
Stroke Care in OECD Countries:
A Comparison of Treatment, Costs and Outcomes in
17 Countries

Annex

Lynelle Moon, Pierre Moise, Stéphane Jacobzone
and the ARD-Stroke Experts Group

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ANNEX 1: MEDICAL BACKGROUND

1. This annex largely deals with the medical aspects of stroke, including transient ischaemic attacks (TIAs). The information aims to supplement that provided in the main section of this report, thus providing further detail and background to provide additional context to the discussion in this report. This is not intended to provide detailed medical information—this can be found in the listed references or a relevant medical text.

1. Definition and general characteristics

2. *Cerebrovascular disease* comprises several disorders in which there is a disturbance of blood supply to the brain. *Stroke* is a cerebrovascular disease, and has been defined as “rapidly developed signs of focal (or global) disturbance of cerebral function lasting more than 24 hours (unless interrupted by surgery or death), with no apparent nonvascular cause, including patients presenting with clinical signs and symptoms suggestive of subarachnoid haemorrhage, intracerebral haemorrhage, or cerebral ischemic infarction”(check reference).

3. There are two main types of stroke: *ischaemic* (when blood flow to the brain is blocked) and *haemorrhagic* (when bleeding into or around the brain itself), accounting for approx. 85% and 15% of cases respectively in western countries (Bath *et al.*). Haemorrhage exerts pressure on the surrounding tissue and, as a consequence, causes direct neuronal injury causing ischaemia (lack of blood flow). Ischaemic stroke results from occlusion of a brain artery due to local atherosclerosis or from the migration of an emboli (usually due to carotid atherosclerosis or atrial fibrillation). The ischaemia causes injury from lack of oxygen and nutritional support, but the damage may be reversed if reperfusion is obtained quickly.

4. *Transient ischaemic attack (TIA)* is a temporary cerebrovascular event that leaves no permanent damage, usually resulting from a temporary blockage. It may occur when there is temporary deficiency in blood supply to brain, and may last only a couple of minutes. Symptoms will also disappear completely after 24 hours. After a first TIA event, patients are considered at high risk for an acute ischaemic stroke. It is predicted that one-third of these patients will later have a stroke, another third will have repeated TIAs, and the other third may never show further signs of cerebrovascular symptoms. Approximately 30% of people having major stroke have had a TIA prior to that, and 10% of all TIAs sufferers have a stroke within 2 weeks (American Association of neurological surgeons website)

2. Epidemiology

5. Stroke is highly preventable: changes in the individual and population levels of the major risk factors for stroke (such as hypertension and smoking) would have a significant effect on stroke rates. In addition, stroke is also very treatable in many cases particularly for ischaemic stroke, contrary to the previous thinking which tended to categorise stroke as an untreatable, “old person’s” disease.

6. It has been estimated that approximately one-third of people who have a stroke will die within 12 months (but most within the first 3 weeks), and another third will be permanently dependent on the help of others (Bath *et al.*). This makes stroke a major cause of death and disability in many OECD countries. Its

importance in terms of death and disability levels coupled with its potential for prevention and treatment, makes stroke an important disease to monitor.

Non-modifiable factors

Age

7. Stroke incidence (the number of new cases) and prevalence (the number of cases in a population at a given time) rates increase with age quite dramatically. The incidence rate more than doubles every 10 years after age 55 (ITFPCHD). As the number of older people is increasing in OECD countries, it is expected that the number of people with stroke will also increase.

Sex

8. In the majority of OECD countries, men have higher incidence rates of stroke than women. In some countries however, this pattern does not occur in all age groups, with younger women under 40 years of age, and older women over 85 years of age having higher incidence rates. Despite generally having lower incidence rates than men for the majority of age groups, more women have stroke than men because of their longer life expectancy.

Race-ethnicity

9. There are differences observed in the stroke incidence rates for different ethnic groups. For example, higher rates are found in black and hispanic Americans compared to other Americans, and Asian Americans. In general, rates in Japan and Korea tend to be higher than many other OECD countries.

Family history

10. A family history of heart disease and/or stroke appears to be associated with a higher risk of stroke.

Risk factors

11. There are a number of modifiable risk factors for stroke, outlined below. These risk factors differ in the method and effectiveness of prevention and treatment programs. For example, hypertension can usually be treated at least to some degree with antihypertensive drugs. In addition, changes to diet, weight and exercise can also be beneficial in reducing hypertension. These behavioural changes may be more difficult to sustain than the medical treatment with drug therapy. Similarly, it is acknowledged that while smoking cessation would result in a large reduction in the risk for stroke, the behavioural changes required are often difficult to maintain.

12. While each of these are important alone, it is also important to note that individuals with a number of these risk factors will be at even higher risk of having a stroke. Given the interaction between many of these risk factors, it is quite likely that many individuals will have more than one of these risk factors. Therefore, an assessment of an individual's risk profile would need to take account of the person's 'global risk'.

Hypertension

13. High blood pressure (generally systolic pressure above 140mmHg and/or diastolic pressure above 90mmHg) is regarded as the single most important risk factor for stroke, both ischaemic and haemorrhagic. It accounts for a third to a half of the population attributable risk in some studies. Effective treatment of high blood pressure has been estimated to reduce the incidence of stroke and fatal stroke by about 40%. Highlighting the association between many of the risk factors for stroke, people who are overweight, physically inactive, eat excess salt, or drink alcohol heavily are more likely to have hypertension.

Tobacco smoking

14. Tobacco smoking is a well-established risk factor for stroke, with an almost twofold increase in relative risk associated with it (ITFPCHD). The increased risk of stroke for smokers decreases steadily after quitting smoking, with the increased risk disappearing within 3-5 years (Lees *et al.*).

High blood cholesterol

15. High blood cholesterol is another risk factor for stroke, though not as well-established as the risk factors discussed above. High blood cholesterol and other blood lipids promote atherosclerosis, resulting in narrowed arteries and subsequently reduced blood flow to the brain.

Heavy alcohol consumption, overweight, physical inactivity

16. Although less well-documented, heavy alcohol consumption, overweight (generally defined as Body Mass Index>25) and physical inactivity all appear to increase the risk of stroke.

Associated medical conditions

17. There are a number of medical conditions that are associated with stroke. Most directly are the cerebrovascular conditions TIA (described earlier) and carotid stenosis. Carotid stenosis is narrowing of the carotid arteries due to buildup of fatty plaque on the walls of the arteries. Other medical conditions that are often associated with stroke include atrial fibrillation (a common arrhythmia of the heart), a history of acute myocardial infarction (heart attack) and diabetes.

3. Clinical characteristics*Signs and symptoms*

18. Small strokes can be apparently asymptomatic and thus go undiagnosed, particularly in the elderly and/or frail. However, generally stroke is characterised by one or more of the following:

- motor deficiencies (weakness, hemiplegia, facial paralysis)
- sensory deficiencies (most often on one side, touch, pain, warm/cold)
- speech difficulties or slurred speech

- difficulty with vision usually on one side: blocked or loss of vision, blurriness
- loss of consciousness, severe sudden headache, incontinence.

TIAs often result in stroke-like symptoms, but these may only be apparent for a brief time (2-30 minutes).

Complications and consequences of stroke

19. Dysphagia (difficulty with swallowing) affects about 35% of stroke patients, which may lead to aspiration and pneumonia, as well as nutritional problems. Hyperglycaemia (high blood sugar), fever and hypertension are also potential consequences of stroke, and are associated with poor outcomes. For stroke patients, hypertension is not usually treated for about 1 week following the stroke, as some drugs may worsen the outcome (possibly by reducing cerebral blood flow). In addition to these more stroke specific consequence, the more general complications associated with immobilisation, such as deep vein thrombosis (DVTs), pressure sores, respiratory and urinary tract infections are also potentially significant for stroke patients. Large ischaemic strokes may result in oedema, swelling and herniation leading to death.

4. Treatment/management/rehabilitation of ischaemic stroke and TIAs

20. Detection of cerebrovascular disease before the onset of a stroke event is difficult, unless a patient has a high risk profile or experiences a TIA. However, high-risk patients as well as patients experiencing a stroke are likely to undergo a range of tests to provide an accurate assessment of the type of stroke, the risk of subsequent strokes, and the optimal treatment pattern for the patient. Specific interventions can include assessment, acute care, drug treatment, possibly a surgical procedure (carotid endarterectomy) and rehabilitation by a multidisciplinary team.

21. When a stroke does occur, it is an emergency, requiring urgent medical attention. In most OECD countries, the majority of patients with moderate to severe strokes will be hospitalised for assessment and at least initial treatment. For TIA patients there is no specific treatment, though diagnostic testing (including to exclude the diagnosis of stroke) and management of stroke risk factors becomes important.

22. For ischaemic stroke patients, TIA patients and those in a high risk group, prevention of subsequent strokes is a key goal. This will be aimed at reducing the risk by modification of risk factors, and includes both specific medical interventions, for example drug treatment, and life-style changes. It includes blood pressure control. In addition, aspirin treatment that may have begun in the acute phase is likely to continue in order to reduce the risk of subsequent strokes. 'Lifestyle advice' is likely to cover many of the risk factors, including the importance of smoking cessation, a healthy diet, weight control and exercise.

Diagnostic tests

23. Often for TIA patients, asymptomatic high-risk patients, and those during their first stroke event, CT scan and MRI are the first diagnostic imaging tests to be conducted. This is to differentiate between hemorrhagic and ischaemic stroke, as the treatment pattern differs for the two types of stroke (Bath *et al.*).

24. Following this assessment by CT and/or MRI/MRA, more vascular imaging tests may be conducted to detect the location and to define the extent of carotid stenosis. These tests may include doppler ultrasound, magnetic resonance angiography, and contrast angiography (or arteriography). Further details on these diagnostic test are provided below.

Computerised tomographic (CT) scans

25. CT scans are the most common type of brain imaging used for stroke patients, and it is generally expected that nearly all stroke patients would receive a CT scan soon after admission to hospital. Many clinical guidelines recommend brain imaging (*e.g.* CT or MRI/MRA) for all stroke patients in the first few days (*e.g.* UK National Clinical Guidelines for Stroke).

26. CT scans use an X-ray beam and computer imaging to construct an image of the head. The CT scan represents different densities of blood, bone and brain, with the primary use being to distinguish haemorrhagic from ischaemic strokes. Although blood can easily be identified (haemorrhagic stroke), the damage from ischaemic stroke may not be visible several days after the stroke.

MRI/MRA

27. Magnetic resonance imaging and magnetic resonance angiogram (MRI/MRA) use a large magnet and radio waves to generate an image. They can identify stroke anatomy (as does CT scanning), but also assess blood flow perfusion, differentiate between new and old lesions, and identify carotid artery stenosis. It can also identify major arteries inside the head and brain tissue, as well as those in the neck (which are the only arteries that CT scans can detect). It is also more accurate for diagnosing particular types of strokes. The added advantages of MRI over CT scanning may eventually result in MRI 'taking over' from CT scanning for stroke patients.

Doppler ultrasound

28. This is the most basic of imaging tests. It is non-invasive, and uses sound waves to provide a picture of the outside and inside of the artery walls. It has the advantage of being able to determine the level of blood flow through an artery, usually only the arteries in the neck.

Angiography

29. With this test, a contrast material is injected directly into the artery then regular X-rays are taken, outlining the blood vessel and thus detecting the location of the abnormality causing the stroke. It is the most accurate way of looking at arteries in the neck, head and brain, providing information not available from the other tests, and is often used to determine the amount of blockage. It is invasive, with a physician inserting a catheter into the major artery near the groin and directing it up to the major arteries near the brain. Though it is a very accurate assessment method, complications may arise during this diagnostic procedure by provoking another stroke. In recent years, there has been some discussion as to whether MRA will be able to effectively replace the contrast angiography, not only in terms of diagnostic performance, but also from a cost effective perspective.

Organisation of care

30. A proportion of patients experiencing a severe stroke will die shortly after onset, and prior to possible admission to hospital. Most other patients with moderate to severe strokes will be admitted to hospital for treatment. Patients with TIAs may or may not be admitted to hospital for monitoring and diagnostic testing; some may be managed in the community.

31. Within the hospital setting, stroke units have been demonstrated to be more effective than general wards (Stroke Unit Trialists' Collaboration 1997, Jorgenson *et al.* 1995, Langhorne *et al.*, 1993), with patients having better outcomes in terms of shorter length of stay, discharge to nursing home, survival and functional wellbeing. In stroke units, there tends to be diagnostic equipment and the multidisciplinary personnel ready to make rapid evaluation, and subsequently to provide dedicated care and rehabilitation support. In some of the previous studies conducted across European countries, there appears to be significant variation in the type and range of care services received by a stroke patient, even after adjusting for case mix (Beech *et al.*, 1996).

Drug treatment

32. The two main groups of drugs relevant for stroke and TIA patients (and those at high risk of these conditions) are those used mostly for prevention (blood pressure lowering drugs, lipid lowering drugs) and those used more for curative purposes (antithrombotic drugs). Aspirin is used often for stroke patients, and its actions for into both the preventive and curative groups.

Blood pressure lowering drugs

33. There are several different types of blood pressure lowering drugs, including diuretics, beta blockers, calcium channel blockers, and ACE inhibitors. These are commonly used long-term in patients with high blood pressure, and thus are seen as being preventative in relation to stroke. After a stroke event, these will not usually be commenced until 1-2 weeks after an acute stroke, as early use can worsen outcomes (Lees *et al.*).

Lipid lowering drugs

34. This group of drugs include statins and other drugs for lowering cholesterol, as well as several types of drugs used to lower triglyceride levels, such as fibrates. Although there is good evidence that they are effective in reducing the risk of stroke and death, it is claimed that they are underused (Straus).

Antithrombotic drugs

35. Included in this class are:

- thrombolytic drugs (dissolve blood clots; and in certain cases are given under close supervision in hospital soon after the stroke)
- aspirin (and other antiplatelet drugs: these interfere with the formation of blood clots that are made of platelets, shown to reduce both deaths and disability from stroke)
- anticoagulants (these reduce the formation of clots by interfering with the clotting process; *e.g.* warfarin and heparin).

36. Thrombolysis within 3 hours of the onset of stroke significantly increases the chance of full recovery when administered by specialists. The three thrombolytic drugs used at this time are: tissue plasminogen activator (TPA), streptokinase, and urokinase. A major risk in taking these agents is development of intracerebral haemorrhage. TPA, the newest and most expensive drug, can be used for ischaemic stroke and TIA patients who meet the strict list of indications and are currently at a hospital with

a highly skilled medical team and 24-hour access to CT scan, MRI, and stroke unit or neurosurgery facilities. The therapy must also be given within 3 hours of stroke onset, which is difficult to verify due to the subtle symptoms associated with TIA and ischaemic stroke. According to recent studies, TPA may play a role in minimising damage from acute ischaemic infarct and preserving functional status in selected patients. (The NINDS rtPA stroke study group, 1995). Other studies have shown negative benefits with TPA administration, but was undertaken when higher doses were given and time to treatment was longer than a 3-hour window. (ECASS, 1991).

37. Anti-platelet therapy—such as aspirin—is aimed at reducing the tendency for the blood to clot. A course of aspirin begun within 48 hours of the onset of an ischaemic stroke has been shown to reduce the risk of subsequent disability and death (Bath *et al.*). But the benefit is small, and neuro-imaging is strongly recommended prior to commencing aspirin (to exclude haemorrhagic stroke). Aspirin has also been demonstrated to be effective in reducing death from vascular conditions for patients who have had a TIA. The use of aspirin after TIA, mild stroke, and acute ischaemic stroke has demonstrated benefits in preventing repeated strokes or attacks such as reduction of risk of recurrent events by about 25% (Antiplatelet Trialists' Collaboration, 1994). Uncertainty remains as to what is the most efficacious dose. Other antiplatelet therapy—such as dipyridamole, ticlopidine, and clopidogrel—may also be effective, but are much more expensive relative to low-cost aspirin.

38. Anti-coagulants have tended to be the traditional treatment for cerebrovascular disease, but they can only be given to patients who do not suffer from high blood pressure due to haemorrhaging side effects. There are several types of anti-coagulant therapies available such as warfarin and heparin.

Surgical interventions

39. Carotid endarterectomy (CEA) may be used for patients with higher level carotid stenosis, in which the plaque obstructing the carotid artery (that increases the risk of ischaemic stroke) is surgically removed. The success of the procedure and the occurrence of complications have been shown to depend on the experience of the surgeon. Although it has been demonstrated to be very effective for particular groups of patients, this group forms a small component of those at risk. Most benefit seems to be for symptomatic patients with high-grade stenosis (>70%) (Canadian report).

40. Tu *et al.* (1998) describes the evolution of adoption and use of this procedure, which was originally developed in the 1950s. Rates of carotid endarterectomy increased between the date of its inception to the mid-1980s, when rates began to decline in response to a number of studies uncovering high rates of complications. (Tu *et al.*, 1998). In the early 1990s, evidence was released that carotid endarterectomy was effective in preventing stroke in symptomatic patients with carotid stenosis of 70% or more if performed in high-volume centres with highly skilled surgeons and low adverse event rates (NASCET, 1991, European Carotid Surgery Trialists' Collaborative Group, 1991, Mayberg, 1991). For patients with a TIA or non-disabling ischaemic stroke and who have angiographic evidence of severe carotid stenosis, CEA performed within 6 months of the attack significantly reduces the risk of ischaemic stroke over the next years in that area (European Carotid Surgery Trialists' Collaborative Group, 1991, NASCET, 1991). Since these latest studies, rising rates of this intervention have been documented in several national and US-Canadian studies (Tu *et al.*, 1998).

41. Currently, there is much discussion of whether the procedure can be effective in reducing risk of stroke among TIA and asymptomatic carotid stenosis patients with less than 70% carotid stenosis (Executive Committee of ACAS, 1995). Some argue that the benefit is rather small and that the risk is too high for cardiac event during the procedure. Many researchers have been concerned that surgeons may be

conducting these procedures inappropriately since they are not medically necessary (Winslow, 1988, Perry *et al.* 1997).

Rehabilitation

42. Rehabilitation aims to restore function, and to reduce the effect of stroke on the patient and their caregivers. Optimal rehabilitation comes from a multidisciplinary approach, which will include a team of doctors, nurses, physiotherapists, occupational therapists, speech therapists, dieticians, psychologists and social workers.

43. The long-term support of patients with stroke is important, potentially including: community support services, assessment process to match needs with services, and a review mechanism to ensure patient is gaining benefit from the services. Services for carers are also important, which includes recognition of the consequences and support in carrying out the role, information about the disease, care techniques, and available support (UK outcomes report).

5. Health outcomes

44. Health outcomes are changes in health, health related status or risk factors affecting health. They result from the natural history of the condition, or may be the result of interventions to prevent or treat it (UK outcomes report).

45. Two commonly used outcome measures for stroke are mortality and disability rates. Along with overall mortality rates due to stroke (number of deaths per 100 000), rates of case fatality (deaths within a certain period after onset) might also be monitored if data are available. Evidence on the declining case fatality raises questions as to whether it is due to presentation of lower stroke severity or improved management of the stroke. Frequency of the different types of stroke are likely to influence severity levels since haemorrhagic stroke is more fatal than ischaemic stroke.

46. Stroke is a highly disabling disease, which may have an impact in terms of limitations in daily activities related to subsequent symptoms or other functional rating scales for stroke. These data, however, are usually not routinely collected on a large scale, though data are often available from periodic surveys.

ANNEX 2: DETAILED TABLES AND GRAPHS

Table A2.1. Coverage of public health insurance and availability and use of private health insurance

	Public Health Insurance			Private Health Insurance		
	Universal	Services excluded from coverage related to stroke*	Availability	Use	% of population covered	
Australia	Yes	None (some limitations regarding aids and equipment)	Yes	Choice of doctor in public hospital and choice of private hospital; not available for ambulatory or outpatient physician services; covers co-payments, including drugs, within certain levels of cover.	45.8% of Australian population were covered by private health insurance hospital cover as of 09/00.	
Canada	Yes	Pharmaceuticals outside the hospital ⁽¹⁾	Yes	Covers excluded services such as pharmaceuticals outside the hospital.	About 70% of Canadian population	
Denmark	Yes	None	Yes	Covers the co-payment for pharmaceuticals; also used to avoid waiting lists.	30% (8% fully covered; 22% partly covered)	
Greece	Yes	None, if using public facilities	Yes	Provide access to private providers	About 10%	
Hungary	Yes	None	Not significant	For a very limited segment of the population, foreign-based.	N.r.	
Italy	Yes	None	Yes	Access to doctors outside the national system, on a private basis, or can offer reimbursement for some services		
Japan	Yes	None	Yes	Private insurance traditionally provides an insured person with an indemnity benefit to compensate for lost income due to hospitalization. As of 2000, private insurance also provides compensation for co-payments	Approximately 50%	
Korea	Yes	MRI and ultrasonography	No	N.r.	N.r.	
Mexico	No (Three tier system)	None	Yes	Access to private physicians/hospitals	% pop. Public services 70% pop. Social security % pop. Priv. insurance	
Netherlands	Yes ⁽²⁾	None	Yes	For persons not covered by the Health Insurance Act, self-employed or people above a certain maximum yearly income.	62.8% Health Insurance Fund 30.3% Private Insurance Fund 6.8% other	

Table A2.1. Coverage of public health insurance and availability and use of private health insurance

	Public Health Insurance		Private Health Insurance		% of population covered
	Universal	Services excluded from coverage related to stroke*	Availability	Use	
Norway	Yes	None	At an early stage	Private health insurance has been virtually non-existent up until recently. They are now establishing, but they play at this time a negligible role in funding of health care services.	Negligible
Portugal	Yes	?		?	?
Spain	Yes	None	Yes	Mainly as supplementary insurance; free choice of physician and hospital; sole form of insurance for most self-employed professionals	10 - 20%
Sweden	Yes	None	Yes	Limited; used by employers to jump queues for key personnel	?
Switzerland	No ⁽³⁾	None (within limits of a quite extensive, pre-defined "health care basket")	Yes	(a) the content defined by the law on social health insurance (b) additional health care, considered as "comfort care" for supplemental services such as private room, dental care, complementary medicines etc.	(a) 100% (b) 2/3 of the population have some form of additional insurance
UK	Yes	None	Yes	Jump the waiting lists	11% (1996)
USA	No (only 65 and over, and the eligible poor and disabled)	For those over 65, pharmaceuticals outside the hospital	Yes	Covers all services related to stroke; Covers excluded services for public health insurance such as pharmaceuticals outside the hospital and cost sharing.	2/3 of adults under 65; 55% of Medicare population has private supplemental insurance

Source: OECD Questionnaire "Core Set of Indicators" for stroke. N.r.: not relevant. * This does not necessarily mean that all these services are free of charge. (See table on cost-sharing).

(1) Means-tested provincial social assistance schemes cover the poor, those on social assistance and the elderly (Four provinces have universal public coverage; Ontario does not)

(2) Individuals with an income higher than a certain maximum (EUR 29 314 in 2000) are not covered by the Health Insurance Act.

(3) Universal coverage through a mandatory contract with a private health insurance since January 1, 1996 ("social health insurance")

Table A2.2. Cost-sharing policies for non drug-related stroke care

	Inpatient Care	Ambulatory Care			Co-payment		Detailed descriptions
		Specialist care	Diagnostic Procedures	Rehabilitation	Exemptions	Reinsurance	
Australia	Yes	Yes	Yes	Yes	Yes	Yes	<i>Public, modest cost-sharing; private, significant cost-sharing:</i> For ambulatory physician services, public patient's out of pocket expenses is the difference between the Medicare reimbursement (85% of the Medicare Benefits Schedule fee) and the doctor's fee (actual fee charged tends to be close to the schedule fee). Co-payments are higher for specialists if patient was not referred. Pathology and diagnostic imaging services are covered only when patients have been referred. Depending on the place of service provided, public health insurance will pay 75-85 per cent of the scheduled fee and private health insurance may cover the gap. For outpatient specialist care, public outpatients have no charge. <i>Exemptions from co-payment:</i> Medicare has a safety net scheme to protect patients whose accumulated out-of-pocket payments in any one calendar year exceed a specified amount. Eligible individuals and families are entitled to receive up to 100% of the schedule fee for the remainder of the calendar year.
Canada	None	None	None, if referred	None, if referred	N.r.	N.r.	
Denmark	None	None	None	None	N.r.	N.r.	
Greece	None	Yes	Yes	Yes	Yes	Yes	Co-payments for outpatient care depend on whether it is contracted (no co - payment) or no contracted ambulatory care unit. Private insurance companies can cover the co-payments. In practice, both in public and private health care sector the co-payments are rather significant, but in public sector these payments are informal.
Hungary	None	None, if referred	None, if referred	None	Yes (?)	Yes (non-profit insurance companies)	Since January 1998, co-payments are required if patients normally requiring referral consult directly a specialist or if they deal with a specialist other than the one to which they were referred. Patients receiving services from physicians outside of the national health insurance system do pay some out-of-pocket payments. Patients may pay under-the-table "gratitude money" to influence treatment choice and can be considered a form of out-of-pocket payment where patients pay providers operating within the national health insurance system.
Italy	None	Yes, modest	Yes, modest	Yes, Modest	Yes	None	Payment of a limited out-of-pocket contribution for remaining services, mainly ambulatory and outpatient care services. A system of exemption from cost sharing exists, particularly for low-income populations. For individuals with stroke there is an exemption from co payment for some diagnostic and pathology services.
Japan	Yes (with ceiling)	Yes (with ceiling)	Yes (with ceiling)	Yes (with ceiling)	Yes (with ceiling)	Yes	Co-payments of 20 - 30% of medical fees, with exemption for the poor, for inpatient and outpatient services. Limited to 63 600 JPY. For persons aged 70 or greater, or 65 with a disability, co-payment of 1 000 JPY per day (limited to 30 days) for inpatient and 500 JPY per day for outpatient services. As of 2000 private insurance is available to cover co-pay.

Table A2.2. Cost-sharing policies for non drug-related stroke care

	Inpatient Care	Ambulatory Care			Co-payment		Detailed descriptions
		Specialist care	Diagnostic Procedures	Rehabilitation	Exemptions	Reinsurance	
Korea	Yes significant	Yes, significant	Yes, significant	Yes, significant	Yes	None	Co-payments are uniform for the entire population except for the elderly aged 70 years or more (65 or greater as of July 2000) for whom the co-payments may be less. Co-payments for drugs differ by type of medical facility.
Mexico	Modest (Public prog.) More significant (Priv. prog.)	Modest (Public prog.) More significant (Priv. prog.)	?	?	?	?	Very low co-payments exist at all levels of care for governmental health care system. These are defined on the basis of income level rather than on cost of treatment. For social security system, there is no explicit cost-sharing. For private schemes, if use private facility, must pay co-payment or pay co-payments, premium and deductible for private insurance. Some social security system patients often access private facilities and pay out of pocket; also purchase own drugs if there is a lack of supply via social security system.
Netherlands	Yes, modest	None	None	None	Yes	None	Exemptions to the co-payment are possible based on income; charges should not result in adverse effects; there is a maximum to the yearly total for out-of-pocket payments per insurer or family; there is a co-pay for inpatient care for stays over 365 days, the rate is function of income (Exceptional Medical Expenses Act)
Norway	None	Yes, modest	Yes, modest	Yes, Modest	Yes	None	There is a co-payment of 110 NOK (13 USD) for specialist services with an annual upper limit 1 320 NOK (150 USD). Elderly are entitled to a reduction on co-payment on all services. For rehabilitation, co-payments are for ambulatory care.
Portugal							
Spain	None	None	None	None	None	N.r.	Out-of-pocket payments are mainly for pharmaceutical and orthotic-prosthetic products, dental health services and direct private payments.
Sweden	Yes, modest	Yes, modest	Yes, modest	Yes, modest	None	None	Current co-payment is very small; for outpatient treatment co-pay is SEK 120 - 200 and for inpatient treatment is SEK 50 - 100 per day, both depending on county councils. There is an annual maximum for all outpatient care (SEK 900). Substantial payments can be faced for rehabilitation outside hospital
Switzerland	Yes	Yes	Yes	Yes	No	No	Each calendar year, the first CHF 230.- of health care costs are paid by the patient (higher "franchises" can be elected by patients in order to reduce their health insurance premiums). In addition, there is a co-payment of 10% for all health care expenditures, irrespective of the type of care and place of delivery, up to a maximum of CHF 600.- (adults) per year. Inpatients also contribute to hospital non-medical expenditure (CHF 10.- per day) if they are living alone.
UK	None	None	None	None	N.r.	N.r.	There are virtually no co-payments for publicly provided specialised care. In addition, patients who opt to insure themselves privately, or who are recruited to a private health insurance scheme by virtue of their employment, may choose to be treated in a private health care facility and costs may be partly or fully reimbursed, depending on the insurance arrangement.

Table A2.2. Cost-sharing policies for non drug-related stroke care

	Inpatient Care	Ambulatory Care			Co-payment		Detailed descriptions
		Specialist care	Diagnostic Procedures	Rehabilitation	Exemptions	Reinsurance	
US (Medicare and Medicaid)	Yes	Yes	Yes	Yes	None	Yes (Medigap)	<p><i>Cost-sharing arrangements are highly dependent upon the type of insurance.</i></p> <ul style="list-style-type: none"> Medicare covers everyone over age 65. Medicare Part B, which covers 80% of non-inpatient services, has a monthly premium (\$54/month in 2002 and a deductible that was \$100 in 2001) for medical insurance. Medicare Part A, which covers inpatient services, has a deductible for each hospital admission of USD 812 (as of 2002) and additional co-payments for lengthy stays (\$198/day for the 61st through 90th day in 2001). Those in Medicare HMO plans may have more complete coverage and less out of pocket payments (20 percent of Medicare enrollees are in HMOs). For individuals 35-64, 14% are without health insurance, an additional 9% are covered by public programs (such as Medicaid), and the remaining 77% have private health insurance (with about 73% of these enrolled in some type of managed care plan). For private insurance and Medicaid, cost-sharing (though limited in managed care plans) varies widely depending on the specific health plan.

Source: OECD Questionnaire "Core Set of Indicators" for stroke. N.r.: not relevant.

Note: Unless otherwise indicated, this applies to public health insurance schemes. Most private insurance schemes involve some cost-sharing.

Note: For the purposes of this table we have included co-insurance (a proportion of the cost of a service) as part of co-payment (a fixed amount of the cost of a service).

Table A2.3. Cost-sharing policies for drugs used in the treatment of stroke

	Differentiation	Method	Exemptions from co-payments	Reinsurance of second-tier co-payment allowed?	Does reinsurance offset co-payment?
Australia	By type of beneficiary	Fixed amount Max \$ 21.90 for general population and \$ 3.50 for concessional patients per prescription (as at 1 Jan 2001)	Waiver for concessional cardholders, low income, chronically sick.	Private insurance but mainly for hospital care.	Not usually
Canada	By type of drug and beneficiary	Most provinces use a combination of co-payments and deductibles as part of cost sharing with beneficiaries. Overall 88% of Canadians have coverage, 62 % private plans, 19 % provincial plans, 7% under both. Universal coverage in <i>Alberta</i> , British Columbia, Quebec and Saskatchewan (partnership between public and private). <i>Ontario</i> covers elderly and those on social assistance. Drugs administered in-hospital are free of charge.	?	Yes	N.r.
Denmark	By type of drug and partly by beneficiary	Prior to March 1, 2000 50.2% for drugs with definite and valuable therapeutic effects, 25.3% for drugs used for the treatment of well-defined and often life-threatening diseases (<i>most drugs used to treat stroke belong in this category</i>). As of March 1, 2000, reimbursement is dependent on the amount of drug which the patient uses in a given year. Persons with a chronic illness face a maximum accumulated co-payment of 3 600 dkk per year. The previous exemptions in place no longer apply except in cases involving chronic illness.	According to the social legislation, pensioners, low income families and disabled persons are eligible for a reimbursement of co-payment.	Yes	In some cases (7% have full coverage and 22% are covered for 50% of co-payment - 1999)
Greece	Very partial	Fixed contribution of 25% of the total drug value, but only 10% for pregnant women, 0% for chronic diseases	?	Yes	No
Hungary	By type of drug and beneficiary	A percentage of the drug price from 0% to 100% depending on the drug.	Exemption for low-income individuals for a restricted list of drugs (mainly generics)	Yes, for non-profit insurance company	N.a.
Italy	By type of drug and beneficiary	Prescription charge of 3 000 ITL (\$1.50) plus percentage of the price. Three main drug categories (0, 50, 100 %). Moving towards more prescription charge and reduction of the share of drugs with patient charge (more or nothing) NHS patients are required to pay part of the nationally set fee of the services they demand, up to a preset expense limit per prescription (currently 70 000 lire; every prescription can contain up to 8 specialist tests/services/procedures.	Exemption according to income, age and health status From 01/01/2001 all drugs classified A and B (incl. ACE inhib., calc. chann. block., diur., anti-plat., β -block.) are free of charge, including the basic prescription charge.	N.a.	N.a.
Japan	By type of beneficiary	Since 1983, health and medical care for people who are 70 or more, or 65 or more with a disability, has been financed by the Health Services Law for the Aged. This law provided services for 13 million beneficiaries, or 10% of the total population in 1997. In 1997, patients were responsible for a fixed co-payment of 1 000 JPY per day for inpatient services and 500 JPY per visit for outpatient services.	Special rules for certain diseases. Waivers for low income.	Yes	N.r.

Table A2.3. Cost-sharing policies for drugs used in the treatment of stroke

	Differentiation	Method	Exemptions from co-payments	Reinsurance of second-tier co-payment allowed?	Does reinsurance offset co-payment?
Korea	Not by type of beneficiary or size.	Differentiated percentage of co-payment by type of medical facility: in-patient 20%; outpatient pharmacies 40% (as of July 2000, patients get prescription from clinic or hospital and must buy at pharmacy); local clinic 30%; hospital 40%; general hospital 55%.	Co-payments may be less for the elderly aged 70 years or more	Yes	Yes
Netherlands	By type of drug	Drugs are clustered into mutually interchangeable therapeutic groups with a set reimbursement limit per cluster. Any price difference between the reimbursement limit and the prescribed drug must be borne by the patient.	No	N.r.	N.r.
Norway	By type of beneficiary	50% co-payment. Maximum 43 \$ per prescription. When costs from pharmaceutical and medical services exceeds 150\$, all costs are covered	Waiver for children below 7 years and elderly.	Yes	N.a.
Portugal					
Spain	By type of drug and beneficiary	Based on the price of drug. Generally 40% of the price, 30% for civil servants mutual companies. There are no co-payments for inpatients.	Retired, handicapped and chronically ill.	No	Yes
Sweden	By prescription size and beneficiary	Patients pay 100% of the costs up to SEK 900 per 12 month period, 50 % of the costs between SEK 900 and 1700, 25 % of the costs between SEK 1 700 and 3300, 10 % of the costs between SEK 3 300 and 4 300, after which the high cost protection ceiling cuts in and reduces out of pocket payment to 0. This construction limits the total amount that a patient would have to pay for prescription drugs per 12 month period to SEK 1800. Note, however, that all drugs consumed during episodes of inpatient care are free of charges for patients.	None	Yes	Yes
Switzerland	None	Each calendar year, the first CHF 230.- of health care costs, including drugs, are paid by the patient (higher "franchises" can be elected by patients in order to reduce their health insurance premiums). In addition, there is a co-payment of 10% for all health care expenditures, irrespective of the type of care and place of delivery, up to a maximum of CHF 600.- (adults) per year. There is no separate billing for drugs delivered during a hospital stay.	None	No	No
UK	By beneficiary type	Fixed amount charge, currently £ 5.5 per prescription.	Many waivers ⁽¹⁾	Unknown	N.a.
US (Medicare and Medicaid)	N.r.	Drugs not included in Medicare but may be covered if HMO. Almost all private insurance plans have co-payment requirements. 60% of retail sales are at least partly paid by third parties to some exempt. 73% of private plans have a 2 or 3-tiered co-payment scheme. Average is \$8 for generics and \$15-20 for brand name drugs. Medicaid covers some drugs.	Yes	N.a.	

Source: OECD questionnaire on pharmaceutical management and regulation up-dated by the OECD Questionnaire "Core Set of Indicators" for stroke. N.r.: not relevant; N.a. not available
 Note: Unless otherwise indicated, this applies to public health insurance schemes. Most private insurance schemes involve some cost-sharing. For the purposes of this table we have included co-insurance (a proportion of the cost of a service) as part of co-payment (a fixed amount of the cost of a service).

(1) In 1995, 16% of the total number of the prescriptions carried a prescription charge and 22% of the value of total prescriptions carried a charge.

Table A2.4. Financing of hospitals

Countries	Global Budgets	Mixed - Case-mix (DRG) and global budgets	Case-Mix (DRGs)	Fee for Service	Within budget constraint
Australia	Public hospitals in New South Wales	Public hospitals in Australian Capital Territory.	Public hospitals (Queensland Victoria, Western Australia, South Australia, Tasmania, and Northern Territory). Have been developed so hospitals can monitor resource allocation	Private hospitals financed by fee charges to private insurers and/or out-of-pocket payments.	No
Canada	Yes	None	See mixed	None	N.r.
Denmark	Yes (run by local counties)	As of Jan 2000, 3% of the budget will be based on DRGs	None	None	N.r.
Greece	Public hospitals	None	None	Private hospitals - fee charges to private payers	No
Hungary⁽¹⁾	See mixed	Monthly fixed payment for 15 % of expenditure for institutions providing outpatient specialist care, including hospitals – coupled with a relative tariff fee for service (Cf. German floating points system). DRG based using Homogeneous Diagnosis Groups.	See mixed	Outpatient	Yes
Italy	See mixed	DRGs based tariff system with a yearly volume and expenditure limit	See mixed	Private hospitals/ private patients outside the NHS	No
Japan	None	None	Trial at 8 national and 2 social insurance hospitals since November 1998.	Mainly Fee for Service, calculated from nation-wide point-fee system. Applies to surgery and most settings of care.	No
Korea	None	None	Tentatively developed for some diseases but not stroke	Mainly fee for service	No
Mexico	Public hospitals (governmental and social security system) global budgets.	IMSS recently started to introduce DRGs in most hospitals (however budgets are not activity-based)	See mixed	Private hospitals obtain funds based on fee for service or per diem basis.	No?
Netherlands	Yes, based on 3 budget components	No	No	None	N.r.
Norway	Block grants from county governments until 1980-1997.	Since 1997, combination of global budgets and activity based (DRGs). Outpatient surgery is now included in the DRG system from 1999.	See mixed	Yes private sector (negligible)	No
Portugal					
Spain	Financing based on historical budget	None	None	Private providers	N.r.

Table A2.4. Financing of hospitals

Countries	Global Budgets	Mixed - Case-mix (DRG) and global budgets	Case-Mix (DRGs)	Fee for Service	Within budget constraint
Sweden	Mainly global budgets; set by local authorities since 1993; as a rule, hospitals have usually been granted additional funding if applied for.	Since the 1993 reform, a few county councils reimburse part of the expenses using a DRG system.	See mixed	Hospitals receiving patients referred from county councils which do not have hospitals that perform CABG or PTCA charge the patients' county council fee for service	No
Switzerland	In some cantons, block grants for Canton's financing (50% of costs)	Some cantons include case-mix elements in the definition of their global hospital budgets.	None	Fixed charges per day of hospitalisation paid by insurers (50% of costs). Price agreements at the canton level between hospitals & health insurance organisations	No
UK	Overall fixed budget for inpatient and outpatient activity. 69% of contracts are block contracts.	Some cost and volume contracts	See mixed	Private sector outside the NHS pure fee for service system Since 1991, GP fund-holders pay fee for service (50% of GPs in 1997), price competition	No Yes
USA	Global budgets for Veterans hospitals and Kaiser.	None	Since 1983 used by Medicare for all hospitals.	Mixed FFS, per diem, and DRG for both Medicaid and the private sector.	No

Source: OECD Questionnaire "Core Set of Indicators" for stroke. N.r.: not relevant.

(1) Special fees for technologies.

Table A2.5. Remuneration systems for specialists

Country	Ambulatory care specialists		Hospital-based specialists		Comment
	Mode of Remuneration	Mixed hospital and ambulatory practice	Mode of Remuneration (Salary, Fee-for-service or mixed)	Salaried/public physicians allowed private practice within public hospitals	
Australia	FFS (including private office-based specialists treating hospital patients)	Yes	Mixed	Yes	In ambulatory care settings, physicians are paid with no limit on the use of services and annual expenditures. Physician treating public patients in public hospitals, fees paid by the hospital. Medicare Benefit Schedule defines approved fees, but doctors not bound to charge schedule fee. For physicians treating private patient in public hospital or private hospital, public sector benefits will cover the physician fee partially along with private sector (either private health insurance or out of pocket payment from patient).
Canada	FFS	Yes	Salaried and FFS	N.r.	Physicians remunerated fee for service operate within a global budget constraint for all physicians within each province.
Denmark	N.r.	N.r.	Salaried	No	FFS exists in the very small private sector. Most specialists are hospital based.
Greece	FFS	Segmented	Public: - Salaried Private: Mixed	See comment	In private hospitals, physicians receive a mix of salary and FFS. Unofficial informal private payments may exist in public hospitals
Hungary	Salaried	Yes (see comment)	Salaried	Unofficial gratitude payments	Some ambulatory care specialists practice out of outpatient polyclinics with no hospital background.
Italy	FFS	Yes	Public: Salaried. Private: some FFS	Yes; allowed quota of revenue.	Majority of doctor-patient contacts in hospital outpatient centres under the care of specialists. Specialists are mainly hospital-based. Highly hospital-centric and specialist oriented system.
Japan	Salaried for hospital physicians. Fee-for-service for independent clinics.	Yes	Salaried	No	Adjustments in the salary scale for seniority, qualification, experience and special co-ordination powers.
Korea	Salaried - public FFS - private	Yes	Mainly salaried and mixed in some private hospitals	No	No public regulation or standards of physicians' salaries.
Mexico	Salaried - public FFS - private	?	Salaried - public FFS - private	?	
Netherlands	FFS	Yes	FFS in general hosp. Salaried in univ. hosp.	No	Most specialists work in a general hospital in which FFS system exists
Norway	Salaried - public FFS - private	N.r.	Salaried	No	Most specialists are hospital based. No specific adjustment linked with treatment choices.
Portugal					

Table A2.5. Remuneration systems for specialists

Country	Ambulatory care specialists		Hospital-based specialists		Comment
	Mode of Remuneration	Mixed hospital and ambulatory practice	Mode of Remuneration (Salary, Fee-for-service or mixed)	Salaried/public physicians allowed private practice within public hospitals	
Spain	Salaried		Salaried (public); FFS private	Yes	There are two different salary levels, one for primary care physicians and one for specialists. Differences in salary levels for specialists are related to seniority, hierarchical level and organizational responsibilities. Physicians practicing only in public system receive an "exclusivity bonus."
Sweden	Salaried	Yes	Salaried	N.r.	
Switzerland	FFS	Yes	Salaried - public FFS - private	Yes (part of the gain is returned to the hospital)	In ambulatory care settings, physicians are paid with no limit on the use of services and annual expenditures. In private clinics and for private patients in public hospitals, physicians are paid on a FFS basis. For inpatients covered only by the social health insurance, hospital physicians are salaried.
UK	None	N.r.	Salaried - public FFS - private	Yes, with some controls	Annual capitation fees based on number of registered patients (plus allowances, health promotion payments); some fee for service for selected services. Very small private sector. Most specialists are hospital-based consultants, plans to expand consultant posts by 2004. They also can earn up to 10% of gross income from private practice based on fee for service. In addition, the contract between consultants and the NHS is expected to change with increased financial rewards for consultants tied to the NHS.
USA	Mixed	Yes	Mixed, salaried/ capitation/ FFS	N.r.	Payments (either capitation, FFS, and salaried) vary based on contract arrangements between hospitals and health plans, and also to hospital's status.

Source: OECD Questionnaire "Core Set of Indicators" for stroke. N.r.: not relevant.

Table A2.6. Regulation on MRI and CT scanners

Country	Capacity Constraints on diagnostic technology		Intensity of wait for elective services		Are waiting times for emergency significant		Queue Jumping	Comment
	Explicit	Targeted funding ⁽¹⁾	MRI	CT Scan	MRI	CT Scan		
Australia			1	0	0	0	Yes	Priority in public hospitals determined by a formal triage system. Within Australia variability exists in waiting times, for instance between hospitals. The waiting times for private patients in private hospitals are generally much shorter than for public patients in public hospitals, dependent upon physician caseloads and hospital bed availability.
Canada			2	2			No	Wait times for elective CT scan and MRI are significant. Access to private MRI, <i>i.e.</i> for services not reimbursable by the provincial health insurance plans, is available in Alberta and Quebec.
Denmark			2	2			Yes	This is a serious issue. Wait time for CT can vary across the counties from 1-15 weeks; for MRI/MRA from 1-36 weeks.
Greece							Yes	
Hungary	Yes	Yes	2	2	Yes	Yes	Yes	Ability to pay physicians "gratitude money" (out-of-pocket direct under the table payments) may affect waiting time for surgical procedures. Supervised waiting lists have been set up for services that cannot be provided within two months.
Italy	No	Yes, partially	2	2	In some regions	In some regions	Yes	Ministry of Health has begun monitoring on a national level. There is a high degree of variability among the regions
Japan			0	0			N.r.	
Korea	Yes (MRI)	No	1	1	No	No	N.r.	Prior to the introduction of universal public health insurance in 1989 there were no regulation constraints regarding diagnostic technology. At present, each hospital must receive approval by the Ministry of Health and Welfare for introduction of a MRI unit.
Mexico								
Netherlands	No	No	0	0	0	0	N.r.	There is no regulation for the access to above high technologies such as CT-scans and MRIs. The supply of top-clinical care facilities, such as neurosurgery, are however limited by the Special Medical Services Act (Wet op bijzondere medische verrichtingen).
Norway			2	2	No	No	Yes	
Portugal								
Spain			1	2	0	0	Yes	The National Health System explicitly uses waiting times as a means of controlling access to high technology diagnostic and therapeutic procedures
Sweden	No	No	2	2	Variable across the country	Variable across the country	Yes	A limited number of key personnel in private companies can go to private hospitals to jump public queues.

Table A2.6. Regulation on MRI and CT scanners

Country	Capacity Constraints on diagnostic technology		Intensity of wait for elective services		Are waiting times for emergency significant		Queue Jumping	Comment
	Explicit	Targeted funding ¹	MRI	CT Scan	MRI	CT Scan		
Switzerland	0	0	0	0	0	0	N.r.	There is some wait according to patient preference and perceived quality of provider, so it is not an issue of capacity.
UK			2	2			Yes	Waiting lists are an important issue in the UK. In 1997 the government made a commitment to reduce waiting lists. However, the number of people on waiting lists increased and continued to do so until March 1998. Since then the number of people on waiting lists has fallen. The desired goal is to achieve a position where no one is waiting for more than 12 months, but there are now more people waiting between 12 and 18 months than when the government came to office.
USA			0	0	No	No	N.r.	Relatively short waiting times, but utilisation is controlled by limiting coverage and reimbursement for some expensive, high-tech procedures.

Note: N.a. - Not available; N.r. Not relevant. Intensity of wait scale: 0 = insignificant wait, 1 = some wait, 2 = significant waiting times may exist

Table A2.7. Guidelines for carotid endarterectomy

Country	Carotid Endarterectomy			Stroke Facility ⁽¹⁾	Patient health	Asymptomatic patients	Comments
	Degree of stenosis	Other than 70-99	Floor				
Australia	<= 30%	No	<= 5%	ROD <= 5%	male LE 1 year; female LE 2 years	Yes (see comments)	Asymptomatic: <i>no symptoms on other side</i> stenosis of 70-99%; <i>no symptoms on either side</i> stenosis 80-99%; threshold for ROD and patient health higher for no symptoms on other side There are no national guidelines.
Canada							
Denmark	No	No	No	No		Not recommended	Asymptomatic patients are offered CE within clinical trials and exceptional cases
Greece							
Hungary	<50%	No	No	No		Nor recommended	Elderly rarely selected for CE
Italy	<50%	Between 50 and 70%	No	No		Stenosis >= 60% and CR < 3%	Recommendations for no CE when stenosis < 50% and for asymptomatic patients are high (Grade A) recommendations.
Korea	<50%	Between 50 and 70%	No	No		No unified guideline	
Japan							
Mexico							
Netherlands	<50%	No	See comments	See comments	No limits	See comments	Stroke facility: Combined operative morbidity and mortality of lower than 5-7% Asymptomatic patients: Degree of stenosis <50% and combined operative morbidity and mortality of lower than 2%
Norway	No	No	No	No			
Portugal							
Spain	N.a.	Depends on patient's general health status and quality of life	N.a.	N.a.	Patient's general health status	Not recommended	There are no national guidelines on the use of CE. International guidelines are used, among them <i>Joint Council of the Society for Vascular Surgery</i> and <i>North American Chapter of the International Society for Cardiovascular Surgery</i>
Sweden	<70%	No, but physicians have some discretion	ROD < 5-7%	ROD < 5-7%	No upper age limit but quality of life must be considered	Not recommended	Asymptomatic patients are offered CE within clinical trials and exceptional cases.
Switzerland	N.r.	N.r.	N.r.	N.r.	N.r.	N.r.	There are no national guidelines.
UK							
USA							There are no national guidelines, by these may be established by private insurers.

Note: ROD: risk of death; CR: complication rate (morbidity and mortality), N.a.: not applicable

(1) This concerns specification for the performance of stroke facilities (e.g. maximum risk of death to be accepted). Some of these regulations may be implicitly linked to high volume facilities. The debate remains fairly open however, as concerns the link between high volume and other characteristics.

Table A2.8. The organisation of stroke units and rehabilitation

Country	Stroke units		Access constraints on rehabilitation		Comment
	Guidelines	Planning	Acute care rehab	Outpatient and/or ambulatory rehab	
Australia	No	No	No	No	Possible There are currently no regulations governing stroke units, however an application has been put to the government to develop stroke unit accreditation guidelines and a national committee to facilitate this. The private health industry is currently working to consolidate health insurance arrangements pertaining to rehabilitation services.
Canada	No	No	No	No	Possible There are no formal classifications to define a facility as a stroke facility. As a first step, a multi-stakeholder group convened a survey in Ontario to formulate a coordinated provincial stroke care delivery strategy.
Denmark	Yes	Yes?	Yes	Yes?	The National Board of Health recommended in 1994 that all counties should establish specialised stroke units. Some counties emphasize equal geographical distribution while others have a more centralised set-up with larger units.
Greece	No	No	No	No	There is no formal planning for the distribution of open heart centres and cardiac catheterisation laboratories, which are located only in urban areas.
Hungary	No	No	No	No	No formal regulation exists. National Stroke Centre supervises the professional level of stroke units. Availability of acute CT scans is a requirement (not necessarily in-house) but neither multidisciplinary nor continuity of care.
Italy	Not formal	Yes, at regional level	Yes	Yes	Mandatory accreditation programme for hospitals & outpatient clinics (regional responsibility) Only a few regions have followed accreditation program Long waiting lists for public rehabilitation has led to extensive use of private facilities.
Japan	No	No	No	No	Public and private health care institutions are free to decide which service they provide and what equipment to purchase. However, the availability of public subsidy influences the decision in purchasing equipment, particularly high priced diagnostic and therapeutic equipment.
Korea	No	No	No	No	There are no official regulations on establishing stroke units. Hospitals are free to establish units at their own discretion. Waiting for rehabilitation services is a significant policy issue
Mexico					
Netherlands	Yes	Yes	Yes	Yes	Possible Dutch guidelines focus on both stroke units within the hospital and regional stroke units which emphasise harmonization and co-operation among the various health care professionals in a region.
Norway	No	No	No	No	No formal regulation, but stroke units are recommended. Only one private centre. It is located in the largest health region.
Portugal					

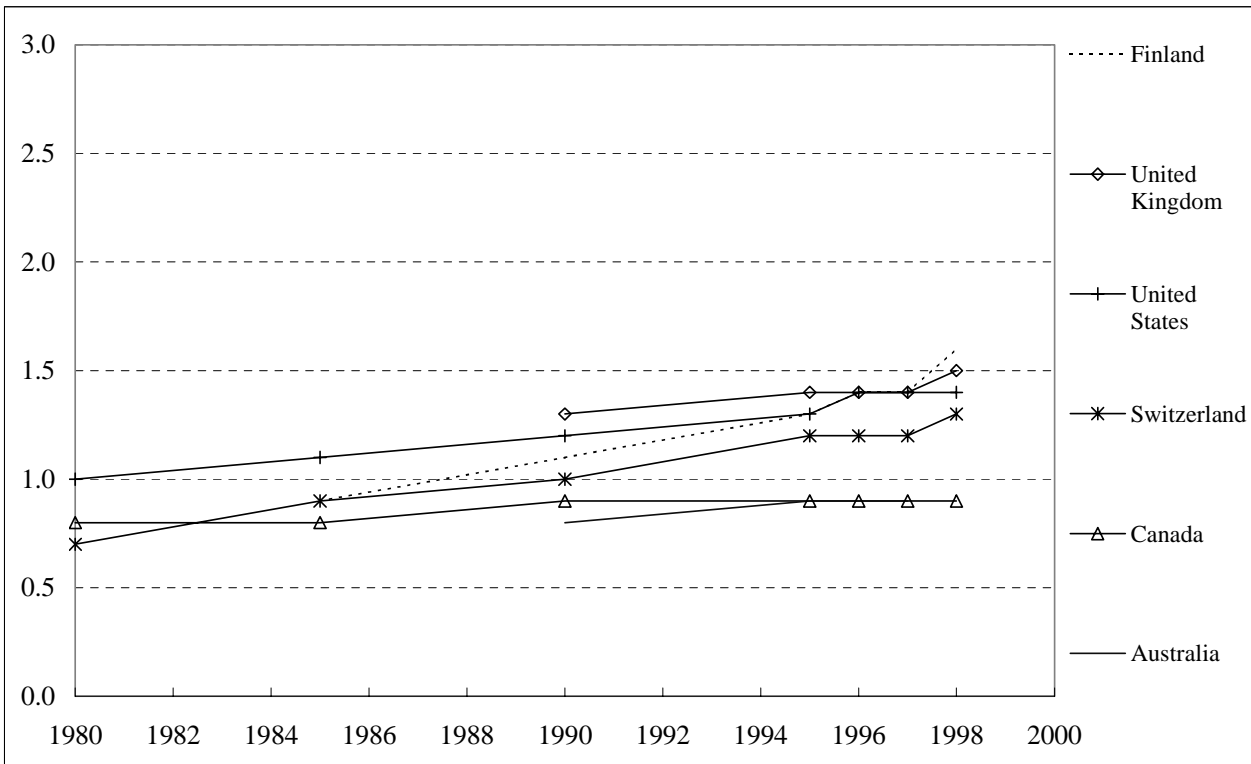
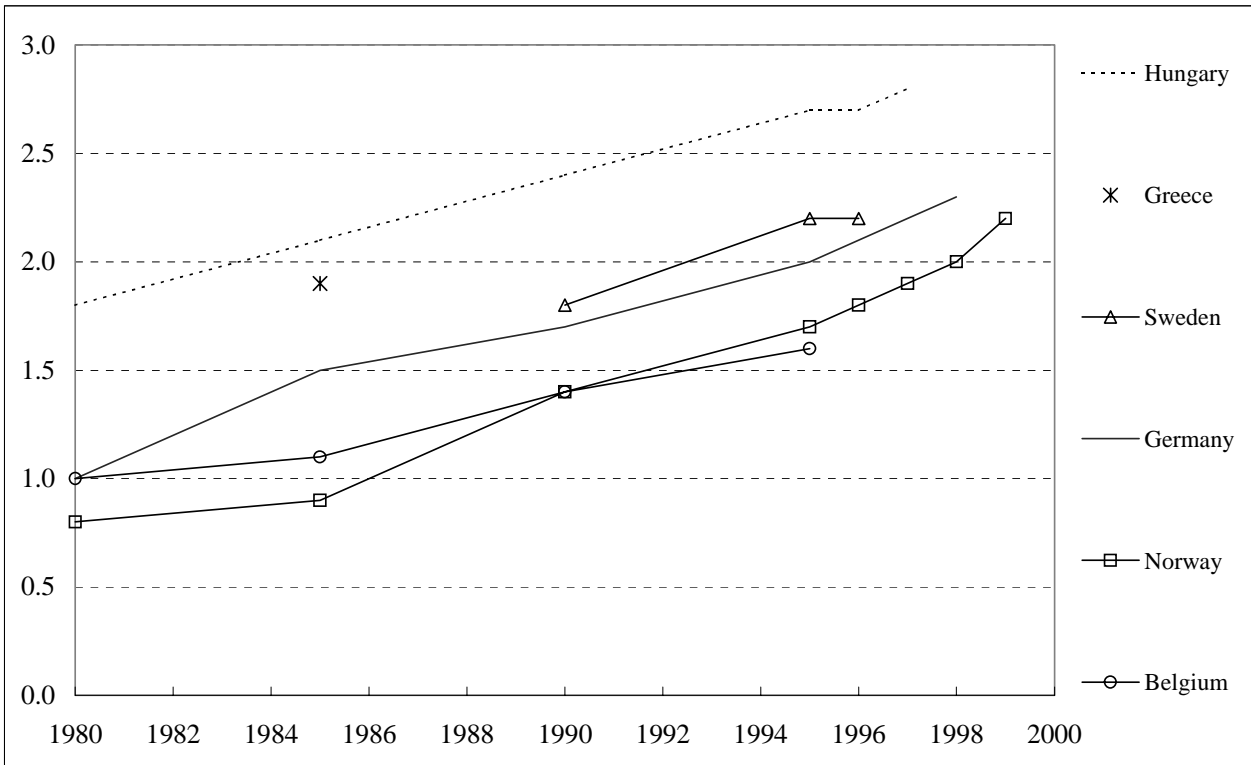
Table A2.8. The organisation of stroke units and rehabilitation

Country	Stroke units		Access constraints on rehabilitation		Comment	
	Guidelines	Planning	Acute care rehab	Outpatient and/or ambulatory rehab		Option for private rehabilitation
Spain	No	Yes	No	No	Yes	No official position or accreditation regarding stroke units. Some hospitals are planning units and have elaborated recommendations. Some of the problems in implementing stroke units is the lack of rehabilitation services and trained personnel, and existing units do not employ well a multidisciplinary approach. The lack of stroke units in the public system has given rise to private stroke units.
Sweden	Yes	Yes	No	Yes?*		Decisions regarding large investments on new capital (increasing capacity) rest with the county councils. No formal regulation at the national level. Funding for county councils regulated at the national level.
Switzerland	No	No	No	No		There are no formal classifications to define a facility as a stroke facility. Rehabilitation care is usually provided as inpatient care, either during the acute phase (in general hospitals) or after the acute phase (in rehabilitation facilities, often not specific to stroke care), and hospital care is organized (and planned) at the level of each canton. Formal outpatient rehabilitation is unusual, and ambulatory rehabilitation is left to the initiative of the patient's private physician (as such, largely undocumented).
UK	Yes	Yes	Yes	Yes		Funds are transferred from purchasers (District Health Authorities and GP fundholders) to hospitals and other providers under contracts that specify what services are to be provided and the terms on which they are to be supplied.
USA	No	No	No*	No*		Distribution of facilities is driven by market forces.

Source: OECD Questionnaire "Core Set of Indicators" for stroke. Note: Guidelines refer to the use of explicit recommendations regarding the composition of stroke units regarding personnel, availability of stroke care services, number of beds and targets such as a minimum number of carotid endarterectomies per year. Planning refers to recommendations on the geographical distribution of stroke units.

* Medicare and private insurance cover the cost of rehabilitation (or at least partly) but coverage may be restricted.

Figure A2.1. Number of specialists per 100 000 inhabitants



Source: OECD Health data (2000).

Figure A3.1. Stroke incidence by type and country
(per 100 000 population, latest available year)

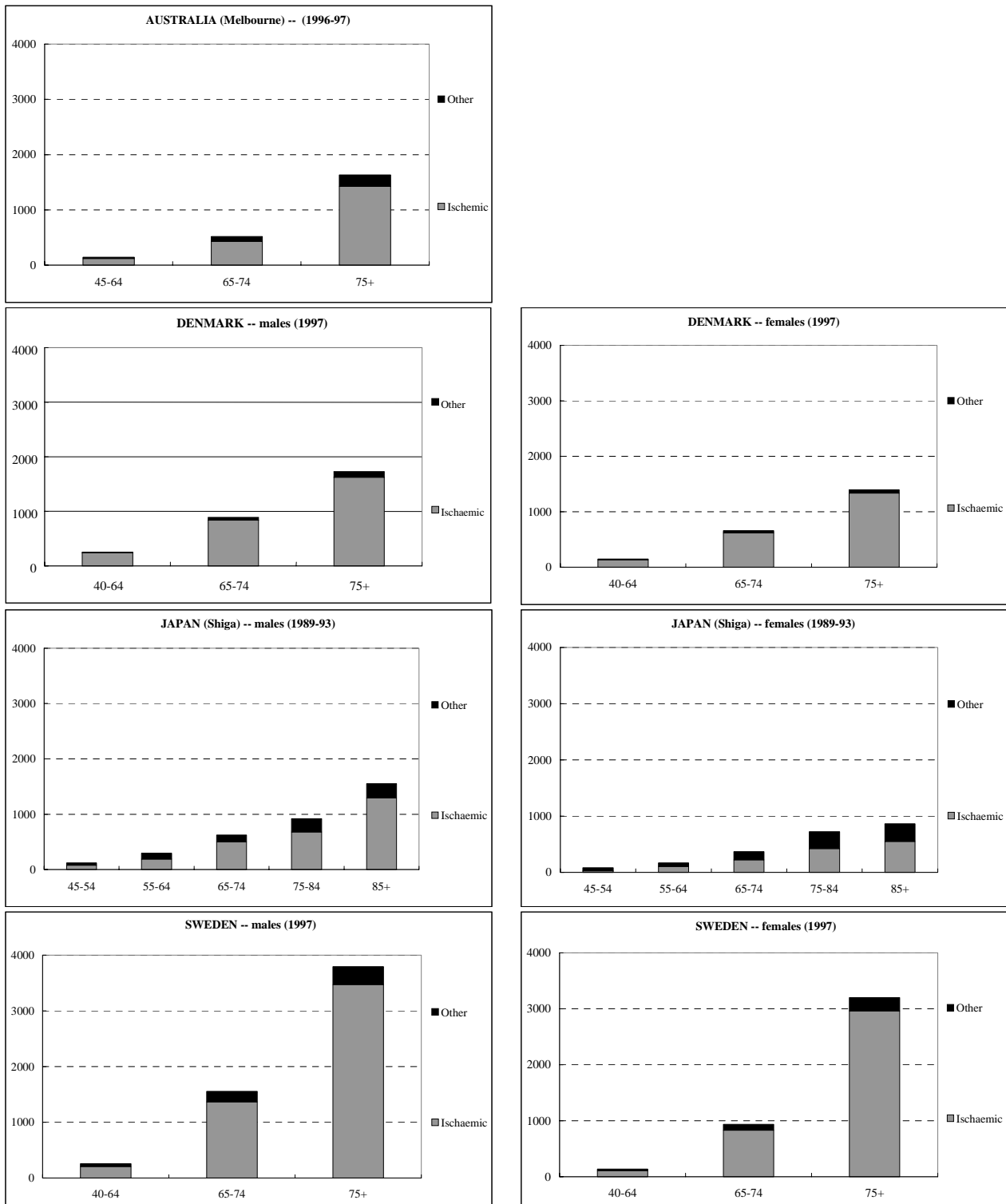


Figure A3.2. Incidence of all stroke, by country
(per 100 000 population, latest available year)

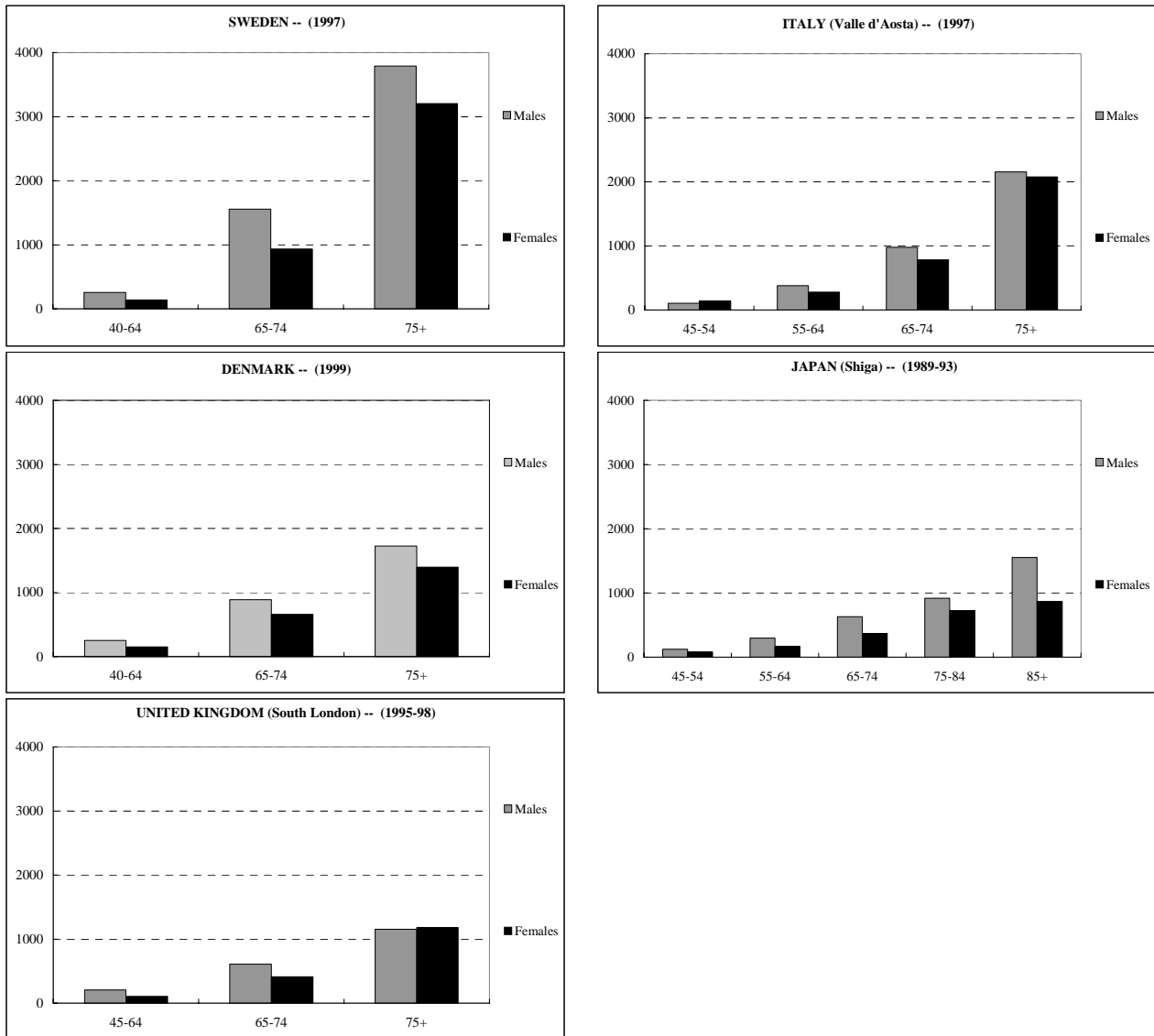


Figure A3.3. Ischaemic stroke incidence, by country
(per 100 000 population, latest available year)

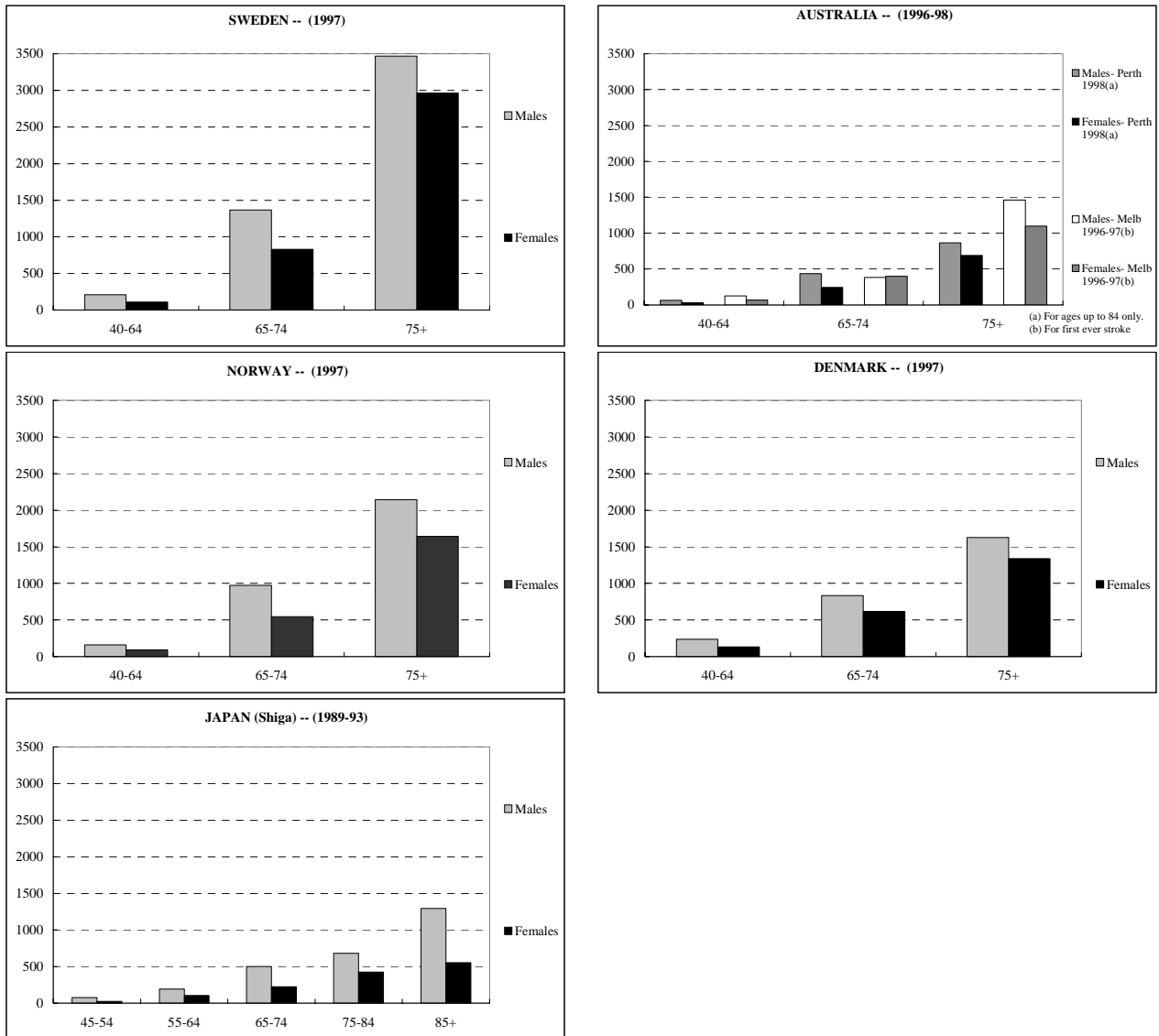


Figure A3.4. Trends in the age-standardised ischaemic stroke incidence (per 100 000 population aged 40+)

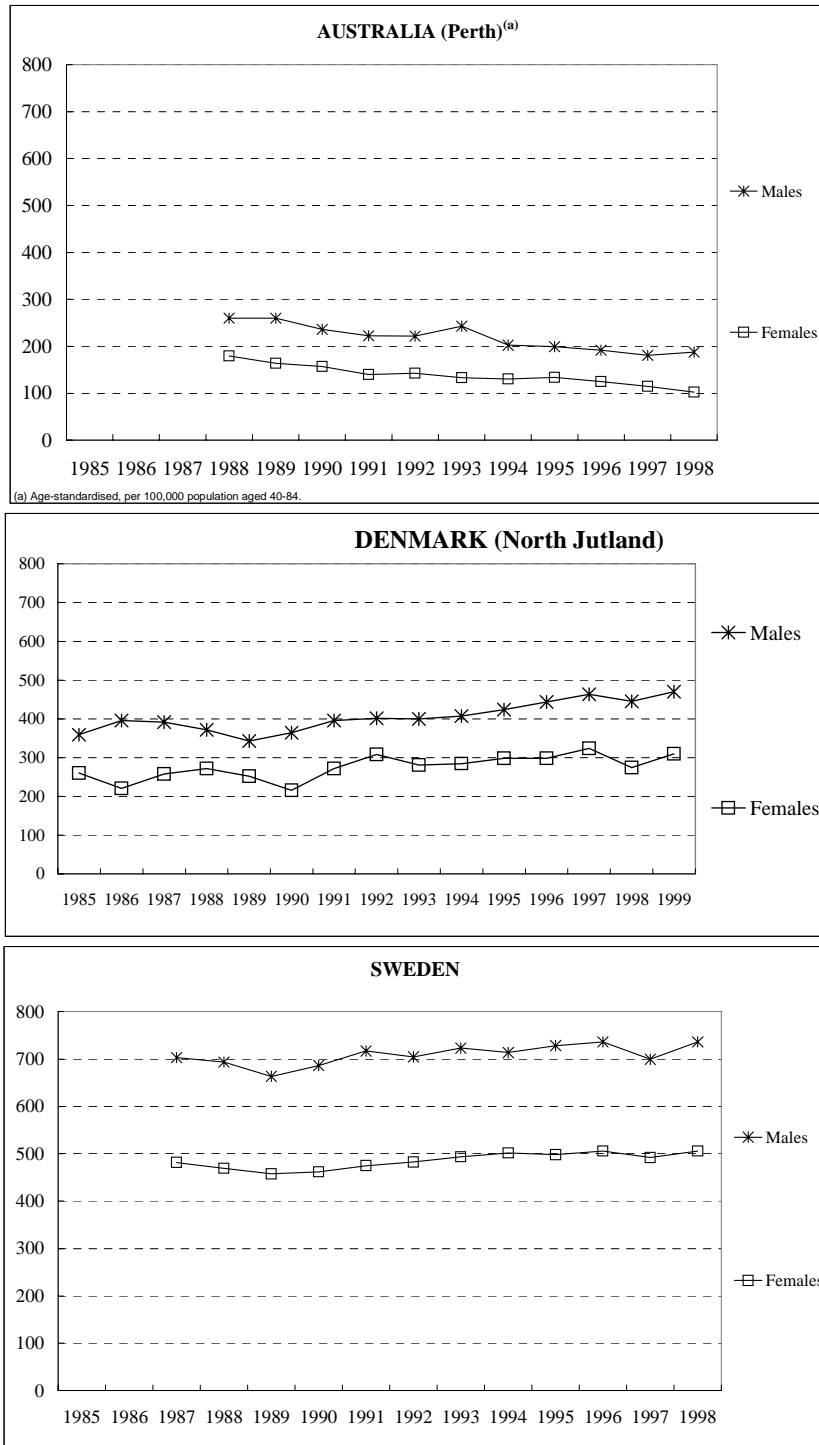


Figure A3.4. (cont.) Trends in the age-standardised ischaemic stroke incidence (per 100 000 population aged 40+)

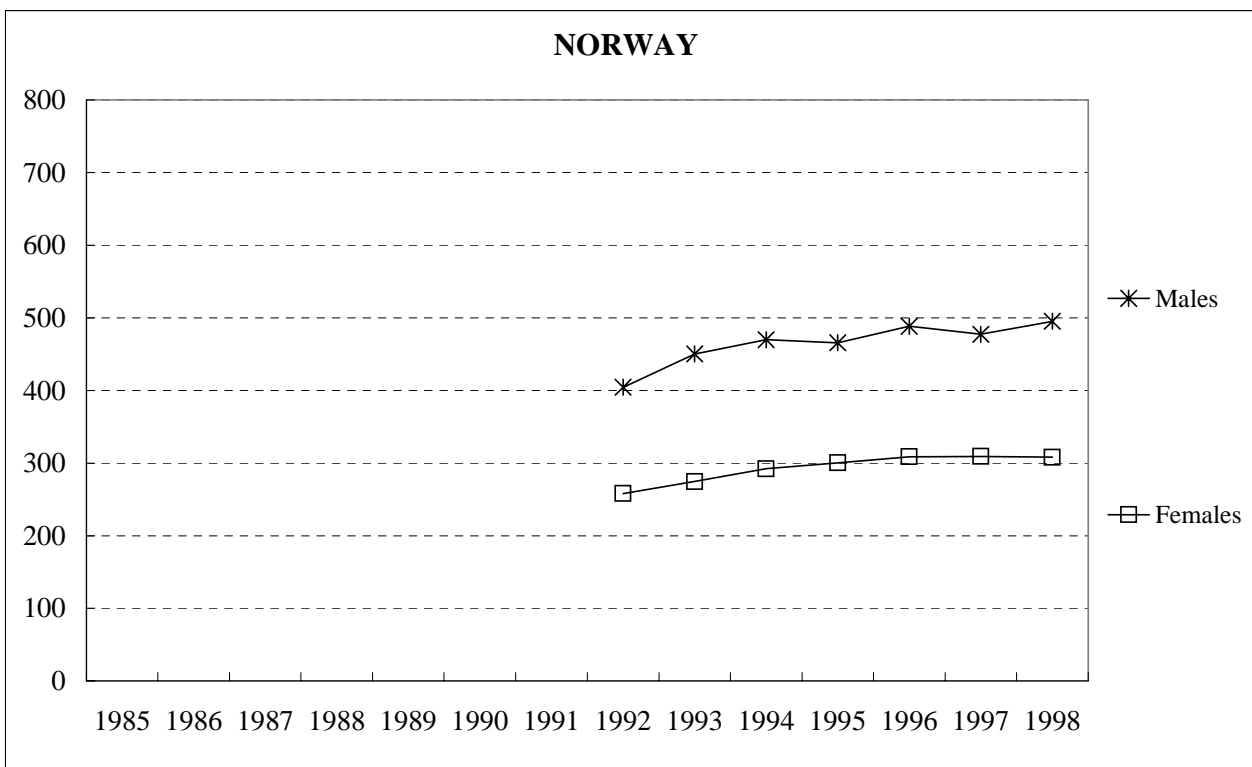
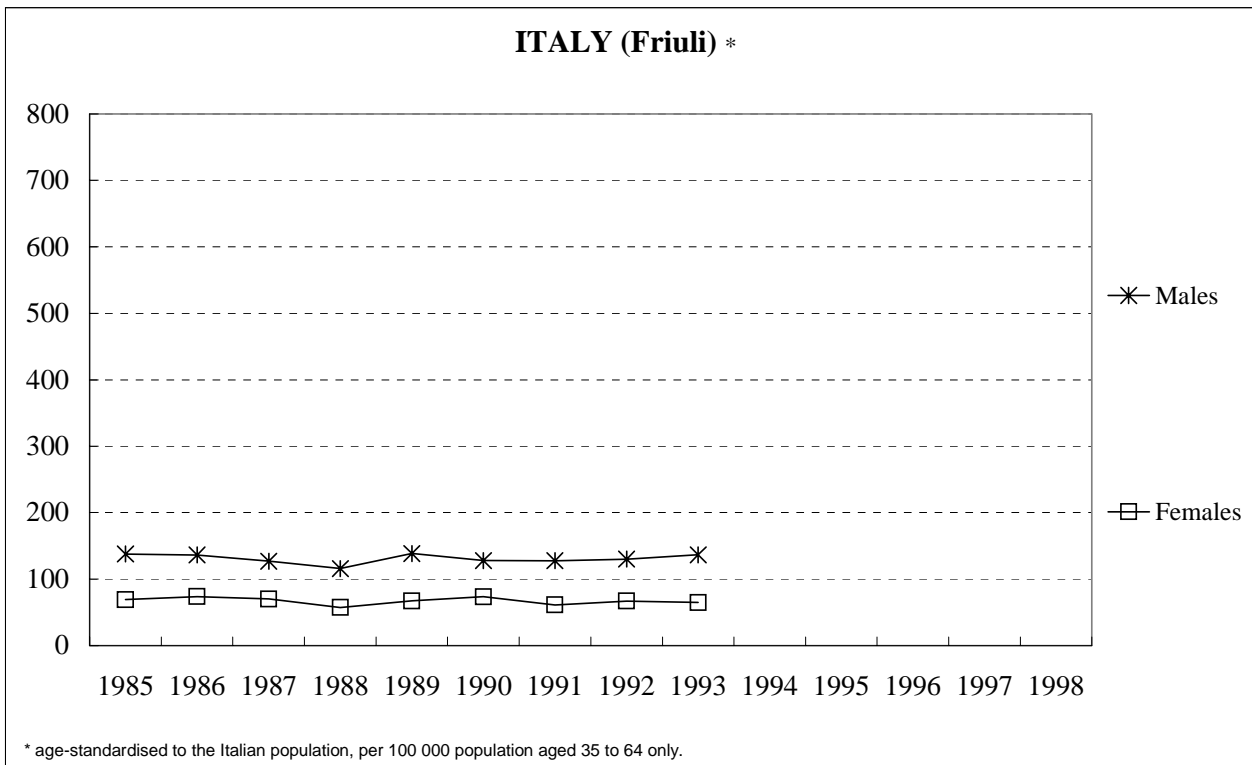


Figure A3.5. Stroke mortality by type and sex
(per 100 000 population)

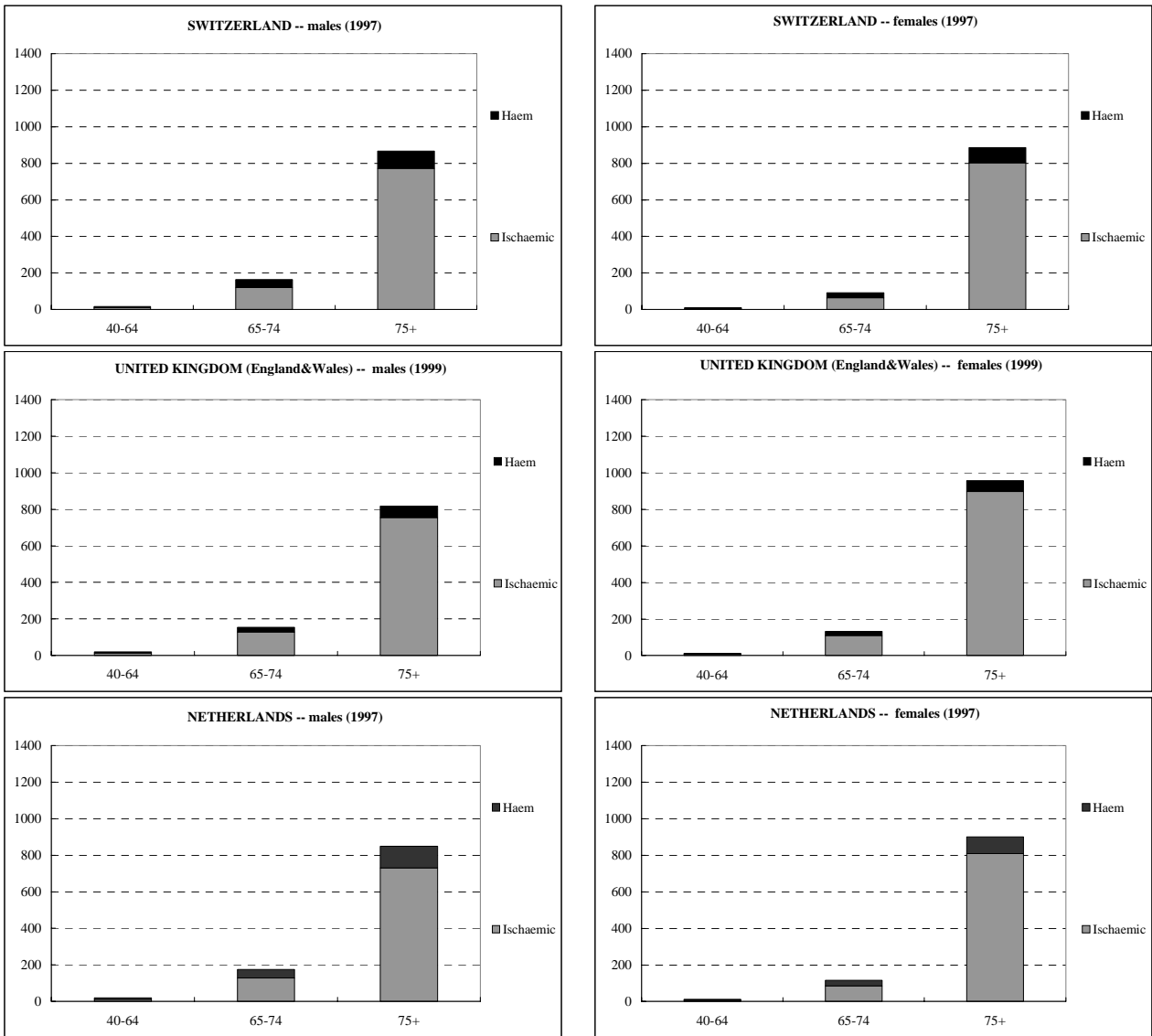


Figure A3.5 (cont.) Stroke mortality by type and sex
(per 100 000 population)

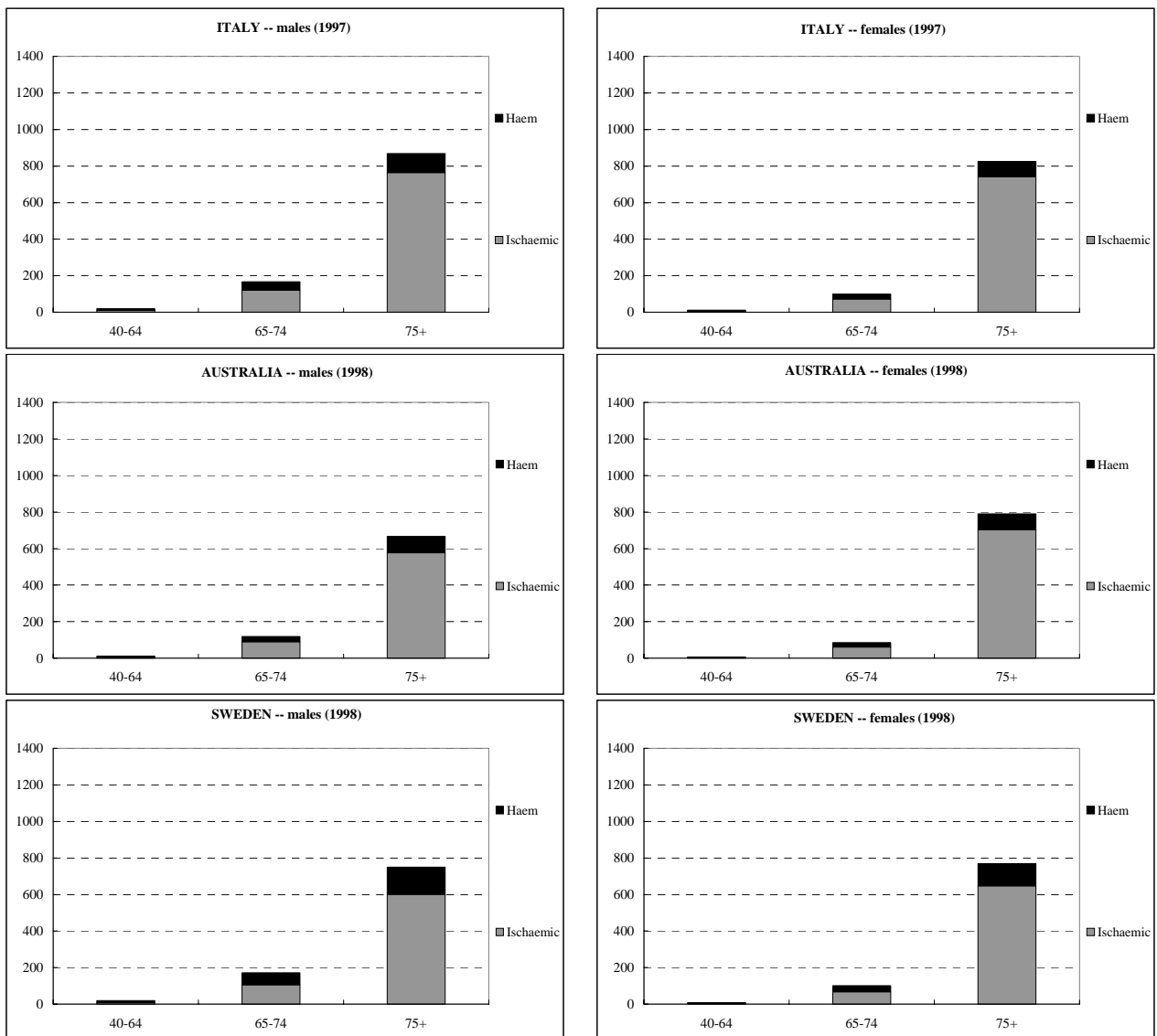


Figure A3.5 (cont.) Stroke mortality by type and sex
(per 100 000 population)

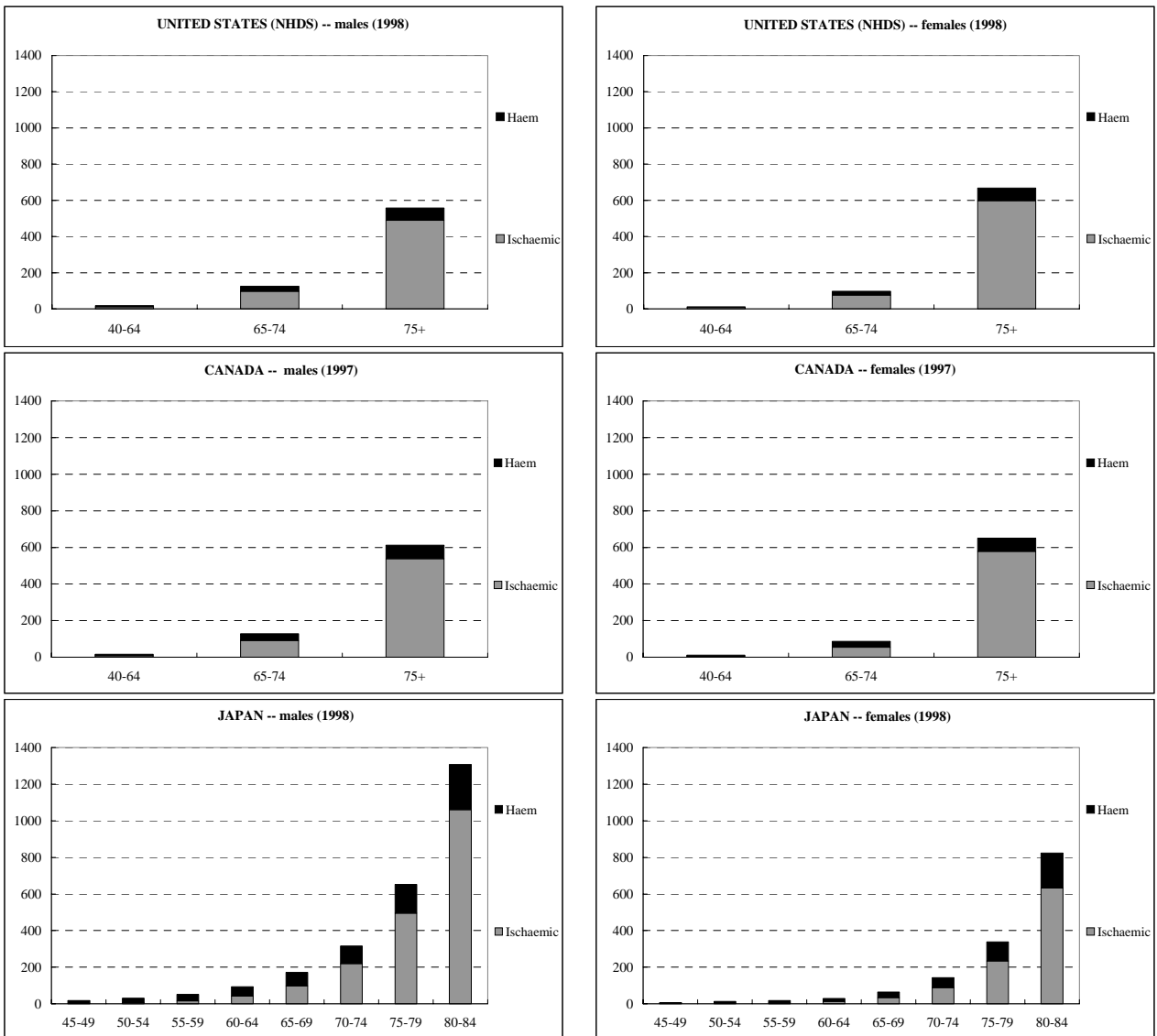


Figure A3.6. Ischaemic stroke mortality, by age and sex
(per 100 000 population)

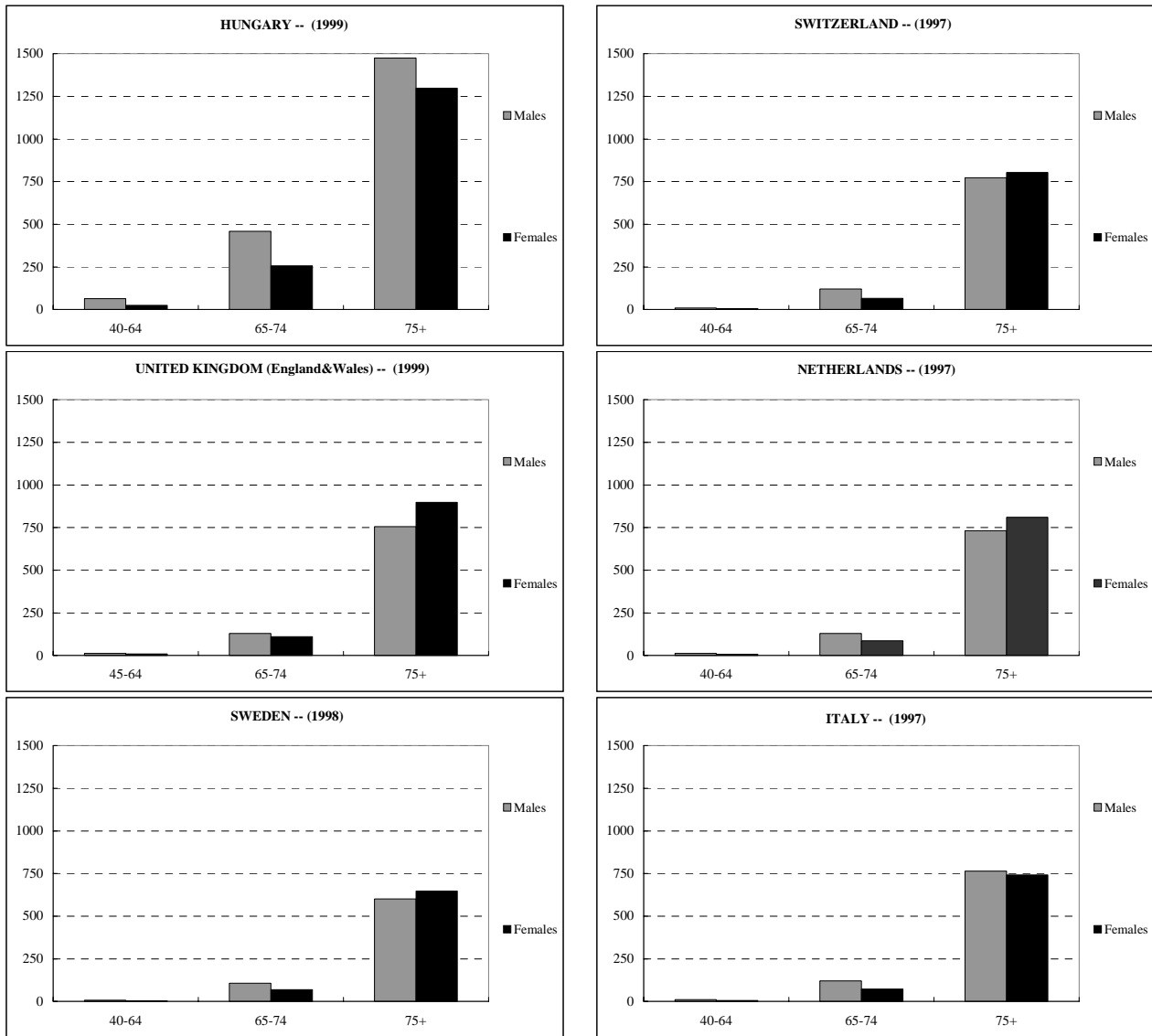
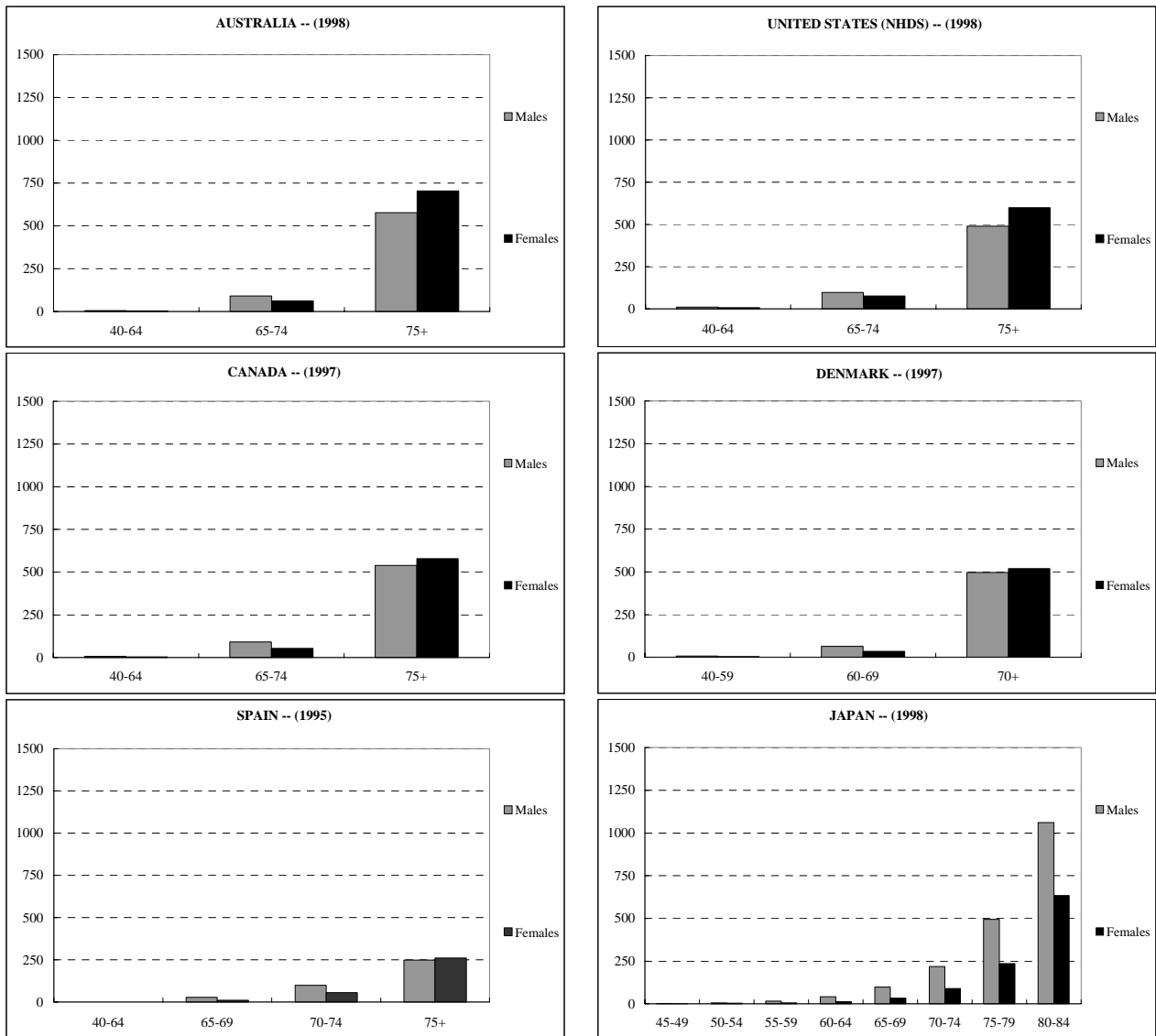
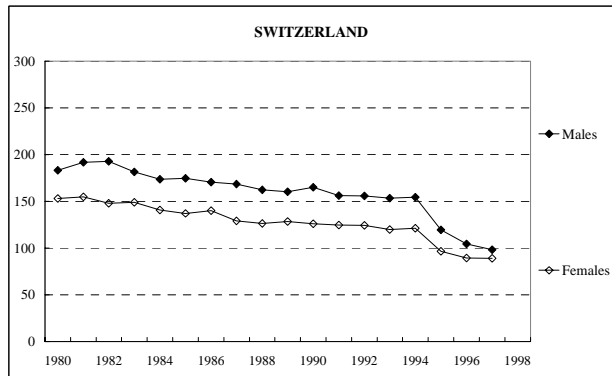
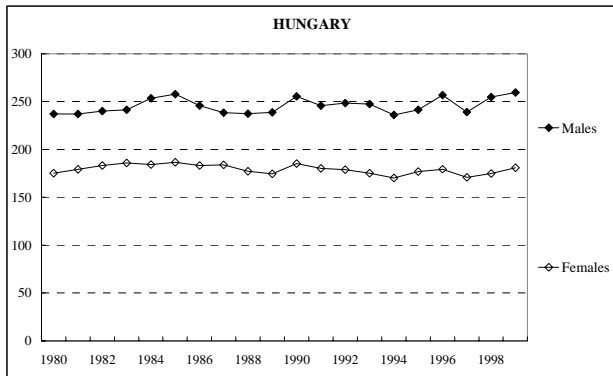


Figure A3.6. (cont.) Ischaemic stroke mortality, by age and sex (per 100 000 population)



Trends

Figure A3.7. Trends in the age-standardised ischaemic stroke mortality rates, by country
 (per 100 000 population aged 40 and over, age-standardised to the European standard population)



Note: moved from ICD9 to ICD10 between 1994 and 1995.

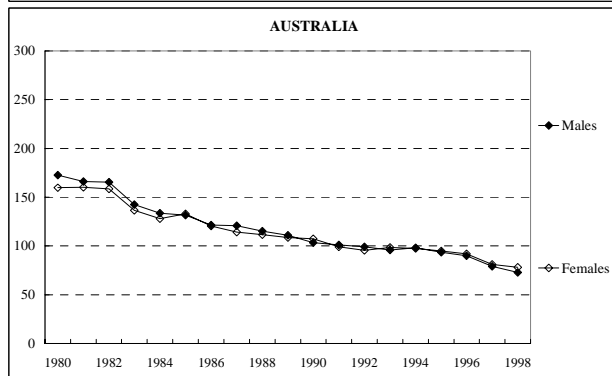
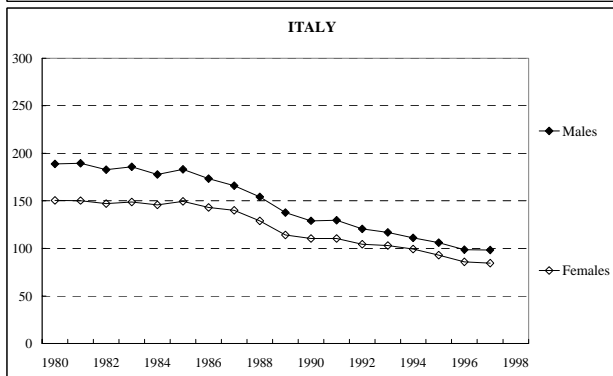
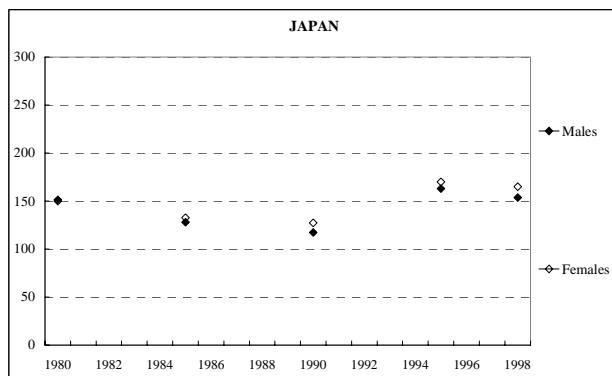
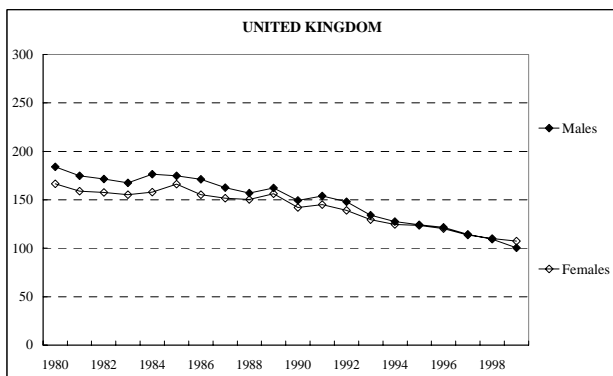


Figure A3.7. (cont.) Trends in the age-standardised ischaemic stroke mortality rates, by country (per 100 000 population aged 40 and over, age-standardised to the European standard population)

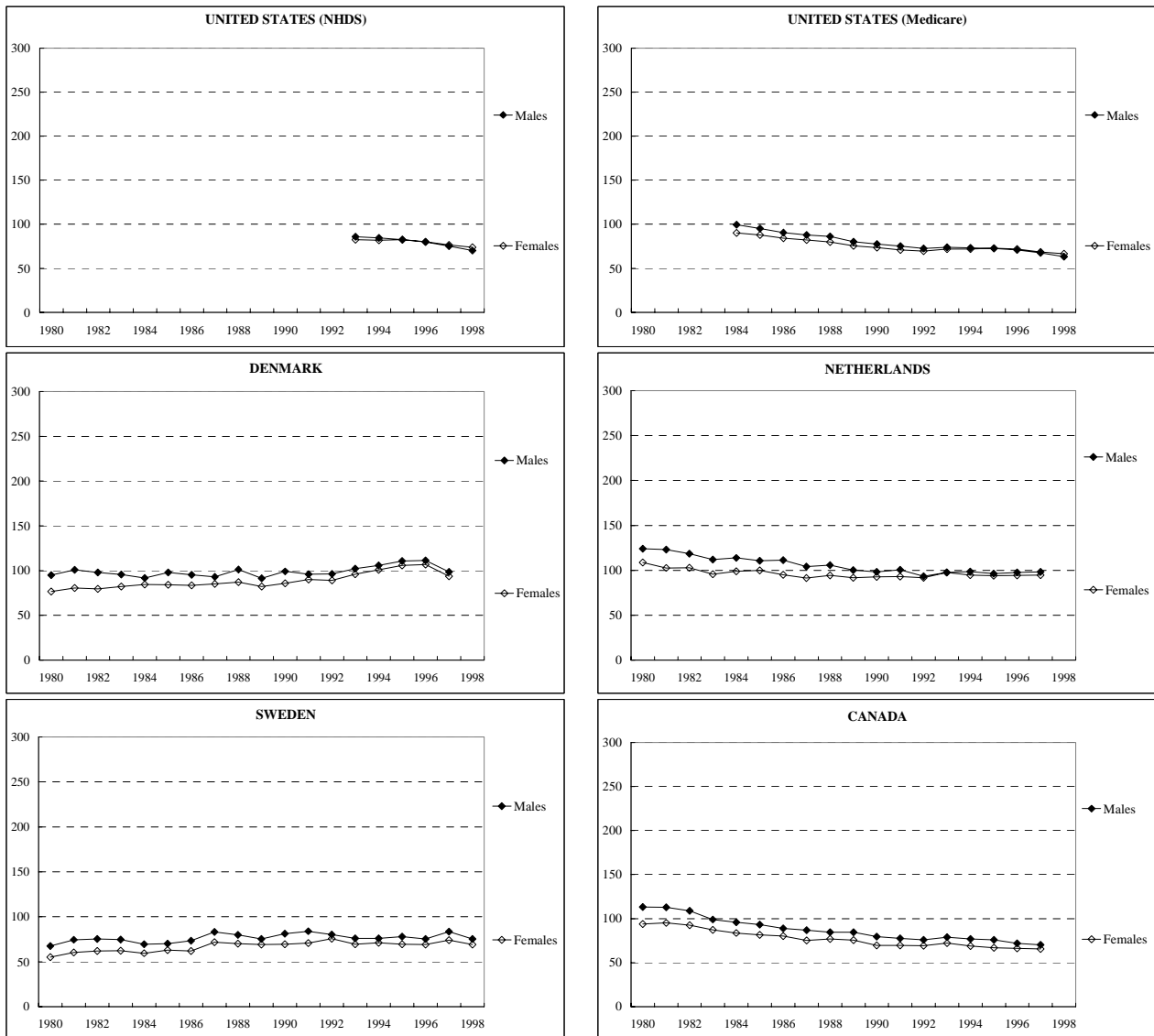


Figure A4. 1. Ischaemic stroke hospitalisations

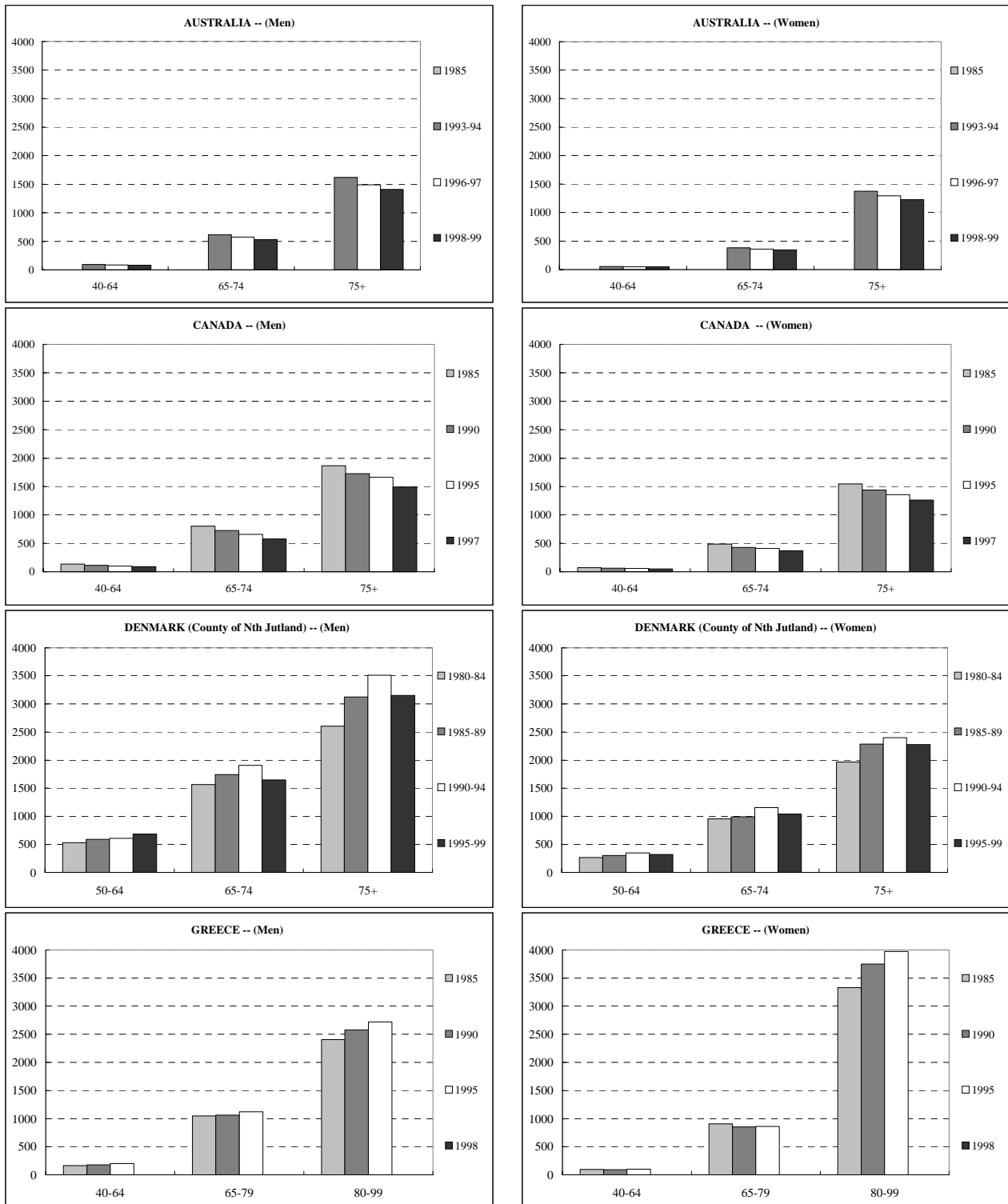


Figure A4.1. (cont.) Ischaemic stroke hospitalisation

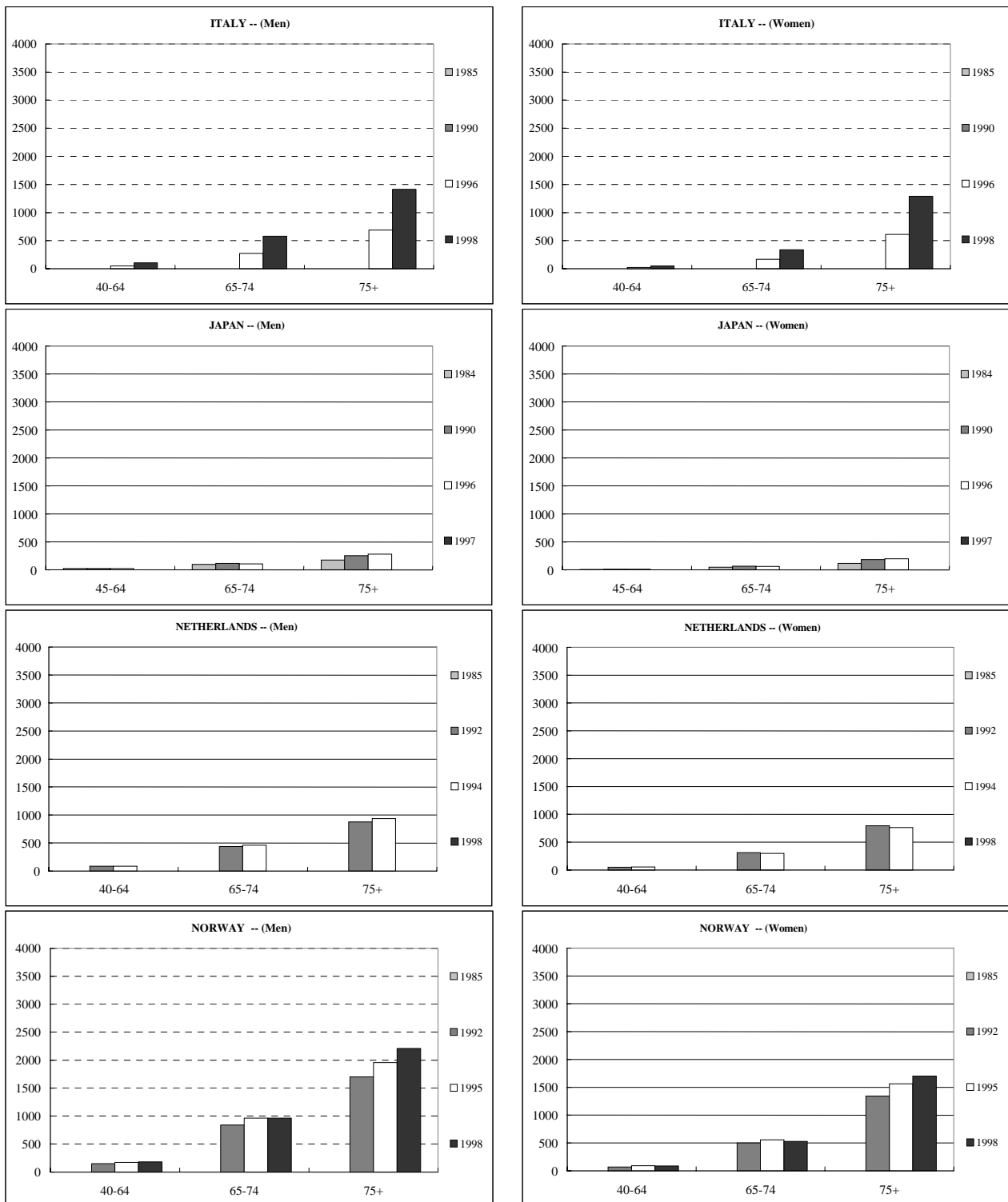


Figure A4.1. (cont.) Ischaemic stroke hospitalisation

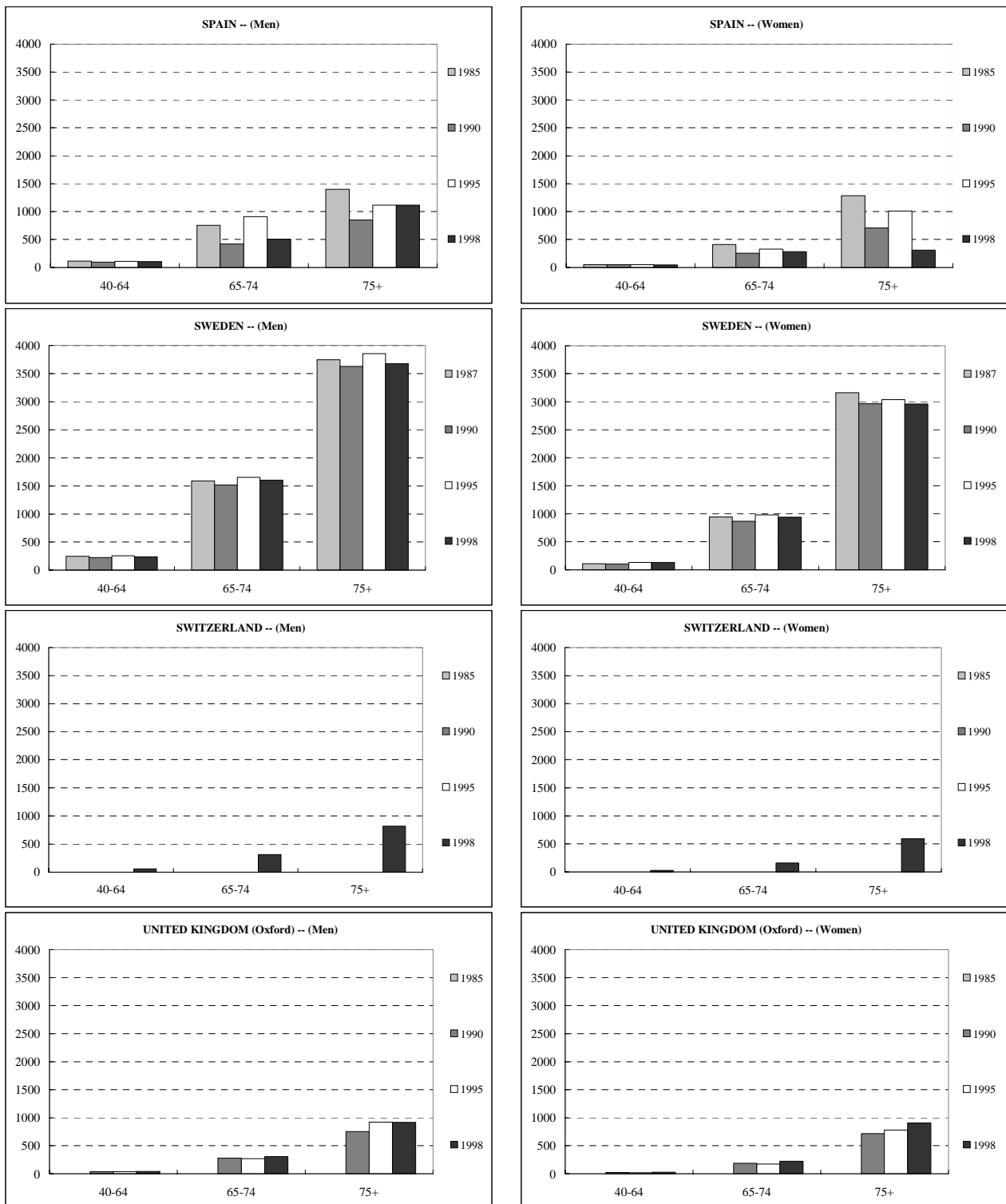


Figure A4.1. (cont.) Ischaemic stroke hospitalisation

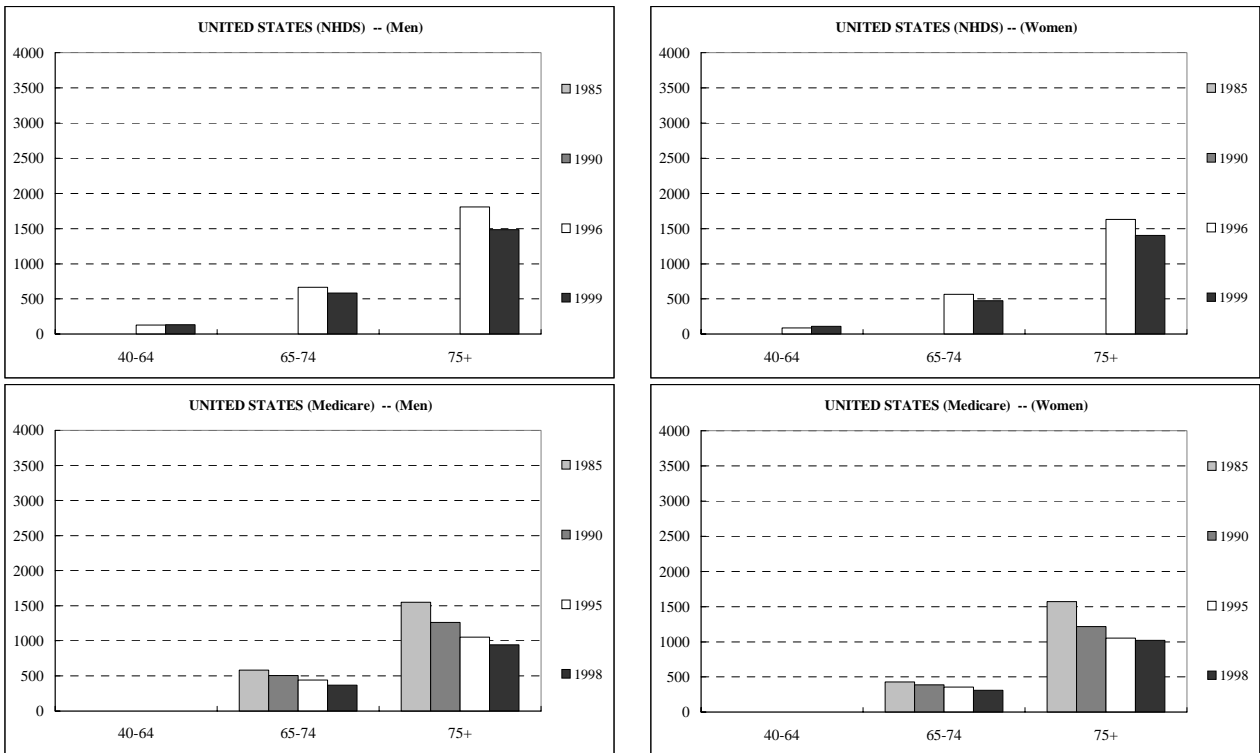


Figure A4.2. TIA hospitalisations
Per 100 000 population aged 40 and over

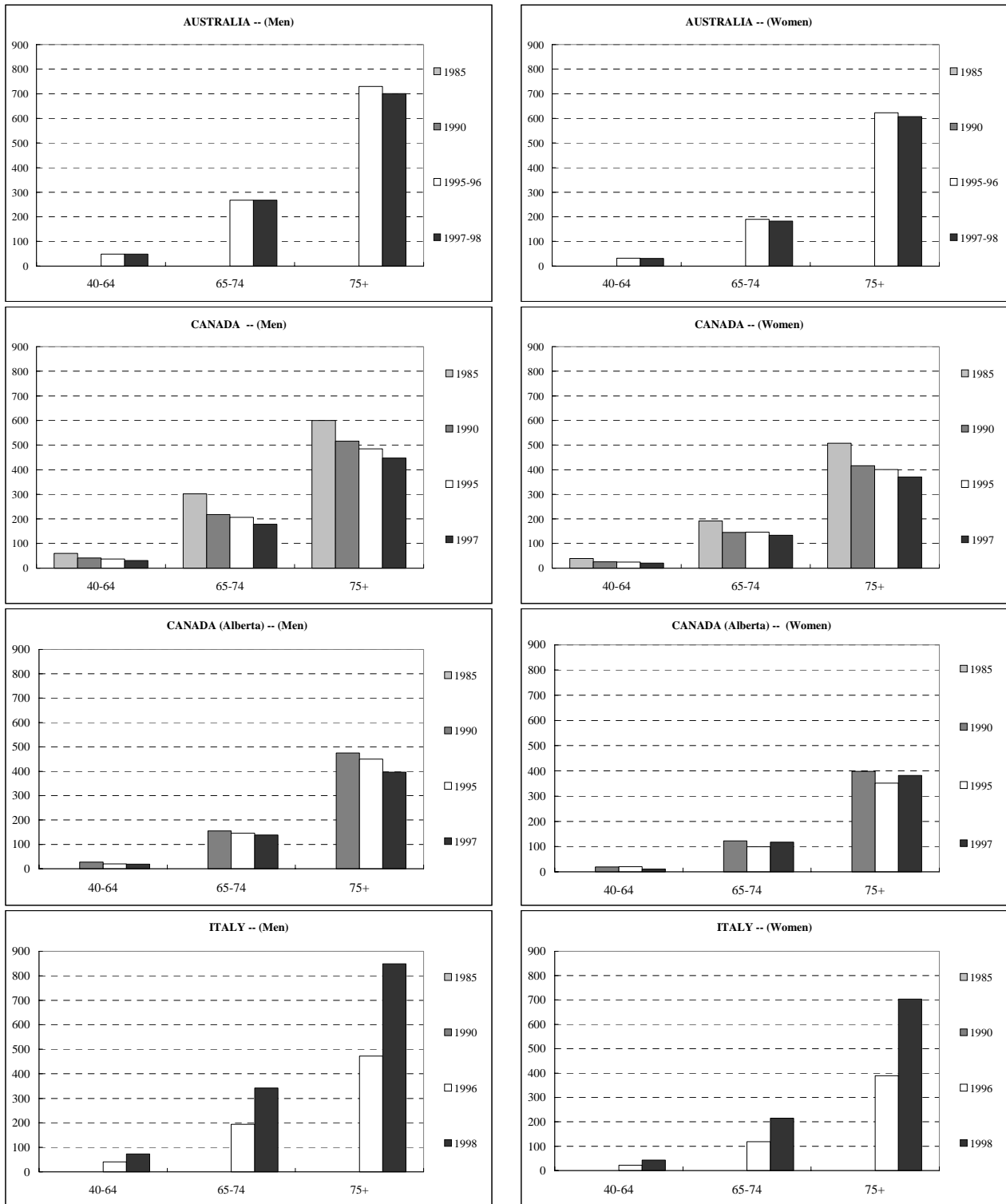


Figure A4.2. (cont.) TIA hospitalisations rate
Per 100 000 population aged 40 and over

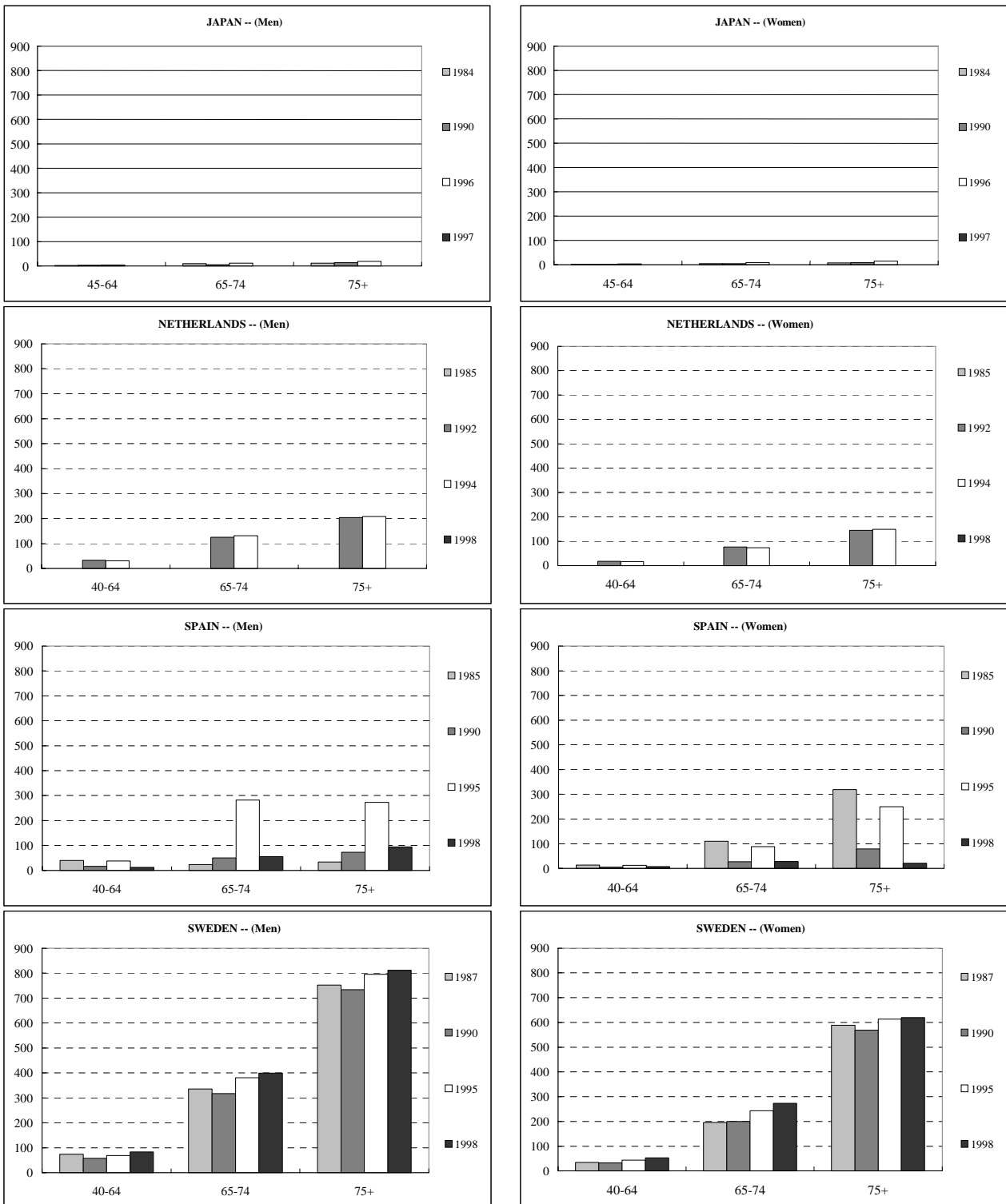


Figure A4.2. (cont.) TIA hospitalisations rate
Per 100 000 population aged 40 and over

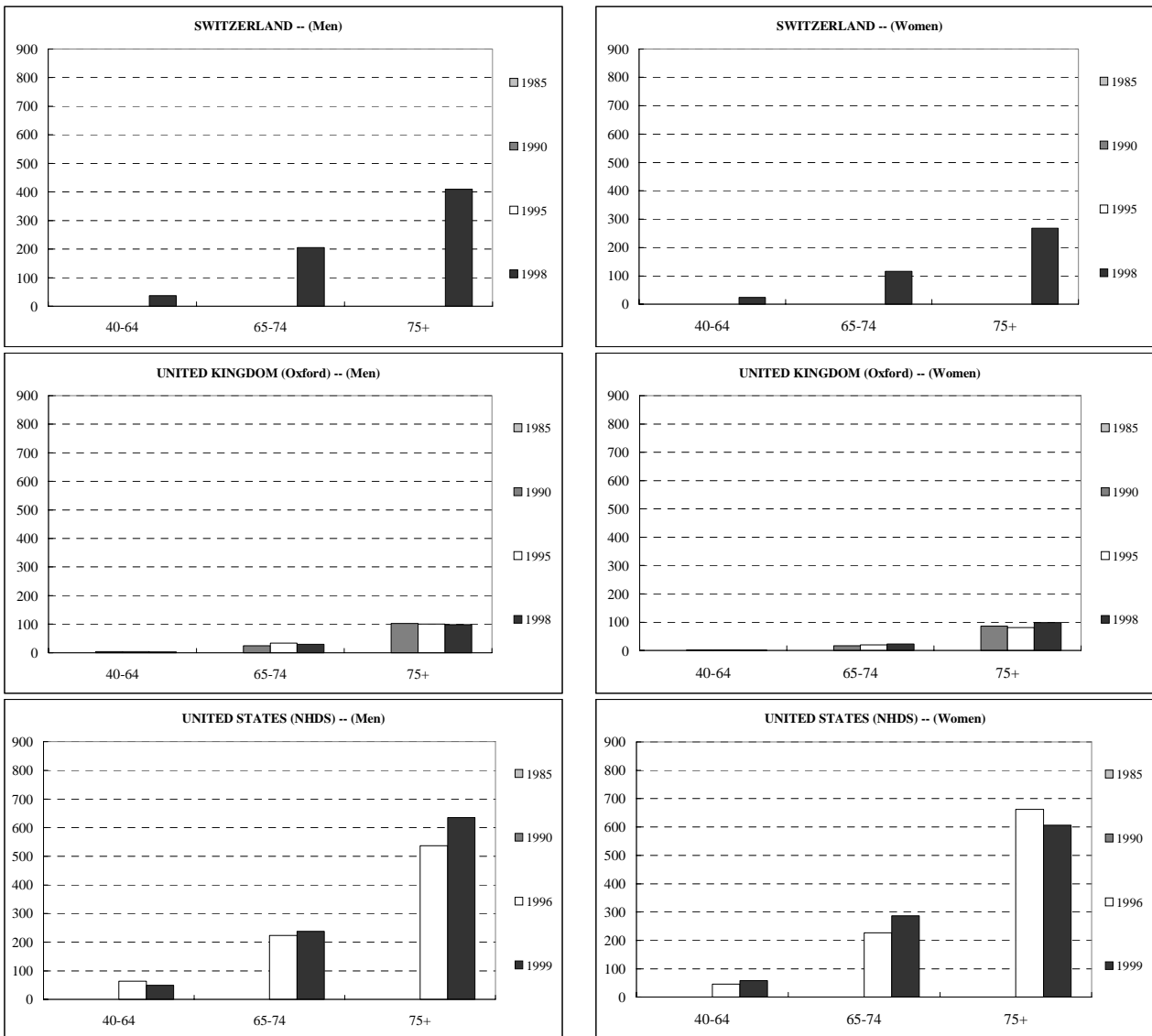


Figure A4.3. Use of CT scans for ischaemic stroke patients- unlinked data

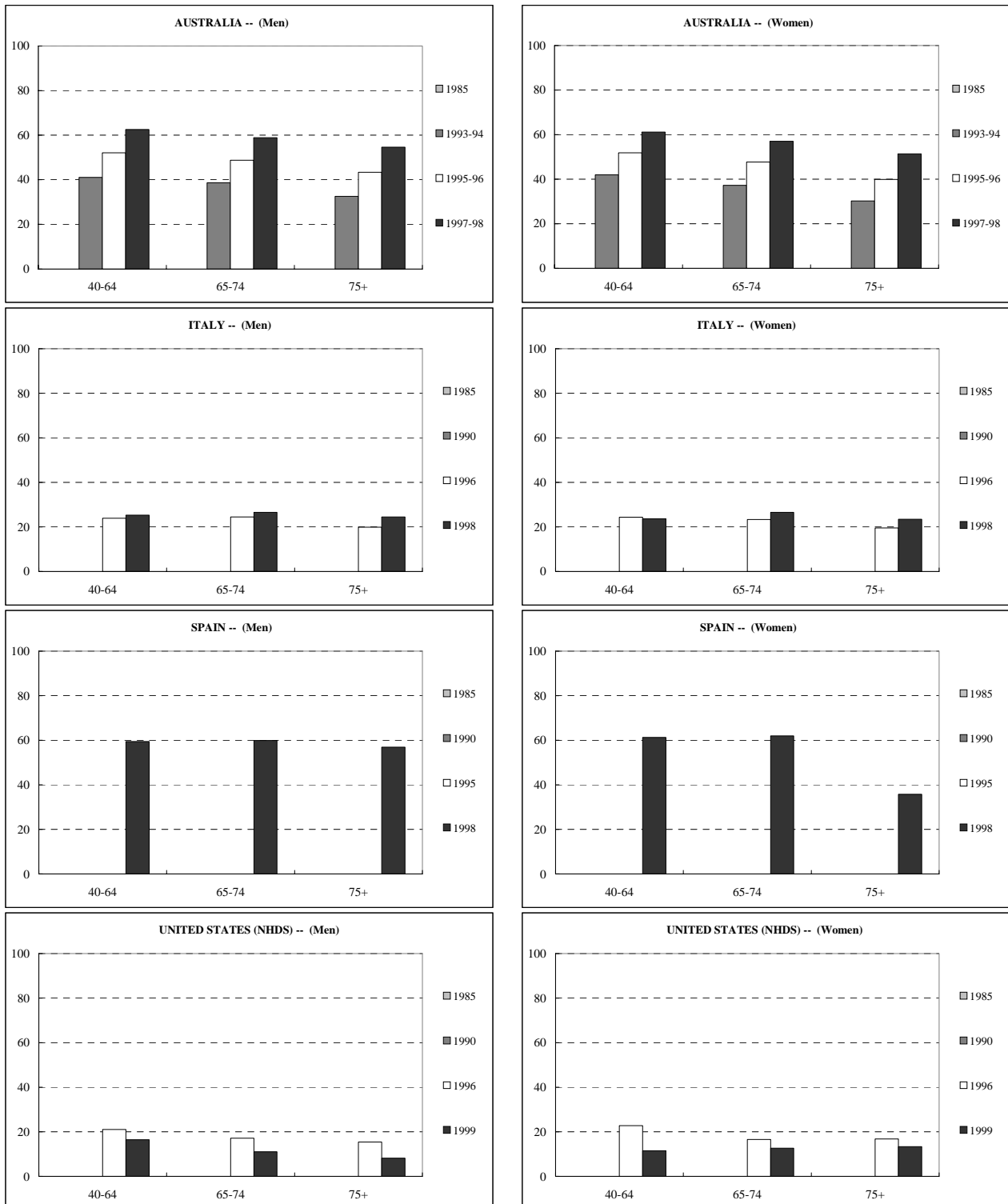


Figure A4.4. Use of CT scans for TIA patients- unlinked data

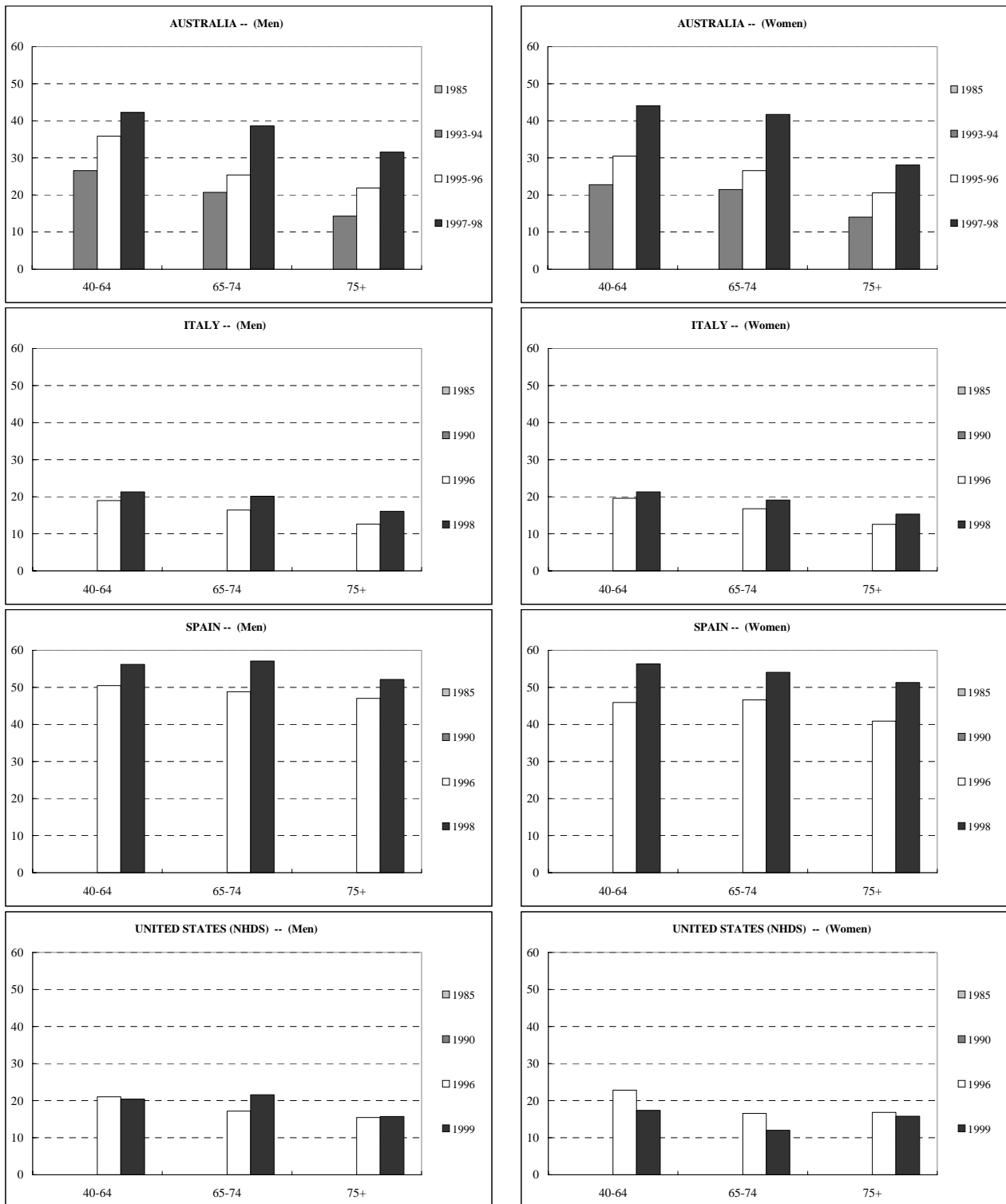


Figure A4.5. Use of MRI/MRA for ischaemic stroke patients- unlinked data
As a percentage of ischaemic stroke admissions

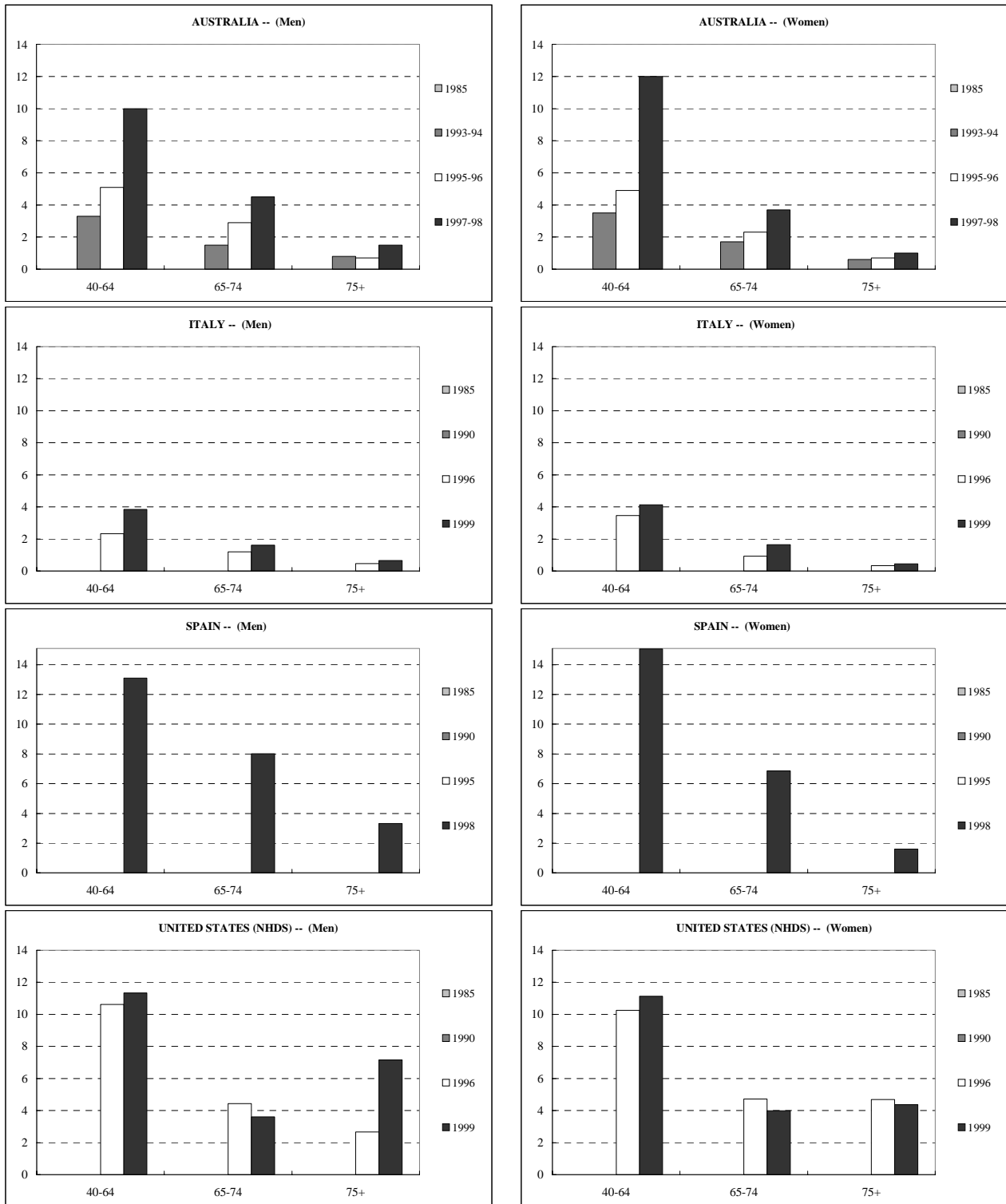


Figure A4.5. (cont.) Use of MRI/MRA for ischaemic stroke patients- unlinked data
As a percentage of ischaemic stroke admissions, different scales

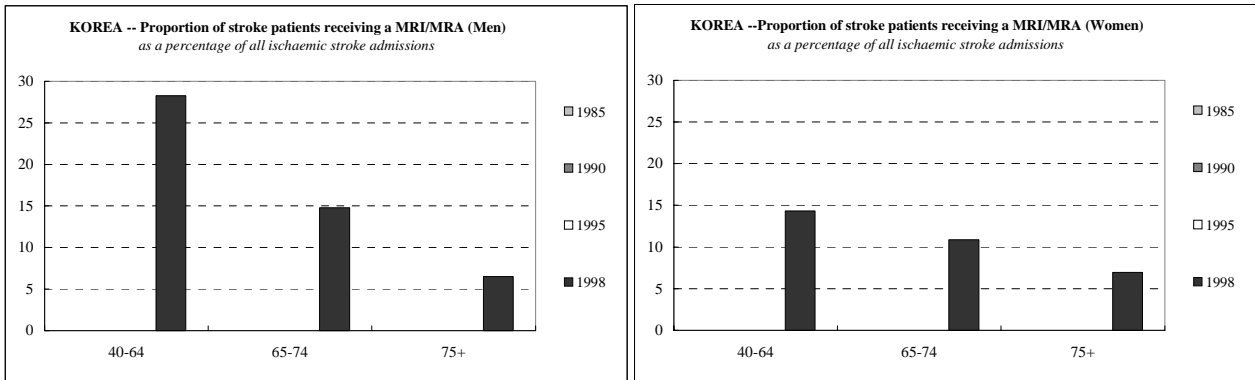


Figure A4.6. Use of MRI/MRA for TIA patients- unlinked data

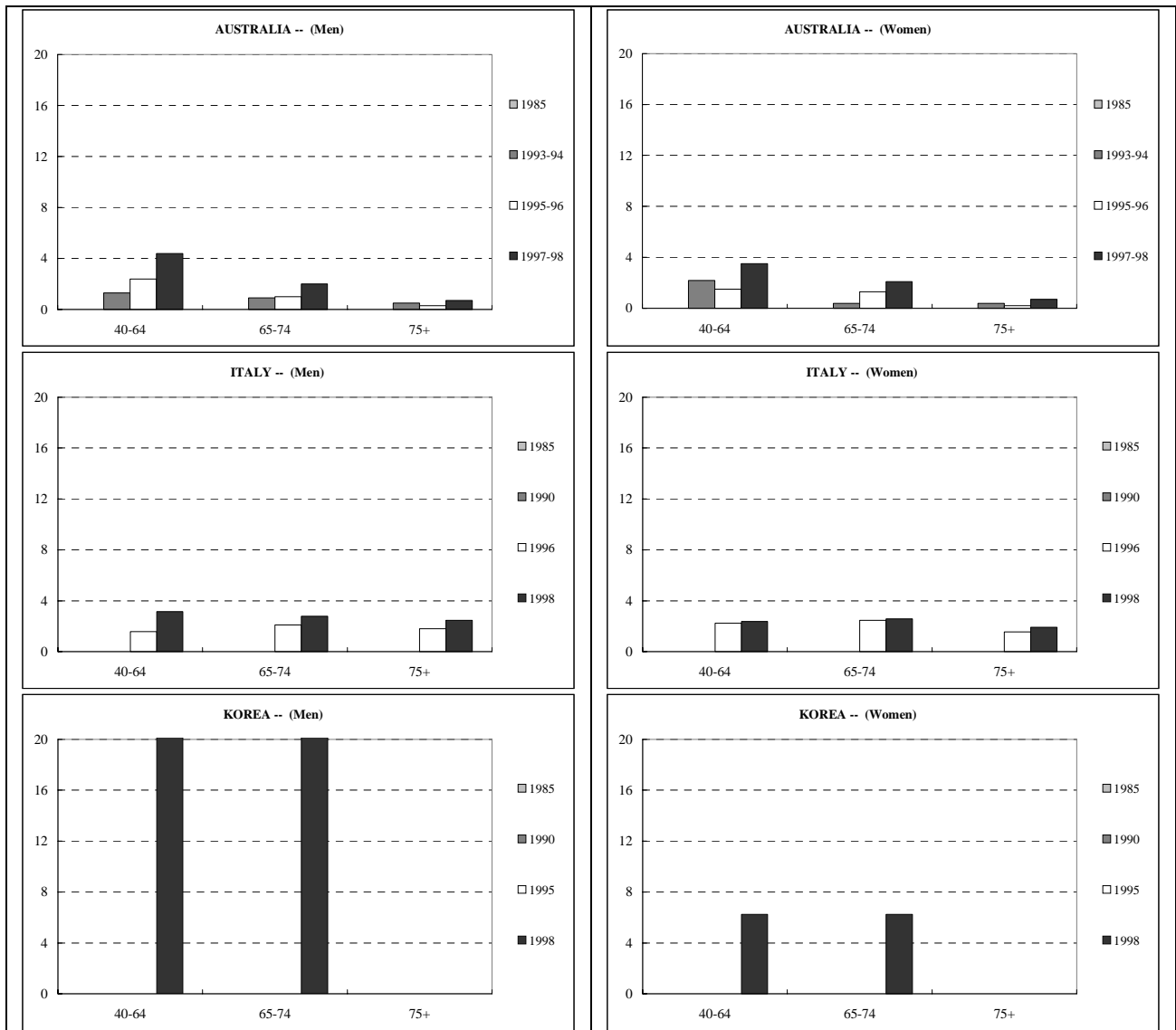


Figure A4.6. (cont.) Use of MRI/MRA for TIA patients- unlinked data

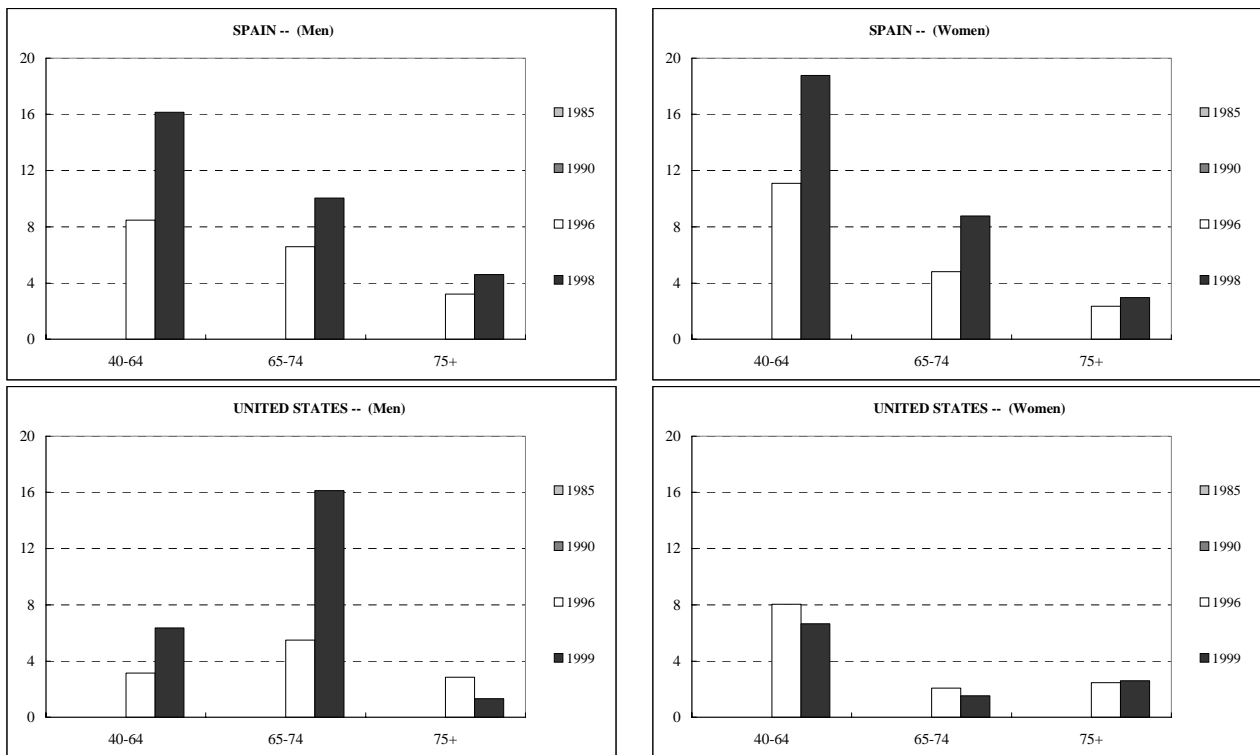


Figure A4.7. Use of CT scans for ischaemic stroke patients- hospital and community data

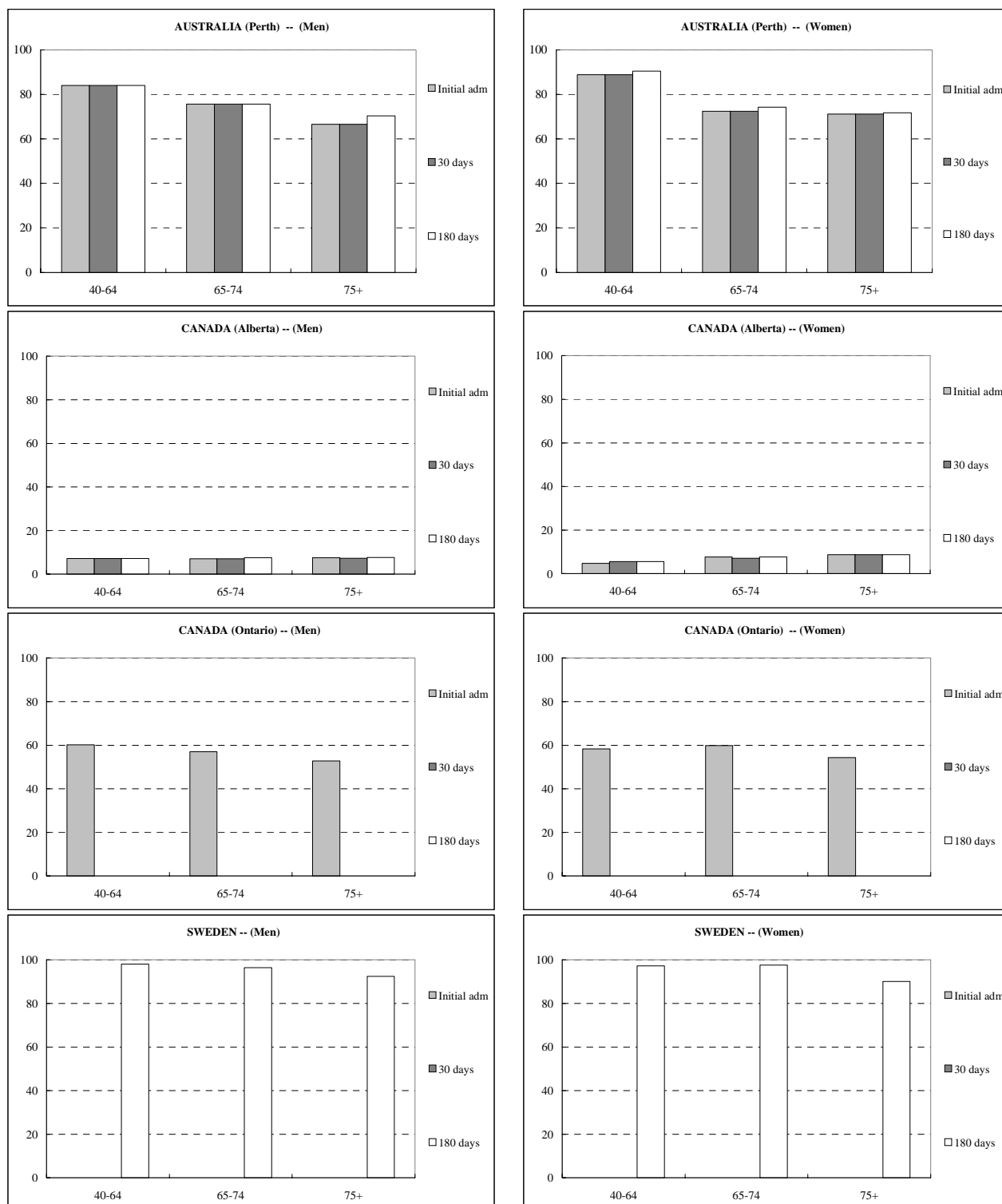
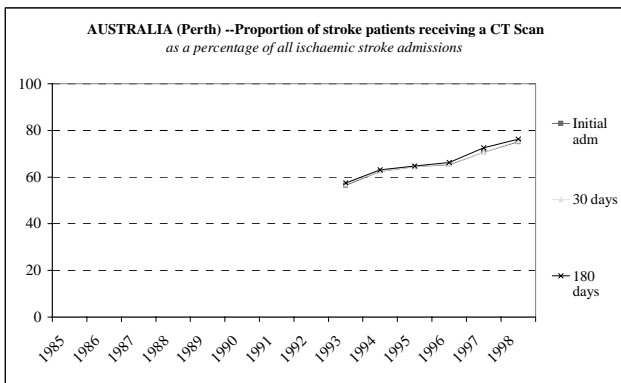


Figure A4.8. Trends in the use of CT scans for ischaemic stroke patients- hospital and community data



Note: computed with the Australian ischaemic admission rates.

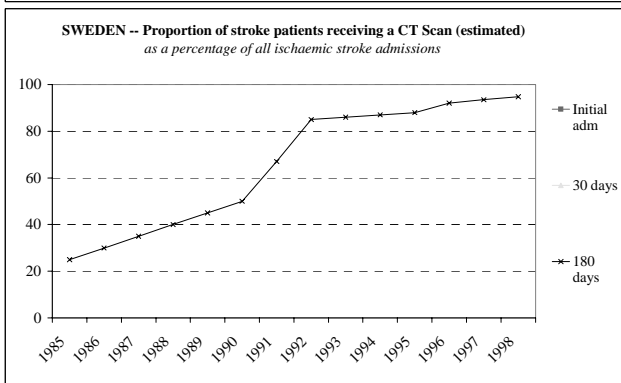
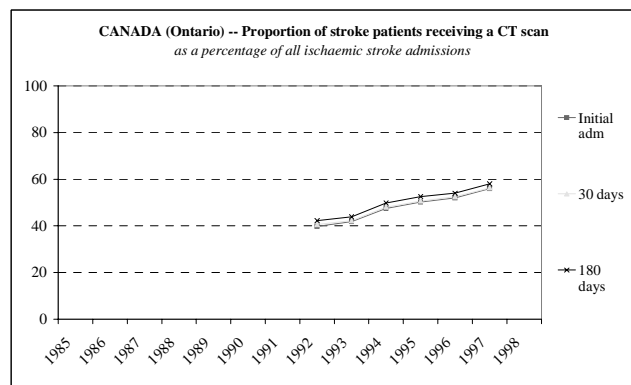
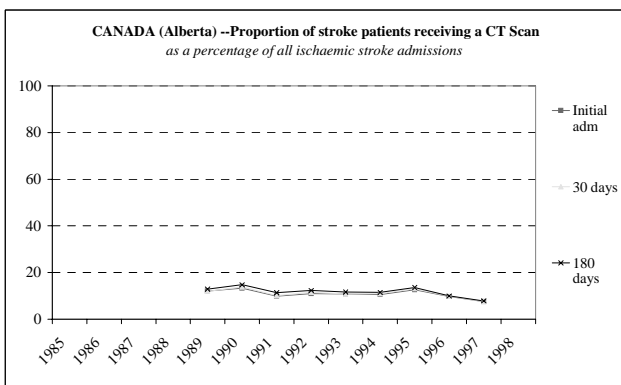


Figure A4.9. Use of CT scans for TIA patients- hospital and community data

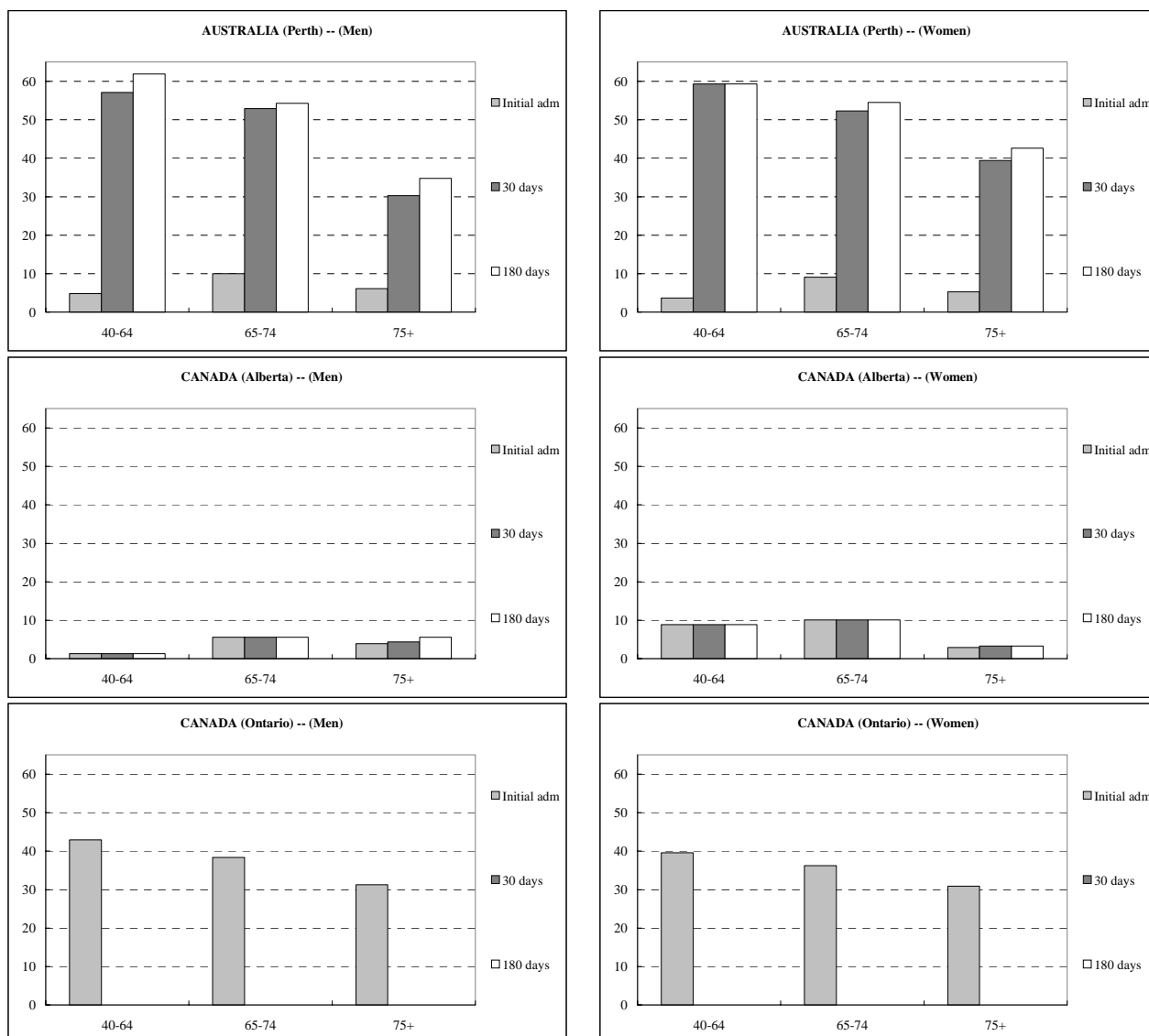
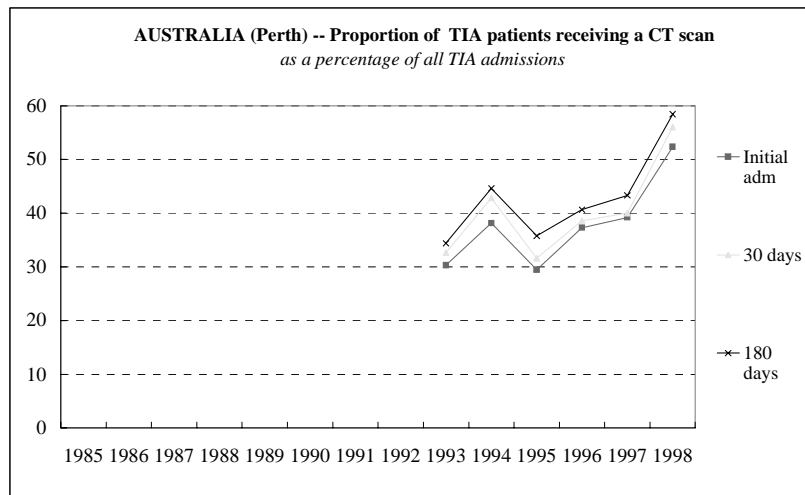


Figure A4.10. Trends in the use of CT scans for TIA patients- hospital and community data



Note: computed with the Australian TIA admission rates.

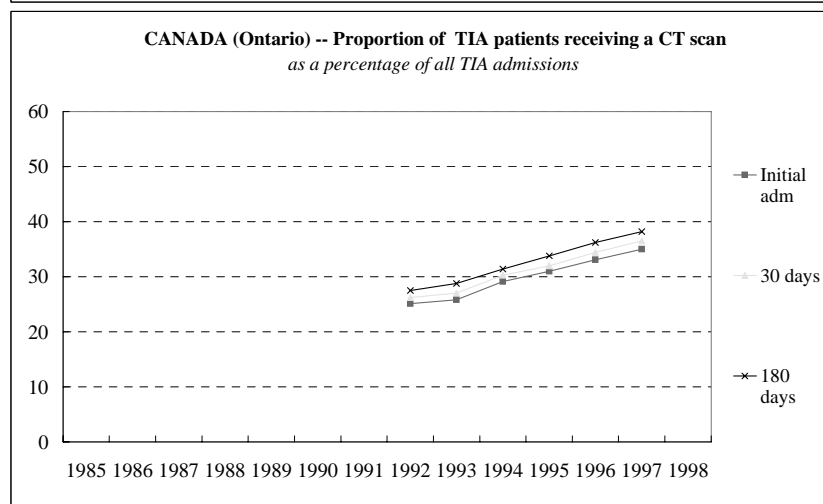
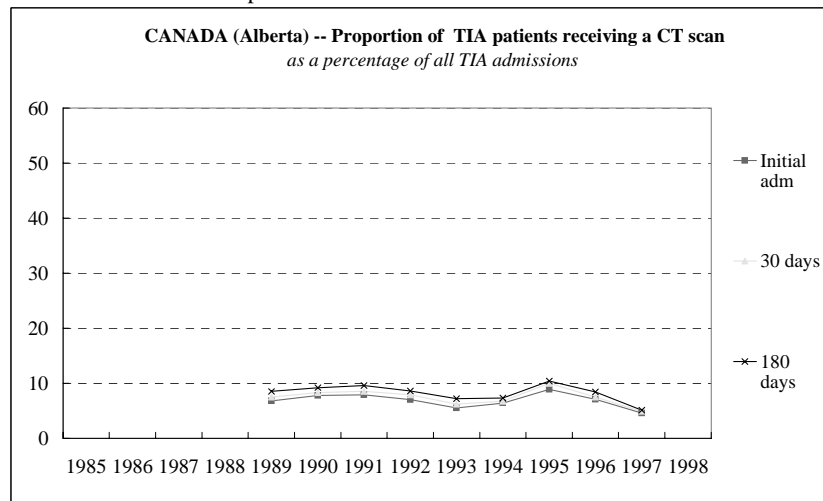


Figure A4.11. Use of MRI/MRA for ischaemic stroke patients- hospital and community data

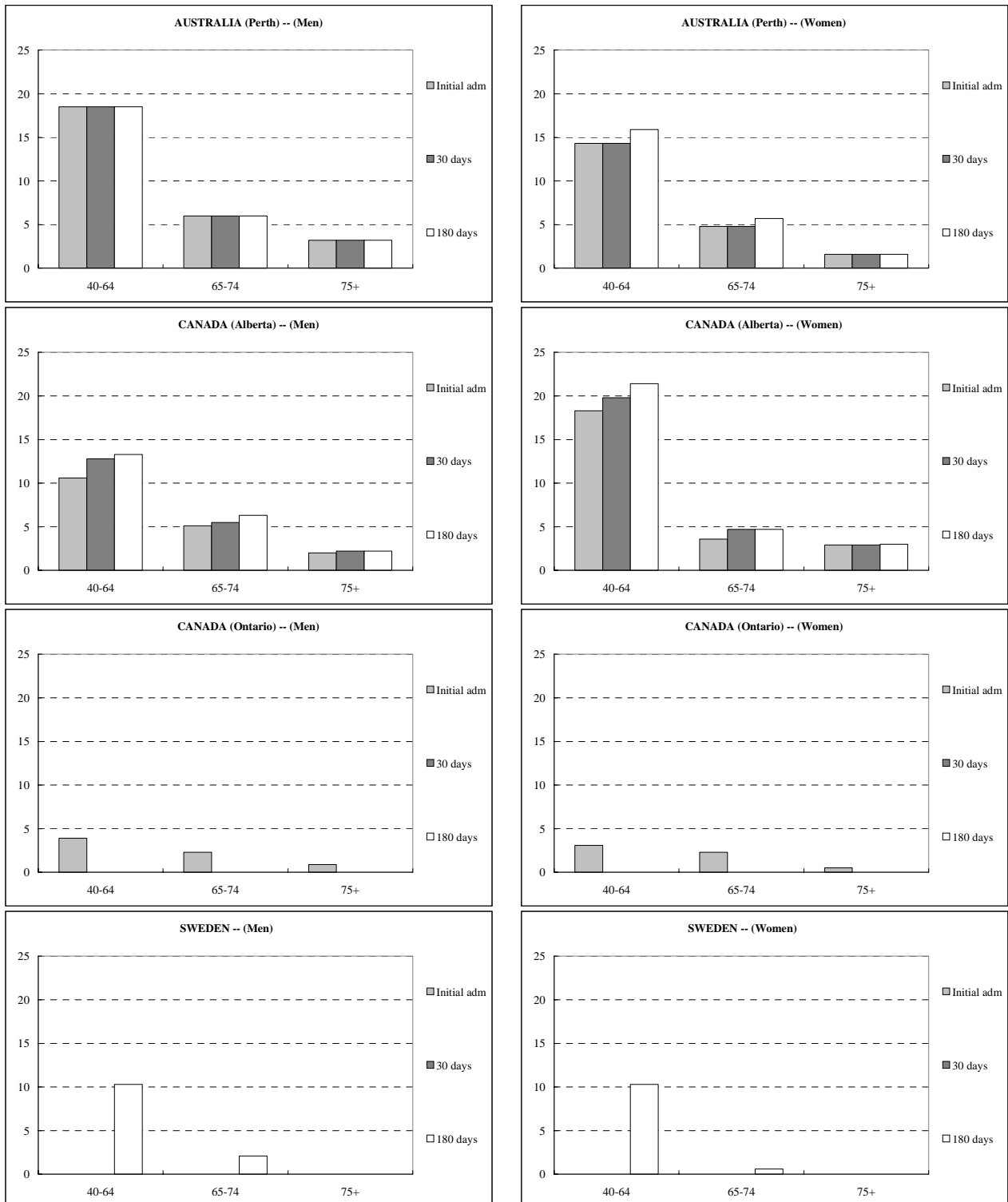
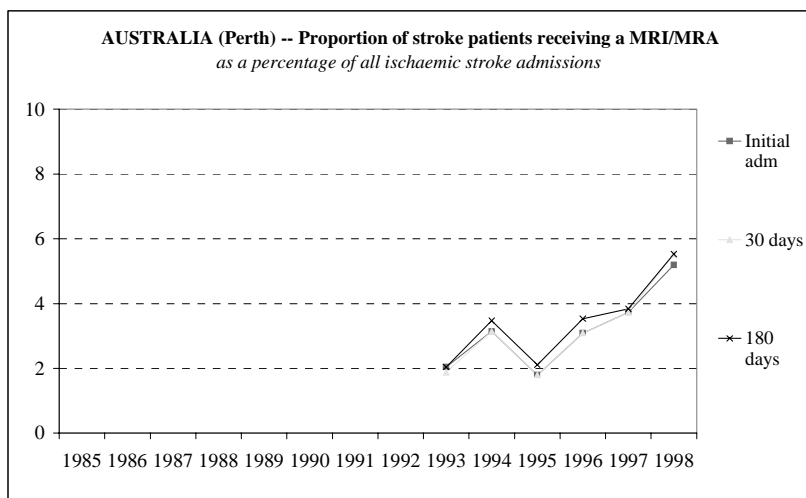


Figure A4.12. Trends in the use of MRI/MRA for ischaemic stroke patients- hospital and community data



Note: computed with the Australian ischaemic admission rates.

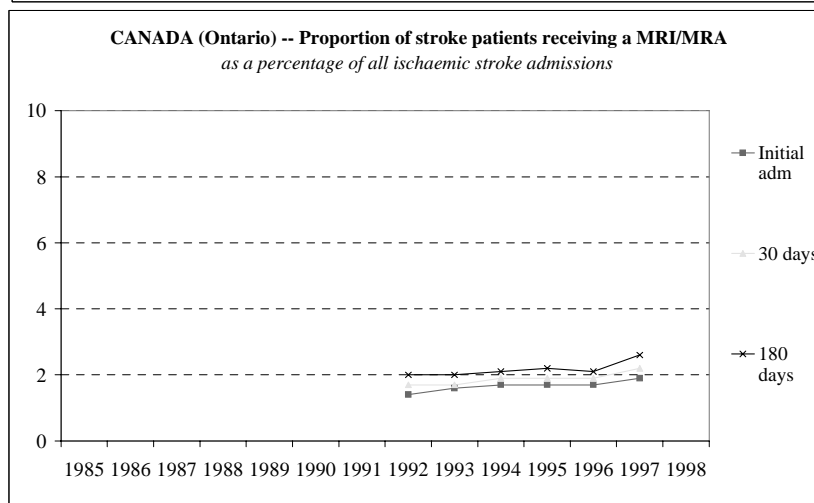
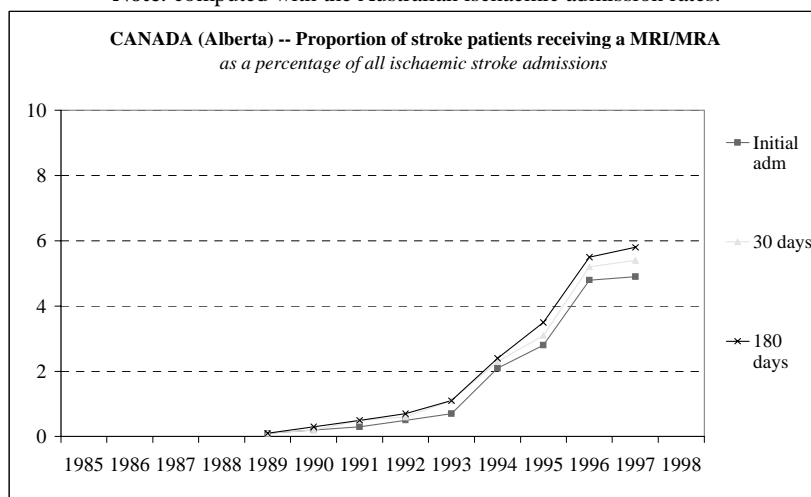
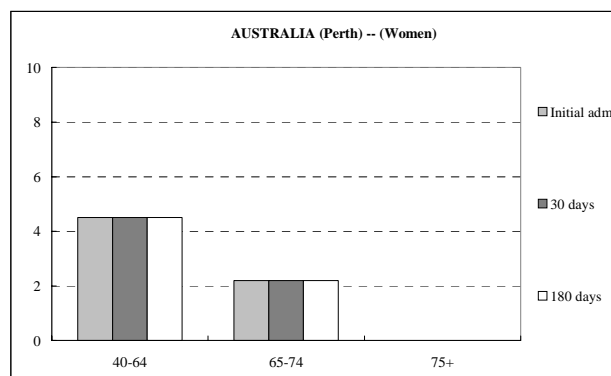
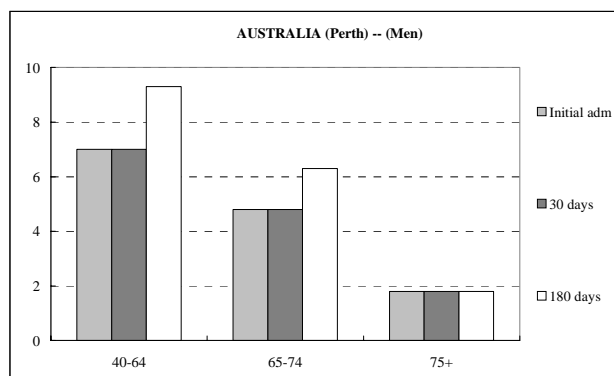


Figure A4.13. Use of MRI/MRA for TIA patients- hospital and community data (1997)
 As a percentage of TIA admissions



Note: 1996 data.

Note: 1996 data.

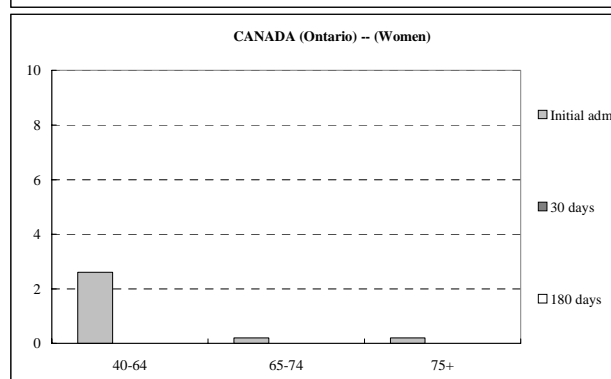
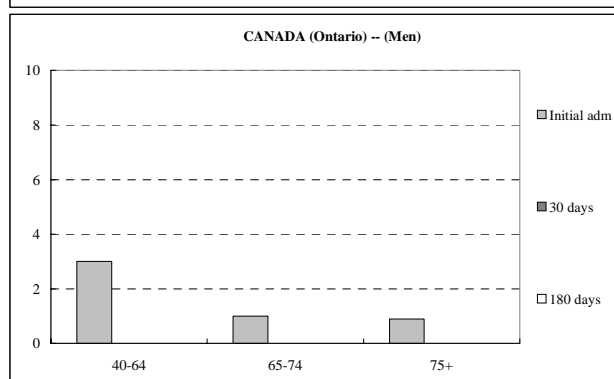
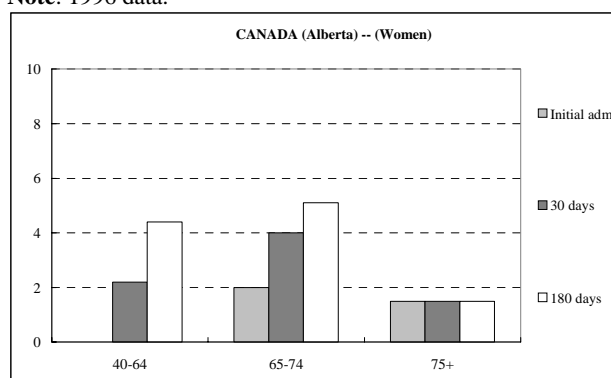
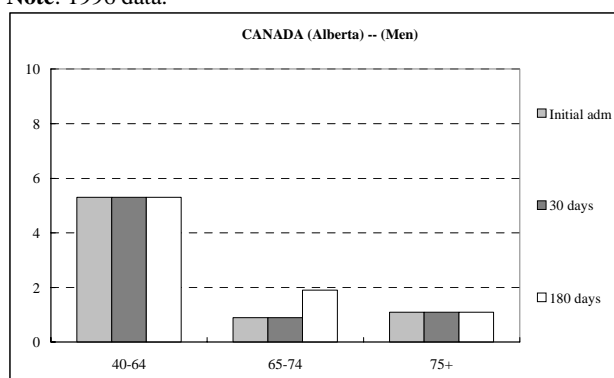
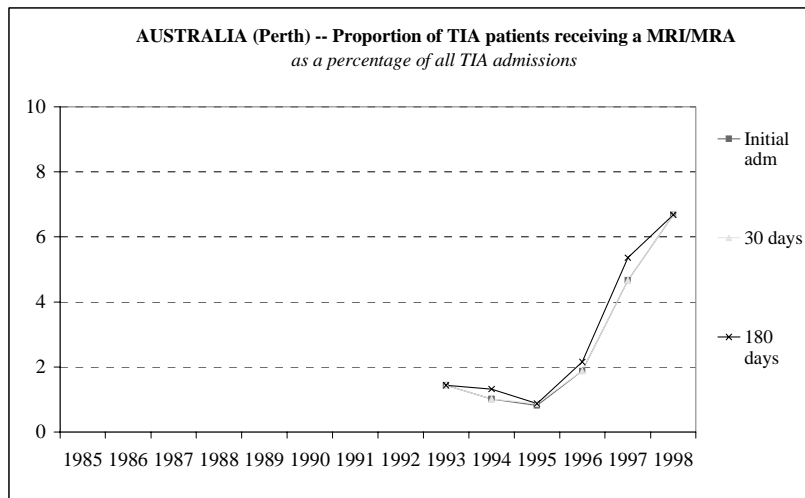


Figure A4.14. Trends in the use of MRI/MRA for TIA patients- hospital and community data



Note: computed with the Australian TIA admission rates.

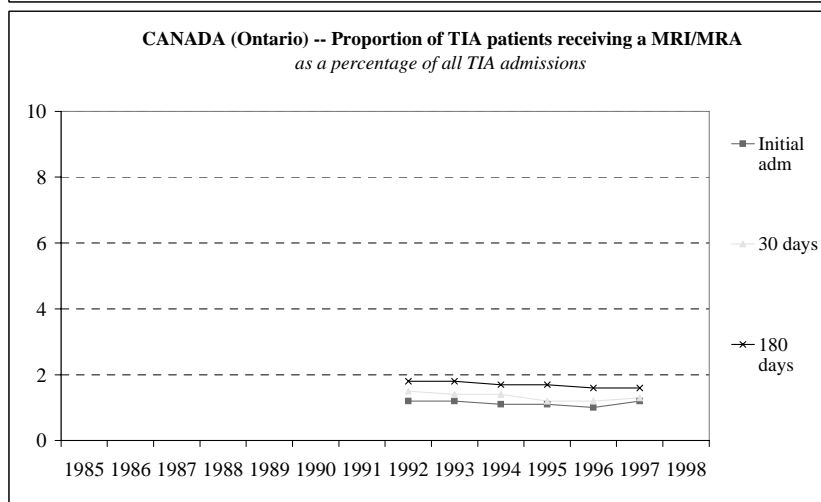
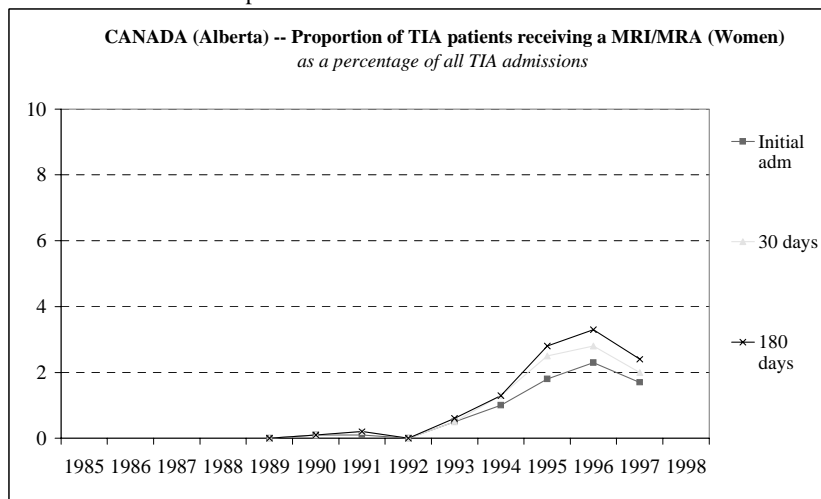


Figure A4.15. Trends in the use of carotid endarterectomy procedures
Per 100 000 population aged 40 and over

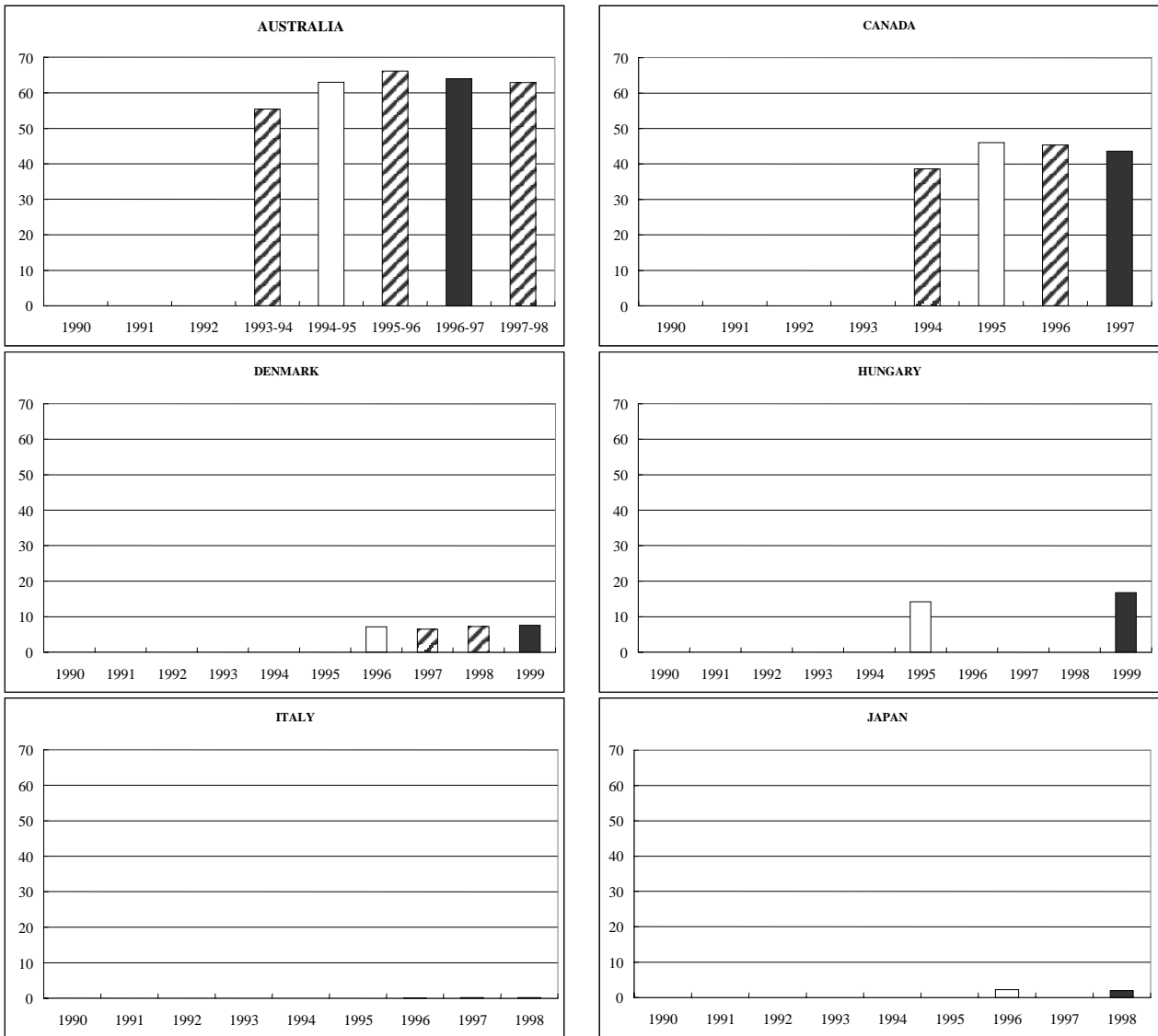


Figure A4.15. (cont.) Trends in the use of carotid endarterectomy procedures
Per 100 000 population aged 40 and over

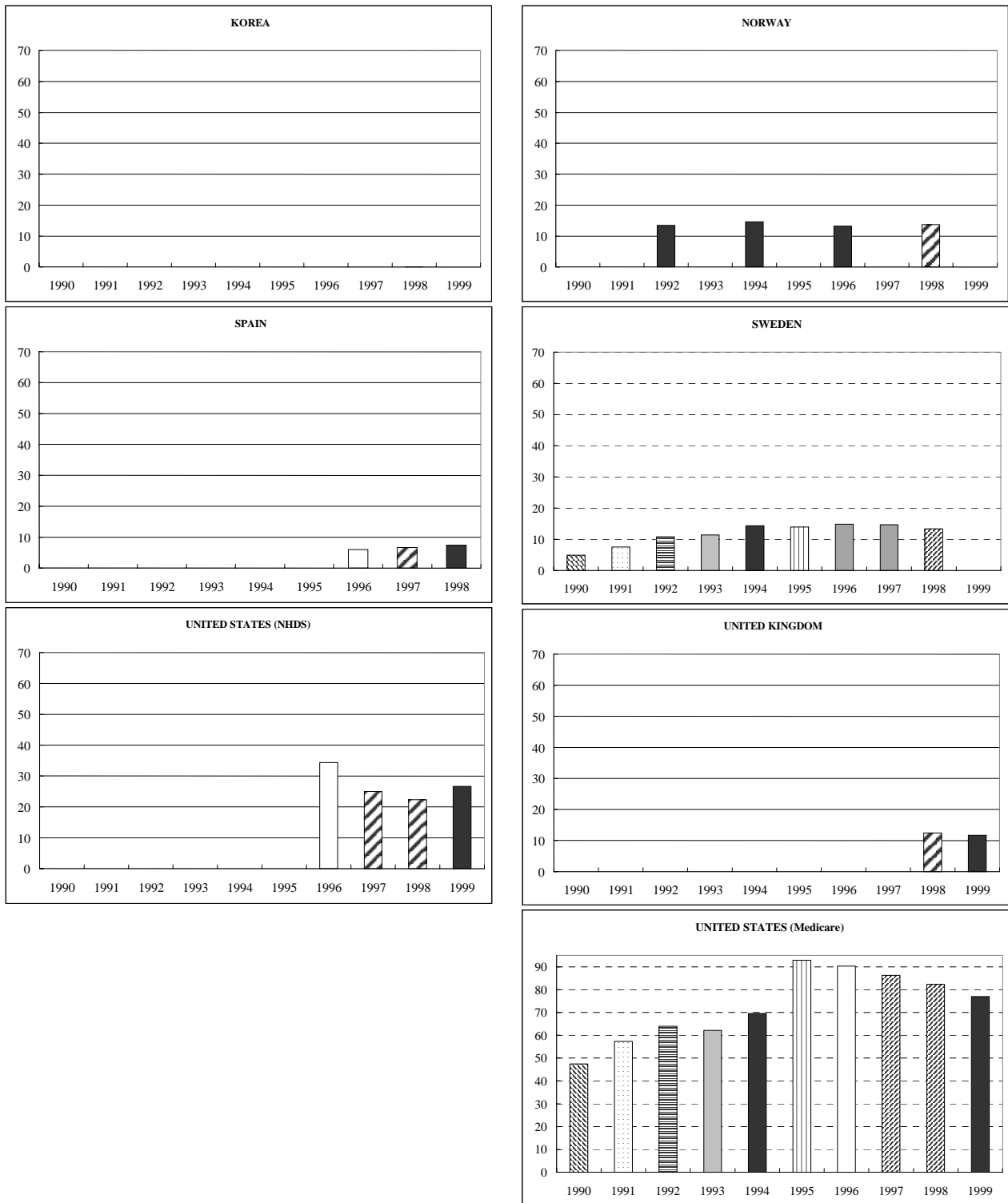


Figure A5.1. 7 day hospital fatality rates
As a percentage of all admissions

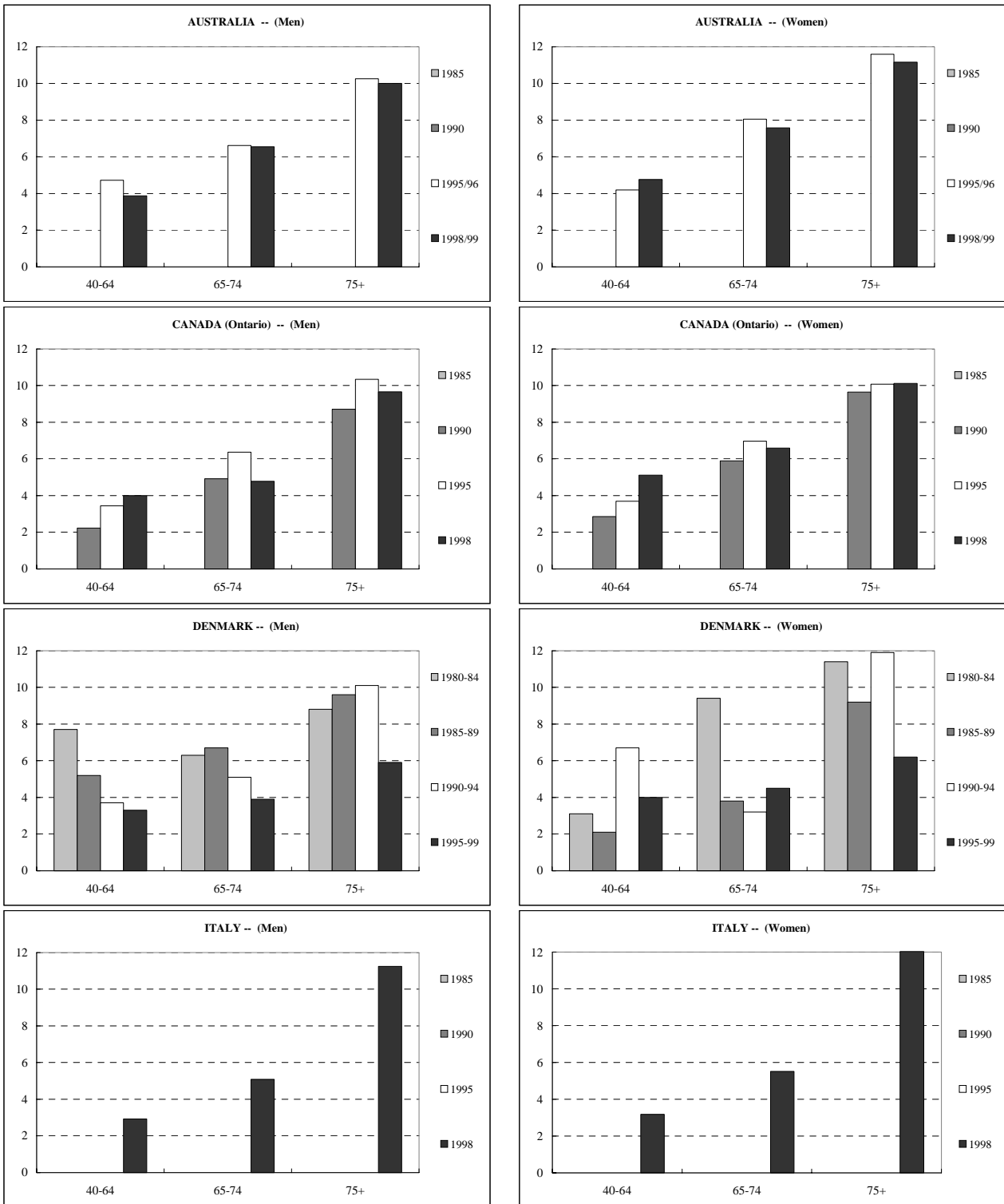


Figure A5.1. (cont.) 7 day hospital fatality rates
As a percentage of all admissions

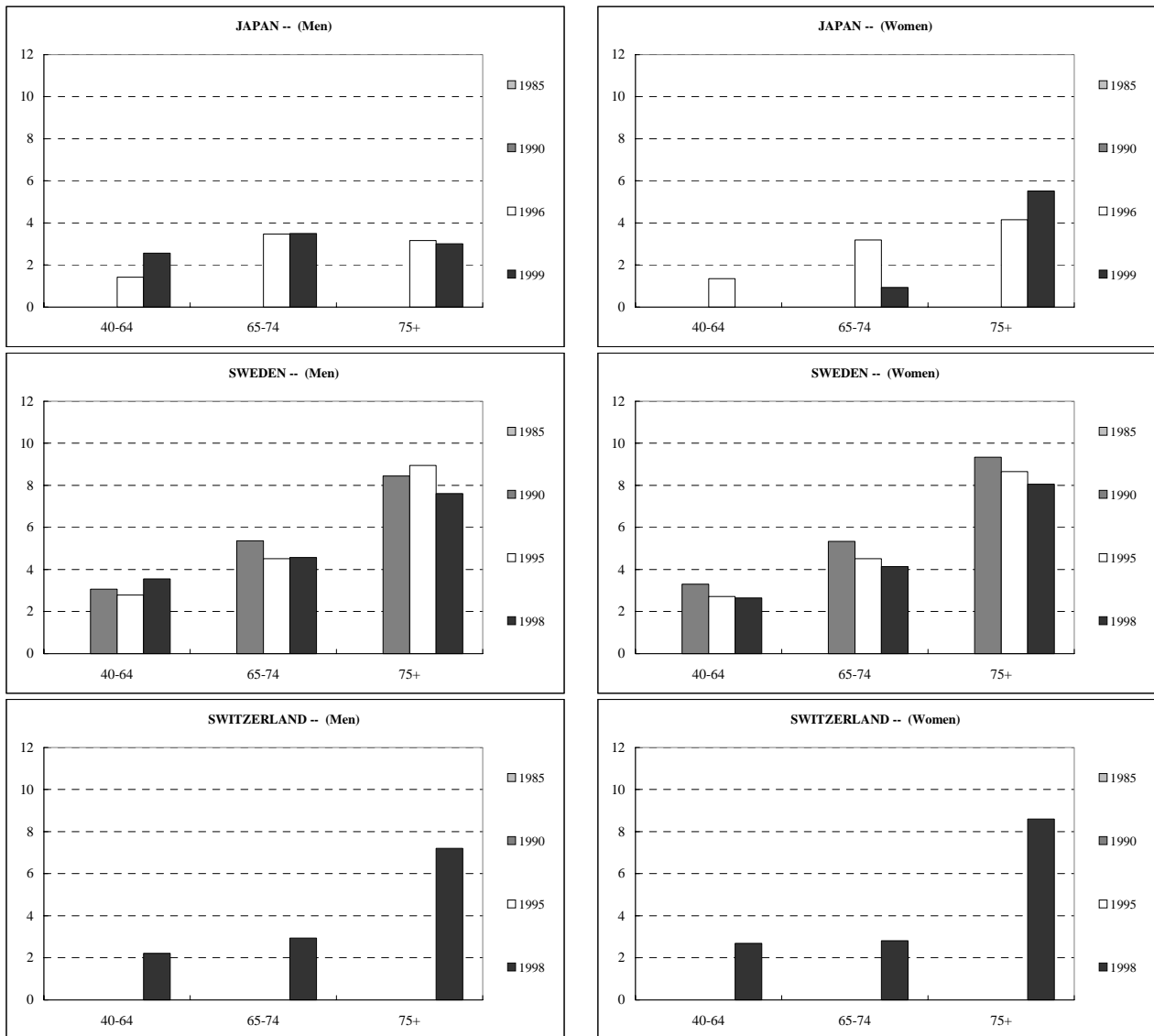


Figure A5.1. (cont.) 7 day hospital fatality rates
As a percentage of all admissions

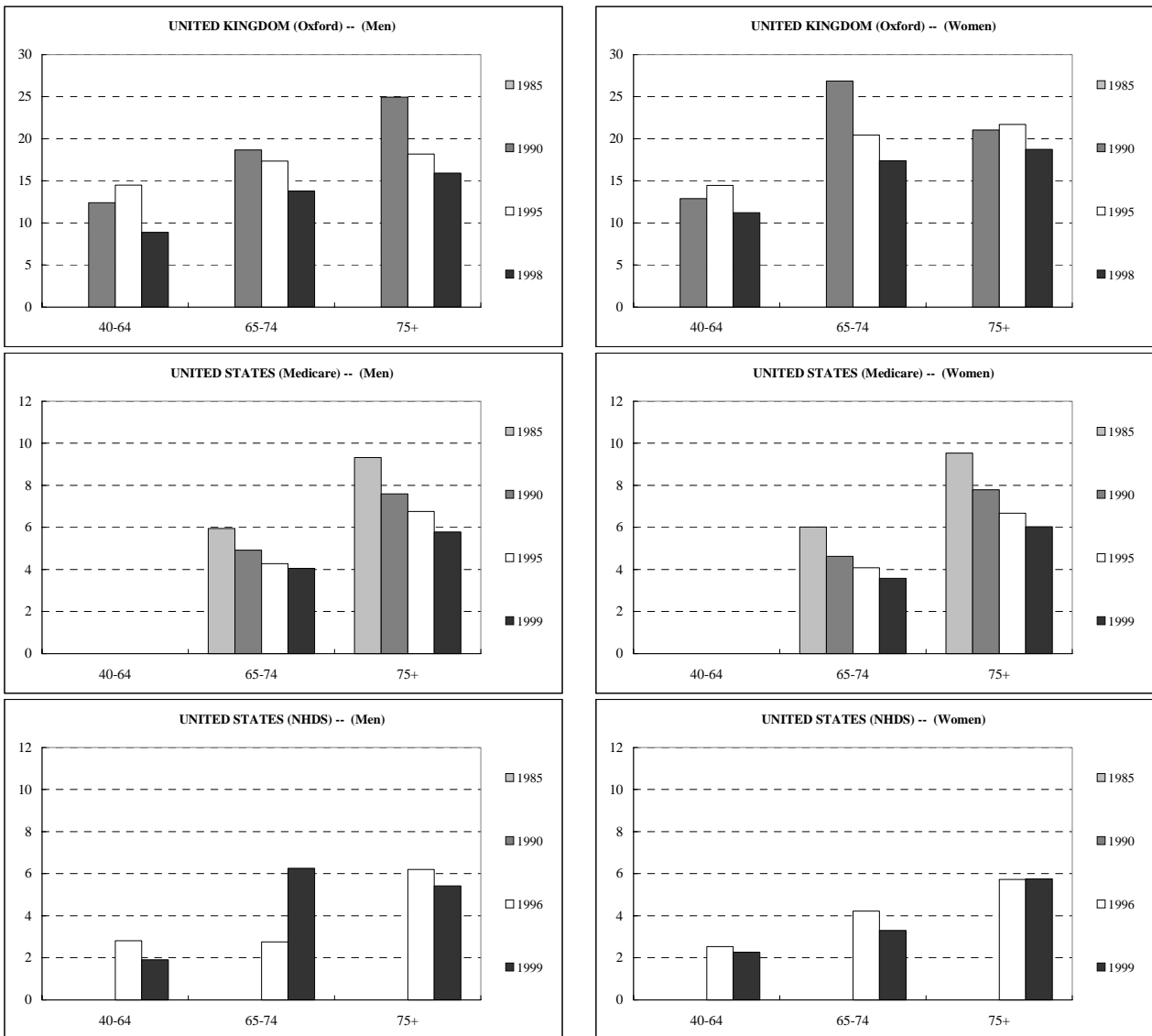


Figure A5.2. 30 day hospital fatality
As a percentage of all admissions

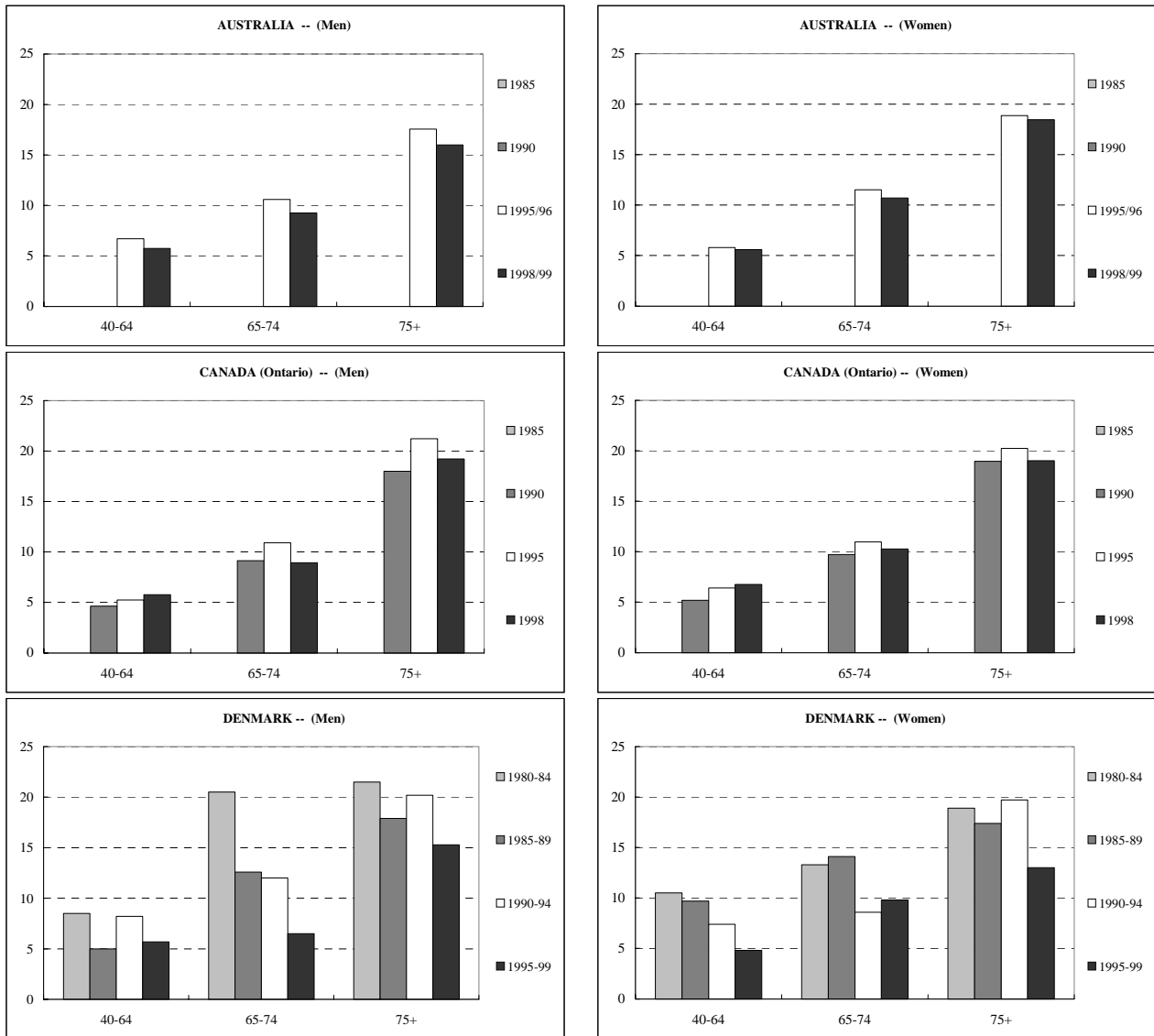


Figure A5.2. (cont.) 30 day hospital fatality
As a percentage of all admissions

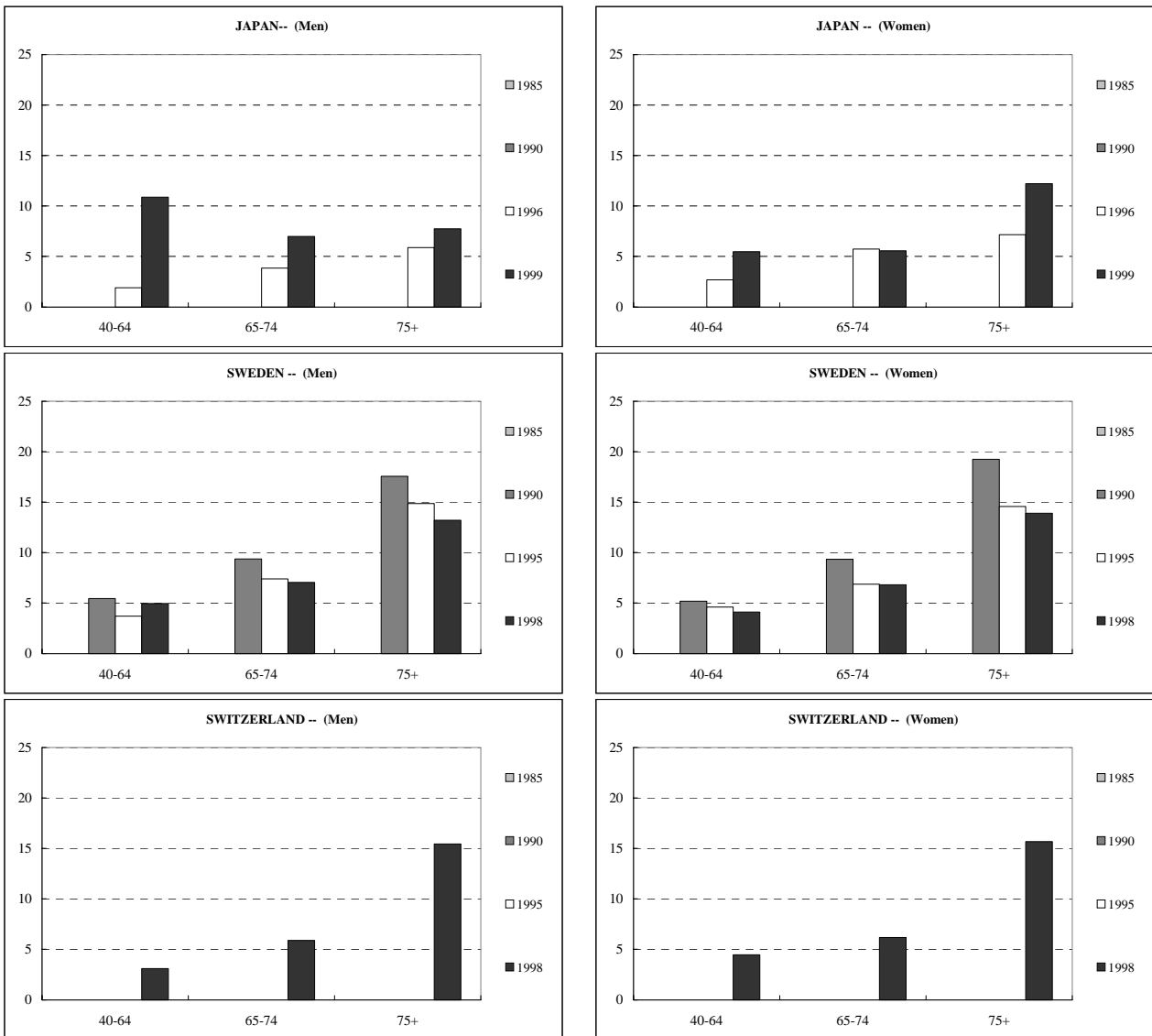


Figure A5.2. (cont.) 30 day hospital fatality
As a percentage of all admissions

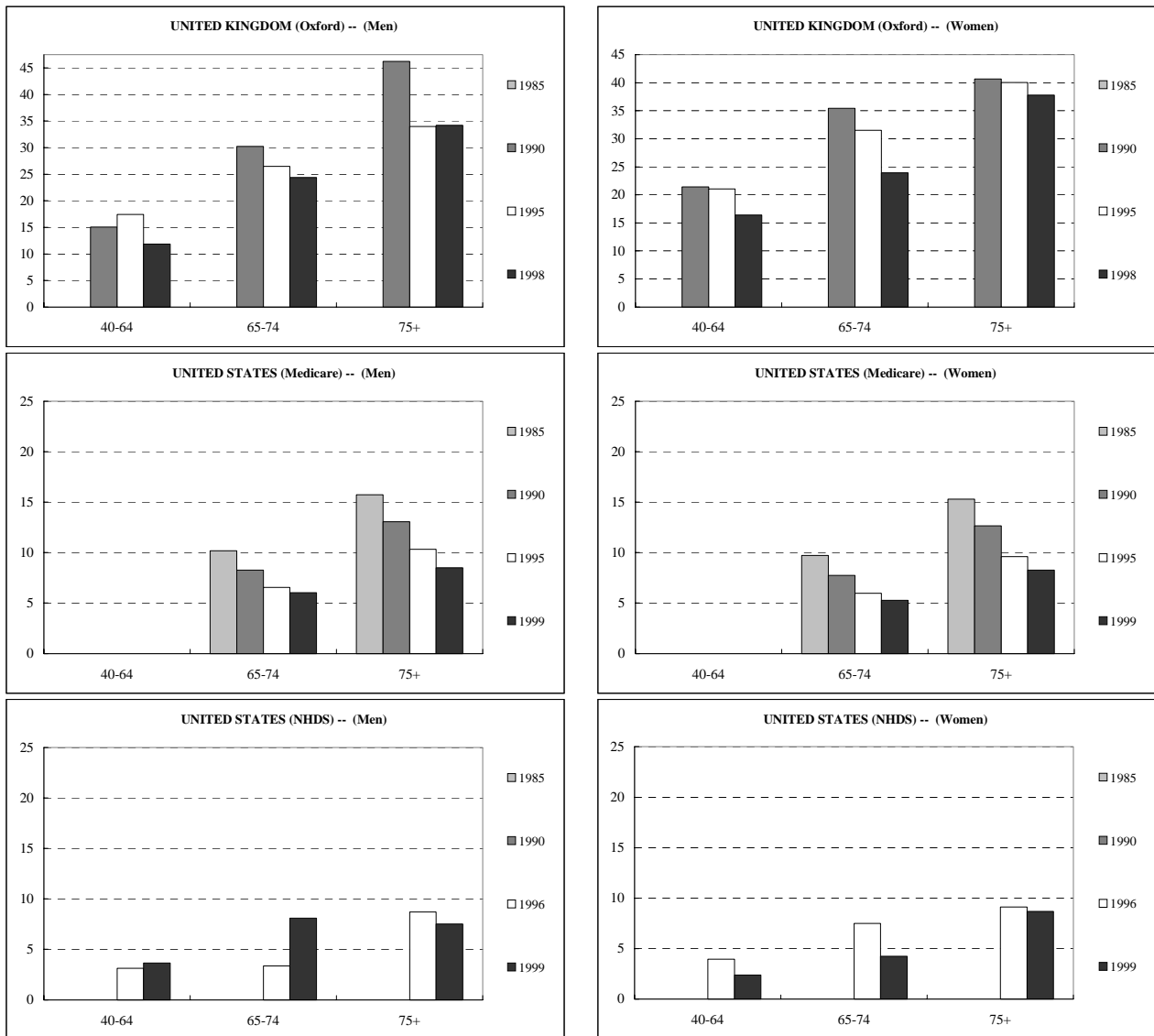


Figure A5.3. 30 day case fatality
As a percentage of all admissions

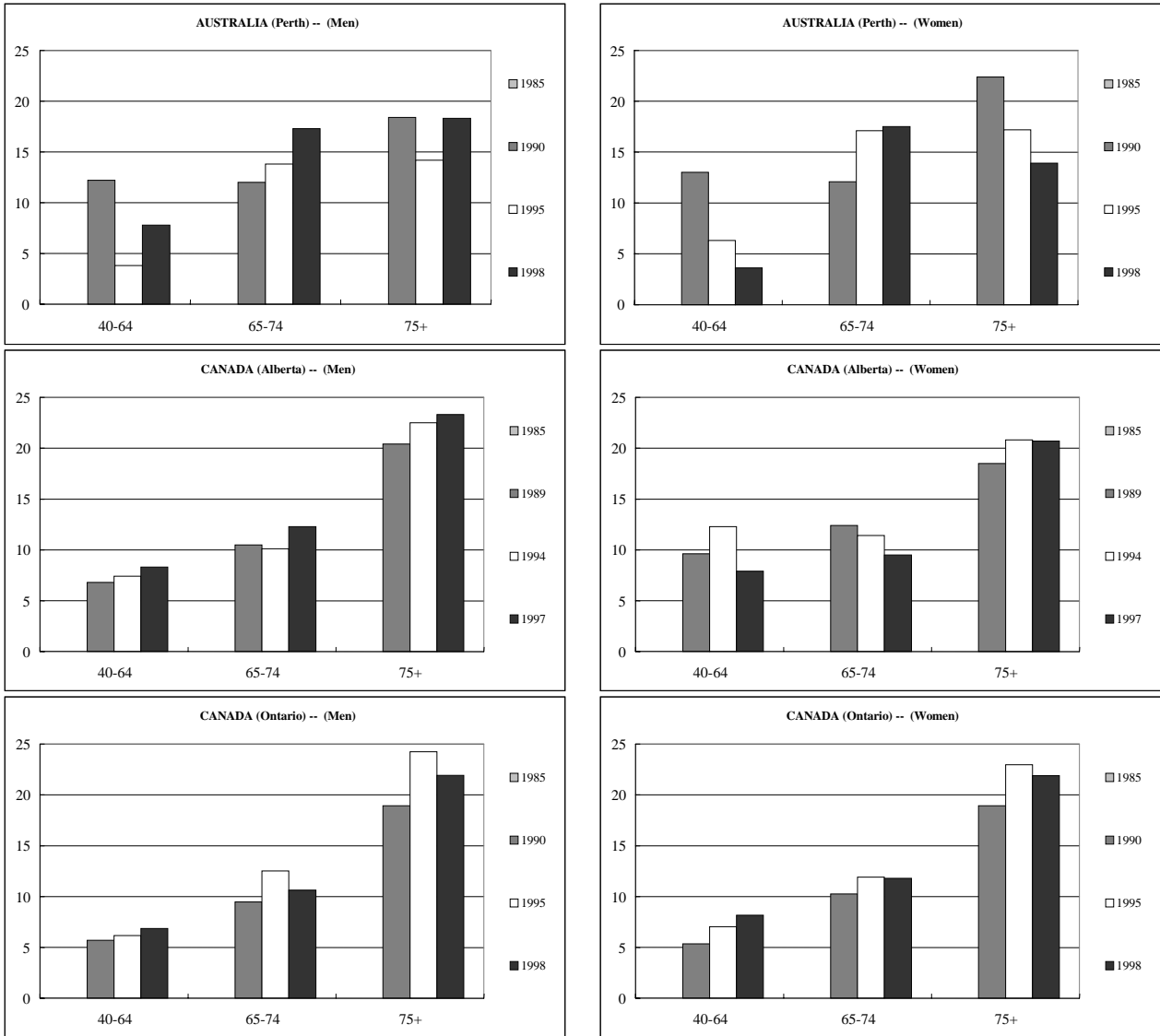


Figure A5.3. (cont.) 30 day case fatality
As a percentage of all admissions

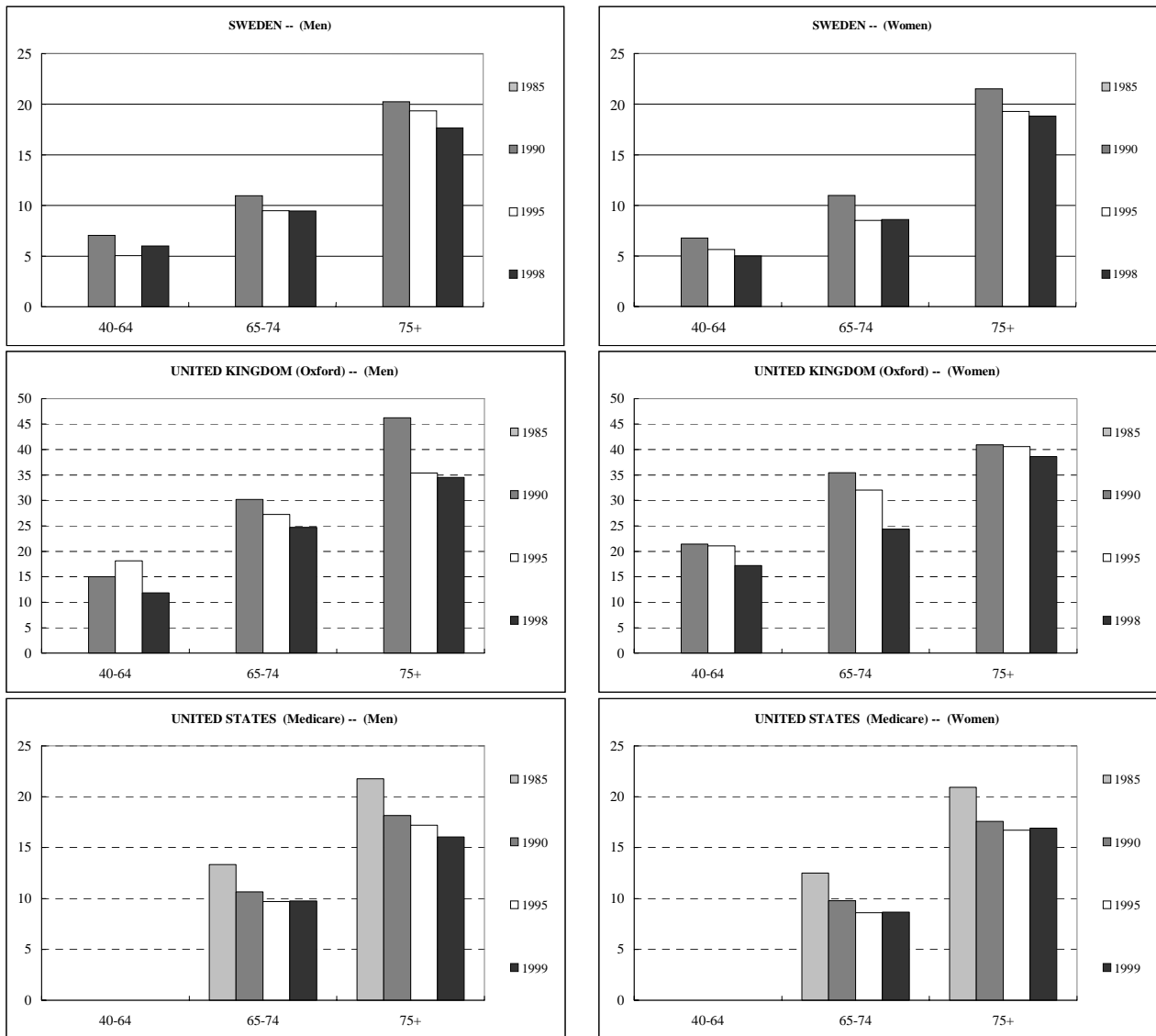


Figure A5.4. One year case fatality
As a percentage of all admissions

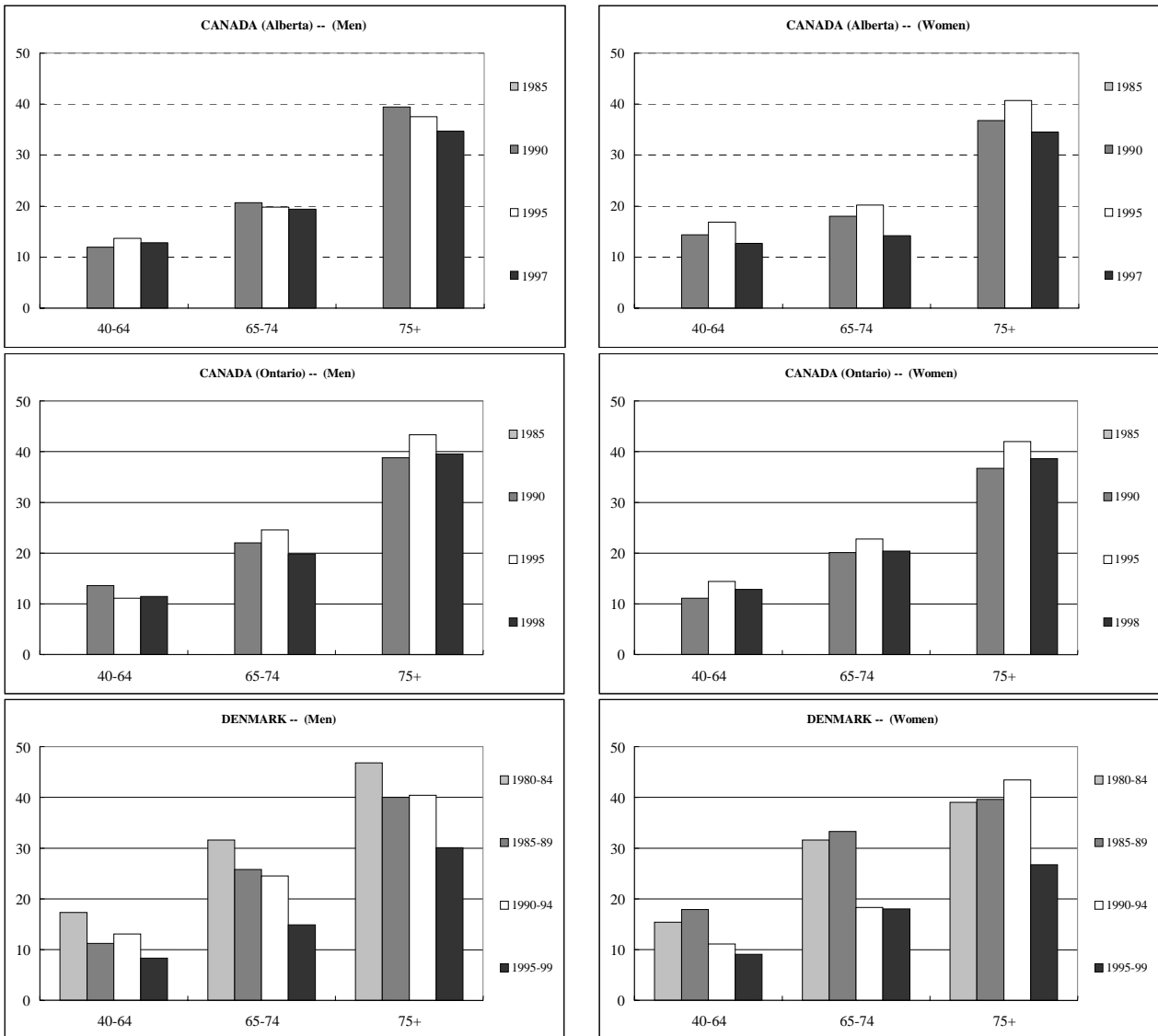


Figure A5.4. (cont.) One year case fatality
As a percentage of all admissions

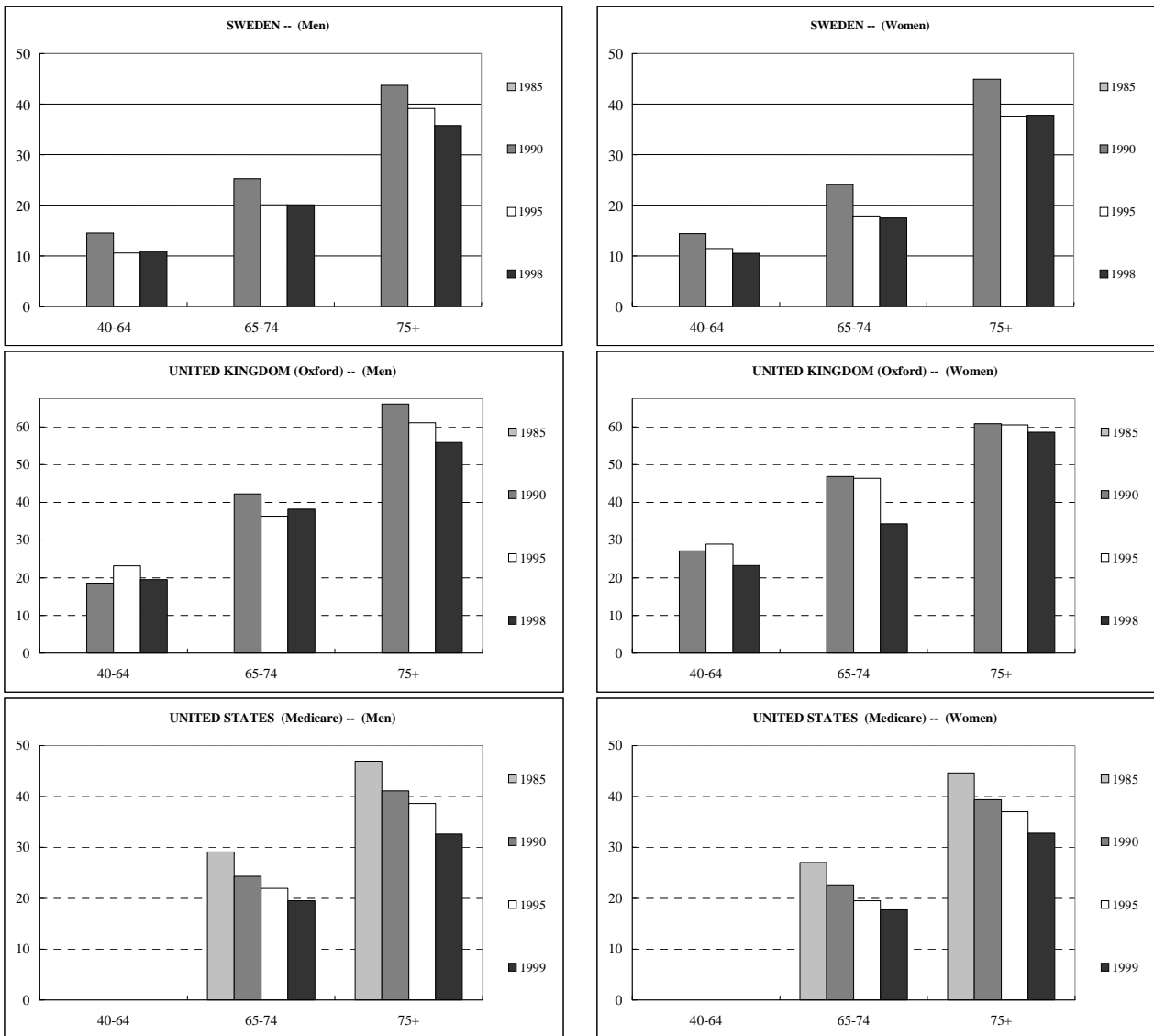


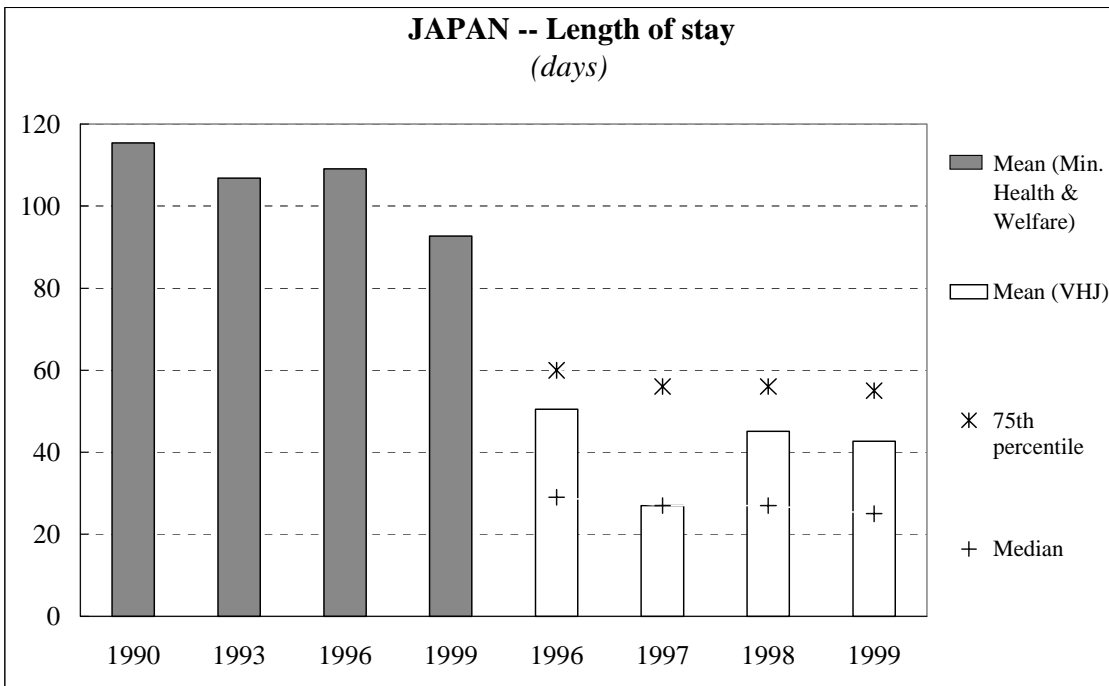
Table A6.1. Hospital and community costs for stroke

Country	Year	Length of study	Scope	Relative unit expenditure (mean, % per capita GDP)	Sensitivity analysis	Expenditure breakdown	Notes	Source
Grieve <i>et al.</i> (2001) study (adjusted for casemix)							Variables used for casemix adjustment: age, sex, stroke subtype, level of consciousness, incontinence, dysphasia and paralysis; sensitivity analysis when unit costs for one centre applied to all centres	
Menorca (Spain)	1996-97	3 months	First ever strokes, not subarachnoid haem (SAH)	14.6 (10.9-18.4)	13.8 (10.7-16.9)	Inpatient=80% Outpatient=8% Comm/NH=12%		Grieve <i>et al.</i> (2001)
Florence (Italy)	1996-97	3 months	First ever strokes, not SAC	25.8 (21.7-29.9)	19.9 (16.6-23.2)	Inpatient=84% Outpatient=2% Comm/NH=14%		Grieve <i>et al.</i> (2001)
Almada (Portugal)	1996-97	3 months	First ever strokes, not SAC	31.2 (25.7-36.7)	27.8 (23.0-32.6)	Inpatient=76% Outpatient=21% Comm/NH=3%		Grieve <i>et al.</i> (2001)
Copenhagen (Denmark)	1994-95	3 months	First ever strokes, not SAC	36.6 (33.0-40.1)	28.3 (25.6-30.9)	Inpatient=88% Outpatient=2% Comm/NH=10%		Grieve <i>et al.</i> (2001)
London (UK)	1996-97	3 months	First ever strokes, not SAC	37.8 (31.0-44.6)	34.3 (28.2-40.4)	Inpatient=94% Outpatient=2% Comm/NH=4%		Grieve <i>et al.</i> (2001)
Other studies								
Sodertalje (Sweden)	1994	one year	Patients admitted with a first stroke in a county hospital who survived one year	Mean=52 Median=33		Inpatient=88% Outpatient=10% Drugs=2%	Calculated net health expenditure: difference between costs in one year before and after stroke	Zethraeus <i>et al.</i> (1999)
Copenhagen (Denmark)	1994-95	one year	Patients admitted to a stroke unit in one hospital	78		Hospital=72%	Health care and social services	Porsdal and Boysen (1999)

Table A6.2. Sources and notes for chapter 6 tables and graphs

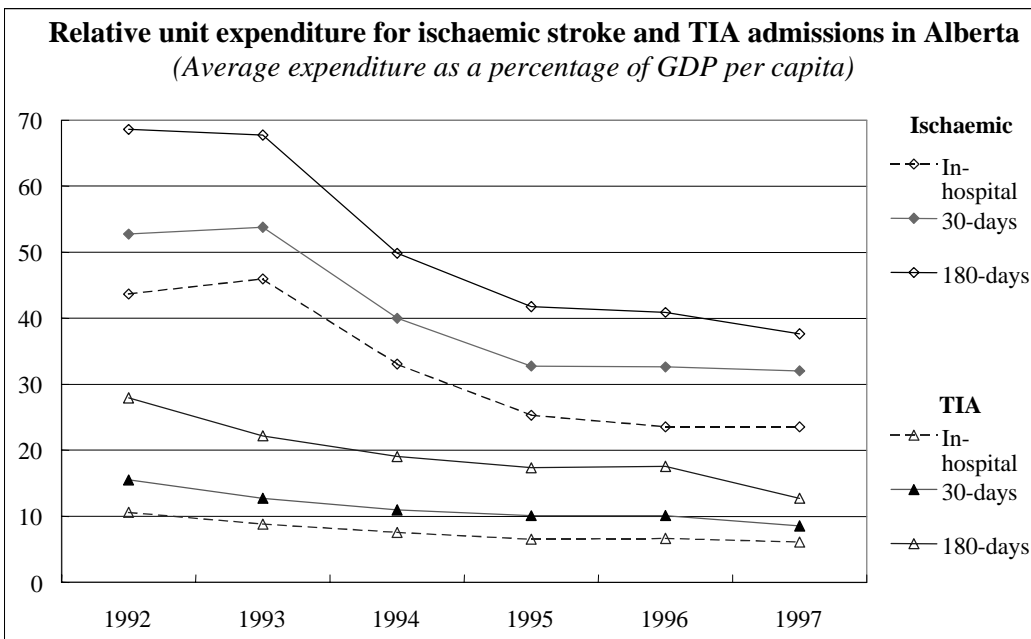
Country	Table/figure	Source	Notes
Australia	Tab 6.1, Fig 6.4	Mathers and Penn 1999	
	Tab 6.2, Fig 6.2, 6.3	AIHW National Hospital Morbidity Database (AIHW NHMD)	
	Tab 6.3, Fig 6.5, 6.6	AIHW NHMD, Dept of Health and Aged Care: Report on the National Hospital Cost Data Collection 1997-98	
Canada	Tab 6.1, Fig 6.1	Moore <i>et al.</i> 1997	
	Tab 6.2, Fig 6.3	Country report	Includes some long-term care facilities
Canada (Alberta)	Fig 6.5, 6.6	Country report	In-hospital expenditure
	Fig 6.7	Country report	
Canada (Ontario)	Tab 6.4	Ontario Case Costing Project	??? Per day or per admission
	Fig 6.5	Ontario Case Costing Project	Stroke patients discharged alive
	Fig 6.6	Ontario Case Costing Project	TIA patients not undergoing CE
Denmark	Tab 6.2, Fig 6.2, 6.3	Country report	
	Fig 6.5	Country report	Based on DRG 14; doesn't include depreciation
	Fig 6.6	Country report	As Above but based on DRG costs for DRG 15
Denmark (Copenhagen)	Tab 6.4	Country report	
	Fig 6.5	Grieve, Dundas <i>et al.</i> 2001	
Greece	Tab 6.2, Fig 6.2, 6.3	Country report	ICD9 436 only
Hungary	Fig 6.3	Country report	
Hungary (Budapest)	Fig 6.5	Grieve, Dundas <i>et al.</i> 2001	
Italy	Tab 6.2, Fig 6.2, 6.3	Country report	
	Fig 6.5	Country report	Based on DRG reimbursement
	Fig 6.6	Country report	Tariff for acute patients with LOS>1 day
Italy (Florence)	Tab 6.4	Country report	
	Fig 6.5	Grieve, Dundas <i>et al.</i> 2001	
Japan	Tab 6.2, Fig 6.4	Ministry of Health and Welfare	A representative sample of hospitals
	Tab 6.2, 6.3, Fig 6.4, 6.5	Voluntary Hospitals of Japan Quality Improvement Project	9 tertiary care hospitals
Korea	Tab 6.3, 6.4, Fig 6.3	Country report	one hospital
Netherlands	Tab 6.1, Fig 6.1	Evers <i>et al.</i> 1997	
	Tab 6.2, Fig 6.2, 6.3	Country report	
	Tab 6.2, Fig 6.2, 6.3	Country report	
Norway	Fig 6.5	Country report	Average of discharged alive and deceased
	Fig 6.6	Country report	
Portugal (Almada)	Fig 6.5	Grieve, Dundas <i>et al.</i> 2001	
Spain	Tab 6.2, Fig 6.2, 6.3	Country report	
Spain (Menorca)	Fig 6.5	Grieve, Dundas <i>et al.</i> 2001	
Sweden	Tab 6.2, Fig 6.2, 6.3	National Hospital Discharge Register	1992: change in number of long-term pts incl.
Switzerland	Fig 6.3	Country report	For all first stay admissions
UK	Fig 6.3	Country report	
UK (London)	Fig 6.5	Grieve, Dundas <i>et al.</i> 2001	
US	Tab 6.1, Fig 6.1	Hodgson <i>et al.</i> 1999	
	Tab 6.2, Fig 6.2, 6.3	NCHS website	

Figure A6.1. Hospital length of stay for stroke patients, Japan



Sources and notes: See Table A6.2.

Figure A6.2. Relative unit expenditure for ischaemic stroke and TIA admissions in Alberta, Canada



Sources and notes: See Table A6.2.

ANNEX 3: COUNTRY SUMMARIES

47. As part of the project, countries were given the option of submitting a short summary of recent health policy developments in their country, particularly in relation to stroke. Those submitted are included here.

Australia

48. The Commonwealth Government has introduced a number of measures to encourage people to purchase private health insurance in order to counteract a long-term trend of decreasing participation in private health insurance. As of September 2000, 45.8% of the Australian population were covered by private health insurance hospital cover. Private health insurance provides consumers with added benefits such as choice of doctor in public and private hospitals and choice of private hospital.

49. The private health industry is currently working to consolidate health insurance arrangements pertaining to rehabilitation services.

50. Very complex medical/surgical procedures have traditionally been provided in public hospitals. More recently, the private sector has moved to provide these more complex services, for example, some coronary procedures.

51. There has also been a rapid growth in the number of free standing day hospital facilities since 1989. This increase coincided with new health insurance arrangements for day hospital services and evidence suggests that this growth will continue.

Canada

52. Canada has a predominantly publicly financed, privately delivered health care system with access to universal, comprehensive coverage for medically necessary hospital and physician services. Health service is the responsibility of the ten provinces and three territories which plan, finance and evaluate hospital care, physician and allied health services, some prescriptions and public health. The federal government administers national standards (i.e., the Canada Health Act) and assists in financing through fiscal transfers.

53. The system mainly relies on primary care physicians, who control access to most specialists, hospitals, diagnostics and drug prescriptions. Private practitioners are generally paid on a fee-for-service basis and submit their claims to the provincial health insurance plan for payment. Dentists work independently of the health care system, except where in-hospital dental surgery is required. While nurses are generally employed in the hospital sector, they also provide community health care including in-home and public health services.

54. Over 95% of Canadian hospitals are operated as private non-profit entities run by community boards of trustees or voluntary organizations. Health care in Canada is financed primarily through taxation, in the form of provincial and federal personal and corporate income taxes.

Denmark

55. Public healthcare in Denmark is a tax-financed public service, run by regional authorities (counties) within the frame of national guidelines formulated by national health authorities. Healthcare is financed through general taxation (81%) and co-payment (19%). Access to general practitioners, hospitals and private specialists is free, but a co-payment exists for medicine (50 or 75% until the year 2000). A private insurance can be taken out to cover the co-payment or to get access to private care. For stroke patients, private care is almost never used.

56. Hospitals are financed through global budgets, and doctors and nurses are salaried. Economic incentives are almost non-existent when medical decisions are made. General practitioners and specialists who practice outside the hospitals are privately organised and own their own practice as private entrepreneurs. General practitioners are paid a mix of fee-for-services and a capitation fee while private specialists are paid on the basis of fee-for-service from the counties.

57. The National Board of Health recommended in 1994 that all counties should establish specialised stroke units with interdisciplinary teams for treatment and rehabilitation. Since then, the counties have gradually established stroke units, but the capacity varies from county to county.

Italy

58. Since 1978 (Law n. 833/78), health care coverage in Italy is universally provided by the public system, under the National Health Service (NHS – Servizio sanitario nazionale), aiming at assuring equal access to health care for all.

59. The structure of the system, adjusted over time, presently includes:

- a central level (Ministry of Health), which defines the major objectives of the system (through the National Health Plan, National Laws, Guidelines etc.) and allocates financial resources, coming from general taxation, to regional Administrations;
- a regional level (19 Regions and 2 autonomous Provinces), which is responsible for the regional planning, taking into account local needs, the organisation of services and the distribution of resources to local Agencies
- a local level (Local Health Agencies –including GPs- and Hospital Agencies), which organises in detail both hospital and community care, as well as prevention and rehabilitation, according to regional norms.

60. Recently, a major development of the system has moved towards a real devolution of powers: in the field of health, Regions are now responsible for almost the whole of the organisation. This accounts for many differences in the national situation.

61. Activities provided by the NHS include:

- Public Health
- Primary health care
- Specialised treatment

- Hospital care
- Care and rehabilitation of disabled people

62. Even if the National Health System is a public one, some private services can operate on the same basis, provided that they undergo a process of accreditation by the public authority.

63. Interventions performed by these two types of services can be either free of charge or requiring the payment of a limited “out of pocket” contribution by patients.

64. A few months ago a classification of “Essential levels of care” has been issued, listing all activities and performances that the NHS must guarantee to all citizens, free of charge or with different degrees of cost-sharing.

65. Totally private services are fully paid for by their clients.

66. Drugs are also classified according to different modalities of co-payment (A=completely free of charge, B=partially free of charge, C=costs covered by clients).

67. Also in this area, Regions can put local limitations to prescriptions and payments.

Korea

68. Health policy and health care system in Korea reflect changes in society and health conditions. Korea is one of the most rapidly industrialized economies in the world. It has experienced fast development with unprecedented social and cultural changes since the early 1960s. Korea was one of the poorest countries in 1961 with US\$ 82 GNP per capita, which had grown more than 100 times in 1995 (US\$ 10 076) with the improvement of major health indicators.

69. Korean health care has traditionally been a private sector dominated system with about 85% of hospitals and virtually all clinics privately owned. In 1998, 88% of the hospital beds were provided by the private sector.

70. The supply of medical doctors, mainly graduates from newly founded medical schools, has more than doubled from about 1 400 new enrollees in 1976 to about 3 000 in 1994. Compulsory health insurance was introduced in 1977 and achieved universal coverage in July 1989. The financial resources of the insurance system are primarily contributions paid by the insured and their employers and additional government subsidies. In the insurance program for industrial workers and government employees, the employee and employer pay half each of their contribution with varying rates of contribution across insurance plans from 3.2% to 3.8% of wages. The insurance program for the self-employed is financed by contributions from the insured and supported by government subsidy. The contribution of the self-employed is determined on the bases of income and property.

71. Since 1989 when national health insurance was provided to the whole population, national health expenditures have grown fast with the annual percentage growth during the period 1987 – 1992 of 22%. National health care expenditure in 1984 was estimated at 5.4% of GDP. With national health expenditure growing faster than the Korean economy, the future of the health care financing is a matter of concern, since the Korean economy is now experiencing readjustment and growth rates are decreasing. Price control, both lower fee schedules and various utilization control measures have been applied, but so far cost containment policies appear to have failed in cutting the rapid rise of national health care expenditure. Cost containment is likely to require more radical changes and Korean diagnostic related groups (DRG)

system for inpatient service has experimentally been introduced recently only for limited number of diseases, but not yet for stroke, which has been one of the leading causes of death in the country.

In spite of its partially successful completion of major health program, Korea faces diverse challenges. The health care infrastructure does not seem to be appropriate and efficient. Human resources are distributed unequally among geographic locations and specialties. Distribution of specialties is biased towards highly sophisticated technology-oriented practice, which may not match the needs of the population. Long-term care, home care and rehabilitation facilities are not well enough prepared for the stroke victims in terms of organization and training. The development of a national strategy to deal with the need for long-term care, home care services, and nursing homes is one of the most necessary and challenging area in stroke care because the rapid growth of the elderly population and increasing financial burden of long-term care.

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