The Looming War for Skills: Global Demand for Asian Medical and Nursing Professionals

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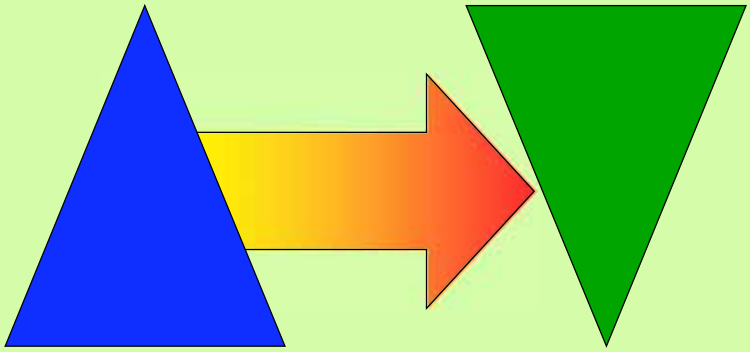
Differential Health Workforce Training Capacity (WHO 2006)

Table 3.2 Health professional training institutions, by WHO region

WHO region	Medical	Nursing and midwifery	Dental	Public health	Pharmacy
Africa	66	288	34	50	57
Americas	441	947	252	112	272
South-East Asia	295	1145	133	12	118
Europe	412	1338	247	81	219
Eastern Mediterranean	137	225	35	8	46
Western Pacific	340	1549	72	112	202
Total	**1691**	**5492**	**773**	**375**	**914**

Source: Mercer H, Dal Poz MR. *Global health professional training capacity* (background paper for *The world health report 2006*; http://www.who.int/hrh/documents/en/).

Impact of Demographic Transformation in Western and Select Asian Nations



Traditional population structure Emerging population structure

Case Study: Practitioner Age of Australian Surgeons (42% = 55+)

Number of Surgeons by Specialty and Age Group, Australia (2003)

			% by age group				
	Main Specialty	Number	32-34	35-44	45-54	55-64	65+	Total
	General Surgery	1,119	4	23	26	32	15	100
	Cardiothoracic	110	1	28	37	25	8	100
	Neurosurgery	126	3	35	29	23	10	100
	Orthopaedic	756	2	34	30	22	13	100
	Otolaryngology	279	5	28	24	33	10	100
	Paediatric	84	1	24	26	36	13	100
	Plastic & Reconstructive	239	2	33	25	31	10	100
	Urology	218	3	33	28	27	9	100
	Vascular	72	0	21	18	54	7	100
	Other	13	0	0	8	62	31	100
Australia Total		**3,016**	**3**	**28**	**27**	**29**	**13**	**100**

Source : 'The Outlook for Surgical Services in Australasia', B Birrell, L Hawthorne and V Rapson, Royal Australasian Colleg e of Surgeons, May 2003

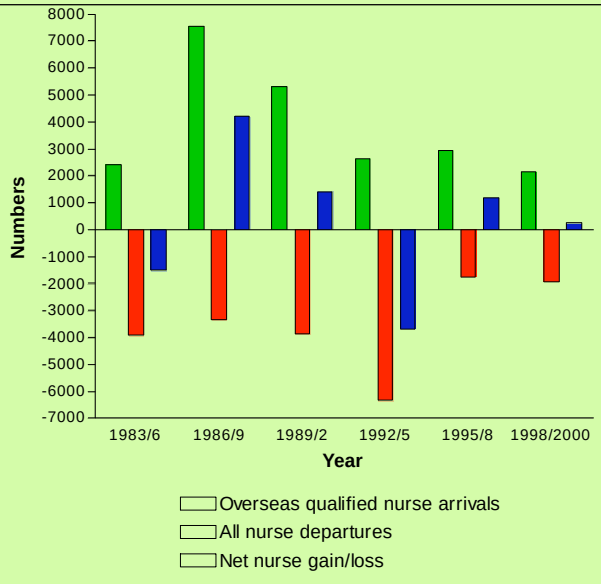
Australian Patient Age - Number and Type of Surgical Procedures Performed (2001 versus 1991)

Rate of Surgical Procedures Per Thousand Persons by Age Group, Victoria, 1993 -94 Compared to 2000 -01

Age Group	1993-94	2000-01
00-04	51	54
05-09	38	35
10-14	27	26
15-19	43	41
20-24	54	48
25-29	63	57
30-34	70	70
35-39	72	79
40-44	75	80
45-49	80	86
50-54	87	99
55-59	94	113
60-64	114	133
65-69	137	166
70-74	149	208
75-79	178	254
80-84	175	263
85+	157	222
Total	75	87

Source : 'The Outlook for Surgical Services in Australasia', B Birrell, L Hawthorne and V Rapson, Royal Australasian Colleg e of Surgeons, May 2003

Additional Demographic Challenges: Net Labour Gains/Losses in Australia's Nursing Workforce (1983-2000)



Competition for Medical Migrants: US, UK, Canada and Australia (2005)

US:

- India (40,838), Philippines (17,873), Pakistan (9,667), Canada (8,990), China (6,687)

UK:

- India (15,093), Ireland (2,845), Pakistan (2,693), South Africa (1,980), Egypt (1,592)

Canada:

- UK (4,664), India (2,143), New Zealand (1,742), South Africa (1,253), Sri Lanka (627)

Australia:

- UK (2,735), South Africa (1,724), India (1,449), Ireland (1,164), Saudi Arabia (658 – most from South Asia)

Source: Adapted from data provided in 'IMGs at home and Abroad: a Challenge to USA Medical Education', F Mullan, American Medical Council Annual Meeting (2005)

Scale of Recent Flows: Medical Migration to Canada 1996-2001

Arrival 1996-2001	Birth Country	Employed						Number
		Own Prof	Other Prof/ Manag	Other work	S/Total	Unemp	Not in Labor-force	
	Canada	**65.7**	13.1	9.9	88.7	2.2	2.2	**134,659**
	UK/Ireland	**47.5**	26.3	0.0	73.8	~	~	**272**
	USA	**45.6**	24.8	0.0	70.5	~	~	**330**
	South Africa	**80.6**	0.0	0.0	80.6	~	~	**388**
	Australia/New Zealand	**60.4**	0.0	0.0	60.4	~	~	**49**
	South Eastern Europe	**10.3**	11.6	21.7	43.5	16.6	32.4	**419**
	Eastern Europe	**8.0**	14.5	31.5	54.0	23.0	23.0	**2,137**
	North West Europe	**35.8**	23.5	14.2	73.6	6.3	13.0	**477**
	India	**18.9**	9.1	31.5	59.5	13.0	22.6	**1,604**
	Other South/Central Asia	**12.4**	12.7	25.9	51.0	17.0	32.0	**3,052**
	HK/Malaysia/Singapore	**30.7**	13.5	12.0	56.2	~	~	**271**
	China (exc. Taiwan)	**4.3**	25.5	26.8	56.6	12.6	30.7	**3,587**
	Taiwan	**11.2**	27.7	16.8	55.8	9.7	31.7	**500**
	Philippines	**3.0**	7.3	67.2	77.4	6.9	15.7	**1,612**
	Iraq	**10.9**	0.0	0.0	10.9	25.6	50.2	**232**
	Other Middle East/N Africa	**15.0**	13.9	15.4	44.3	18.0	36.1	**1,635**
	Central & South Americas	**12.2**	15.0	19.6	46.8	16.5	29.6	**717**
	Other	**14.3**	11.7	38.7	64.7	13.2	30.5	**4516.2**
	TOTAL MIGRANTS							**21,799**

Source: *Labour Market Outcomes for Migrant Professionals – Canada and Australia Compared,* L Hawthorne, Citizenship and Immigration Canada, Ottawa (2007)

Other Health Workforce Destinations in the OECD (WHO 2006)

Table 5.1 Doctors and nurses trained abroad working in OECD countries

OECD country	Doctors trained abroad		Nurses trained abroad	
	Number	Percentage of total	Number	Percentage of total
Australia	11 122	21	NA	NA
Canada	13 620	23	19 061	6
Finland	1 003	9	140	0
France	11 269	6	NA	NA
Germany	17 318	6	26 284	3
Ireland	NA	NA	8 758	14
New Zealand	2 832	34	10 616	21
Portugal	1 258	4	NA	NA
United Kingdom	69 813	33	65 000	10
United States	213 331	27	99 456	5

NA, not applicable.

Issue 1: Individual Agency for Global Health Workers

Motivations:

- **Rural** → urban
- **Public** → private
- **Poor** → rich
- **Unsafe** → secure (disease, law and order)
- **Employment conditions** → remuneration, quality of practice, training, workload, facilities, promotion, health service quality etc
- **Living conditions**
- **Family choice** → children's education, spouse career (etc)

Source: *Working Together for Health – The World Health Report 2006*, WHO, France

Issue 2: The 'Hypermobility' of Health Workers

Patterns:

- Skill workers: lifestyle (not career) = primary motivation
- Migration patterns x 3 decades = health workforce migration
- South to north, east to west

Case study 1: International medical graduates in Victoria:

- 27 regional sites (2003 fieldwork)
- **66%** - 5+ major geographical moves to date
- India → Gulf States→ South Africa→ New Zealand→ rural Queensland → regional Victoria….?

Case study 2: Zimbabwean nurses:

- Public hospitals (HIV-AIDS dominated) → private sector hospitals → South Africa → UK, Australia or New Zealand
- South African Minister views

Sources:
International Migration Outlook – Annual Report, 2007 Edition, OECD, Paris (2007)
The Retention of Overseas Trained Doctors in General Practice in Regional Victoria, L Hawthorne, B Birrell & D Young, Rural Workforce Agency of Victoria (2003)

Issue 3: Human Resource Wastage

Ranking of top 500 world universities (Shanghai Jiao Tong 2006):

- **206 in Europe (overwhelmingly located in North West Europe), including 43 in the UK, and 40 in Germany;**
- **197 in the Americas (167 in the US, 22 in Canada, and just 7 in all Central or South America [including 1 in the top 150]);**
- **92 in the Asia-Pacific (32 in Japan, 16 in Australia, 14 in China (none ranked in the top 150, and with 2 of the top 4 ranked institutions in Hong Kong), 9 in South Korea, 7 in Israel, 5 in New Zealand, 4 in Taiwan, 2 in Singapore, and just 2 in India (neither ranked in the top 300); and**
- **5 in the Africas (4 in South Africa, 1 in Egypt, with no other African or Middle Eastern country listed) (Jiao Tong University 2006).**

Source: Jiao Tong University (2006), 'Academic Ranking of World Universities 2005', Institute of Higher Education Jiao Tong University, Shanghai, August

Medical Employment Outcomes for 1996-2001 IMG Arrivals in Canada and Australia (2001 Census)

South Africa: 81% employed in Canada (**81%** in Australia) √

UK/Ireland: 48% employed in Canada (**83%** in Australia)

India: **19%** employed in Canada (**66%** in Australia)

HK, Malaysia, Singapore: 31% employed in Canada (**59%** in Australia)

Eastern Europe: 8% employed in Canada (**24%** employed in Australia)

China: 4% employed in Canada (**5%** in Australia)

Source: *Labour Market Outcomes for Migrant Professionals – Canada and Australia Compared*, L Hawthorne, Citizenship and Immigration Canada, Ottawa (2007); *Foreign Credential Recognition - Canadian Issues*, Spring, Toronto, 2007

Case Study: Employment Outcomes for IMGs in Canada by 2001 (1996-2001 Arrivals)

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	TOT AL MIGRANTS							**21,799**

Source: *Labour Market Outcomes for Migrant Professionals – Canada and Australia Compared*, L Hawthorne, Citizenship and Immigration Canada, Ottawa (2007)

Employment Outcomes for 1996-2001 Internationally Educated Nurse Arrivals in Canada and Australia (2001 Census)

North West Europe: **32%** employed in Canada (**45%** in Australia)
Philippines: **22%** employed in Canada (**35%** in Australia)
India: **22%** employed in Canada (**66%** in Australia)
Other South/Central Asia: **14%** employed in Canada (**49%** in Australia)
Eastern Europe: **9%** employed in Canada (**33%** in Australia)

South Africa: Only **26** migrants (**63%** employed in Australia)
HK, Malaysia, Singapore: Only **30** migrants (**66%** employed in Australia)
China: Only **126** migrants (**52%** employed in Australia)

2007+ Strategy: $C75 million on bridging programs (1000 IMGs and 800 nurses)

Source: *Labour Market Outcomes for Migrant Professionals – Canada and Australia Compared,* L Hawthorne, Citizenship and Immigration Canada, Ottawa (2007)

Issue 4: Feasibility of Constraining Individual Agency?

Bar select occupations from:

1. Exiting public sector work?
2. Leaving (eg Africa)?
3. Entering western nations (eg the UK)?
4. Accessing advertised vacancies overseas (eg the NHS)?

Likely impacts?

1. Attraction to the profession
2. Human rights/ equal opportunity issues (source and receiving countries)
3. Legal defensibility?

Issue 5: Capacity to Exert Ethical Control?

UK Case Study:

- Department of Health code of practice for NHS employers (2001, updated 2004)
- Focus = international recruitment of health workers
- Guiding principles to promote high standards
- Prevent targeted recruitment from developing countries with healthcare shortages
- Code of practice for recruitment agencies (temporary and permanent workers)
- NHS use of only 'ethical' agencies
- Encouragement of private sector to sign up

But - independent review outcomes

- UK: 'Relatively skeptical about the efficiency' of ethical codes of practice
- Canada ethical attempts = 'Many practical difficulties'

Source: *International Migration Outlook – Annual Report*, 2007 Edition, OECD, Paris (2007)

Issue 6: Competing Source Country Priorities - Filipino Case Study

- **Remittance generation**: Estimates from 10-25% GDP
- **State** = key facilitator
- '**Over-production**' (hence local unemployment)
- **Recruitment industry** taps into motivation (better pay, better future, better working conditions, permanent migration options)
- **Monthly salaries**: $US200 in the Philippines versus $US3,000-4,000 in the US
- **Diversification of destinations**: 1960s (US) compared to 2007 (US, Australia, Europe, Canada, Gulf States, South East Asia etc)
- **1992-2003:** 87,852 nurses officially deployed ('under-count')
- **Additional Filipino health worker exports**: Doctors, dentists, medical technologists, physical therapists, midwives etc

An attractive model to other nations (eg Indonesia)

Sources: *International Migration Outlook – Annual Report*, 2007 Edition, OECD, Paris (2007); 'Health Worker Migration: The Case of the Philippines', M Asis, XVII General Meeting of the Pacific Economic Cooperation Council, Sydney, Scalabrini Migration Center (2007); 'The Globalisation of the Nursing Workforce: Barriers Confronting Overseas-Qualified Nurses in Australia', L Hawthorne, *Nursing Inquiry*, Vol 8 (4): 213-229, Blackwell Science

Distortion of Nursing as a Profession in the Philippines

1. **Calibre of domestic training:**
   - Proliferation of domestic schools/ programs; quality ↓
   - 40 nursing schools (1970s) versus 441 nursing colleges (2005)
2. **Oversupply, under-employment:**
   - 332,206 nurses but demand for only 193,223
   - Local/national employment = 29,467 (15.25%)
   - International employment = 163,756 (84.75%)
3. **Health market distortion:**
   - Shortages of 'skilled, specialized and experienced nurses'
4. **Skills loss:**
   - Doctors convert to nurses (3,500 'nurse medics' migrate 2000-05)
   - Decline in medical school enrolment (4,000 doctors enrol in nursing programs)
   - Growing MD shortages

Source: 'Health Worker Migration: The Case of the Philippines', M Asis, XVII General Meeting of the Pacific Economic Cooperation Council, Sydney, Scalabrini Migration Center (2007);

Potential Solutions to Global Health Workforce Migration: WHO Strategies (2006)

1. **Adjust training to need and demands:**
   - Parochialise – 'focus on local conditions… to limit workforce attrition'
2. **Improve local conditions:**
   - Reduce migration 'push' factors (eg salary incentives to high-demand workers, including those working in high-risk conditions)
3. **Ensure fair treatment of migrant workers*:**
   - (But will this stem flows?)
4. **Adopt responsible recruitment policies:**
   - Ensure receiving countries with 'severe workforce shortages' are 'sensitive to adverse consequences'; engage health ministries, prospective employers and recruitment agencies in strategies 'to avoid poaching'

Source: *Working Together for Health – The World Health Report 2006*, WHO, France

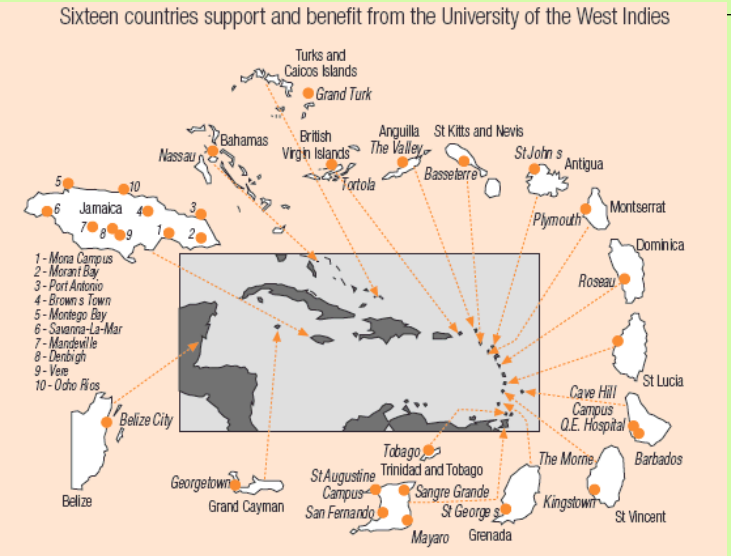
Solutions? WHO Strategies (2006)…

Provide support to human resources in source countries:

- Turn ‘brain drain’ into ‘brain gain’
- Develop ethical recruitment policies and bilateral agreements (to give ‘an explicit and negotiated framework to managing migration’)
- Eg ‘direct twinning of health institutions between poor and rich countries’ (substantial ‘substantial flows of healthworkers in both directions’)
- Caribbean case study
- Complexity

  Rarely ‘one-step’ migration
  If six-step, who pays? (India-Dubai-South Africa-NZ-Australia)
  If imported by a developing nation, who pays? (eg Botswana’s 85% dependence on IMGs, Malaysia’s growing importation etc)

Case Study: ‘Twin’ With/ Support Training Institutions in the Caribbean (WHO 2006)



Solutions? WHO Strategies (2006)…

6. **Develop and implement tactics against violence:**
   - Eg Zero Tolerance code in the UK (NHS)
7. **Initiate and reinforce a safe work environment**:
   - Eg protecting workers against HIV infection risk
8. **Accommodate workers' needs and expectations:**
   - Eg attracting back retired or displaced workers
9. **Target health workers outside the health sector:**
   - (Although 'evidence is scarce on the effectiveness' of this)
10. **Keep track of the workforce (etc)**

But: Dynamic Growth in Demand/ Incentives for Healthworker Migration

Australian Case Study:

- By 2001 **46%** of Australia's medical workforce was overseas-born (cf 40% in 1991 and 44% in 1996)
- **Permanent migration**: By 2001 **22,191** overseas-born doctors, with medical migration continuing unabated (1,263 new permanent resident arrivals in 2001-02)
- **'Area of need' arrivals**: By 2005/06 c5,500 temporary entrant overseas-trained doctors per year (including specialists), cf c500 mid-90s
- **Occupational Trainees**: Eg in surgery, 457 arrivals in 18 months (January 2002-June 2003); 1200 in NSW alone 2005-06
- **Within select specialties:** Growing dependence on overseas trained doctors (eg psychiatry, emergency medicine, surgery)
- **Surgical case study:** 'Non-accredited surgical registrars', eg NSW
- **2007 demand:** 6,500 IMGs and 5,500 internationally educated nurses per year

Competition for Global Health Workers: Australia's Migration Occupations in Demand List (2007)

Skill migration:

- Raised from 33,000 →97,500 per year and ↑
- MODL = 20 bonus points
- Medical and nursing migration: Temporary as well as permanent options

Which priority professions listed apart from health sciences?

- Accountant, Engineers, IT

All other fields on the list = health sciences:

General Practitioner, Anaesthetist, Dermatologist, O&G, Ophthalmologist, Emergency, Paediatrician, Pathologist, Psychiatrist, Specialist Physician, Radiologist, Surgeon, Registered Nurse, Midwife, Mental Health Nurse, Dentist, Dental Specialist, Hospital Pharmacist, Retail Pharmacist, Occupational Therapist, Physiotherapist, Speech Therapist, Podiatrist, Radiographer, radiation Therapist, Nuclear Medicine Technologist, Sonographer

Source: *Evaluation of the General Skilled Migration Categories,* B Birrell, L Hawthorne & S Richardson (2006), Commonwealth of Australia, Canberra

Temporary Entry Medical Visas to Australia

Visa subclass 422 ('Area of need'):

(Birrell & Schwartz 2005)

- 1,419 in 1999-2000
- 2,496 in 2003-03
- 2,428 in 2003-04
- **3,074** in June 2005 (up from 1,636 in June 2003 and 1,237 as of June 2001)

Visa subclass 442 ('Occupational Trainee'):

- ↑**2,437** in June 2005 (cf 1,237 in June 2001), primarily to Queensland (1,016 by 2002/3), WA (597) and Victoria (581)
- **Recent increase in NSW**: June 2004 = 1,202 (Most as HMOs)

Former international student flows:

- 1500+ enrolled in any one year

The Paradox of Globalisation: How to Free Yet Also Constrain Labour Flows? (Australia 2001)

Occupation	Australia -Born	Overseas -Born
Engineering	52%	**48%**
Computing	51%	**48%**
Medicine	54%	**46%**
Science	63%	**37%**
Commerce/ business	64%	**36%**
Architecture	64%	**36%**
Accountancy	64%	**36%**
Dentistry	65%	**35%**
Arts/ humanities	69%	**31%**
Nursing	76%	**24%**
Teach ing	80%	**20%**

Source: Analysis of Australian 2001 Census data

Case Study: Medical Migration to Australia (1996-2001) and Employment Outcomes by 2001

		Employed			Other			
Arrival Date	Birth Country	Med	Other Prof/Man	Other Work	Sub-Total	Unemp	NLF	Number
	Australia/NZ	82.3	8.4	3.6	94.3	0.6	5.1	26658
1996/2001	UK/Ireland	**83.3**	8.7	1.8	93.8	0.7	5.5	**857**
	USA/Canada	**52.9**	11.6	8.7	73.2	5.8	18.3	104
	South Africa	**80.7**	5.8	5.0	91.5	0.8	7.7	**363**
	South Eastern Europe	**35.5**	5.8	14.8	56.1	12.3	31.6	155
	Eastern Europe	**23.5**	5.3	18.2	47.0	12.4	40.6	170
	North West Europe	**52.4**	20.9	5.9	79.2	1.5	19.4	**206**
	India	**65.8**	6.5	4.2	76.5	10.2	12.6	**430**
	Other S/Central Asia	**39.0**	2.3	13.8	55.1	10.9	32.4	**516**
	HK/Malaysia/Singapore	**58.6**	4.3	6.4	69.3	2.1	28.6	140
	China (exc. Taiwan)	**5.1**	20.4	26.8	52.3	8.4	39.1	**489**
	Taiwan	**57.1**	0.0	0.0	57.1	0.0	42.9	21
	Philippines	**33.3**	7.4	13.6	54.3	7.4	38.3	81
	Iraq	**36.9**	3.8	3.8	44.5	24.4	31.3	160
	Other M East/N Africa	**36.1**	11.6	12.5	60.2	12.4	27.4	**241**
	Central & South Americas	**45.7**	8.6	8.6	62.9	0.0	37.1	35
	Other	**36.1**	7.4	10.4	53.9	5.9	40.2	424
	TOTAL MIGRANTS (Exc. NZ)							**4392**

Source: L Hawthorne, from Australia Census data (2001)

OTD Study: AMC MCQ Outcomes 1978-2005

Candidates: 139 source countries

Top 10 sources: India (14%), Sri Lanka (8%), Egypt (7%), Bangladesh (5%), China (5%), UK (5%), Iraq (4%), South Africa (4%), Philippines (4%), Pakistan (3%)

Highest % of first time presenters: S Asia, N Africa/M East, SE Asia and E Europe

Pass rates: 51% on 1st attempt, 47% on 2nd attempt, 81% overall

Highest pass rates: UK/Ireland (95%), South Africa (86%), North America (86%)

Lowest pass rates: Other Americas (67%), SE Asia non-Commonwealth (70%), East Europe (70%)

Age, English and recency of training highly significant: Harder to pass for older candidates

OTD Study: AMC Clinical Outcomes 1978-2005 (Hawthorne et al 2007)

Overall pass rate: 86% of attempters (but just 53% of all MCQ attempters go on to pass)

Highest pass rates: South Africa (66%), UK/Ireland (64%)

Lowest pass rates: Other Americas (41%), SE Asia non-Commonwealth (38%), South East Europe (49%), Central Asia (49%)

Middle East/ North Africa: Just as likely to pass as OTDs from English speaking backgrounds (OTDs from Eastern Europe and non-Commonwealth countries the most disadvantaged)

Age: Highly significant (candidates requiring 3+ attempts older!)

But: IMGs' Access to Medical Employment in Australia (2007)

Only 26-33% of IMGs encounter the AMC in their first 5 years:

- Growing use of RACGP and specialist pathways
- Minimal impact on employment outcomes (high demand)

IMG survey (3,000):

- Proportion securing full accreditation within first 5 years: **41%**
- Proportion employed in medicine: **78%**
- ESB doctors (95%) compared to North Africa/ M East (82%), Asia-Commonwealth (74%), and 'Other' doctors (68%)

When compared with English Speaking Background doctors, respondents from:

- Europe and ME/ N Africa = 3 times less likely to have obtained work in medicine
- Asia-Commonwealth = 4.7 times less likely
- Other backgrounds = 7.6 times less likely

Source: *The Registration and Training Status of Overseas Trained Doctors in Australia:* L Hawthorne, G Hawthorne & B Crotty (Department of Health and Ageing 2007, 157pp)

Type of Medical Registration by Doctor Origin (IMG Survey)

	N	Type of medical registration		
		General	Conditional / Specific	Not registered
English-speaking background	171	51%	**36%**	14%
Europe	153	33%	**41%**	25%
North Africa/Middle East	154	38%	**39%**	23%
Asia-Commonwealth	386	28%	**39%**	33%
All other	255	24%	**35%**	41%
Total	1119	33%	**38%**	29%

Statistics: $\chi^2 = 60.14$, df = 8, $p < 0.01$

Impacts of Migration on Health Workforce Shortages (WHO 2006)

Table 1.3 Estimated critical shortages of doctors, nurses and midwives, by WHO region

WHO region	Number of countries		In countries with shortages		
	Total	With shortages	Total stock	Estimated shortage	Percentage increase required
Africa	46	36	590 198	817 992	139
Americas	35	5	93 603	37 886	40
South-East Asia	11	6	2 332 054	1 164 001	50
Europe	52	0	NA	NA	NA
Eastern Mediterranean	21	7	312 613	306 031	98
Western Pacific	27	3	27 260	32 560	119
World	**192**	**57**	**3 355 728**	**2 358 470**	**70**

NA, not applicable.
Data source: (3).

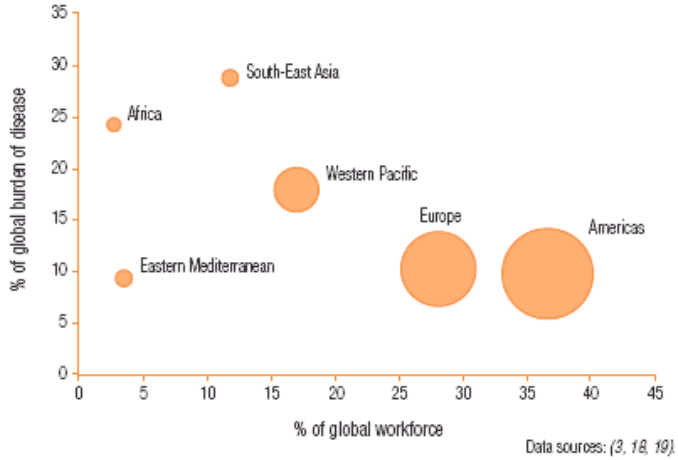
Growing Demand for Future Healthworker Migration in the Context of Declining Fertility Rates

Japan: 1.3
Singapore: 1.4
Canada: 1.6
UK: 1.7
China: 1.7 (0.9 in Shanghai)
Thailand: 1.8
Australia: 1.8
South Korea: 1.9
US: 2.0
Vietnam: 2.3
Indonesia: 2.4
Malaysia: 2.9
Philippines: 3.5

Source: 'Demographic Change in East and South East Asia, and the Implications for the Future', G Hugo, Presentation to 17th General Meeting of the Pacific Economic Cooperation Council, Sydney, 1-2 May 2007

Risks: Exacerbating Undersupply in Developing Nations (WHO 2006)

Figure 1.2 Distribution of health workers by level of health expenditure and burden of disease, by WHO region



Data sources: *(3, 18, 19)*.