounters between 2000 and 2002. The proportions of encounters/problems by disease following from this survey were used as allocation key.

Total physician expenditures in Canada are based on the National Health Expenditure Trends. To allocate these to diseases reports from 11 of the 13 Canadian provinces were used. These reports compiled data on all regional Fee For Service (FFS) expenditure by diagnostic category. The sum of all regional expenditures represents 84% of national physician expenditures and the rest is assumed to be expenditures from alternative payment plans (APP). These APP expenditures were not allocated to diagnostic groups. Fees are allocated only to the primary diagnosis of the physician visit.

The French study used four different sources to allocate physician (including GP) expenditures to disease. The EPPM (l'Enquête permanente sur la prescription médicale) survey is the most important one and covers 70% of all physician expenditures. IMS health data are used to allocate expenditures to diseases. The IMS health data provides data on the diagnosis that caused a consultation (based on a longitudinal survey of 1000 physicians). When more than one diagnosis is reported for a consultation, the costs are divided equally over the diagnoses mentioned. Expenditures on (the few) specialists covering a single disease group are allocated to that disease group. Expenditures on specialists who treat more patients from several disease groups are allocated to diseases using information from the French Health Insurance on the medical acts performed on each disease group. When there were no disease categories defined the authors tried to reclassify medical acts into categories based on the information of the specialty and medical act. Finally around 90% of all physician care expenditures are covered.

The Dutch study also uses several surveys for physician expenditures. For the allocation of expenditures on GPs a survey of general practice (LINH, Landelijk Informatie Netwerk Huisartsen) is an important data source. The number of physician visits is used as allocation key for physician expenditures. Furthermore these visits are weighed according to the type of visit (consultation, phone or visit at home). Also here cost are divided over more diseases when more diseases are the reason of a visit.

Medicines

The Australian COI study allocates expenditures on prescription drugs based on a combination of the above mentioned BEACH data (GP encounters) plus benefit schemes data on the number of prescriptions for each disease. Total expenditures on prescribed drugs come from detailed costing data provided by the Pharmaceutical Benefits Scheme. Expenditures on over-the-counter drugs by disease are estimated using the estimations from the former COI study in 1993 and adjusting them for among other things demographic changes.

Canadian national drug expenditures were taken from the National Health Expenditure Trends. Only prescribed medicines were allocated to disease groups. For the allocation number of prescriptions and expenditures from the IMS health distribution figures were used. These figures combine data from different sources (e.g. all drug stores, physician's prescriptions) and have their own Therapeutic Index in which the expenditures are classed. This Therapeutic Index is reclassified into ICD-codes.

The French study used information from EPPM, covering around 73% of all expenditures on medicines. Expenditures are allocated by means of the number of prescriptions for each product and all prescriptions could be fit in one of the ICD groups. Like the other studies, the prescriptions are combined with data from physician consults. Sometimes the expenditures on prescribed pharmaceuticals are allocated to more disease groups. This happens when the consult data describe more diseases, for which only one drug is prescribed. This method might have created a difference with the other studies. Expenditures on over the counter drugs are estimated using the ESPS household survey which includes information on non-prescribed medicines acquired.

An important data source for the Dutch study is the SFK (Stichting Farmaceutische Kengetallen) dataset which compiles information on drug use, classified by so-called ATC-codes. These are combined with data on prescription diagnoses from the physician survey LINH to classify medicine use in diagnostic groups.
Expenditures on over the counter drugs are estimated using a population survey (Periodiek Onderzoek Leefsituatie, POLS) and the same SFK database. The POLS survey gives information on expenditures on over the counter drugs by certain categories that could be recoded into ICD-codes. These expenditure data are used to allocate the over the counter expenditures by disease.

Dentists
Expenditures on dentists are fully allocated to digestive diseases for all countries except Canada where they were originally unallocated. Therefore in this report they were allocated to digestive diseases completely to make them comparable with the other countries. It should be noted that expenditures on dental care in Australia were estimated by using the 1993 and 1994 expenditure distribution and adjusting them for changes in the age-sex structure, which is a rather simple method.

Nursing and residential (aged) care
In Australia residential (aged) care is divided into different levels. In this case only residential care with the highest levels of care, level 1 to 4 (meaning the most dependent persons), is included. Expenditures on nursing homes are in the Australian study allocated to diseases based on nursing staff opinion about what disease causes the most problems, care and costs. These are sampled in the Australian Bureau of Statistics Survey of Disability, Ageing and Carers.
The Canadian expenditures come from NHEX but they were unable to allocate these expenditures to diagnostic categories.
In the French study expenditures on nursing care were assumed to be allocated to disease similar to long-term stays in hospitals. The allocation of long-term hospital stays to diseases was used as basis for allocating all nursing expenditures to diseases. Expenditures on long-term care (in hospitals) were taken from a survey by CREDES in 1992 and are therefore somewhat dated.
For nursing care expenditure in the Netherlands an almost complete coverage was available from different data sources. The key for the allocation of resources is the number of nursing days.

Concluding one can say that the basics of these studies are similar: all studies use a top-down method to allocate expenditures to diseases with inpatient days, number of visits and prescriptions as allocation key. Mostly registries or surveys are used that cover a wide range of health care in a specific area to define the best allocation to disease. In all cases the exact allocation strongly depends on the data available. Some differences have been noted that might have influenced the comparability. For example the allocation of cost of a prescribed medicine into more disease groups when several diagnoses determined the related physician visit in France. Or the use of age and gender adjusted expenditure distributions from 1993 in the Australian study for dental care and over

the counter drugs, which is a rather (too) simple method. It is however impossible to make a correction for these differences as the allocation is already performed in the best possible (and best available) way in each country. Therefore these differences need to be kept in mind carefully.

5.2 Trends in COI

This section will describe, as far as possible, trends in COI. Australia, Canada, Germany and the Netherlands already performed more COI studies. These are all combined in *table 14*.

Table 14: COI over time (percentages)[1]

		AUS[2]		CAN		GER		NETH
	'93[3]	2000	'93[3]	'98	'94[3]	2002	'99[3]	2003
Neoplasms	5,2	5,1	4,5	2,9	4,8	6,6	4,0	4,2
Mental disorders	7,1	10,4	8,2	5,6	10,0	10,0	22,1	23,8
Nervous system	6,4	4,7	5,1	3,4	7,7	7,9	6,3	6,5
Circulatory system	10,2	9,6	10,3	8,1	11,4	15,8	10,3	9,9
Respiratory system	6,9	6,5	5,3	4,1	4,8	5,5	4,2	4,0
Digestive system	10,2	10,9	11,2	4,2	14,6	13,9	7,0	7,9
Musculoskeletal	8,2	8,1	3,4	3,2	11,5	11,3	5,6	7,1
Sum	54,2	55,3	48,0	31,5	64,8	71,0	59,5	63,4
MAGR[4]		7,5		3,1		3,4		9,3

AUS=Australia; CAN=Canada; GER=Germany; NETH=Netherlands.
[1] Percentage = percentage of total costs allocated to a disease group
[2] Aus: dementia here moved from nervous system to mental disorders
[3] Source: Polder et al. (2005) / Netherlands: Kommer et al. (2006)
[4] MAGR = Mean average (yearly) growth rate in total health expenditure for each country between the two moments in time.

The Dutch numbers are in this table based on the national accounts, so they are not SHA-based (for comparability reasons, Kommer et al., 2006). This makes the percentages in the 2003 column different from everywhere else in this report (the SHA definitions exclude a part of the expenditures according to the national accounts, see *section 4.5*). The comparison shows that there are some small changes for the Netherlands for example for musculoskeletal diseases.
Some changes in COI have occurred in the other countries too. The Canadian percentages appear to have changed significantly. This is however greatly influenced by a much larger part of costs that could not be allocated in 1998. The group unallocated health care costs in 1998 includes for example all aged care, paramedical care (e.g. physiotherapists), home care, public health expenditures, ambulance expenditures, medical goods/appliances. The unallocated expenditures account for 45% of all expenditures, whereas this percentage was 28% in the 1993 study. For 1993 there were more/better data possibilities to allocate expenditure to diseases. Therefore the Canadian data from 1993 and 1998 are hard to compare.

From the data of the other countries one can see that some diseases now use more of the health care resources and others use less. However it seems that in general the diseases that caused the largest economic burden around 1993 are still in the same position. Diseases of the circulatory system and diseases of the digestive system imposed the largest costs around 1993 and also at the end of the 1990s. Cost of diseases of the musculoskeletal system are relatively large in Germany. This also holds for both time moments.

The most important increase is found for cost of circulatory diseases in Germany (11.4 to 15.8%). This rise might have been caused by a higher utilization of more technological (specialized) care with respect to circulatory diseases during the 90s. For example dialysis facilities, coronary catheterization surgery related to ischemic heart disease and pacemaker implantation (Busse et al., 2004). The 1994 study however was more a pilot study and throughout the years data sources and methods have improved a lot. Therefore the comparability between these two studies is problematic.
Another notable change is the rise in expenditures on mental disorders in Australia (after correction: see notes). This change was not found in other countries. The rise in expenditure on mental disorders in Australia was mainly caused by an 89% growth in aged care expenditure on dementias (Goss, 2005).

Health care use and costs by disease have changed over time. The observed changes are however more country-specific and could not be generalized for all countries. One should be cautious with drawing conclusions here, as only two years are incorporated. Only two years of data might be relatively weak for generating trends: more data would make it possible to generate a better view on time trends in COI. The authors of the Australian and Dutch COI study furthermore argue that it is hard to draw any "hard conclusions" from comparisons over time, only general patterns are visible. This is mainly caused by changes in the definition of health care, changes in methods and some changes in data resources. Goss (Australia, 2005) also notes that differences over time should be seen as "approximate only".

It should be noted that the former chapter showed some differences in definitions and inclusion or exclusion of certain sectors. For example the Australian study includes (a small amount of) research expenditures allocated to disease. Expenditures on aids and appliances, included in SHA, could not be allocated to disease in the Australian study, whereas they were allocated in the other studies.
Another difference is that the French COI study excludes administration and expenditures in other industries (HP.6 to HP.9). The German COI study allocates administration expenditures and ambulance expenditures to diseases, whereas this is not the case in other countries.
These differences influence the level and percentages of expenditures measured. In the next section therefore only the SHA categories that were fully incorporated and allocated to disease groups for the five countries are picked out and compared.

5.3 COI combined with SHA categories

Chapter 4 showed the relation between expenditure data calculated nationally and according to the OECD. *Table 15* reveals how total costs are divided over different provider areas for the five countries according to the SHA setup. In all countries most health care resources are used in hospitals, ranging from 30% of total expenditures in Germany to more than 40% in France. The French also spend a relatively large part of their budget on medical goods. The Dutch spend more on nursing and residential care, however the comparability of the expenditure data on long-term nursing care, incorporated in this provider group, is still questioned (OECD, 2005; also van Mosseveld, 2003).

Table 15: Percentage of total (SHA) health expenditure per provider category

		AUS	CAN	FRA	GER	NETH
		2000	1998	1998	2002	2003
HP.1	Hospitals	33,8	32,8	41,9	30,1	35,5
HP.2	Nursing and residential care facilities	6,9	9,7	3,1	7,3	11,8
HP.3	Providers of ambulatory care	31,9	27,7	25,0	26,9	22,1
HP.4	Retail sale and other providers of medical goods	17,1	17,8	22,1	21,1	16,0
HP.5	Provision and administration of public health	-	6,3	2,4	1,9	1,7
HP.6	General health administration and insurance	4,4	1,8	1,8	5,9	4,1
HP.7	Other industries (rest of the economy)	-	0,3	1,3	3,9	2,8
HP.9	Rest of the world	-	-	-	-	1,0
Total current expenditure on health care		94,0	96,5	97,6	97,1	95,1
	Capital formation of health care provider institutions	6,0	2,8	2,4	2,9	4,9
	Undistributed	-	0,7			
Total health expenditure		100,0	100,0	100,0	100,0	100,0

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.
Source: OECD Health Data, with an adjustment for France: €2105 million from hospital expenditure moved to nursing and residential care facilities. This entails long-term hospital stays, arranged for elderly (see *table 9*).

The expenditures on different provider categories can be related to diseases. Underneath the most important diseases (from a cost perspective) are selected. This time they are divided over some SHA provider categories. The following provider groups are shown: hospitals, physicians, dentists and (prescribed) medicines. Expenditures on nursing and residential care facilities are shown (*table 19*) but the great variation in expenditures shows that the comparability of this group is questionable. As mentioned before other sectors could not be included, for example non-prescribed medicines, and other ambulatory professionals (as e.g. physiotherapists and other paramedics). These are not included because they were unallocated in some studies, sometimes not included at all in health care expenditures or a different definition for these categories was used.
The following tables include for each country two columns. First a column with the percentage of costs allocated to diseases and second a column with costs measured

in nominal, per capita terms. As mentioned in *section 3.2* these nominal comparisons should be made with some caution, because reference years are different (mainly for Canada and France using 1998 data). However in almost all cases a relatively large percentage is also associated with a relatively large per capita amount.

In *table 16* expenditures on hospitals (HP.1) and physicians/specialists (HP.3) are reported. Expenditures on physicians/specialists are originally part of ambulatory care (HP.3), but there is a possibility that in some cases specialists/physicians use hospital resources and receive their payment out of the hospital budget. Therefore expenditures on specialists might be hidden in hospital expenditures. To improve comparability they are taken together. *Table 17* shows expenditures on prescribed medicines, the third table reports expenditures on dental care (*table 18*) and *table 19* shows expenditures on nursing care. These groups together account for 65 to 75% of total health expenditures.

Table 16: Expenditures on HP.1 hospitals and HP.3 only physicians/specialists by disease

	AUS		CAN		FRA		GER		NETH		
	%	p.c.[1]	%	p.c.	%	p.c.	%	p.c.	%	p.c.	Var[4]
Neoplasms	7,6	90	5,7	61	8,1	97	9,3	118	7,4	98	17,1
Mental disorders	6,1	72	9,4	101	13,1	157	10,0	127	15,1	201	32,4
Nervous system	4,8	57	5,9	64	5,2	63	7,0	89	6,6	87	15,6
Circulatory system	10,9	129	13,1	141	10,5	126	15,6	199	11,6	154	16,8
Respiratory system	7,7	91	6,2	67	5,9	70	5,7	73	5,2	69	15,4
Digestive system	7,0	83	7,3	79	6,3	76	7,2	92	7,4	98	6,2
Musculoskeletal	8,9	105	5,3	57	6,3	76	13,9	177	8,6	114	38,7
Subtotal	53,0	627	52,9	570	55,4	665	68,7	875	61,9	823	
Total exp[2]		1.184		1.077		1.200		1.274		1.329	

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

[1] p.c. = per capita expenditures (in US$ PPP).

[2] Total expenditures on hospitals and physicians/specialists were slightly adjusted to fit in the SHA definition of hospital expenditures:

Aus: adjustment in physician expenditures of +$32 per capita to fit in SHA, assumed that it did not affect COI distribution.

Can: Total adjusted to fit in SHA +$20 upwards, no change in COI distribution is assumed.

Fra: Elderly care excluded as it should not be in SHA HP1. Total upwarded $36 to equal the SHA, no change in COI distribution is assumed for this.

Ger: Total adjusted upwards $1 upwards to fit in SHA, no change in COI distribution is assumed for this.

[4] Variation coefficient (of percentages) = standard deviation / average

Table 16 reveals that total per capita expenditures on hospitals and physicians overall are relatively low in Canada and more similar in the other countries. The table furthermore shows that there are similarities, but also some outliers. Expenditures on mental diseases are relatively high for France and the Netherlands. The authors of the French study however explain that expenditures on mental disorders in the French study are probably overestimated. Part of these costs is probably allocated to other sectors in the other studies, but the exact height of overestimation could not be given (Paris et al., 2003).

Germany has remarkably high expenditure on circulatory diseases and diseases of the musculoskeletal system. The overall high level of cost of diseases of the musculoskeletal system in Germany, mentioned before, seems to originate mainly in these provider groups (hospitals and physicians). Comparing expenditures on prescribed medicines namely (*table 17*) does not show a large difference for diseases of the musculoskeletal system.

The next table shows expenditures on prescribed medicines by disease. Overall Germany has high expenditures on (prescribed) medicines, originating partly from high costs of endocrine diseases and diseases of the circulatory system (France also spends a large part of prescribed medicines on circulatory disease). Australia had relatively high per capita costs of respiratory diseases for hospitals and physicians. This is not reflected in expenditures on prescribed medicines, where the expenditures on respiratory diseases are similar to the other countries. In *table 15* France reported a relatively high percentage of expenditures for medicines (and other medical goods). The French are known to have a relatively high consumption of medicines, but according to Sandier et al. this high consumption is accompanied (or even caused) by relatively low price levels of pharmaceuticals in France. This might be an indication why French expenditures are not highest in this case (more information on price differences: *section 5.4*). However the most important cause of this difference will be the difference in reference year.

Table 17: Expenditures on HP.4 only prescribed medicines by disease

	AUS[1]		CAN		FRA		GER		NETH		
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.	Var
Neoplasms	2,8	7	2,3	6	1,6	5	3,4	14	1,9	5	29,9
Endocrine	15,0	35	8,8	23	8,7	26	14,8	60	6,5	18	36,2
Diabetes		9				8		29		13	
Mental disorders	9,8	23	11,7	30	7,3	22	6,3	26	8,8	24	24,1
Circulatory system	19,6	46	19	49	23,6	71	24,1	98	21,0	58	10,7
Respiratory system	11,8	28	11,9	31	14,1	42	10,1	41	10,3	29	13,8
Digestive system	8,6	20	8,1	21	6,5	19	6,1	25	7,3	20	14,3
Musculoskeletal	7,9	19	6,6	17	7,2	22	6,0	24	6,5	18	10,7
Subtotal	75,5	176	68,4	177	69	206	70,8	289	62,3	173	
Total prescribed medicines		235		259		299		408		268	
Total medicines		411		344		398		-		349	

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

[1] Aus: dementia placed in mental disorders

Expenditures on dental care are shown in *table 18*. These were fully allocated to diseases of the digestive system in the Australian, French and German study and unallocated in the Canadian study. To make things comparable they are reported here as expenditures on diseases of the digestive system. The expenditures on dental care differ a lot, with high per capita expenditures for Canada and Germany and low expenditures for France

Table 18: Expenditures HP.3 only dentists[1]

	AUS		CAN		FRA		GER		NETH	
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.
Digestive system	100	124	100	176	100	118	100	**189**	100	122

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

[1] The French figure is slightly upwarded $3 to equal the national figures (see *table 7*) and fit in the SHA.

Table 19: Expenditures on HP.2 nursing and residential care facilities

	AUS[1]		CAN		FRA		GER		NETH		Var
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.	
Neoplasms	0,9	1	-	-	2,6	2	9,3	20	1,6	6	107,3
Mental disorders	**58,2**	97	-	-	16,9	12	31,3	66	51,7	184	47,9
Dementia		81	-	-						154	
Nervous system	6,8	11	-	-	12,2	8	8,3	18	6,2	22	32,2
Circulatory system	13,5	22	-	-	21,8	15	21,8	46	15,6	56	23,5
Respiratory system	2,3	4	-	-	5,4	4	1,2	3	2,4	9	63,7
Digestive system	0,9	1	-	-	3,9	3	0,8	2	2,4	9	73,1
Musculoskeletal	12,4	21	-	-	2,6	2	5,5	12	2,1	7	83,9
Genitourinary	0,4	1	-	-	8,3	6	0,3	1	0,5	2	166,4
Subtotal	95,4	158			73,7	51	78,5	166	82,5	294	
Total		166		222		69		212		356	

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

[1] Aus: dementia placed in mental disorders. Total adjusted with $10 upwards to equal OECD totals. It is assumed that this did not affect the COI distribution.

Table 19 shows large variations in expenditures on nursing and residential care facilities. Differences in this sector were already viewed in *table 14*, showing the percentage of total expenditures for each sector. There it was already shown that France allocates only 3.1% of their expenditures to nursing and residential care and the Netherlands 11.8%. The differences in *table 19* most likely illustrate the comparability problems of this group.

Table 20 shows the sum of *tables 16, 17 and 18*, including expenditures on hospitals, physicians, specialists, prescribed medicines and dental care. The HP.2 group is excluded because of its incomparability (without expenditure on nursing and residential care facilities 57 to 75% of total expenditure is included).
The table shows that on average diseases of the circulatory system, mental disorders and diseases of the digestive system impose the largest cost-burden on a country. They consume the largest percentage of health care expenditure and this holds for all countries involved.

This table reveals some interesting differences, especially for Germany. For a number of disease groups Germany has the highest percentage allocated to that disease group and also the highest per capita spending. This holds for example for endocrine disease, circulatory disease and musculoskeletal disease. The Netherlands (and also France)

Table 20: Sum of COI for hospitals, physicians, prescribed medicines and dentists

	Aus	2000	Can	1998	Fra	1998	Ger	2002	Neth	2003	
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.	Var
Infectious diseases	2,6	39	1,6	25	2,4	40	2	36	3	51	22,4
Neoplasms	6,3	97	4,5	67	6,3	101	7,1	132	6	103	15,9
Enodcrine diseases	5,3	82	2,9	44	3,2	51	6,4	120	2,9	50	39,5
Blood diseases	0	0	0,4	6	0,4	7	0,6	11	0,6	11	24,9
Mental disorders	6,1	95	8,7	132	11,1	179	8,2	153	13,1	225	28,5
Nervous system	4,5	70	5,2	79	5,1	83	6,4	121	5,9	101	13,7
Circulatory system	11,3	175	12,6	191	12,1	196	15,9	297	12,2	210	13,7
Respiratory system	7,7	118	6,4	97	7	112	6,1	114	5,6	96	12,2
Digestive system	14,7	227	18,2	276	13,2	213	16,3	305	13,9	240	13,2
Genitourinary	4,9	76	4,8	73	5,6	91	4,7	89	4	69	12,0
Pregnancy / childbirth	3,2	50	2,4	37	3,6	58	2	38	3,3	57	22,5
Skin diseases	2,6	40	2,7	42	1,5	25	2	37	2,4	41	22,2
Musculoskeletal	8	124	4,9	74	6	97	10,8	202	7,6	131	29,8
Congenital malform.	0,4	7	0,3	5	0,5	8	0,5	10	0,7	11	25,2
Perinatal diseases	0,9	13	0,6	9	0,7	12	0,5	9	1,1	19	33,8
Symptoms, ill-defined	12,4	191	3,3	50	3,5	57	3,6	67	10,8	186	66,9
Accidents	0	0	0	0	0	0	0	0	0	0	
Injury, poisoning	9	138	6	91	5,9	95	4,5	84	4,1	70	32,5
Additional category	0	0	10,8	163	3,2	52	2,4	45	0	0	84,2
Unallocated	0	0	3,6	54	8,7	141	0	0	2,7	47	64,9
Total 4 provider groups	100	1543	100	1512	100	1617	100	1871	100	1719	
All SHA-groups		2406		2291		2234		2915		3022	

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

spends relatively more on mental disorders and Australia has relatively high cost of respiratory disease. Another remarkable point is the high percentage for digestive disease in Canada.

These differences mainly originate from different expenditures in the hospital/physician sector. Only the difference in costs of endocrine disease and also circulatory diseases in Germany are found in the prescribed medicine area also.

The last row of this table shows total costs with all SHA sectors included. This means the inclusion of expenditures on all other ambulatory care (e.g. physiotherapy), nursing and residential care, public health and administration. These could not be included in the costs by disease in this table, but added in the final row in order to give the overall view.

As mentioned in the first chapter differences in COI are caused by a number of factors. Aspects of health care demand (e.g. demography, epidemiology) were named among them as well as aspects of health care supply (e.g. treatment variation). The next chapter will examine how each of these factors has influenced the differences in COI.

6 COI AND COST DRIVING FACTORS

- It is hard to find international comparable data on the prevalence of diseases. Epidemiological explanations of differences in costs are therefore difficult to find. When comparable epidemiological data are available they are often too detailed and their differences mostly do not go with differences in costs.
- Demographic differences are important as total COI rise with age in all countries. This pattern is similar across countries, especially when costs are corrected for nursing and residential care expenditure.
- COI per age group vary more for some particular diseases (digestive disease, circulatory disease), showing that differences in costs are not solely based on demographic differences. It also means that demographic changes might have different effects in these countries with respect to specific diseases.
- There is a lot of treatment variation across countries, measured by average length of stay in hospital, number of inpatient and day cases. These differences are most likely related to cultural aspects of diagnosing and treatment, being embedded in the health care system.
- A simultaneous exploration of two or more COI dimensions like age, sex, disease and sector gives a better insight into international differences of health care expenditure.

The previous chapter showed among other things COI in separate SHA-categories. In general there was a similar COI pattern for the selected countries, whereas some notable differences were present too. In this chapter possible explaining factors of differences in costs will be examined.
Section 6.1 will describe epidemiological differences. *Section 6.2* shows what the demographic influence on COI is. *Section 6.3* deals with treatment variation and finally 6.4 will explore other differences (health care prices and technological differences).

6.1 Epidemiology

General COI studies describe all costs in one year and are prevalence based. Therefore the epidemiological information has to be prevalence based, as incidence based data only show new cases.
Comparable data on the prevalence of different diseases or disease groups, however, are scarce. European prevalence data of neoplasms are the best available data. For other disease groups this availability was problematic and therefore other data (e.g. mortality) were examined too. Neoplasms use around 5% of total health care expenditure and up to around 10% of hospital and physician resources (see *chapter5*).

Data on the prevalence of *neoplasms* in Europe are collected by the European network of Cancer Registries (EUCAN, 2003). *Figure 7* shows the 1 year prevalence of all types of cancer in 1998. The 1 year prevalence refers to all people that had cancer that year.

Table 21: Cost of neoplasms in hospitals (including physicians) and total health care (% of health expenditure and per capita (inhabitant) (p.c.))

	AUS		CAN		FRA		GER		NETH	
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.
Neoplasms (hosp/phys)	7,6	92	5,7	60	8,1	97	9,3	118	7,4	98
Neoplasms (total)	5,1	116	2,9	68	5,3	130	6,6	187	5,0	151
Breast		-		-		-		20		13
Digestive system		-		-		-		36		15
Lung (Trachea/Bronchien)		-		-		-		14		12
Prostate		-		-		-		15		6

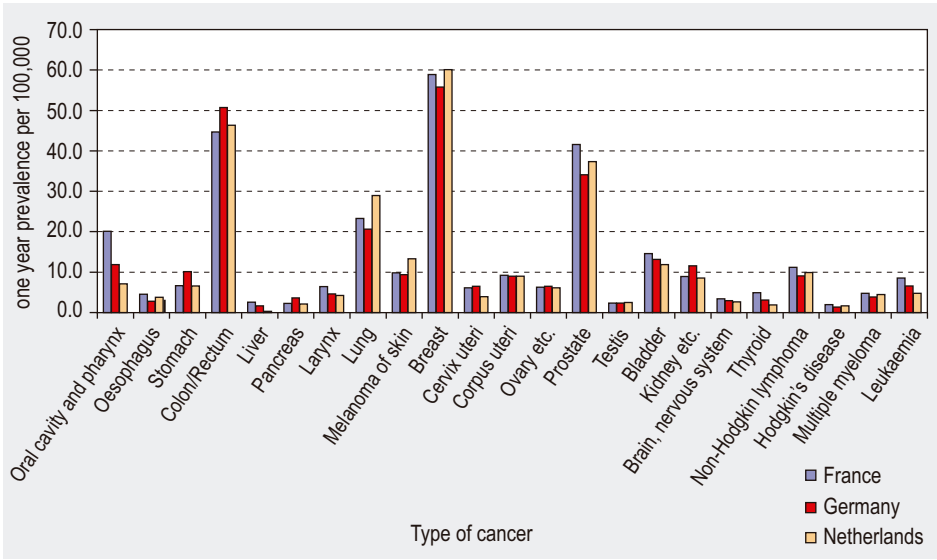


Figure 7: One year prevalence of neoplasms in 1998 (per 100,000 inhabitants, age 15-75+)
Source: EUCAN, 2003; European network of Cancer Registries (IARC)

Overall France had the highest one year prevalence of neoplasms in 1998, namely 324 per 100,000 inhabitants, compared to 297 for Germany and 300 for the Netherlands. Looking at the 5-year prevalence of neoplasms reveals almost exactly the same pattern (1302, 1171 and 1195 per 100,000 inhabitants, respectively; EUCAN, 2003). This can be an indication of rather stable prevalence patterns over time. The incidence rates of neoplasms for 1998 are also very similar (plausibly caused by a very short duration of some of these diseases). Prevalence estimations for Australia and Canada were available in the Globocan 2002 project estimates, including the prevalence of all sorts of cancer around the world (International Agency for Research on Cancer, 2005). However the estimations for Canada in this database are based on data from the USA and therefore not representative for Canada. This was also a problem with the Australian data.
Figure 7 shows that cancer types with highest prevalence are similar for all countries, namely: breast, colon/rectum, prostate and lung cancer. If it is assumed that the prevalence rates for the years around 1998 did not deviate substantially from these pre-

sented here, than the epidemiological data provide no explanation for differences in expenditure on neoplasms. France namely had the highest prevalence, but not the highest costs.
Expenditures on the different types of cancer are shown in *table 21*. These were only available for Germany and the Netherlands. The costs are lower in the Netherlands for all sorts of cancer shown, but as mentioned before, the prevalence data do not have the same pattern. Germany spends more on neoplasms (at total, hospital/physician, and medicine level) for a more or less comparable number of people with cancer. Compared to France the Germans even have lower prevalence rates (and also lower incidence). When the epidemiologic data are age-standardized (according to European age standards) the number of people in Germany with cancer becomes even lower compared to the other countries (*appendix I*). Therefore differences in cost of neoplasms do not reflect epidemiological differences.

Circulatory diseases are associated with high costs in all countries. The level of these costs differs between countries. France, Germany and the Netherlands provide a somewhat more detailed level of cost of circulatory disease (*table 22*). Coronary heart disease, stroke and hypertension are the main contributors to cost of circulatory disease.

Table 22: Cost of circulatory disease in hospitals (including physicians), expenditure on medicines and total health care costs (% of health expenditure and per capita (p.c.))

	AUS		CAN		FRA		GER		NETH	
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.
Circulatory (hosp/phys)	10,9	129	9,4	141	10,5	126	15,6	199	11,6	154
Circulatory (medicines)	19,6	46	19,0	49	23,6	71	24,1	98	21,0	58
Circulatory (total)	9,6	219	8,1	189	10,7	262	15,8	447	10,9	329
Coronary heart disease					16,0	42	20,0	88	26,0	82
Stroke					11,0	29	22,0	99	26,0	81
Heart failure							8,0	35	7,0	23
Hypertension					22,0	57	23,0	103	13,0	41

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

There is hardly any comparable literature on the prevalence of circulatory diseases for these countries.
A study on the prevalence of stroke was performed for the Netherlands. Bots et al. (1996) measured the prevalence of stroke for a Dutch sample. They reported that an international comparison of the prevalence of stroke is difficult, because few of these studies have been performed. But the studies that were compared showed very little variation in the prevalence of stroke. This indicates that the prevalence of stroke can not explain differences in costs.

Together with malignant neoplasms, diseases of the circulatory system are the main cause of death in western countries. They each are responsible for around 30 to 35% of overall mortality (OECD Health Data, 2005). Mortality data might give an indication how often a disease is prevalent in a country. This is however not necessarily true: when in one country mortality is relatively low in a year this might be due to tech-

nological innovation causing better treatment and higher survival rates. The country however may still experience a high prevalence, for example because it is not able to prevent the disease.
It is remarkable that Germany has highest overall mortality from circulatory disease and France shows relatively low mortality, see the figures below. Comparing this to the cost of circulatory diseases the high mortality figures might be an indication that Germany has relatively more people suffering from circulatory diseases and furthermore resulting in relatively high costs for this disease group. This might indicate that the mortality data, if they are related to the prevalence, say something about differences in costs.

The French situation is different with lowest circulatory mortality while costs are near to the average. This finding weakens a possible relation between mortality and costs. Australia and Canada have higher mortality but lower costs. This might be an indication that mortality data do not provide a good indication of disease prevalence which is the basis of COI. If mortality however would prove to be an indicator of prevalence, it means that in this case (France) a difference in prevalence would not determine a difference in costs.

Neoplasms and circulatory disease impose large disease burdens on western countries. From a cost perspective it was mentioned that there are some other influential diseases for example mental disorders and digestive disease having higher cost than neoplasms. Complete and comparable prevalence data are lacking. Furthermore mortality data might give less information as these are less fatal disease groups. It was chosen

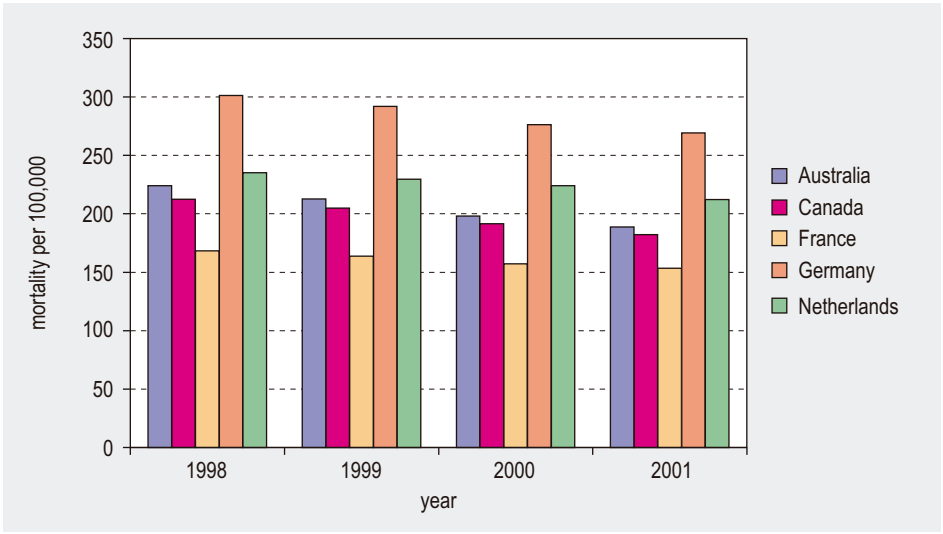


Figure 8: Circulatory mortality between 1998 and 2001 per 100,000 inhabitants (age-standardised) Source: OECD Health Data 2005

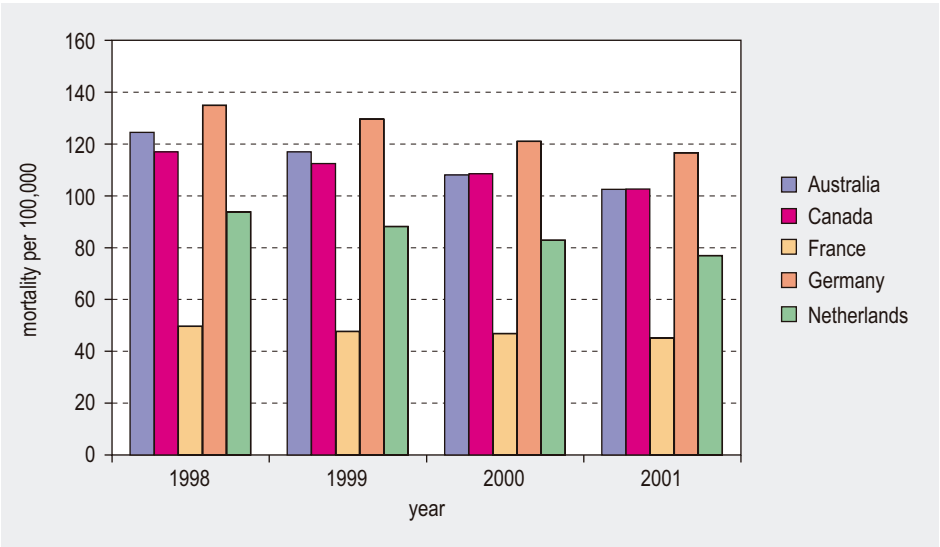


Figure 9: Coronary heart disease mortality between 1998 and 2001 per 100,000 inhabitants (age-standardised) Source: OECD Health Data 2005

therefore to shortly address some other specific diseases (asthma, diabetes) in order to show more information on possible epidemiological explanations.

The following (general) conclusions could be drawn regarding the prevalence of asthma/COPD: the prevalence of (symptoms of) asthma and COPD are on a comparable level in western European countries. The prevalence in English-speaking countries (US, UK, Canada and Australia) is substantially higher (Van der Wilk, 2004). This holds for asthma among children and adults. The reason for this has not been encountered yet (Pearce et al., 2000).

The high prevalence of asthma in English-speaking countries might be indicative for the relatively high percentage of (mainly hospital) costs allocated to *respiratory diseases* in Australia. Canada (partly English speaking) however reports lower cost of respiratory diseases, but asthma/COPD is not the only disease in the disease group respiratory diseases. Therefore other diseases have influenced the cost of respiratory disease in Canada and the other countries too. These other diseases possibly have influenced the high percentage for Australia besides asthma/COPD. Cost of asthma however were not

Table 23: Cost of respiratory disease (% of health expenditure and per capita (p.c.))

	AUS		CAN		FRA		GER		NETH	
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.
Respiratory (hosp/phys)	7,7	91	6,2	67	5,7	73	5,7	73	5,2	69
Respiratory (medicines)	11,8	28	11,9	31	14,1	42	10,1	41	10,3	29
Respiratory (total)	6,5	148	4,1	96	6,2	152	5,5	155	4,6	139
Asthma/COPD	-	-	-	-	-	-		80		48

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

reported separately in Australia and could not be compared therefore. So the relation between prevalence and costs is not very strong.

Endocrine diseases are a relatively large cost group within medicines (*table 17*). Their part ranges from 6.5 to 15% of the costs of prescribed medicines.
Diabetes has a large influence in this disease group, mostly causing around 50% of the

Table 24: Cost of endocrine disease and diabetes for medicines and total health expenditure (% of health expenditure and per capita (p.c.))

	AUS		CAN		FRA		GER		NETH	
	%	p.c.	%	p.c.	%	p.c.	%	p.c.	%	p.c.
Endocrine (medicines)	15,0	35	8,8	23	8,7	26	14,8	60	6,5	18
Diabetes (medicines)		9		-		8		29		13
Endocrine (total)	4,2	96	1,9	44	2,8	68	5,8	164	2,6	79

AUS=Australia; CAN=Canada; FRA=France; GER=Germany; NETH=Netherlands.

cost of endocrine diseases. Australia and Germany both have relatively high cost of endocrine diseases in the medicine area. The per capita amount is relatively large in Germany, especially when comparing cost of diabetes only. In epidemiology however there is at this moment no indication that the prevalence of diabetes is higher in Germany (King et al., 1998). These studies however mostly lack comparable data. Therefore in this case the relation between epidemiology and costs is unclear too.

From these examples two conclusions can be drawn. First, there are very few internationally comparable data on the prevalence of diseases. It seems that it is hard to obtain even national prevalence data let alone internationally comparable prevalence data. Furthermore the cost data are mostly on a high level of aggregation and often do not provide cost estimations for specific diseases, whereas prevalence data mostly are very specific and available for only a part of a disease group.
Second, when available, prevalence data provide no unambiguous explanation of differences in costs. For example Germany has a lower prevalence of overall cancer but spends relatively the most on this group. There is an indication for Australia that a higher prevalence of respiratory diseases was of influence but this is uncertain. Furthermore cardiovascular mortality is relatively high in Germany. When prevalence is related to mortality, this epidemiological difference influences costs. For the remainder other factors that might influence COI need to be explored to gain more insight.

6.2 Demography

Epidemiological data could not explain differences in COI. Another determinant of health care costs is demography, which will be examined in this section.
It could be expected that elderly on average need more care than younger people and therefore health care costs in older populations might be higher than in younger ones. These demographic elements will be investigated in this section.

Demographic data on the number of people in different age groups and health care costs in different age groups (for different diseases and overall) were available for Australia, Germany and the Netherlands. Therefore the influence of demographic differences will only be explored for these countries.

The German population is more aged than the Australian and Dutch populations. By 2001 for example 12.5% of the population was 65+ in Australia, 13.6% in the Netherlands and 16.9% in Germany (12.6% in Canada and 16.2% in France; OECD Health Data 2005). In the former chapters Germany was found to have higher health care costs for a number of diseases, which might be related to this demographic difference.
Figure 10 shows the costs per inhabitant of each age group for Australia, Germany and the Netherlands. The costs here are based on the initial COI data and could not be divided into different SHA sectors, because age-specific costs per provider were not available. Therefore these age-specific costs could not be corrected for the differences between the OECD definition and the COI definition of health expenditure (like in *chapter 5*). This required an adjustment in age-specific data for Australia. In the Australian study expenditures on some sectors were not allocated to diseases and were not divided over age-classes. These are expenditures on e.g. ambulance, aids and appliances and administration, which should be included using the SHA. This group entails around US$ 270 per capita health expenditures. Furthermore research expenditures ($45 per person) had to be excluded from the age specific expenditures as they fall outside the scope of the SHA. In the next figure these costs ($270) are allocated over the age groups assuming that these costs are divided over the age groups similar to all other health care costs in Australia (possibly leading to some over-/underestimation). The Dutch numbers included expenditures on capital formation. These were not included in the Australian and German study. To make it comparable the expenditures on capital formation per age group are excluded for the Netherlands (capital formation equals $150 per person for the Netherlands). For the rest the Dutch and German studies both included all SHA groups.

Figure 10 shows per person health expenditures in different age groups. All countries experience rising expenditures with age, especially in the oldest age groups. A substantial difference is found in the 85+ category, where the Netherlands has relatively high per capita expenditures. This probably has its origins in the nursing and residential care sector that proved to be relatively large in the Netherlands and predominantly addresses the elderly.
To examine what would happen in the case of a lower level of expenditures on nursing and residential care in the Netherlands some assumptions were made. Australia and Germany spend around 7% of their expenditures on nursing and residential care (see *table 15*). *Figure 11* shows what would happen if the Dutch expenditures on nursing and residential care were similar, namely 7% in stead of 11.8% of total health expendi tures (for details: *appendix J*). *Figure 11* reveals that under this assumption expenditure per Dutch citizen in the 85+ group is comparable to Australia and Germany.

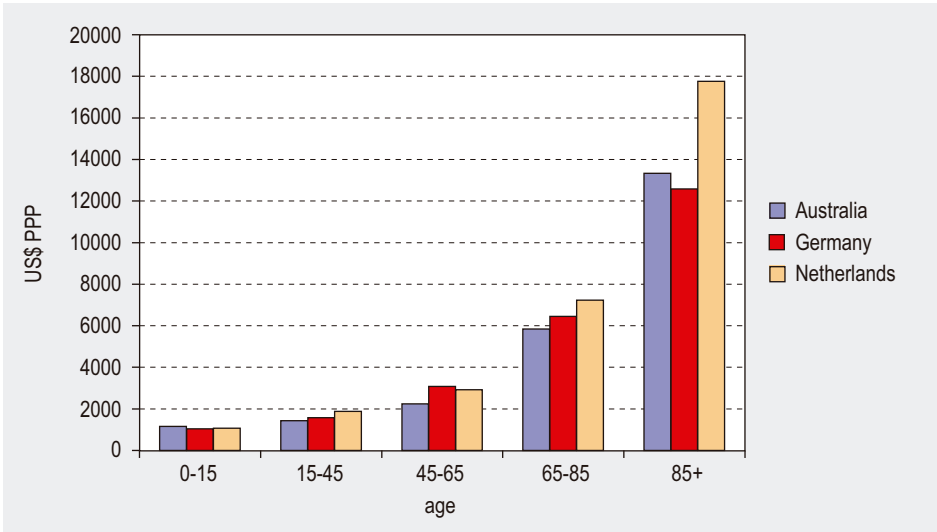


Figure 10: Total COI per inhabitant by age in Australia, Germany and the Netherlands (in US$ PPP)

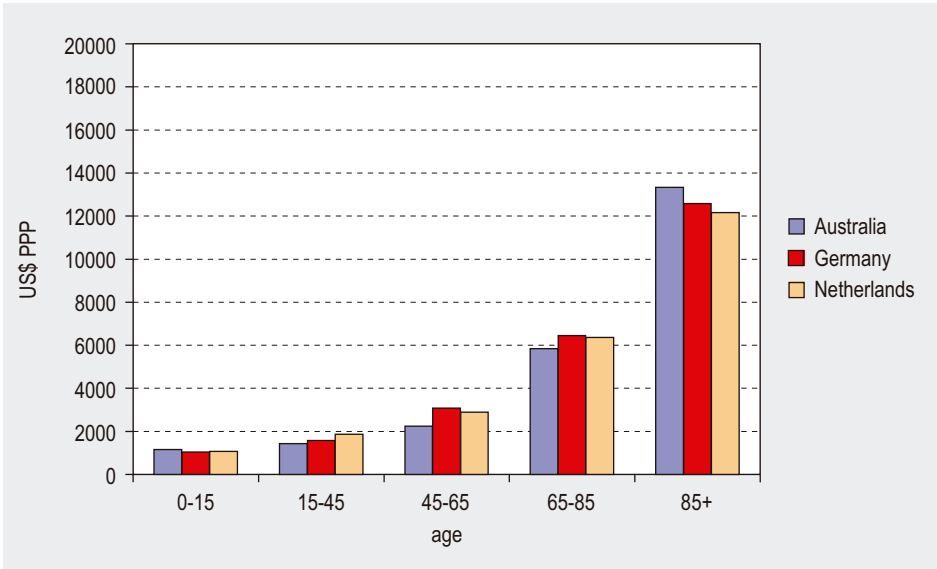


Figure 11: Total COI per inhabitant by age (in US$ PPP) after scaling down Dutch expenditures on nursing and residential care

To explore the influence of demographic differences on COI, first total costs were corrected for age structure. To do this the Dutch age-structure (of 2001) was projected on Germany and Australia, respectively. This means that 13.6% of the population would be 65+ years old. The costs per person in the age groups -65 and 65+ were kept fixed.

Table 25 shows COI in Germany divided into four age groups: under 15, 15-45, 45-65 and 65+. The costs per person in these age groups are €1043, €1575, €3087 and €7028 respectively. Combining the first three groups, results in costs per person under 65 of €1951 and costs per person 65+ of €7028. If Germany now would have 13.6% of the population 65+ this would lower total costs with 6.4% (see the table underneath). This means that a younger population, therefore a pure demographic change, would have lowered total health expenditure with 6.4%.

Table 25: Consequences of implementing the Dutch (younger) age-structure in Germany (cost in US$ PPP)

	-15	15 - 45	45 - 65	65 +	SUM
COI per person in age group	1.043	1.575	3.087	7.028	
Inhabitants per age group (mln)	12	34	21	14	
Total costs per age group (mln)	13.003	54.035	65.982	100.151	
Total costs -65 & 65+ (mln)			133.021	100.151	233.172
Persons -65 & 65+ (mln)			68	14	
COI per person -65 and 65+			1.951	7.028	
Persons -65 & 65 using Dutch age-structure (mln)			71	11	
Total costs			138.796	79.355	218.150
Change in total COI					-6,40%

A similar calculation can be made for Australia (*table 26*). The Australian COI study used ten different age groups: 0-4, 5-14, 15-24,...,75-84, 84+. In the following table these are regrouped into four groups in order to make the table comparable to the German table. Health care costs in these four age groups ranged from $1150 per 0-14 year old person to $6655 per person over 65 years.

As mentioned earlier the Australian population is relatively young compared to the German (and Dutch) population. The costs per person over 65+ are also in Australia a multiple of the costs per person under 65 ($6655 and $1577, respectively). *Table 26* shows that an adjustment of the age structure (by implementing the Dutch age structure) increases COI with 3.4%.

If these changes are applied to per capita expenditures this would decrease per capita expenditures for Germany from $2915 to $2728 and increase per capita expenditures for Australia from $2406 to $2488. The French and Canadian COI studies unfortunately

Table 26: Consequences of implementing the Dutch (older) age structure in Australia (cost in US$ PPP)

	-15	15 - 45	45 - 65	65 +	SUM
COI per person in age group	1.150	1.425	2.243	6.655	
Inhabitants per age group (mln)	4	9	5	2	
Total costs per age group (mln)	4.587	12.110	10.071	16.207	
Total costs -65 & 65+ (mln)			26.768	16.207	**42.975**
Persons -65 & 65+ (mln)			17	2	
COI per person -65 and 65+			1.577	6.655	
Persons -65 & 65 using Dutch age-structure (mln)			17	3	
Total costs (mln)			26.488	17.969	**44.457**
Change in total COI					**3,40%**

did not provide enough information to do similar calculations. However a study by Esmail and Walker (2004) calculated age-adjusted health expenditures (as % of GDP) for OECD countries. The Canadian expenditures in this study rose to the top of the list after age-adjustment. This demonstrates again that demographic differences are relevant and substantial.

The demographic figures showed differences in expenditures between age groups. In all countries older age groups have higher per capita costs, therefore different age-structures influence total expenditure. It is interesting to combine the age differentiation with the disease dimension in order to see whether these differences in age-specific costs also hold at disease group level. *Table 27* shows what happens if the costs are furthermore differentiated over the different disease groups. Australia did not provide age-specific data for all disease groups. Again the focus is on disease groups with highest costs. It should be noted again that these age-specific cost figures comprise all SHA provider groups, including the less comparable nursing en residential care (HP.2).

Differences in costs between the different age groups are found for all disease groups. The magnitude of these differences however varies significantly. The most pronounced rises in costs with age can be found for diseases of the circulatory system, mental/nervous system disorders and diseases of the musculoskeletal system.
Cost of neoplasms and digestive diseases are higher for the older age groups (65+), but hardly rise, or fall, after the age of 65. This holds for all three countries. Cost of circulatory diseases show differences between age groups for all countries. These costs are highest in Germany irrespective of age.
The Australians seem to spend more on diseases of the nervous system for elderly, but this is caused by the switch from a whole group of dementias, former included in mental disorders as mentioned earlier. Health care cost by age for dementia were however not separately reported. In the Netherlands mental disorders among elderly impose a substantial burden on costs. Dementia is highlighted here to demonstrate that the high expenditure on mental disorders for elderly mainly consist of high dementia costs.

Costs of diseases of the respiratory system in Germany and the Netherlands follow a U-shaped pattern, with highest costs in the youngest and oldest age groups including a significant difference in the 85+ group.

Table 27 shows that total costs per age group are highest for the Netherlands in all age groups. The cross-country difference however fluctuates between the different age groups, as it is relatively large in the oldest age group, but smaller in the others. Furthermore this pattern is different if one focuses on specific disease groups showing that high costs per person 85+ in the Netherlands are mainly caused by relatively high expenditures on mental disorders. The difference with Germany is $3911 per person 85+ for mental disorders compared to a difference in total costs of $5180 for this age group. In the mental disorders group, dementia is a main driver of expenditure at older ages and therefore a main cause of the difference in total costs per person over 85.

Table 27: Per capita costs by age in Australia, Germany and the Netherlands (US$ PPP) for most 'costly' disease groups

	AUS					All	GER					All	NETH					All
	-15	15-45	45-65	65-85	85+	ages	-15	15-45	45-65	65-85	85+	ages	-15	15-45	45-65	65-85	85+	ages
Neoplasms	13	40	168	449	519	116	21	52	261	545	555	187	11	39	210	546	596	145
Mental	-	-	-	-	-	-	104	198	250	546	2.020	283	85	324	328	1050	**5.931**	**446**
Dementia							0	1	6	264	1.564	71	0	0	14	663	5.108	158
Nervous system	58	57	117	701	**4.025**	-	42	73	136	325	565	223	102	107	237	598	928	211
Circulatory system	6	36	270	1.026	1.815	219	10	63	469	1.588	**2.980**	447	5	43	347	1381	2.542	310
Respiratory system	-	-	-	-	-	148	198	104	136	258	372	155	99	64	116	381	723	133
Digestive system	-	-	-	-	-	249	63	323	563	614	533	393	90	272	390	471	573	292
Musculoskeletal	25	104	239	547	**1.264**	185	31	146	448	788	1.091	319	36	131	287	593	955	199
Sum	102	237	794	2.723	7.623		469	959	2.263	4.664	8.116		428	980	1896	5024	12.278	
All disease groups	1.150	1.425	2.243	5.840	13.329	2.214	1.043	1.575	3.087	6.449	12.580	2.831	1.072	1.884	2916	7233	17.760	2.873
Total SHA[1]						2.261						2.831						2.873

[1] Expenditures on capital formation are excluded in the last row (therefore these per capita expenditures are not similar to *table 2*). As mentioned before these expenditures were only allocated to age groups in the Dutch study. Therefore they were excluded from the expenditures by age groups here.
Total costs in the last row shows for Australia a difference with the row above. This difference is formed by Research expenditures ($47 per capita) that had to be excluded from the Australian figures. Furthermore $270 per capita had to be included (in these $2214) on top of the total allocated costs to make the Australian COI by age comparable, as mentioned aside *figure 10*. These expenditures (on e.g. administration, aids and appliances and ambulance) were not allocated to diseases and to age groups, whereas they should be included according to the SHA definitions. It is assumed for the included $270 that they are allocated over age groups similar to the division of all other costs. These non-used costs are added to the total costs and not to the disease cost estimations, because it would be too uncareful to assign these extra costs to disease groups. Therefore the disease-specific expenditures in *table 27* are underestimated for Australia.

Total cost (final row of the table) in the Netherlands are only a fraction higher. This is caused by the fact that Germany has relatively more people in the older age groups. In these years (Germany: 2002 and Netherlands: 2003) 17% of the German population was in the 65+ group, compared to 13.6% in the Netherlands. This results at an aggregate level in almost similar costs (last row *table 27*), because the effect of higher costs per person for the Netherlands is smoothed out by a much lower proportion of people in the expensive older age groups.

Costs of illness by age, sex and disease

Next to age specific data, gender specific cost data are available. The next figures show the cost per male and female in all age groups. The first figure shows total costs per male and female in different age groups, whereas the others show the situation for some specific disease-groups. The costs for Australia will be somewhat underestimated in the following figures. It was already noted (see note *table 27*) that these age-sprecific costs require an adjustment for Australia, but that it could not be made for specific disease groups. With the age specific costs by gender the same problem arises and therefore in the next figures age-specific costs for Australia are slightly underestimated.

Figure 12 shows how total costs are divided over the specific age groups and sexes. There are differences in costs between males and females. Females have higher per person costs in all age groups, except the youngest ages. The sex-difference in costs in the age group 15-45 is mainly caused by cost of pregnancy and childbirth. Differences between sexes are very similar across countries, only the 85+ group shows some diverging results. Here the difference between sexes is small in Germany and larger

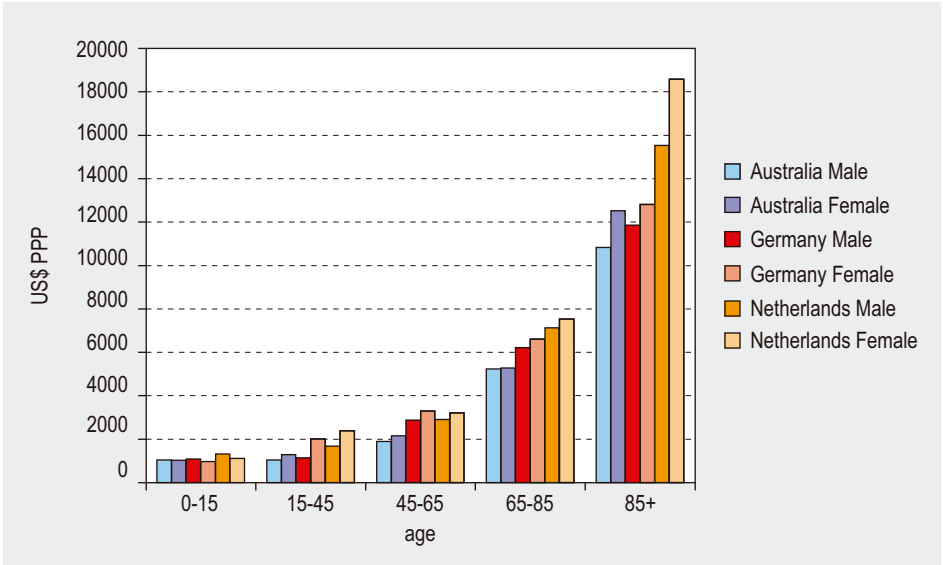


Figure 12: Cost per male and female by age in Australia, Germany and the Netherlands (US$ PPP)

in Australia and the Netherlands. It was mentioned before (*section 3.3*) that Germany has relatively many women in the 85+ group. However the difference in costs per sex is not as different as in Australia and the Netherlands. If Germany would have had the Dutch age- and sex-specific costs (with relatively higher costs per female), this would have lead to higher overall costs.
Table 27 showed that it is helpful to look at the different disease groups in order to see what diseases are the main drivers behind differences in age (and gender) specific costs. This is demonstrated in the following five figures showing costs by gender and age for neoplasms, circulatory diseases, digestive diseases, diseases of the musculoskeletal system and mental disorders.

Figure 13 shows the situation for neoplasms. In the 65-85 and 85+ age groups all males have higher costs than females in all countries. Furthermore expenditures per sex are (slightly) higher for Germany in all age groups except for females 85+ (Netherlands higher). *Table 27* however showed that the Netherlands has higher cost of neoplasms in the age groups 65-85 and 85+. This difference is probably influenced by the fact that the proportion of women among 85+ is relatively high in Germany.
It was already noted that Germany had highest cost of neoplasms per inhabitant. From *figure 13* can be concluded that the relatively higher costs for Germany in the 45-65 group and the fact that Germany has more people in the oldest age groups (as costs per 85+ are similar) influence this difference.

Figure 14 shows the situation for circulatory diseases. Costs per male are higher in all countries until 85. Only in the 85+ age group costs per female are (slightly) higher for Germany and the Netherlands. The fact that Germany has relatively many women in the 85+ group does not really influence differences in total costs as costs per sex are almost similar in the 85+ group.

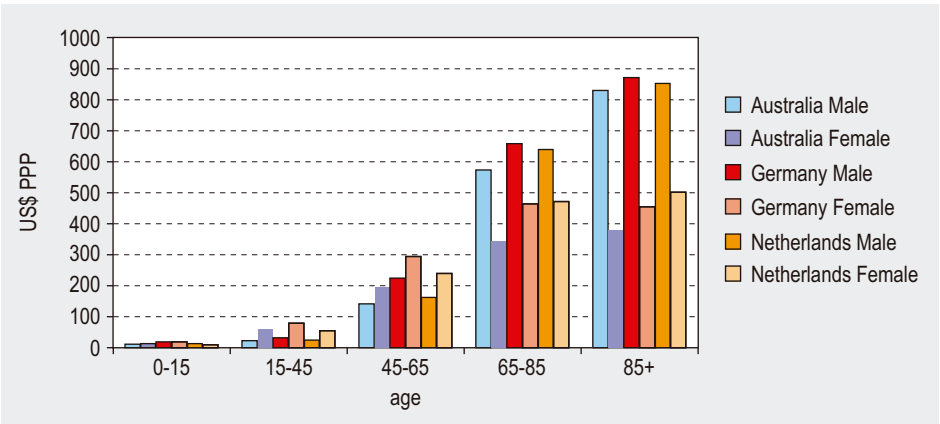


Figure 13: Cost of neoplasms by gender and age in Australia, Germany and the Netherlands (US$ PPP)

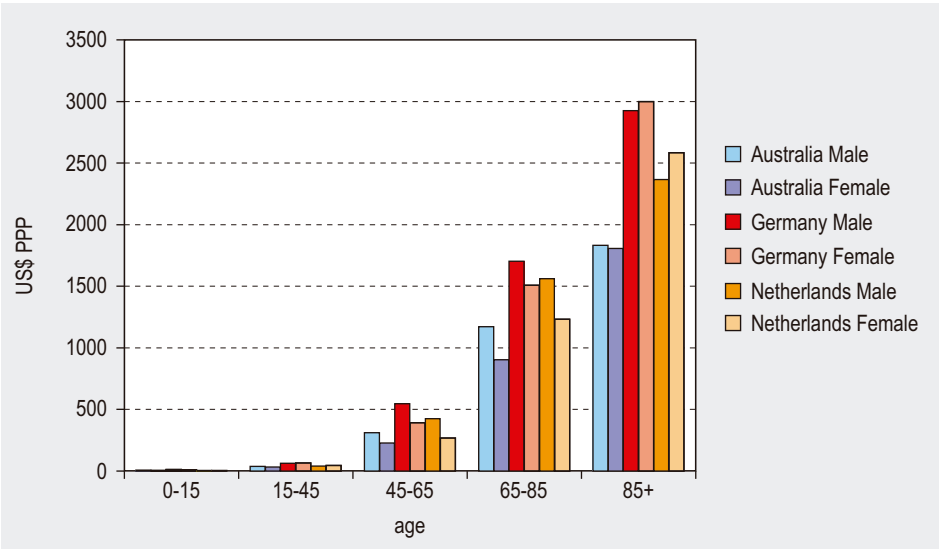


Figure 14: Cost of circulatory disease by gender and age in Australia, Germany and the Netherlands (US$ PPP)

Table 27 already demonstrated that Germany has highest costs of circulatory diseases in all age groups (and especially in the 85+ group), possibly implying that this is more important for the difference in total costs in this disease group than the demographic fact that Germany has more citizens in the older age groups. If this difference in age-specific costs holds (over time), ageing might have less influence on the level of cost of circulatory diseases in the Netherlands than in Germany.

The next figure examines cost of digestive diseases. Important in this disease group are expenditures on dental care, causing almost half of the costs in Germany and around 42% of cost of digestive disease in the Netherlands. The Australian study did not provide age and gender specific cost estimations for this disease group. *Figure 15* shows that when costs are higher for men and women in Germany they are also higher in the Netherlands. Remarkable are the relatively high costs for Germany between 15 and 85, mainly in the 45-65 age group. This has influenced the total cost of digestive diseases in Germany. The percentage of people in the middle age categories is namely very similar in Germany and the Netherlands, therefore the difference in total cost of digestive disease might be caused by more extensive and costly dental treatment in Germany in the middle age groups.
Another difference can be found in the oldest age group. In Germany costs decrease after 85, whereas the Dutch costs are still rising.

Cost of diseases of the musculoskeletal system follow the pattern shown in *figure 16*. All countries report higher costs per female in all age groups for musculoskeletal disease. Between 15 - 85 years of of age Germany has the highest costs per person, however in the final age group Australia shows relatively high costs per female. The Australian population is relatively young and furthermore has the lowest proportion of

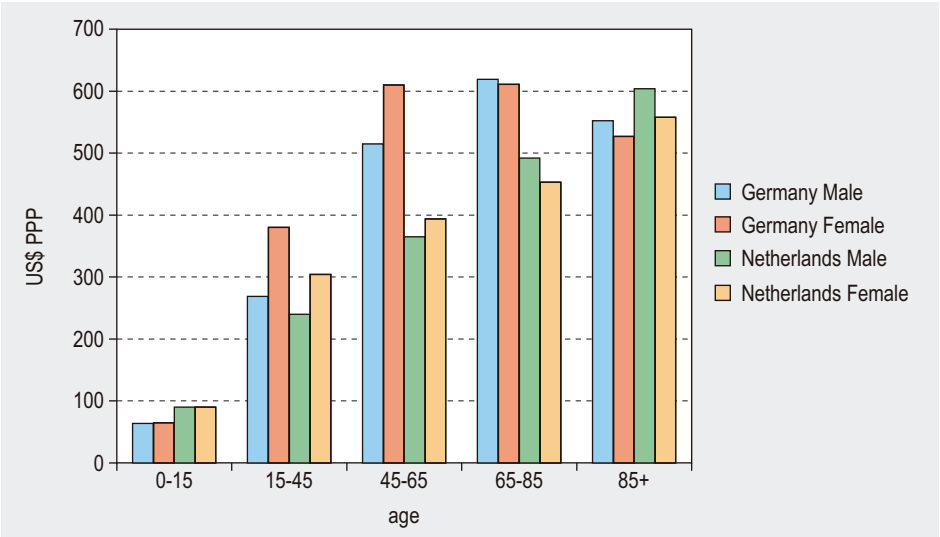


Figure 15: Cost of digestive diseases by gender and age in Australia, Germany and the Netherlands (US$ PPP)

women in the 85+ group, therefore this difference did not result in higher total cost of musculoskeletal disease. According to this figure ageing of the Australian population will have relatively large consequences for cost of musculoskeletal disease, especially among the very old.

Figure 17 demonstrates that the difference in expenditures on mental disorders is relatively large between Germany and the Netherlands. In the Netherlands costs per male 85+ are 2.5 times and costs per female 3 times as high as in Germany. It is plausible that this difference causes the difference in total costs, shown in figure 12. To examine this, cost of mental disorders are subtracted from total costs. Figure 18 shows the result of this. Expenditures on mental disorders are excluded and costs in Germany and the Netherlands become rather similar.

This result is most likely related to the difference in nursing and residential care expenditures found earlier (*table 19*). These showed relatively high expenditures on mental disorders and mainly dementia for the Netherlands. Furthermore *table 27* showed that dementia is an important driver of the high age-specific costs for mental disorders.

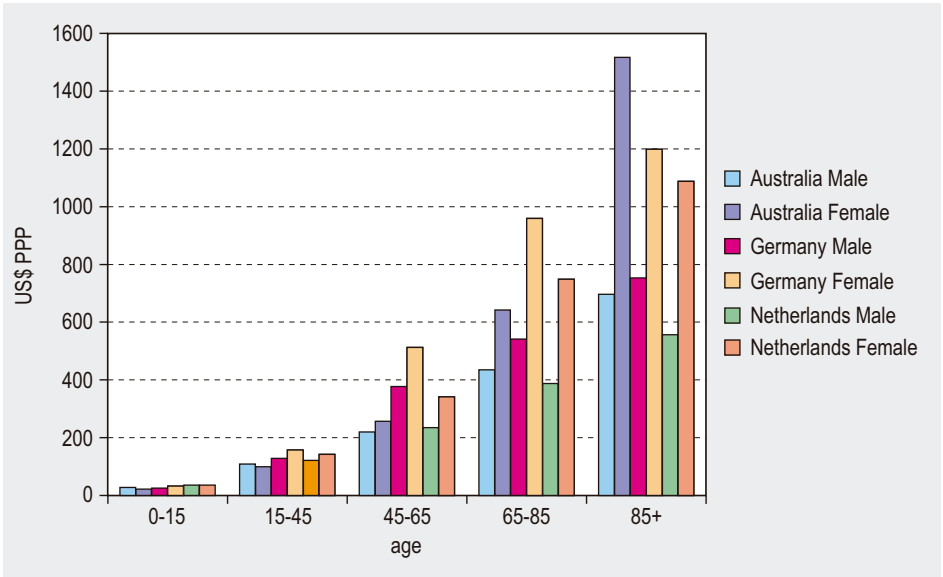


Figure 16: Cost of diseases of the musculoskeletal system by gender and age in Australia, Germany and the Netherlands (US$ PPP)

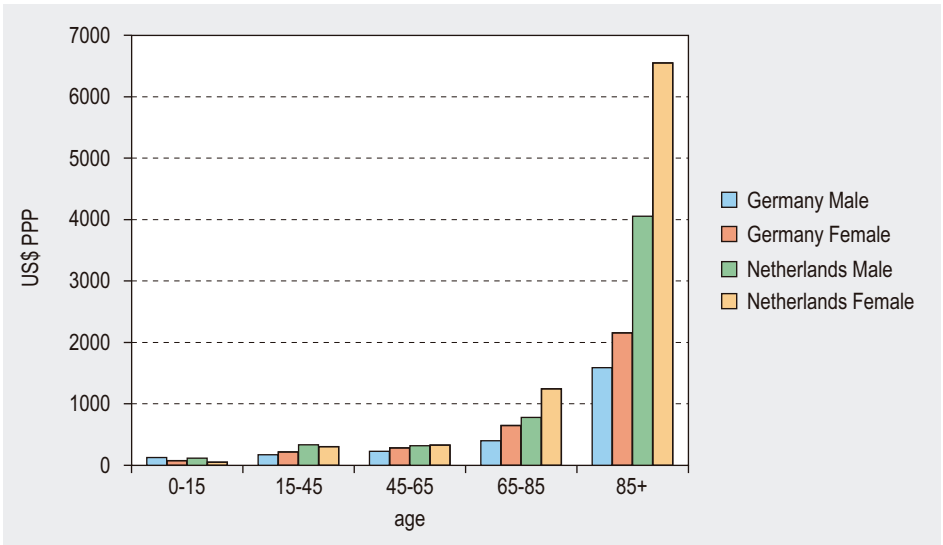


Figure 17: Cost of mental disorders by gender and age in Australia, Germany and the Netherlands (US$ PPP)

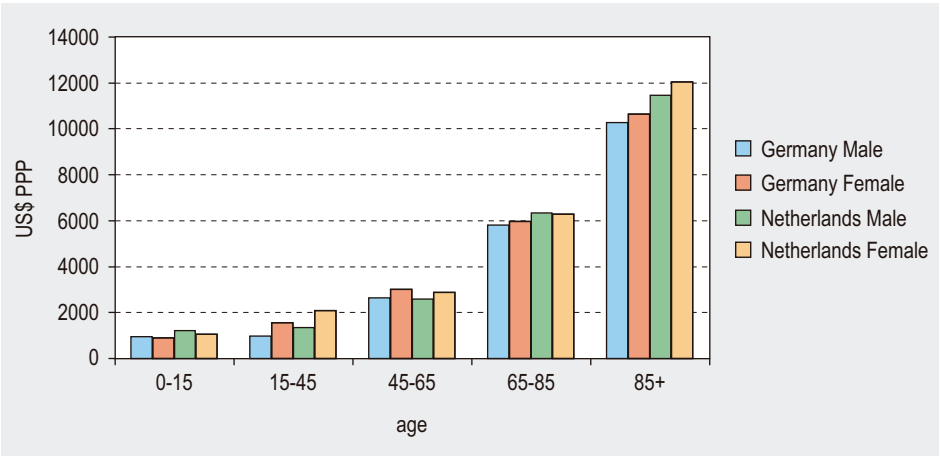


Figure 18: Total COI by gender and age in Australia, Germany and the Netherlands, excluding mental disorders (US$ PPP)

The former graphs have shown that demography matters, but its influence on costs differs per country and per disease group. Another way of looking at the influence of ageing on costs was demonstrated by Seshamani and Gray (2002). They examined the effect of ageing in different countries by means of comparing the percentage of the population with the percentage of health care costs each age group consumes. In this way Seshamani looked more at the distribution of costs over age-groups and not specifically at the level of expenditure for different age-groups (like in the previous figures). Seshamani found that in England and Wales the ageing population did not influence the rise in health care costs. The share in costs for people 65+ did not rise as much as their share in the population. However not all health care was included, therefore the result could have been affected by a shift of care (e.g. from hospitals to nursing homes). It could also be influenced by a change in health care policy (more cost-containing policy in hospitals) or changes in the access to care for elderly.

A similar calculation has been performed for the three COI studies with age-specific expenditure data. The share of 65+ people in the population and in health care costs was calculated and shown in *table 28* to investigate the Seshamani findings for COI.

Table 28: Share in total health care costs by all 65+ compared to their share in the population (%)

	Aus		Ger		Neth	
	costs	pop	costs	pop	costs	pop
Total costs	38,0	12,5	43,0	17,3	38,0	13,8
Neoplasms	49,0	12,5	50,0	17,3	52,0	13,8
Circulatory system	64,0	12,5	66,0	17,3	66,0	13,8
Digestive system	-	12,5	26,0	17,3	22,0	13,8
Musculoskeletal	43,0	12,5	44,0	17,3	39,0	13,8
Mental disorders	-	12,5	42,0	17,3	48,0	13,8

The table shows that Germany has a more aged population and this group of elderly also consumes a larger part of health care resources than in less-aged countries. The same reasoning can be applied for different disease groups. What is remarkable is that the same rule does not always hold for the specific disease groups. For example diseases of the circulatory system; the elderly take 66% of health care costs in Germany, but in the 'younger' country the Netherlands the percentage is also 66.
This means that it is not automatically true that when country A is more aged, the percentage of costs caused by the aged (for some diseases) is higher.
The conclusion of this finding is questionable. It might suggest that health expenditures for a certain population group (e.g. the elderly) rise when this group gets relatively large, but that this rise approaches a certain asymptote. An interesting question is for example what will happen with the costs of circulatory diseases for the 65+ group when the Dutch population ages. Will it rise further to 70, 80% or higher or will it stay at a rather similar level? The answer to this type of question first of all depends on the development of the costs per person in these older age groups and second on the development of the costs in the other age groups. A comparison of total costs per person 65+ with the costs per person -65 (as ratio) shows the following result for Australia, Germany and the Netherlands respectively: 5993/2020= 2.97, 7028/3087= 2.28 and 8449/3059= 2.76. It is obvious that the costs per person -65 are relatively high in Germany. This is what is also behind the equal proportion of costs of circulatory disease for the elderly in Germany and the Netherlands. The costs per person under 65 are relatively high (compared to older age groups) in Germany than the Netherlands.
If these ratios will stay the same, the effect of a demographic change towards more elderly in the population on the distribution of costs, will be largest in Australia (relative to total costs) and somewhat smaller in the Netherlands. A future longitudinal analysis might be able to show whether this ratio will change when the countries age.

The next figure shows the data from *table 28* in four figures including also the proportion of the 0-45 and 45-65 age group in the population as well as in total costs (not per capita).

The panels in *figure 19* show that there is not always a proportional increase in the percentage of costs taken by 65+ when an older population is examined, at least for some disease groups. For example examining the cost of circulatory disease, shows that the 65+ group in Germany consumes the same part of cost of circulatory disease as in the Netherlands, whereas they are a larger part of the population in Germany.
In *figure 19* the country points are in all graphs relatively close to each other. This tells that the distribution of costs over age groups is rather similar for these countries, because the proportion of costs for different age groups is similar. The graphs also show the differences between the disease groups: for circulatory disease the elderly take a large part of health care cost, whereas the cost of musculoskeletal disease are more equally divided over different age groups. This finding also holds for all three countries.

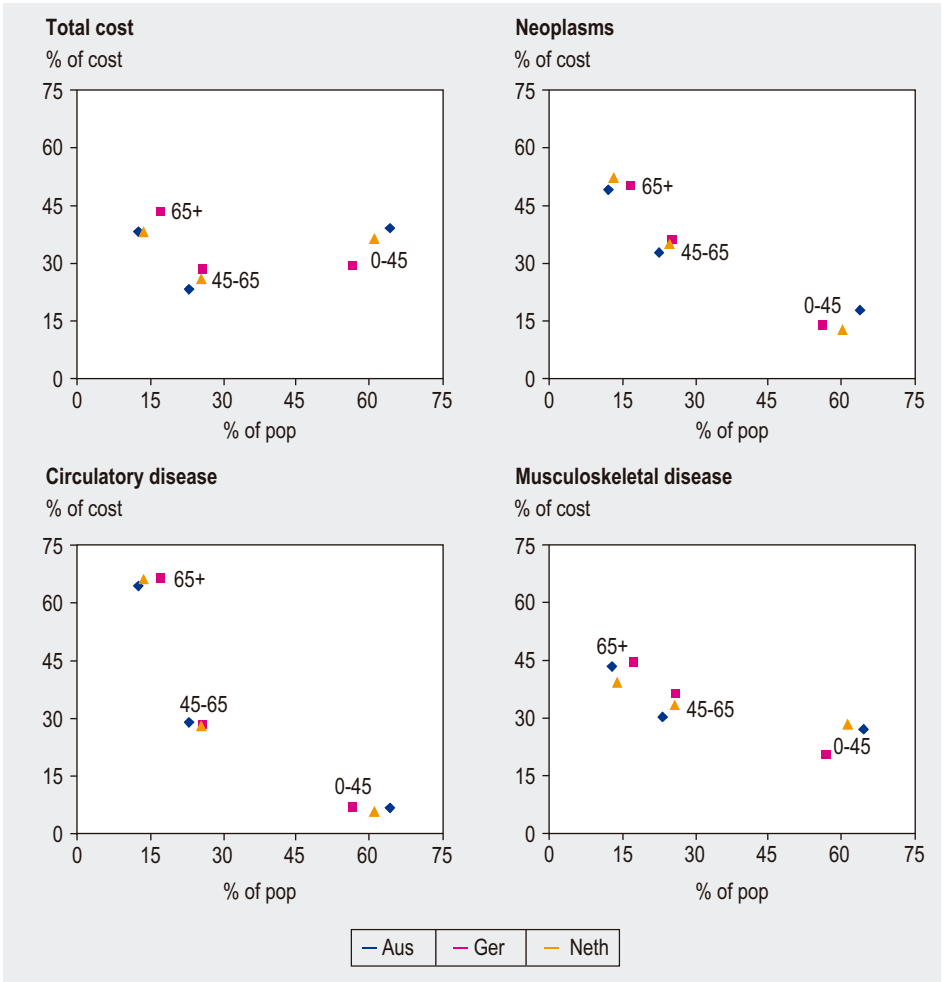


Figure 19: Share of different age groups in costs and population in Australia, Germany and the Netherlands for all diseases, neoplasms, circulatory disease and musculoskeletal disease

From these different views on the role of demography some conclusion can be drawn. First, since elderly people have higher health care costs in all countries, demographic differences are an important factor of cross country differences in health expenditure. A more aged population results in higher health expenditures. In Germany, for example, health expenditure would decrease by 6.4% if the population had a similar age structure as the Dutch (ceteris paribus).

Second, the influence of more aged people differs per country. It seems for example that ageing in Germany has a large effect on the level of expenditures of circulatory disease and in Australia on expenditures on diseases of the musculoskeletal system. COI per aged person are namely higher in these countries for these disease groups (*figure 14* and *figure 16*). This means that not only the pure demographic difference (Germany more aged) is important but there are more factors influencing differences

in total cost. A possible epidemiological explanation for circulatory disease (higher circulatory mortality/prevalence) was already mentioned in the former section.
Important is also the comparison with costs in other age groups. Germany for example shows higher costs per person under 65 compared to the costs per person over 65. Therefore the effect of a more aged population in Germany is somewhat flawed by the fact that the younger age groups (which are also important, because of their high volume) are relatively expensive in Germany.
This leads to the Seshamani hypothesis that the proportion of costs caused by the aged does not necessarily rise when the population ages. For COI this was found untrue at the level of total costs, because in Germany the elderly take 43% of expenditures compared to around 38% in the 'younger' countries. However for some disease groups this difference does not appear and the Seshamani hypothesis seems to hold. For an extensive investigation of this more, longitudinal, data are needed to compare also the changes in age-specific costs within each country over time.
Finally the demographic analyses demonstrated some problems with respect to comparability, mainly in expenditure on nursing and mental health. These groups are the main cause of high expenditures in the Netherlands for the older age groups. If mental disorders are taken out, total COI become more similar over age groups.
We conclude that the role of epidemiology is questionable and the role of demography is present, but not exhaustive. The next section will investigate how treatment variations vary (in hospitals) and whether treatment variations are plausible determinants of the differences in costs.

6.3 Treatment variation

Besides epidemiology and demography treatment variation can influence COI. Treatment variation is in this section estimated by the average length of stay (ALOS) in hospitals. This is not a complete measure of cross-country treatment variation, because outside hospitals treatment variation can occur too. It however seemed the best available measure.
The data were sampled by the European Hospital Data Project (EHDP, 2003) that tried to get comparable hospital data for Europe. However the content of these data is not completely similar for all countries. For example the Dutch data include rehabilitative care in public hospitals (inpatient and day case), whereas they are not included for France and Germany. Furthermore the Dutch data do not include curative care in private and maternity hospitals, whereas these are included for France and Germany. Because of these differences, interpretations should be guided with caution.
The Hospital Data Set covers all European countries, therefore for this report only France, Germany and the Netherlands were compared.
Table 16 in *section 5.3* showed differences in expenditures on hospitals and physicians by disease. Germany had relatively high cost of circulatory diseases and musculoskeletal disease, whereas France and the Netherlands had high expenditures for mental disorders. In the next figures it will be examined, whether these differences are related to differences in treatment variation.

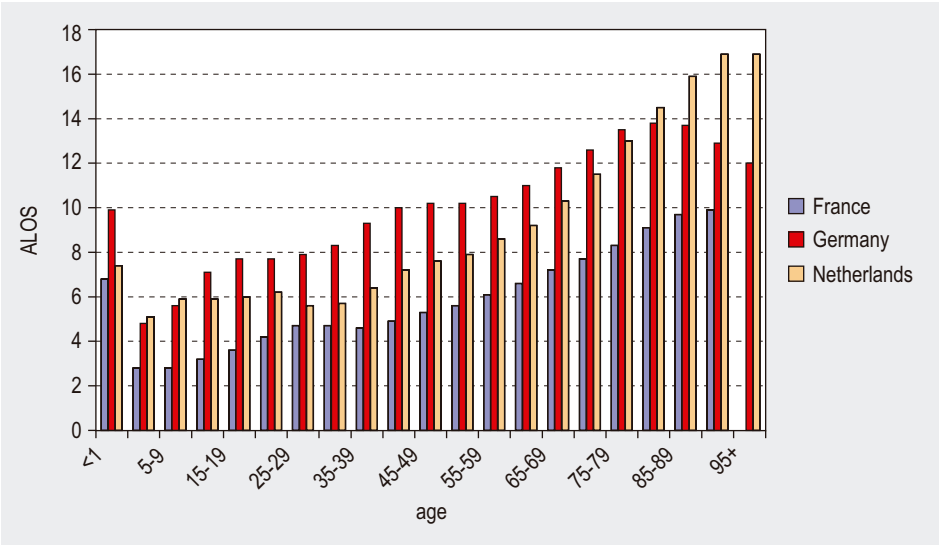


Figure 20: Average Length of Stay in French, German and Dutch hospitals in 1999 (number of days) Note: ALOS = # bed days / # inpatients, where the number of inpatients and bed-days only counts for people staying at minimum one night in hospital: day cases are excluded.

In the following figures treatment variation in hospitals is examined. *Figure 20* shows average length of stay for all inpatient cases. The following figures show the ALOS for some specific disease groups. The data entail all inpatient cases (day cases excluded) for 1999.

One can conclude from *figure 20* that France has the lowest ALOS in all age groups and Germany has the highest ALOS in most groups. From the age group 80-84 years onwards the ALOS in German hospitals decreases, while the ALOS in Dutch hospitals continues rising (this might be related to the inclusion of rehabilitative care in the Dutch data and not in other countries).
The next figures will show the situation for some specific diseases to find out if some of the differences in COI (in hospitals) are related to the average length of stay.

Average length of stay in hospitals for circulatory diseases follows a similar pattern as the ALOS for all disease groups. France again has a relatively low ALOS in all age groups and the Dutch ALOS is again relatively high at older ages. A difference with *figure 20* is that for all younger ages (up to 25 year) the ALOS is highest in the Netherlands. From *figure 21* can be concluded that the higher hospital costs of circulatory diseases for Germany (see *section 5.3*) will not be related to a higher average length of stay in hospitals, because the Netherlands has a higher ALOS in half of the age groups, and especially in the expensive age group 80+.

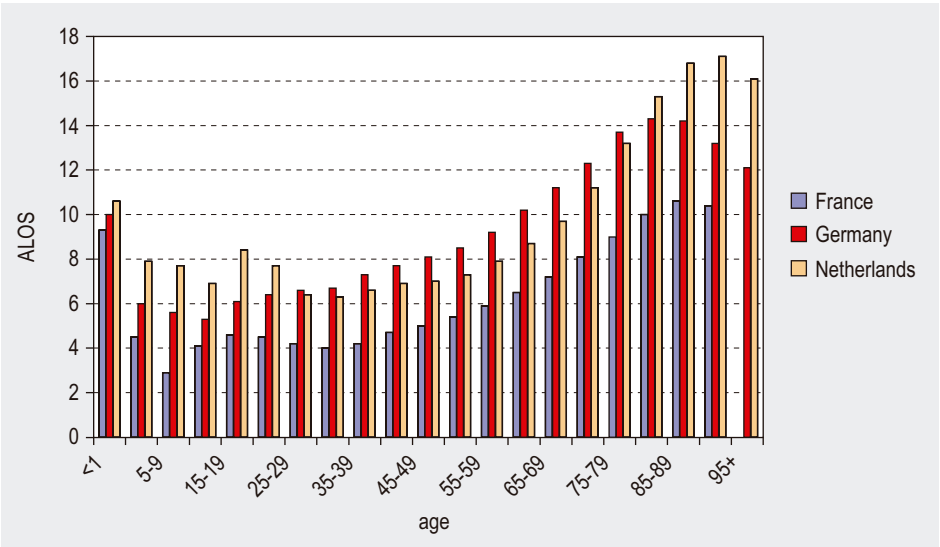


Figure 21: Average Length of Stay circulatory diseases in French, German and Dutch hospitals in 1999

Figure 22 reports the ALOS for musculoskeletal diseases. Again a relatively high ALOS for the older age groups in the Netherlands can be noted. In the beginning of this section it was already mentioned that the Dutch numbers include rehabilitative care in public hospitals, which might have caused the higher ALOS for elderly, as it can be assumed that elderly have more and longer rehabilitative needs. Overall Germany spent more (compared to France and the Netherlands) on musculoskeletal diseases, with the largest difference between 45 and 85. For this disease group there might be a relation with the average length of stay, also being relatively high for Germany in the 45-85 year age group.

Figure 23 shows the situation for mental disorders in hospitals. This disease group reports somewhat larger differences. France has an extremely low average length of stay, while the high cost for the Netherlands in the older age groups is for mental disorders more different than other disease groups. However a problem in this group is that the German study included curative care in psychiatric hospitals, whereas the other two countries excluded this group. In the Netherlands this is 2% of all hospital activity, whereas this is in France as much as 26% of all hospital activity. These differences make a good comparison problematic.

The figures showing average length of stay suggest that treatment variation in hospital might have affected differences in COI, at least for some groups. This however is not a complete picture. *Figure 24* adds data on the number of inpatient cases. The ALOS might be higher on average in Germany, but when fewer cases are treated in their hospitals the effect of a higher ALOS on total costs might disappear.
Figure 24 shows that this is not the case. Germany also has a relatively high number of inpatient cases. Combined with a higher average length of stay in most age groups,

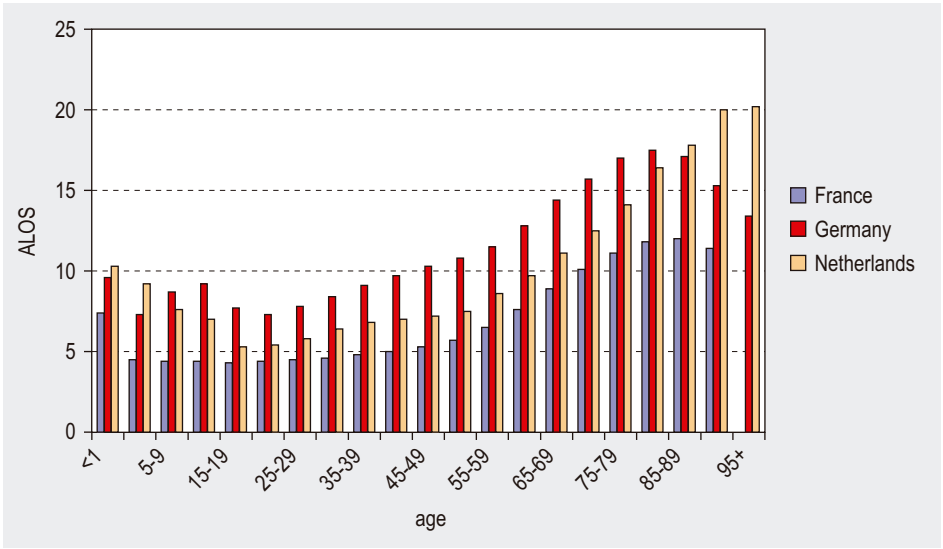


Figure 22: Average Length of Stay musculoskeletal diseases French, German and Dutch hospitals in 1999

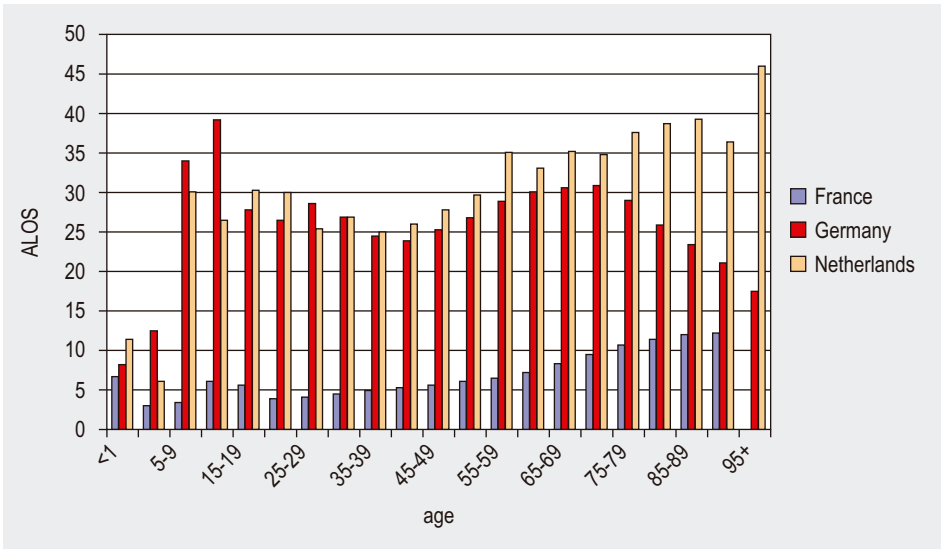


Figure 23: Average Length of Stay for mental disorders in French, German and Dutch hospitals in 1999

there are more and longer inpatient stays in Germany. The figure also tells that the number of inpatient cases is for France similar to Germany and for the Netherlands it is relatively low, except for the final age group. Already mentioned methodological differences need to be kept in mind here.

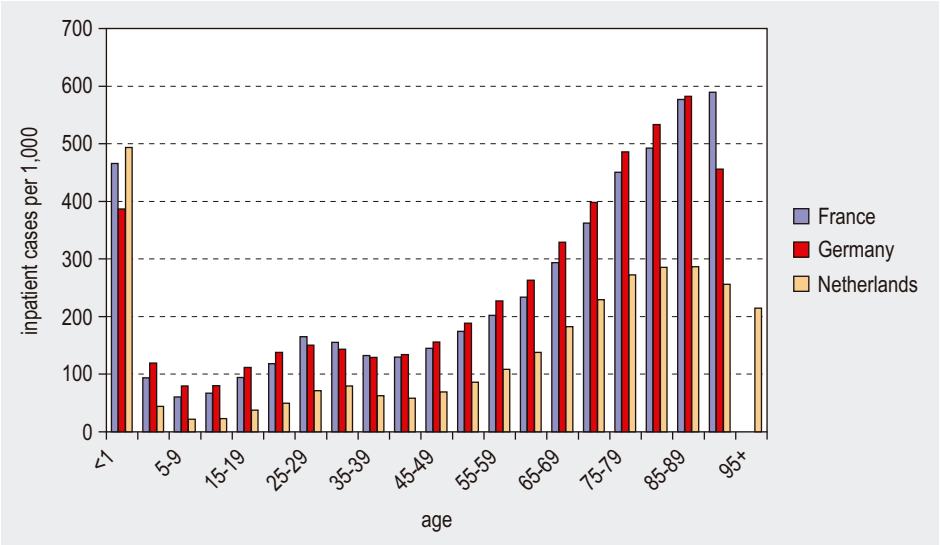


Figure 24: Inpatient cases per 1000 population in French, German and Dutch hospitals in 1999

However if one now views the number of daycases, the picture is completely different. In Germany the number of daycases is very low compared to France and the Netherlands. Recalling the costs of hospitals showed relatively similar total costs for the three European countries (in France somewhat lower). France has a low ALOS, there are few inpatient cases in the Netherlands and at last there is a low number of daycases in Germany.
It is possible that all these differences smooth each other out at an aggregate level. For example Germany treats more people inpatient increasing the difference in costs, smoothed out by less daycases lowering the difference in costs. France has a lower length of stay in hospital, but has a high number of inpatient and also daycases compensating this lower ALOS. To test this hypothesis hospital costs need to be split up into cost of daycases and cost of inpatient cases. This division was however not available in the COI data.

This section revealed significant differences in the average length of stay in hospital, number of inpatient cases and number of day cases in hospital. This indicates that treatment variation between countries exists, which will also influence costs. However at an aggregate level this might be smoothed out. Some already mentioned methodological differences need to be kept in mind.
Furthermore the picture is not complete, because only inpatient cases are included and among others ambulatory care not. Treatment variation can also occur outside the hospital in other provider groups, for example variation in prescription practices or differences in outpatient care treatment. A complete picture of treatment variation therefore requires more information.

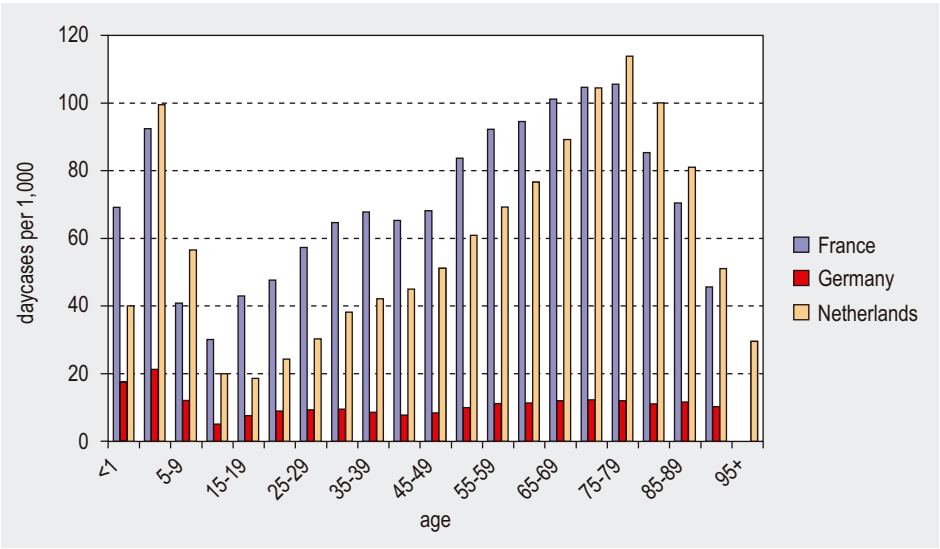


Figure 25: Daycases per 1000 population French, German and Dutch hospitals in 1999

Besides, treatment variation is related to cultural differences. Payer (1988) described that Germans for example are more 'focused' on circulatory diseases than some other western countries, meaning that a wider range of problems is diagnosed as circulatory disease.

6.4 Other factors

Underneath some other determinants of health care spending (as mentioned in the first chapter) are shortly examined. Constraints of time and space made a more extensive research of these subjects impossible. However some recommendations and directions for further research will be given.

Technology

Differences in the use of (specialized) technology might influence COI. The use of more specialized technology is expected to raise costs, because of its expensiveness. It can also raise costs because better technology detects and possible cures more (diseases), resulting in a higher demand for advanced treatment.

Better technology can improve treatment and after that improve health. When an improvement in health is reached, this can lead to lower health care use and costs in the long-run. Better technology can also lower costs, because it results in improved productivity and possibly also reduces the need for labour resources (depending on to what extent labour and technology are substitutes). Theoretically an increase and decrease of costs is possible.

The technological infrastructure can be described by the use of specialized technology, investments in laboratory equipment, number of scans in use or by investments in Research and Development (R&D).
The influence of technology on health care costs has been researched a number of times. These studies relate technological infrastructure to an aggregate level of health care expenditure, and do not focus on diseases. Okunade and Murthy (2001) for example tested the influence of investments in R&D on health care spending. They found that technology was a major driver of increasing health care costs.

Health care prices

Health care prices are determinants of health care spending, as total expenditure is equal to: volume times price of health care. In this report expenditures are controlled for general price differences (at GDP level). However health care prices might behave differently from the rest of the economy. There are so-called health PPPs which should control for differences in health care prices. The quality of this health PPP however is limited at this moment as it is only based on a basket of pharmaceuticals (OECD Health Data 2005) and therefore does not represent the whole health care sector. The health care sector is very diverge, including pharmaceuticals, all kinds of technology (see above), physicians etcetera. Health PPPs actually should include all these aspects.
Danzon and Chao (2000) however explain that even within the pharmaceutical sector it is hard to define the price level in countries (in a comparable way). In each country very diverging sets of pharmaceuticals are used, furthermore studies comparing pharmaceutical prices are very sensitive to the methods used (Danzon and Chao). They explain how pharmaceutical price comparisons often are biased, because of a specific sample selection and because of cross national differences in the use of generic or non-generic drugs. They do conclude that the 'regulatory regime' is an important factor behind differences in prices. Countries with a stronger governmental influence and regulation seem to have lower prices for older and globally used 'molecules' (drug types) than other countries.

7 CONCLUSIONS AND DISCUSSION

The interest in cross country comparisons is rising in the current globalizing world. Countries and governments want to learn from each other and want to investigate whether certain foreign policies can be used or not. This also happens in the field of health care, often with respect to expenditure on health care. These comparisons are often used to find out how well or efficient a country or a country's health care system is performing and most important why. Possible lessons from other countries can improve the efficiency of the system. Health care systems are however diverse and all kinds of factors influence these health expenditure. COI studies and international comparisons of COI describe some of the determinants of health care spending and therefore can be helpful in gaining more insight in what drives health expenditure.

The central question of this report was: "To what extent and why do COI estimates differ internationally?"

This central question was divided further into six more specific questions:

1 How do COI patterns compare across countries and which disease groups have the largest cross-country cost differences?
2 What is the role of health care definitions with respect to differences in COI estimations?
3 How do differences in allocation methods influence the comparison?
4 What is the role of epidemiology, demography and treatment variation in explaining differences in cost estimates across countries and across diseases?
5 Viewing the comparison and the analysis of explaining factors; does it give an answer to the questions in a satisfactory way?
6 Is it useful to repeat this analysis in the future and what information is needed to improve the analysis further?

First overview of COI

The answer to the questions above should start with *table 2* and *3* of this report, which demonstrated that the various COI studies show a mixture of similarities and differences between countries. At aggregate level Australia, Canada, France, Germany and the Netherlands spend a rather similar percentage of their income on health: between 9 and 11% of their GDP (using the System of Health Accounts definition). Calculating per capita expenditures (*table 3*) revealed that the Dutch and German health expenditures are somewhat higher compared to the other countries. This is influenced by the fact that these two studies are performed in a more recent year, however Germany has had high expenditures for many years and Dutch health care expenditures have taken a steep rise since the late '90s.

The allocation of cost to disease groups shows that for these countries the same disease groups are the main drivers of health expenditure. Diseases of the circulatory system, mental disorders and diseases of the digestive system are in all countries in the top

with respect to health care costs. Furthermore cost of pregnancy and childbirth and perinatal diseases rank low in all countries. Therefore cost patterns are in general relatively similar.
Besides these similarities differences were found too. There are relatively large differences in cost allocated to ill-defined conditions, the additional category and unallocated cost. Furthermore small cost groups as expenditures on pregnancy or expenditures on diseases of the blood and blood-forming organs show a high variation. In other (more expensive) disease groups there is also variation, mostly caused by one country having a specific outlier in a certain disease group. The results in *table 20* show that Germany for example has high cost of circulatory disease and musculoskeletal disease. The Netherlands for example spends a relatively large part on mental disorders and Australia spends somewhat more on respiratory diseases than other countries.

Differences in definition do matter, corrections are needed
Differences in COI are caused by various factors. The determinant that needs to be examined first is the definition of health expenditure in these studies. The question is: what kind of health care is included and is this internationally comparable? There were differences to note with respect to this comparability question, for example: the French study did not include expenditures on public health and prevention, the Australian study did not allocate expenditures on ambulances and the Canadian study could not allocate expenditures on paramedical care to disease. These differences hamper the comparability of COI studies.
In order to arrive at a comparable set of health care expenditure, the System of Health Accounts (SHA) provider classification was used as backbone of further comparisons. The SHA can be used as framework to report more comparable data on health expenditures. In *chapter 4* it was shown that the amounts used in the COI studies for different provider groups are in these countries fairly equal to the SHA outcomes. This is caused by a nowadays more comprehensive use of the SHA in these countries. There were, however, also some differences, as some studies included expenditures that did not fall within the SHA definition.

To solve the differences in content and deviations from the SHA, a selection was made in *chapter 5* of health care providers that are included and allocated to disease in all studies and also fit in the SHA. This selection consists of: hospitals, nursing care facilities, physicians (GP's), specialists, prescribed medicines and dentists (these groups cover around 65-75% of total expenditure). *Table 20* in *chapter 5* showed that controlling for differences in the content of these studies results in better comparable COI figures with less variation within disease groups. Expenditure on nursing and residential care was excluded, because the SHA definition needs revision on this subject, according to experts from OECD and Eurostat. The result of the COI comparison for this provider group (*table 19*) illustrated this finding, by showing tremendous differences in nursing and residential care expenditure across these countries.

Cost patterns are in general similar, despite differences in health systems

COI comparisons reveal some relevant insights into the influence of demography, epidemiology and treatment variation on health expenditure. It seems that the possibilities for international comparisons have improved in the past decade. Previous comparisons led to the conclusion that COI studies were incomparable across countries (Polder et al., 2005). This report, however, demonstrated that linking COI results with the SHA improves the comparability, at least for curative care. Furthermore it showed that cross-country comparisons of all determinants separately is useful for finding out why differences occur.

This report showed that the western countries studied in general have similar cost patterns, also as percentage of total expenditure and in currencies adjusted for exchange rates and price differences. This gives the impression that for particular diseases every country faces a quite similar demand for health care, irrespective of the health care system. *Chapter 4* highlighted for each country the major characteristics of its health care system. There are tax-based and insurance based systems, different insurance packages, differences in the role of the private sector etcetera. In the end, however, cost patterns by disease are relatively similar in these countries. So COI figures might provide useful information for the evaluation of health care reforms, from a national as well as an international perspective. Countries might learn from each other what effects health care policies and reforms can have on health care cost.

This becomes even more apparent when the COI studies are equipped to report the data in several dimensions at the same time. Important dimensions on the demand side are: age, gender and disease and on the supply side these are the three dimensions of the SHA system; provider, function and financing. Provision of cost data in different dimensions and combinations of dimensions gives the comparison more power, because all these different types of information can give a better understanding of the background of changes and differences in COI. In this report for example the comparison of cost by age, provider and disease gave a better understanding of the difference between the Netherlands and other countries with respect to cost in older age groups, aged care and mental disorders.

Demographic differences and treatment variation are important.

Other determinants of cost differences were examined in *chapter 6*. Epidemiological differences were considered in the first place. However comparable prevalence data turned out to be scarce. Prevalence data for neoplasms were available but showed very little difference across countries, whereas cost estimations were different (higher in Germany). These higher costs therefore could not be caused by an epidemiological difference. For circulatory disease there was an indication of an epidemiological explanation, because Germany had a higher mortality of circulatory disease. If this is linked with a higher prevalence this would explain the higher cost in Germany. As this is uncertain it can be said that the role of epidemiology is not clear. However the, in general, relatively similar cost patterns of these countries possibly reflect a similar epidemiological pattern of diseases (with some exceptions).

Demographic influences were much more clear, as COI rise with age in all countries. Germany for example would have had 6.4% lower total expenditure if the population would have been less aged (*table 25*). Also here, the disease categorization provides useful insights: for neoplasms, the cost per age group are relatively similar across countries, meaning that differences in demography have much influence on total cost of this group. Cost of circulatory disease, however, show a different pattern: in the oldest age group these are relatively high in Germany compared to the other countries. This means that, possibly caused by the epidemiological difference mentioned, the influence of a demographic difference is here exaggerated by a difference in average costs per aged person. Demographic differences therefore can not explain all differences in COI and the effect of demographic differences can differ per country and per disease group.
The demographic analyses furthermore demonstrated that the high costs for elderly in the Netherlands are mainly concentrated in nursing and residential care even within the SHA definitions. If a correction is made for this (e.g. exclusion of mental disorders) the costs in the oldest age group become more similar to the other countries.

Treatment variation is often mentioned as a third source of international differences in health expenditure. In this report we estimated treatment variation by average length of stay in hospital, accompanied by data on the number of hospital stays and the number of day cases in hospital. It was demonstrated that there are significant differences in these variables between France, Germany and the Netherlands. Differences in average length of stay (ALOS) were found and might explain some differences in costs. For example a high ALOS for musculoskeletal disease in Germany, possibly related to higher cost of musculoskeletal disease (between 15-85 year). The difference in cost of circulatory disease (in hospitals) however could not be explained by varying average length of stay.
The number of inpatient cases and also day cases showed different patterns too. For each of these variables a different country was the outlier: in Germany a low number of day cases and in the Netherlands a low number of inpatient cases. Therefore it was unclear in which direction treatment variation is moving in general. The picture was furthermore not complete, as only hospital care was included. Treatment variation outside hospitals should also be considered.

Cross country comparisons should focus on aggregate levels
Considering all the comparisons made in this report, what do they tell us: Can COI studies provide satisfactory answers and lessons? Our exploration showed that it is impossible to give a complete answer of the exact influence of all determinants on COI. In this way the comparison is not completely satisfactory. Therefore, we recommend to keep the comparison at ICD chapter level and not to go into detailed, disease specific comparisons.
First of all the number of diseases where costs could be allocated to differs between countries. The Dutch study was able to separate 100 specific diseases, whereas 50 diseases were used in France. Next to this costs sometimes could only (or best) be allocated to a disease chapter and not to specific diseases. E.g. the French study could

identify expenditures on mental diseases (for psychiatry), however an allocation to specific diseases would be too inaccurate and was therefore not performed. It should be noted that it is not proposed to make the COI studies at an aggregate (ICD-chapter) level. From a national perspective information on the cost of specific diseases might be requested.

Standardisation and more extensive use of the SHA will improve COI comparability in the future

The conclusion that the comparability of COI studies is limited to aggregate levels, however, does not mean that there is no room for improvement. First of all the use of a common reporting framework as provided by the SHA will facilitate cross country comparisons. At this moment an increasing number of countries are working on internationally comparable data. Most OECD countries are implementing (or have implemented) the SHA next to their national health accounts. This shows the interest of most countries to provide internationally comparable data and the possibilities it might provide. In spite of the fact that countries are quite autonomous in the organisation of the health care system they show increased interest in developments in other countries.
The SHA itself, however, has its problems too at this moment. The main problem regards the estimation of comparable nursing and residential (aged) care expenditure. In this report we concluded that at this stage, it will be better to focus COI comparisons on curative health care and further try to improve the methods of estimating nursing and residential care expenditure. In spite of this there is also room for improvement in curative care, especially for paramedical care and non-prescribed medicines.

Second, the reference years and methods should be standardised. In general the COI studies are performed in similar ways. All studies follow similar, top-down, steps in calculating COI. However, there remain differences in data sources used, which are in some cases and countries better (more representative) than in others. The allocation methods differ sometimes, for example for expenditure on medicines in France. This shows the need for a common standardized COI methodology. Not at least since the interest in both COI and international comparisons is still increasing.
This common methodology should keep in mind that COI studies first of all need to be useful for national policy making. If not the information would be useless, because it would not be implemented on the national level where health policy is made. From a national perspective more detailed data might be requested (e.g. of specific diseases), whereas for international comparisons more aggregate information is better.
In addition it makes sense to relate COI comparisons to the GDP in each country. This will become more relevant when countries with more diverging income levels will be compared. Per capita expenditures of about $2000 will have a quite different impact in countries depending on their income levels. The countries in this report, however, had similar GDPs and therefore expenditures were only compared to GDP at aggregate levels. We concluded that all countries studied spend similar amounts of their wealth on health care.

Third, the incorporation of new and other dimensions might be worthwhile. As mentioned, all COI studies were based on the provider classification of the SHA. The SHA, however, is actually a tri-axial system, combining expenditure by provider, function and financing. The functions of health care providers can be different across countries. A hospital in country A might perform different activities than a hospital in country B (e.g. more focus on in- or outpatient care or more focus on rehabilitation). Comparing hospital expenditures might become problematic in this way. The comparison of nursing and residential care expenditure by disease showed that the comparability of this provider group is constrained by differences in the actual definition, which is related to the functions of the care delivered by these providers.
Since COI studies only use the provider classification, the extension of the analyses with health care functions and financing could create new opportunities for better insight, especially at provider levels. At an aggregate level (summing up different provider groups) the lack of information on functions might be less problematic. It is very well possible that more outpatient care in hospitals in one country goes together with less outpatient care by ambulates or that more rehabilitative care in hospitals is combined with less rehabilitative care in other health care facilities. The hypothesis in this case is that health care functions are spread out differently over the provider categories across countries, but these differences smooth out at a more aggregate level. In conclusion, a functional breakdown seems to be useful, however not necessarily needed at the aggregate level. This idea should be investigated further.

Including a time dimension in COI research and comparisons also seems rewarding. Longitudinal data can provide insight in changes over time within countries and changes in differences between countries. In this report some time trends were studied but the analysis was hampered because, according to the different authors, the country specific COI studies were less comparable over time. Newer updates that match fully the SHA should be used to investigate the real opportunities for cross country comparisons over time.

A distinction between price and volume will enhance the understanding of cost developments

If possible a division of health expenditure in volume and price estimations would be useful for a better understanding of differences in expenditure. This may explain whether differences in cost are caused by more treatment or by price differences. A split of expenditures into internationally comparable volume and price measures, however, is a complex job. The OECD is running a project on international comparisons of output and prices in health care at this moment (OECD, 2005). The project tries to setup a methodology for better (more comparable) aggregate price and volume estimates. These are at this moment unavailable. In this report we discussed health care specific PPPs (health care price corrections) and concluded that these are, at this moment, not suitable for international comparisons, since they are only based on a basket of pharmaceutical products, which is too limited for comparing the whole health care sector. Right now the use of GDP PPPs is the second best solution.

Making volume estimates can also raise problems. Ideally these estimates should describe the volume of episodes of treatment, where one episode can (will) include several activities. It is defined in this way by Eurostat (OECD, 2005). The definition of an 'episode of treatment', however, is unclear and will likely differ among countries. Chains of care with involvement of different providers cause additional problems for cross country comparability, because they require linked patient information for different providers. These and other issues will be investigated in the OECD project.

In the end these and other steps will result in better COI figures that serve the national and international debate on health and health expenditure with a deeper understanding of the interrelationships between demand and supply of health care.

REFERENCES

AIHW, Australian Institute of Health and Welfare. Health expenditure Australia 2002-2003, Health and Welfare expenditure series Number 20. Canberra: AIHW, 2004

Behrens C, Henke KD. Cost of illness studies: no aid to decision making? Reply to Shiell et al., Health Policy 1988; 10: 137-141

Böhm K, Cordes M, Forster T. Krah K, Krankheitskosten 2002. Wiesbaden: Statistisches Bundesamt, 2004

Bloom BS, Bruno DJ, Maman DY, Jayadevappa R. Usefulness of Cost-of-Illness Studies in healthcare decision making. Pharmacoeconomics 2001; 19 (2): 207-213

Bots ML, Looman SJ, Koudstaal PJ, Hofman A, Hoes AW, Grobbee DE. Prevalence of stroke in the general population. The Rotterdam Study. Stroke 1996a ; 27: 1499-1501

Busse R, Riesberg A. Health Care Systems in Transition, Germany 2004. Copenhagen, WHO Regional Office for Europe on behalf of European Observatory on Health Systems and Policies, 2004

Byford S, Torgerson DJ, Raftery J. Cost of illness studies. BMJ 2000; 320 (7245): 1335

Canada Health Act. Statutes of Canada, 1984

CIHI. National Health Expenditure Trends 1975-2004. Ottawa: Canadian Institute for Health Information, 2004

CREDES, Centre de Recherche, d'étude et de documentation en économie de la santé. L'information a partir d'Eco-Santé. CREDES, Eco-Santé infos 1998; 1

Danzon PM, Chao LW. Cross-national price differences for pharmaceuticals: how large, and why? Journal of Health Economics 2000; 19: 159-195

Drummond M, O'Brien B, Stoddart GL. Methods for the economic evaluation of health care programs. Oxford University Press, 1997

EHDP, European Hospital Data Project, System Version 1.21. Department of Health and Children Ireland, 2003

Esmail N, Walker M, Yeudall. How good is Canadian Health Care? 2004 Report, An international comparison of health care systems. Vancouver: The Fraser Institute, 2004

Exter den A, Hermans H, Dosljak M, Busse R. Health Care Systems in Transition: Netherlands 2004. Copenhagen, WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies, 2004

EUCAN. Cancer Incidence, Mortality and Prevalence in the European Union, EUCAN database Version 5.0, <www.encr.com.fr> 01-19-2006

Fedstat, Federal Statistical Office Germany. Health expenditure by health care provider 2002, Federal Health Monitoring System,

<http://www.destatis.de/basis/e/gesu/gesutab6.htm> 11-20-2005

Fenina A, Geoffroy Y. Comptes nationaux de la santé 2004, Document de travail, Ministère de la Santé et des solidarities. Direction de la recherche, des études, de l'évaluation et des statistiques (DREES) 2005; 84

Fortin G. SHA-Based Health Accounts in 13 OECD Countries: Country Studies Canada, National Health Accounts 1999. OECD, 2004

Gerdtham UG, Jönsson B, MacFarlan M, Oxley H. The determinants of health expenditure in the OECD countries: a pooled data analysis. Developments in Health Economics and public policy 1996; 6: 113-134

Goss J. Health system expenditure on disease and injury in Australia, 2000-2001. Canberra: Australian Institute of Health and Welfare, 2005

Grosse-Tebbe S, Figueras J. Snapshot of health systems. The state of affairs in 16 countries in summer 2004. World Health Organization 2004

Health Canada. Economic Burden of Illness in Canada, 1998. Policy Research Division, Strategic Policy Directorate, Population and Public Health Branch. Health Canada, 2002.

Henke KD, Martin K. Die Krankheitskostenrechnung als entscheidungshilfe. Bundesgesundheitsblatt – Gesundheitsforschung – Gesundheitsschutz 2005; 49: 19-27

Hilless M, Healy J. Health Care Systems in Transition, Australia 2001. Copenhagen, WHO Regional Office for Europe on behalf of European Observatory on Health Care Systems, 2001

Hodgson TA. Cost of illness studies: no aid to decision making? Comments on the second opinion by Shiell et al. Health Policy 1989; 11: 57-60

Hodgson TA, Cohen AJ. Medical expenditure for major diseases, 1995. Health Care Financ. Rev 1999; vol. 21, 2: 119-164

Ingham L, Bennets R, Hynes T. SHA-Based Health Accounts in 13 OECD Countries: Country Studies Australia. National Health Accounts 2000. OECD 2004

International Agency for Research on Cancer. GLOBOCAN 2002 database <http://www-dep.iarc.fr>, 01-20-2006

Jacobson L, Lindgren. Vad kostar sjukdomarna? Sjukvårdskostnader och produktionsbortfall fördelat på sjukdomsgrupper 1980 och 1991. Stockholm: Socialstyrelsen, 1996

Klatt I. Understanding the Canadian health care system. Journal of Financial Service Professionals 2000; 54: 42-51

King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025. Prevalence, numerical estimates and projections. Diabetes Care 1998; 21 (9): 1414-1431

Knol K, Hilvering C, Wagener DJ TH, Willemsen MC. Tabaksgebruik gevolgen en bestrijding, Lemma Utrecht, 2005

Kommer GJ, Slobbe LCJ, Polder JJ. Trends en verkenningen van kosten van ziekten, Zorg voor euro's-2. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu, 2006

Koopmanschap MA. Cost-of-Illness Studies, Useful for health policy? Pharmacoeconomics 1998; 14 (2): 143-148

Mathers C, Penm R, Carter R, Stevenson C. Health system costs of diseases and injury in Australia 1993-94. Canberra: Australian Institute of Health and Welfare, 1998

Mosseveld van CJPM. International Comparison of Health Care Expenditure. Existing Frameworks, Innovations and Data Use. Voorburg, 2003

Mosseveld van CJPM. SHA-Based Health Accounts in 13 OECD Countries: Country Studies The Netherlands. National Health Accounts 2001. OECD 2004

Mosseveld van CJPM, Smit JM. Working paper, Health and social care accounts 1998-2002. Centraal Bureau voor de Statistiek, CBS 2004

NHS Executive, Burden of disease – a discussion document, Wetherby: Office for National Statistics 1996

OECD, Organization for Economic Cooperation and Development. A System of Health Accounts Version 1.0. OECD, 2000

OECD, Organization for Economic Cooperation and Development, OECD Health Data 2003. OECD/ IRDES 2003

OECD, Organization for Economic Cooperation and Development, OECD Health Data 2005. OECD/ IRDES 2005

OECD, Organization for Economic Cooperation and Development International comparisons of output and prices in health care: interim report. OECD, 2005

Okunade AA, Murthy VNR. Technology as a 'major driver' of health care costs: a cointegration analysis of the Newhouse conjecture. Journal of Health Economics 2002; 21: 147-159

Orosz E, Morgan D. SHA-Based National Health Accounts in Thirteen OECD Countries: A comparative Analysis. OECD 2004

Paris V, Renaud T, Sermet C. Dossier solidarité et santé. Des comptes de la santé par pathologie: un prototype pour l'année 1998, CREDES 2003

Payer L. Medicine & culture, Varieties of Treatment in the United States, England, West Germany and France 1st ed. New York: Henry Holt and Company Inc, 1988

Pearce N, Sunyer J, Cheng S, Chinn S, Björkstén B, Burr M, Keil U, Anderson HR, Burney P. Comparison of asthma prevalence in the ISAAC and the ECHRS. European Respiratory Journal 2000; 16: 400-426

Polder JJ. Cost of illness in the Netherlands: description, comparison and projection. Erasmus University Rotterdam, 2001

Polder JJ, Takken J, Meerding WJ, Kommer GJ, Stokx LJ. Kosten van Ziekten in Nederland – De zorgeuro ontrafeld. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu, 2002

Polder JJ, Meerding WJ, Bonneux L, van der Maas PJ. A cross-national perspective on cost of illness - A comparison of studies from The Netherlands, Australia, Canada, Germany, United Kingdom,

and Sweden. Eur J Health Econ 2005;6(3):223-32.

Rice DP. Cost of illness studies: what is good about them? Injury Prevention 2000; 6: 177-179

Sandier S, Paris V, Polton D. Health Care Systems in Transition, France 2004. Copenhagen, WHO Regional Office for Europe on behalf of European Observatory on Health Systems and Policies 2004

Schneider M, Martin K, Henke KD, Behrens C. Kosten nach Krankheitsarten. Wiesbaden: Statistisches Bundesamt, 1999

Seshamani M, Gray A. The impact of ageing on expenditures in the National Health Service. Age and Ageing 2002;31: 287-294

Shiell A, Gerard K, Donaldson C. Cost of illness studies: an aid to decision-making? Health Policy 1987; 8: 317-323

Slobbe LCJ, Kommer GJ, Smit JM, Groen J, Meerding WJ, Polder JJ. Kosten van ziekten in Nederland 2003, Zorg voor euro's-1. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu, 2006

Statistisches Bundesamt. Gesundheit Ausgaben 2003. Wiesbaden: Statistisches Bundesamt, 2005

Wiseman V, Mooney G. Burden of illness estimates for priority setting: a debate revisited. Health Policy 1998; 43: 243-251

Wilk van der EA. Zijn er internationale verschillen? In: Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid <http://www.nationaalkompas.nl/Gezondheid en ziekte/ Ziekten en aandoeningen/ Ademhalingswegen/ Astma en COPD>. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu, 01-21-2006

Zifonun N. SHA-Based Health Accounts in 13 OECD Countries: Country Studies Germany, National Health Accounts 2001. OECD 2004

GLOSSARY

AIHW	Australian Institute of Health and Welfare
ABS	Australian Bureau of Statistics
ALOS	Average Length of Stay
AUD	Australian Dollars
AWBZ	Algemene Wet Bijzondere Ziektekosten: Exceptional Medical Expenses Act, the Netherlands
BEACH	Bettering the Evaluation and Care of Health: Australian health survey
CAD	Canadian Dollars
CBA	Cost Benefit Analysis: measuring a cost benefit ratio in monetary terms
CBS	Centraal Bureau voor de Statistiek: Statistics Netherlands
Ceteris paribus	Scientific term meaning: Everything else being equal
CHST	Canadian Health and Social Transfer
CIHI	The Canadian Institute for Health Information
COI	Cost Of Illness
CREDES	Centre de Recherche, d'Etude et de Documentation en Economie de la Santé: Health economics research centre, France
CVZ	College voor Zorgverzekeringen: Health Care Insurance Board, the Netherlands
DREES	Direction de la Recherche, des Etudes, de l'Evaluation et des Statistiques
DRG	Diagnostic Related Group: a classification system used to group patients by diagnosis and health care use.
EPPM	l'Enquête Permanente sur la Prescription Médicale: Prescription Survey, France
ESPS	L'Enquête Santé et Protection Sociale: Household Survey on health (care), France
FedStat	Federal Statistical Office Germany
Flat rate	Premium independent of income or risk
GDP	Gross Domestic Product
GHM	Groupes Homogènes de Malades: Disease Classification system, France
GP	General Practitioner
HP	Health Provider classification in the System of Health Accounts
ICD	International Classification of Diseases
LINH	Landelijk Informatie Netwerk Huisartsenzorg: National Information Network of General Practitioners, the Netherlands
LMR	Landelijke Medische Registratie: National Medical Registration, the Netherlands
Medicare	Public health insurance system in Australia and Canada

Moral hazard	'Immoral' behavior, caused by the fact that people do not feel the consequences: unnecessary health care use in case of full insurance
NHA	National Health Accounts
NHEX	National Health Expenditure Trends (used in Canada)
NHPA	National Health Priority Areas
NHS	National Health Service: publicly funded health system, UK
OECD	Organisation for Economic Co-operation and Development
OOP	Out of pocket payment
PBS	Pharmaceutical Benefits Scheme
PMSI	Programme de Médicalisation des Systèmes d'Information
PPP	Purchasing Power Parities: are the rates of currency conversion that eliminate the differences in price levels between countries.
SFK	Stichting Farmaceutische Kengetallen: Foundation for Pharmaceutical Indicators, the Netherlands
SHI	Statutory Health Insurance
SHA	System of Health Accounts: accounts developed by the OECD to improve comparability of health expenditure among countries
VHI	Voluntary Health Insurance
WHO	World Health Organization
WTZ	Wet Toegang Ziektekostenverzekeringen: Health Insurance Access Act, the Netherlands
ZFW	Ziekenfondswet: Sickness Fund Act, the Netherlands

APPENDIX A

Drummond´s framework of economic evaluation

Are both costs and consequences of the alternatives examined?				
		NO		YES
Is there comparison of alternatives?	**NO**	Outcome description	Cost description	Cost-outcome description
	YES	Efficacy or effectiveness evaluation	Cost analysis	Cost-minimization analysis Cost-effectiveness analysis Cost-utility analysis Cost-benefit analysis

Source: Drummond, Methods for the economic evaluation of health care programs, 1997

APPENDIX B

Comparison of Australian OECD and AIHW health expenditure data (AUD$ million)

SHA by provider		OECD	AIHW
HP.1	**Hospitals**	**20.376**	**20.377**
HP.1.1	General hospitals		
HP.1.2	Mental health and substance abuse hospitals		
HP.1.3	Speciality hospitals		
HP.2	**Nursing and residential care facilities**	**4.153**	**4.153**
HP.2.1	Nursing care facilities		
HP.2.2	Residential mental retardations. mental health and substance abuse facilities		
HP.2.3	Community care facilities for the elderly		
HP.2.4	Community care facilities for the young (*social care*)		
HP.2.9	All other residential care facilities		
HP.3	**Providers of ambulatory care**	**19.281**	**19.297**
HP.3.1	Offices of physicians	7.660	10.255
HP.3.2	Offices of dentists[1]	3.106	3.448
HP.3.3	Offices of other health practitioners	2.456	2.456
HP.3.4	Outpatient care centres[2]	2.492	2.136
HP.3.5	Medical and diagnostic laboratories[3]	2.565	
HP.3.6	Providers of home health care services		
HP.3.9	Other providers of ambulatory care	1.002	1.002
HP.4	**Retail sale and other providers of medical goods[4]**	**10.303**	**10.302**
HP.4.1	Dispensing chemists	7.321	
HP.4.2	Retail sale and other suppliers of optical glasses and other vision products		
HP.4.3	Retail sale and other suppliers of hearing aids		
HP.4.4	Retail sale and other suppliers of medical appliances		
HP.4.9	All other miscellaneous sale and other suppliers of medical goods		
HP.5	**Provision and administration of public health**	**24**	**893**
HP.5	Provision and administration of public health programmes		
HP.6	**General health administration and insurance**	**2.630**	**1.924**
HP.6.1	Government administration of health	1.086	
HP.6.2	Social security funds		
HP.6.3	Other social insurance		
HP.6.4	Other (private) insurance	819	
HP.6.9	All other providers of health administration	725	
HP.7	**Other industries (rest of the economy)**		
HP.7.1	Establishments as providers of occupational health care services		
HP.7.2	Private households as providers of care		
HP.7.3	Providers of general welfare and social relief (social care)		
HP.7.4	Institutions providing miscellaneous services to health and social care (social care)		
HP.7.9	All other industries as secondary producers of health care		

(Continuationappendix b)

SHA by provider		OECD	AIHW
HP.9	**Rest of the world**		
Total current expenditure on health care		**56.767**	**56.946**
	Capital formation of health care provider institutions	3.601	3.601
	Research[5]		1.114
Total health expenditure		**60.368**	**61.661**

[1] Offices of dentists in the AIHW study includes maxiofacial surgery items listed in the Medical Benefits Schedule.

[2] HP 3.4 in the AIHW study is Community health consisting of e.g. well baby clinics, family planning services, specialized mental health programs. These are a large part of the Outpatient care centres in the OECD study. Some extra groups in the OECD classification of HP 3.4 might not be included in the AIHW study.

[3] Offices of physicians is in the AIHW study 'medical services'. The services under HP 3.5 are included in these medical services. HP3.5 and HP 3.1 together sum up to almost the same amount (AUD$ 10225) as HP3.1 in the AIHW study.

[4] Retail sale and other providers of medical goods is a sum of total pharmaceuticals and aids and appliances in the AIHW data.

[5] The category Research is not reported as a provider-category in the SHA classification, but does exist in the Australian health care expenditure measurements.

APPENDIX C

Comparison of Canadian OECD and CIHI health expenditure data (CAD$ million)

SHA by provider		OECD	CIHI
HP.1	**Hospitals**	**27.082**	**27.082**
HP.1.1	General hospitals		
HP.1.2	Mental health and substance abuse hospitals		
HP.1.3	Speciality hospitals		
HP.2	**Nursing and residential care facilities[1]**	**7.983**	**7.983**
HP.2.1	Nursing care facilities		
HP.2.2	Residential mental retardations, mental health and substance abuse facilities		
HP.2.3	Community care facilities for the elderly		
HP.2.4	Community care facilities for the young (social care)		
HP.2.9	All other residential care facilities		
HP.3	**Providers of ambulatory care**	**22.860**	**21.797**
HP.3.1	Offices of physicians		11.716
HP.3.2	Offices of dentists		6.278
HP.3.3	Offices of other health practitioners[2]		3.803
HP.3.4	Outpatient care centres		
HP.3.5	Medical and diagnostic laboratories		
HP.3.6	Providers of home health care services[3]		
HP.3.9	Other providers of ambulatory care[4]		
HP.4	**Retail sale and other providers of medical goods[5]**	**14.702**	**12.536**
HP.4.1	Dispensing chemists		
HP.4.2	Retail sale and other suppliers of optical glasses and other vision products		
HP.4.3	Retail sale and other suppliers of hearing aids		
HP.4.4	Retail sale and other suppliers of medical appliances		
HP.4.9	All other miscellaneous sale and other suppliers of medical goods		
HP.5	**Provision and administration of public health**	**5.232**	**5.217**
HP.5	Provision and administration of public health programmes		
HP.6	**General health administration and insurance[6]**	**1.471**	**1.471**
HP.6.1	Government administration of health		
HP.6.2	Social security funds		
HP.6.3	Other social insurance		
HP.6.4	Other (private) insurance		
HP.6.9	All other providers of health administration		
HP.7	**Other industries (rest of the economy)**	**237**	**-**
HP.7.1	Establishments as providers of occupational health care services		
HP.7.2	Private households as providers of care		
HP.7.3	Providers of general welfare and social relief (social care)		
HP.7.4	Institutions providing miscellaneous services to health and social care (social care)		
HP.7.9	All other industries as secondary producers of health care		
HP.9	**Rest of the world**		
Total current expenditure on health care		**79.567**	**76.086**

(Continuation appendix c)

SHA by provider	OECD	CIHI
Capital formation of health care provider institutions	2.298	2.298
Health Research		1.194
Undistributed[7]	614	4.160
Total health expenditure	**82.479**	**83.738**

[1] Expenditures on Nursing and residential care facilities fall under the category Other institutions in the CIHI report. The category Other institutions is further defined as residential care facilities.
[2] Offices of other health practitioners includes for CIHI Vision Care Services and Other (chiropractors, massage therapists, orthopedists, osteopaths, podiatrists, psychologists, naturopaths, private duty nurses and physiotherapists).
[3] Home health care services is included in Other services in the CIHI data and could not be separated. It is part of the category Undistributed (see 7).
[4] Ambulance (or medical transportation), in the SHA under HP. 3.9 is for CIHI included in the category Undistributed (see 7). It could not be separated out of Other services.
[5] HP.4 contains for CIHI just expenditures on pharmaceuticals. Expenditures on aids and appliances (normally included here) are included in the category Undistributed (see 7).
[6] HP. 6 entails for CIHI the category pre-payment administration ("expenditures related to the cost of providing health insurance programs by either government or private health insurance firms").
[7] Undistributed expenditures in CIHI include e.g. ambulance and home care. In the CIHI report Undistributed is classified as 'other' in Other health spending.

APPENDIX D

Comparison of French OECD and DREES health expenditure data (€ million)

SHA by provider		OECD	DREES
HP.1	**Hospitals**	**52.909**	**50.576**
HP.1.1	General hospitals		
HP.1.2	Mental health and substance abuse hospitals		
HP.1.3	Speciality Hopitals		
HP.2	**Nursing and residential care facilities**[1]	**1.622**	**2.595**
HP.2.1	Nursing care facilities		
HP.2.2	Residential mental retardations, mental health and substance abuse facilities		
HP.2.3	Community care facilities for the elderly		
HP.2.4	Community care facilities for the young (social care)		
HP.2.9	All other residential care facilities		
HP.3	**Providers of ambulatory care**	**30.271**	**30.363**
HP.3.1	Offices of physicians		13.977
HP.3.2	Offices of dentists		6.415
HP.3.3	Offices of other health practitioners		5.547
HP.3.4	Outpatient care centres		
HP.3.5	Medical and diagnostic laboratories		2.537
HP.3.6	Providers of home health care services		
HP.3.9	Other providers of ambulatory care[3]		1.887
HP.4	**Retail sale and other providers of medical goods**	**26.724**	**24.988**
HP.4.1	Dispensing chemists		20.522
HP.4.2	Retail sale and other suppliers of optical glasses and other vision products		
HP.4.3	Retail sale and other suppliers of hearing aids		
HP.4.4	Retail sale and other suppliers of medical appliances		
HP.4.9	All other miscellaneous sale and other suppliers of medical goods		
HP.5	**Provision and administration of public health**	**3.060**	**3.806**
HP.5	Provision and administration of public health programmes		
HP.6	**General health administration and insurance**	**2.188**	**10.435**
HP.6.1	Government administration of health		
HP.6.2	Social security funds		
HP.6.3	Other social insurance		
HP.6.4	Other (private) insurance		
HP.6.9	All other providers of health administration		
HP.7	**Other industries (rest of the economy)**	**1.549**	
HP.7.1	Establishments as providers of occupational health care services		
HP.7.2	Private households as providers of care		
HP.7.3	Providers of general welfare and social relief (social care)		
HP.7.4	Institutions providing miscellaneous services to health and social care (social care)		
HP.7.9	All other industries as secondary producers of health care		
HP.9	**Rest of the world**		
Total current expenditure on health care		**118.323**	**122.763**

(continuation appendix d)

SHA by provider	OECD	DREES
Capital formation of health care provider institutions	2.862	
Research		4.246
Education		754
Subvention aux systeme de soins		1.542
Aide aux malades		7.065
Double-counting[4]		-2.052
Total health expenditure	**121.185**	**134.318**

[1] The DREES study only includes care for aged people here. This consists of expenditures in "aged-homes" and hospitals (long-term care).
[2] Other health practitioners are: Nurses, Orthoptists, Physiotherapists, Speech-therapists.
[3] Other ambulatory care is the sum of medical transport and "cures thermales".
[4] €2052 had to be removed, because it was included in expenditures on medical goods as well as in research.

APPENDIX E

Comparison of German OECD and FedStat health expenditure data (€ million)

SHA by provider		OECD	Fedstat
HP.1	**Hospitals**	**69.351**	**64.126**
HP.1.1	General hospitals		
HP.1.2	Mental health and substance abuse hospitals		
HP.1.3	Speciality hospitals		
HP.2	**Nursing and residential care facilities**[1]	**16.809**	**16.809**
HP.2.1	Nursing care facilities		
HP.2.2	Residential mental retardations, mental health and substance abuse facilities		
HP.2.3	Community care facilities for the elderly		
HP.2.4	Community care facilities for the young (social care)		
HP.2.9	All other residential care facilities		
HP.3	**Providers of ambulatory care**	**62.084**	**62.118**
HP.3.1	Offices of physicians		31.530
HP.3.2	Offices of dentists		14.797
HP.3.3	Offices of other health practitioners[2]		6.008
HP.3.4	Outpatient care centres		
HP.3.5	Medical and diagnostic laboratories		
HP.3.6	Providers of home health care services		6.257
HP.3.9	Other providers of ambulatory care[3]		3.526
HP.4	**Retail sale and other providers of medical goods**	**48.763**	**48.762**
HP.4.1	Dispensing chemists		32.275
HP.4.2	Retail sale and other suppliers of optical glasses and other vision products		16.487
HP.4.3	Retail sale and other suppliers of hearing aids		
HP.4.4	Retail sale and other suppliers of medical appliances		
HP.4.9	All other miscellaneous sale and other suppliers of medical goods		
HP.5	**Provision and administration of public health**[4]	**4.410**	**4.410**
HP.5	Provision and administration of public health programmes		
HP.6	General health administration and insurance	13.623	13.623
HP.6.1	Government administration of health		
HP.6.2	Social security funds		
HP.6.3	Other social insurance		
HP.6.4	Other (private) insurance		
HP.6.9	All other providers of health administration		
HP.7	**Other industries (rest of the economy)**	**8.938**	**8.964**
HP.7.1	Establishments as providers of occupational health care services		
HP.7.2	Private households as providers of care		
HP.7.3	Providers of general welfare and social relief (social care)		
HP.7.4	Institutions providing miscellaneous services to health and social care (social care)		
HP.7.9	All other industries as secondary producers of health care		
HP.9	**Rest of the world**		**443**
Total current expenditure on health care		**223.978**	

(Continuation appendix e)

SHA by provider	OECD	Fedstat
Capital formation of health care provider institutions	6.614	6.614
Extra[5]		9.097
Total health expenditure	**230.592**	**234.966**

[1] Nursing and residential care facilities in FedStat: stationary/semi-stationary nursing homes
[2] Fedstat: Offices of para-medicals
[3] Fedstat: Institutions providing other ambulatory care and emergency rescue
[4] Fedstat: Health protection; divided into public health offices and other institutions providing protection
[5] Extra includes preventive care/rehabilitation facilities and facilities of occupational retraining/social rehabilitation

APPENDIX F

GDP per capita US$ PPP (GDP) and health expenditure per capita US$ PPP (HE)

		1997	1998	1999	2000	2001	2002
Australia	GDP	22.924	24.106	25.400	26.569	27.635	28.880
	HE	1.953	2.078	2.220	2.404	2.521	2.699
Canada	GDP	24.031	25.071	26.639	28.029	28.902	29.580
	HE	2.137	2.297	2.400	2.503	2.710	2.845
France	GDP	23.068	24.086	24.912	26.353	27.707	28.515
	HE	2.159	2.235	2.312	2.456	2.617	2.762
Germany	GDP	22.681	23.383	24.013	25.165	25.812	26.652
	HE	2.430	2.483	2.557	2.671	2.784	2.916
Japan	GDP	24.451	24.382	24.709	26.067	26.768	27.214
	HE	1.690	1.743	1.829	1.971	2.092	2.139
Netherlands	GDP	23.696	24.771	25.560	27.323	29.121	29.935
	HE	1.932	2.044	2.134	2.259	2.520	2.775

Source: OECD Health Data, 2005.

APPENDIX G

COI along SHA categories

(I) HP.1	AUS	CAN	FRA	GER	NETH	Variation[1]
Infectious diseases	2,2	1,1	1,5	1,7	1,3	27,0
Neoplasms	9,0	7,0	9,9	11,7	8,5	18,7
Endocrine, nutritional and metabolic diseases	3,1	1,8	2,0	3,0	2,0	24,9
Diseases of the blood / blood-forming organs	-	0,4	0,6	0,6	0,7	20,1
Mental and behavioural disorders	5,4	10,2	15,4	12,0	17,6	36,5
Diseases of the nervous system	4,8	5,4	4,6	5,1	6,4	16,3
Diseases of the circulatory system	11,5	15,8	11,2	17,1	12,4	19,0
Diseases of the respiratory system	6,8	5,9	4,8	5,1	4,8	15,8
Diseases of the digestive system	8,0	9,0	6,9	7,9	6,4	13,6
Diseases of the genitourinary system	6,0	6,7	6,4	4,5	4,3	20,3
Pregnancy and childbirth	5,3	4,1	5,5	3,9	4,1	15,8
Diseases of the skin and subcutaneous tissue	2,6	2,8	0,9	1,3	1,8	40,7
Diseases of the musculoskeletal system	8,3	5,5	5,8	12,8	7,9	36,8
Congenital malformations and chromosomal abnormalities	0,7	0,5	0,8	0,7	0,9	20,9
Certain conditions originating in the perinatal period	1,5	1,0	1,3	1,0	1,8	26,6
Symptoms, signs and ill-defined conditions	12,0	2,6	3,7	2,5	9,2	71,6
Accidents						
Injury and poisoning	12,9	9,4	8,1	7,8	5,8	29,7
Additional categories		10,7	1,6	1,3		118,3
Unallocated			8,9		4,1	101,5
	100,0	100,0	100,0	100,0	100,0	
Per capita exp US$ PPP[1]	878,0	730,0		881,0	1,077,0	

(II) HP.2	AUS	CAN	FRA	GER	NETH	Variation
Infectious diseases	0,2	-	0,6	0,2	0,4	72,6
Neoplasms	0,9	-	2,6	9,3	1,6	103,2
Endocrine, nutritional and metabolic diseases	1,3	-	4,1	1,1	1,9	75,8
Diseases of the blood / blood-forming organs	0,0	-	1,3	0,1	0,1	
Mental and behavioural disorders	9,4	-	16,9	31,3	51,7	58,5
Diseases of the nervous system	55,6	-	12,2	8,3	6,2	104,1
Diseases of the circulatory system	13,5	-	21,8	21,8	15,6	24,7
Diseases of the respiratory system	2,3	-	5,4	1,2	2,4	73,8
Diseases of the digestive system	0,9	-	3,9	0,8	0,9	95,8

(Continuation appendix g)

Diseases of the genitourinary system	0,4	-	8,3	0,3	0,5	153,1
Pregnancy and childbirth	0,0	-	1,3	0,0	0,0	
Diseases of the skin and subcutaneous tissue	0,3	-	1,8	0,1	0,3	124,0
Diseases of the musculoskeletal system	12,4	-	2,6	5,5	2,1	73,5
Congenital malformations and chromosomal abnormalities	0,2	-	0,5	0,1	0,0	88,3
Certain conditions originating in the perinatal period	0,0	-	0,0	0,0	0,0	-
Symptoms, signs and ill-defined conditions		-	8,1	15,1	0,9	
Accidents		-	0,0			
Injury and poisoning	2,7	-	7,1	4,8	4,0	44,5
Additional categories		-	0,0	0,1	-	
Unallocated		100,0	1,4		11,4	
	100,0	100,0	100,0	100,0		
Per capita exp US$ PPP	166,0	222,0	69,0	212,0	356,0	

(III) HP.1 + physicians from HP.3	AUS	CAN	FRA	GER	NETH	Variation
Infectious diseases	2,8	1,2	2,0	1,9	2,0	27,4
Neoplasms	7,6	5,7	8,1	9,3	7,4	16,7
Endocrine, nutritional and metabolic diseases	3,9	1,9	2,1	4,7	2,4	39,9
Diseases of the blood / blood-forming organs		0,4	0,5	0,7	0,7	22,9
Mental and behavioural disorders	5,6	9,4	13,1	10,0	15,1	32,5
Diseases of the nervous system	5,3	5,9	5,2	7,0	6,6	14,6
Diseases of the circulatory system	10,9	13,1	10,5	15,6	11,6	15,7
Diseases of the respiratory system	7,7	6,2	5,9	5,7	5,2	15,3
Diseases of the digestive system	7,0	7,3	6,3	7,2	7,4	6,8
Diseases of the genitourinary system	5,9	6,0	6,3	5,5	4,6	12,3
Pregnancy and childbirth	4,2	3,3	4,7	2,9	3,8	16,8
Diseases of the skin and subcutaneous tissue	3,0	2,6	1,4	1,9	2,4	27,5
Diseases of the musculoskeletal system	8,9	5,3	6,3	13,9	8,6	39,3
Congenital malformations / chromosomal abnormalities	0,6	0,4	0,6	0,7	0,8	24,2
Certain conditions originating in the perinatal period	1,1	0,8	1,0	0,7	1,5	29,9
Symptoms, signs and ill-defined conditions	14,3	3,4	3,8	3,6	11,4	70,0
Accidents			0,0			
Injury and poisoning	11,3	7,9	7,5	6,3	5,2	30,2
Additional categories		14,1	3,0	2,1		
Unallocated		5,0	11,7		3,4	
	100,0	100,0	100,0	100,0	100,0	
Per capita exp US$ PPP	1,215,0	1,055,0	1,200,0	1,273,0	1,332,0	

(Continuation appendix g)

(IV) HP.3 only physicians	AUS	CAN	FRA	GER	NETH	Variation
Infectious diseases	4,3	1,6	3,8	2,5	4,9	39,8
Neoplasms	4,1	2,8	1,9	3,9	2,8	28,9
Endocrine, nutritional and metabolic diseases	6,2	2,2	2,4	8,4	3,9	57,6
Diseases of the blood / blood-forming organs		0,4	0,2	0,8	0,7	51,1
Mental and behavioural disorders	5,9	7,6	5,3	5,6	4,9	17,6
Diseases of the nervous system	6,8	7,1	7,4	11,2	7,6	22,7
Diseases of the circulatory system	9,3	7,0	8,0	12,2	8,2	22,1
Diseases of the respiratory system	9,9	6,6	9,6	7,2	6,8	19,9
Diseases of the digestive system	4,3	3,5	4,3	5,5	11,3	54,7
Diseases of the genitourinary system	5,5	4,3	6,1	7,9	5,5	22,5
Pregnancy and childbirth	1,3	1,6	1,8	0,8	2,5	38,7
Diseases of the skin and subcutaneous tissue	4,0	2,4	2,8	3,3	5,3	32,3
Diseases of the musculoskeletal system	10,4	4,9	8,1	16,3	11,3	41,3
Congenital malformations and chromosomal abnormalities	0,2	0,3	0,1	0,9	0,7	80,3
Certain conditions originating in the perinatal period	0,1	0,3		0,1	0,0	87,5
Symptoms, signs and ill-defined conditions	20,3	5,1	3,9	6,1		
Accidents					20,5	
Injury and poisoning	7,4	4,3	5,3	3,2		
Additional categories		21,7	7,7	4,0	2,6	
Unallocated		16,2	21,3			
	100,0	100,0	100,0	100,0	100,0	
Per capita exp US$ PPP	337,0	325,0	263,0	397,0	255	
HP3 total exp per capita US$ PPP	769,0	635,0	558,0	785,0	669,0	

(V) HP.4 only prescribed medicines	AUS	CAN	FRA	GER	NETH	Variation
Infectious diseases	2,8	4,5	5,1	2,9	9,0	30,1
Neoplasms	2,8	2,3	1,6	3,4	1,9	31,9
Endocrine, nutritional and metabolic diseases	15,0	8,8	8,7	14,8	6,5	30,0
Diseases of the blood / blood-forming organs		0,5	0,2	0,5	0,5	53,4
Mental and behavioural disorders	9,3	11,7	7,3	6,3	8,8	27,7
Diseases of the nervous system	5,6	5,8	6,7	7,6	5,2	14,5
Diseases of the circulatory system	19,6	19,0	23,6	24,1	21,0	12,1
Diseases of the respiratory system	11,8	11,9	14,1	10,1	10,3	13,8
Diseases of the digestive system	8,6	8,1	6,5	6,1	7,3	16,5
Diseases of the genitourinary system	3,0	3,5	5,1	4,5	3,0	23,7
Pregnancy and childbirth		0,2	0,5	0,1	2,7	71,3
Diseases of the skin and subcutaneous tissue	2,1	5,0	2,8	3,0	3,3	38,3

(Continuation appendix g)

Diseases of the musculoskeletal system	7,9	6,6	7,2	6,0	6,5	12,2
Congenital malformations and chromosomal abnormalities		0,1		0,1	0,1	0,8
Certain conditions originating in the perinatal period		0,1			0,0	
Symptoms, signs and ill-defined conditions	9,3	5,2	3,8	5,2	13,1	40,7
Accidents						
Injury and poisoning	1,8	2,5	1,5	0,9	0,5	
Additional categories		4,3	5,3	4,4		12,2
Unallocated					0,3	
	100,0	100,0	100,0	100,0	100,0	
Per capita exp US$ PPP[1]	235,0	259,0	299,0	408,0	268,0	

(I) COI for the hospital sector in Australia, Canada, France, Germany and the Netherlands [1] Variation=standard deviation / average. PPP exchange rates; see Table
(II) COI for the nursing and residential care sector in Australia, Canada, France, Germany and the Netherlands
(III) COI for hospitals and physicians in Australia, Canada, France, Germany and the Netherlands
(IV) COI for physicians in Australia, Canada, France, Germany and the Netherlands
(V) COI for prescribed medicines in Australia, Canada, France, Germany and the Netherlands

APPENDIX H

Expenditures on hospitals by disease[1]

		AUS[2]		CAN		FRA		GER		NETH
Neoplasms	9,0	73,0	7,0	53,0	9,9	93,0	11,7	103,0	8,5	91,0
Mental disorders	6,2	50,0	10,2	77,0	15,4	144,0	12,0	105,0	17,6	189,0
Circulatory system	11,5	93,0	15,8	119,0	11,2	105,0	17,1	150,0	12,4	133,0
Respiratory system	6,8	55,0	5,9	44,0	4,8	45,0	5,1	45,0	4,8	51,0
Digestive system	8,0	65,0	9,0	68,0	6,9	65,0	7,9	69,0	6,4	69,0
Musculoskeletal	8,3	67,0	5,5	41,0	5,8	54,0	12,8	112,0	7,9	85,0
Subtotal	49,8	405,0	53,4	402,0	54,0	505,0	66,6	584,0	57,6	619,0
Total Hospitals		813,0		752,0		936,0		877,0		1.074,0

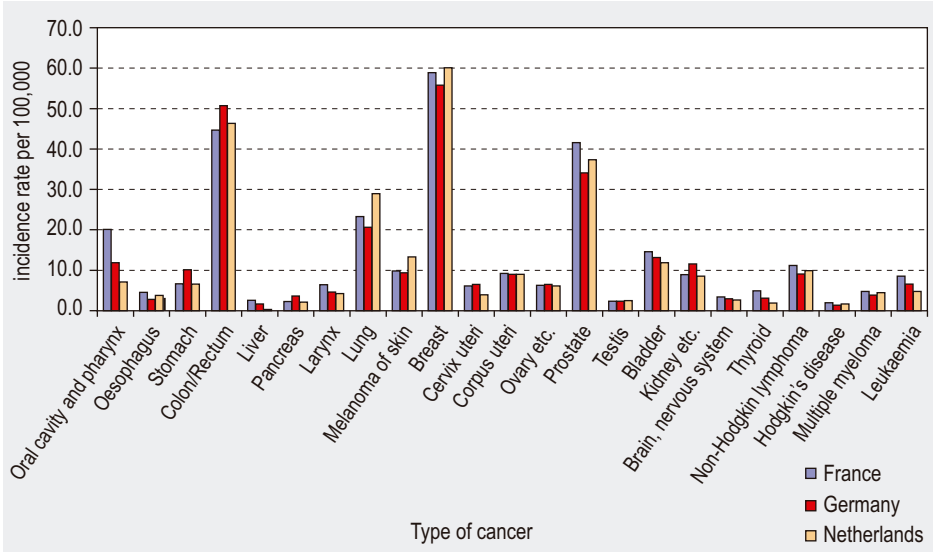
[1] Can: Total adjusted to fit in SHA $20 upwards, no change in COI distribution is assumed. Fra: Section medicalisées excluded as it should not be in SHA HP1. Total upwarded $36 to equal the SHA, no change in COI distribution is assumed for this. Ger: Total adjusted upwards $1 upwards to fit in SHA, no change in COI distribution is assumed for this.

[2] Aus: dementia placed in mental disorders. Some private in-patient expenditures to ambulatory care (see *table 3*, note 1).

APPENDIX I

(EU) age standardized incidence rates of cancer in 1998

	FRA ASR E	GER ASR E	NETH ASR E
Oral cavity and pharynx	24,5	12,3	8,8
Oesophagus	7,6	4,5	6,3
Stomach	9,4	14,8	11,8
Colon/Rectum	43,7	48,7	49,9
Liver	6,8	4,5	1,6
Pancreas	6,2	9,5	7,8
Larynx	6,8	4,1	4,2
Lung	39,7	39	52,0
Melanoma of skin	9,7	8,5	12,9
Breast	56,7	48,2	58,6
Cervix uteri	6,5	6,3	4,2
Corpus uteri	8,7	7,7	8,8
Ovary etc.	7,0	8,1	8,5
Prostate	36,6	27	36,3
Testis	2,7	2,6	2,9
Bladder	13,9	11,1	12,0
Kidney etc.	10,2	12	10,0
Brain, nervous system	6,1	6,8	5,8
Thyroid	5,7	3,5	2,0
Non-Hodgkin lymphoma	12,2	9,8	11,8
Hodgkin's disease	2,5	1,7	2,2
Multiple myeloma	4,9	4,2	4,8
Leukaemia	10,1	9,1	8,1
All sites but skin	363,9	329,7	361,4



APPENDIX J

Recalculation of nursing and residential care expenditures for the Netherlands

	Old Mln. euro		New Mln. euro	
Hospitals	16.037,1	35,5	16.037,1	37,5
Nursing and residential care facilities	5.313,0	11,8	3.000,0	7,0
Providers of ambulatory health care	9.980,0	22,1	9.980,0	23,3
Retail sale and other providers of medical goods	7.228,8	16,0	7.228,8	16,9
Provision and administration of public health programmes	771,5	1,7	771,5	1,8
General health administration and insurance	1.836,7	4,1	1.836,7	4,3
Other industries (rest of the economy)	1.284,1	2,8	1.284,1	3,0
Rest of the world	441,6	1,0	441,6	1,0
Investments	2.220,0	4,9	2.220,0	5,2
Total	45.112,8	100,0	42.799,7	100,0
Total per capita in US$ PPP	3.022,0		2.867,0	