



Short report

Doctors leaving 12 tertiary hospitals in Iraq, 2004–2007[☆]Gilbert M. Burnham^{a,*}, Riyadh Lafta^b, Shannon Doocy^a^aThe Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA^bAl Mustansiriya, Baghdad, Iraq

ARTICLE INFO

Article history:

Available online 6 June 2009

Keywords:

Iraq
Doctors
Violence
Doctor migration
Hospitals
Medical workforce

ABSTRACT

Medical doctors leaving less developed countries are now part of a global labour market. This doctor migration has been extensively studied from economic and health systems perspectives. Seldom, however has the specific role of the conflict or the collapsing state been considered as a cause of migration. Using hospital staffing records we measured the changes in numbers of medical specialists at 12 Iraqi tertiary hospitals (in Baghdad, Basra, Erbil and Mosul) between 2004 and 2007. For doctors leaving their posts, we attempted to determine destinations and circumstances of departure.

We counted 1243 specialists in the 12 hospitals on January 1, 2004. This declined to 1166 or 94% of the original number by late 2007. In Baghdad, specialists decreased to 78% by late 2007. Outside Baghdad, specialists numbered 134% of the original count by 2007. In Baghdad, replacements kept pace with losses until 2005, with loss rates peaking in 2006 at 29%. Outside Baghdad, gains exceeded losses each year.

Violent event rates associated with the migration of doctors were estimated as: threats 30/1000 doctors; kidnappings 6.7/1000; violent deaths 16.5/1000, and any violent event 36.7/1000. Specialists who left Baghdad were 2.5 times more likely to experience a violent event than doctors elsewhere. Specialists departing teaching hospitals were 2.3 times more likely to experience a violent event than those in general hospitals. Of specialists leaving hospital posts for which data were available, 39% went elsewhere in Iraq and 61% left the country. These findings suggest a major loss of human capital from Iraq's hospital sector, a loss that is likely to require some years to fully replace.

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Introduction

The migration of doctors to more developed countries has attracted considerable discussion (Hagopian, Thompson, Fordyce, Johnson, & Hart, 2004; Mullan, 2005; Norcini & Mazmanian, 2005). Traditional migration theory suggests individuals change location in response to both push factors from the country of origin as well as pull factors from destination countries (Arah, Ogbu, & Okeke, 2008; Massey & Edward, 1993; Mathauer & Imhoff, 2006). Most attention has been given to economic drivers and the dissatisfaction with health systems management in countries of origin (Vujici et al., 2004). The role of conflict and human rights abuses serving as push factors has received little attention as a cause of displacement of doctors within a country or across borders.

Lebanon's 15 years of civil disturbances were a major push factor for the emigration for medical graduates from the American University of Beirut (Kronfol, Sibai, & Rafeh, 1992). The protracted civil war in Somalia resulted in mass migration or death of doctors and other health workers with serious health consequences for the population (Leather et al., 2006). Of the approximately 400 working in the public sector in Liberia at the outbreak of war in 1989, there were 87 remaining by 1997 and fewer than 20 by 2003, when conflict ended (Liberia Ministry of Planning, 2006). In Zimbabwe 840 doctors, of the estimated 1200 trained there during the 1990s, had left by 2002, as the economy deteriorated and violence increased (Huddart & Picazo, 2003). The 1959 Cuban revolution resulted in the departure of an estimated 3000 of Cuba's 6000 doctors and most of the faculty from the country's single medical school (De Vos, 2006). In Iran, the estimates of doctors emigrating after the double impact of the war with Iraq and the revolution range from 2500 to 8000 (Willis & Taghipour, 1992).

In Iraq, prior to the Hussein years, many Iraqi doctors completed specialty training in UK, and some remained there (Amin & Khoshnaw, 2003). During the Hussein government it was difficult to leave Iraq legally, but those who did manage to leave often went to English speaking countries, while it is thought that fewer went to

[☆] Our gratitude goes to the senior medical personnel who collected these data at potential personal risks, and who wish to remain anonymous.

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neighbouring countries. In 2004 there were 2327 Iraqi doctors working in the UK, North America or Australia, of which 53.5% were in the UK (Mullan, 2005). Iraqi doctors were also living in Jordan and surrounding countries before 2003. In general, however, not many Iraqi doctors had migrated to other countries, partly because of a Hussein-era ban on doctors leaving. Following the U.S.-led invasion of Iraq in 2003, several researchers estimated 15% of Iraq's population fled their homes (Morton & Burnham, 2008; Mowafi & Speigel, 2008). This flight included many academics, and medical doctors who had become targets of criminal or sectarian violence abroad (Salman, 2006). How many doctors may have left their posts because of violence is uncertain. A *Lancet* perspective (Pincock, 2006) suggested that 3000 doctors had left, and a MEDACT report (2008) suggested that 8000 of the perhaps 17,000 doctors estimated to be present in 2003 (WHO, 2008) had left.

To explore how migration of specialists has affected staffing of tertiary hospitals, we reviewed hospital personnel records in twelve tertiary hospitals from 2004 through late 2007. Tertiary hospitals were chosen because their personnel records were relatively complete, and because specialists working at these hospitals represented an important segment of Iraq's human capital.

Methods

The study was conducted at 12 tertiary hospitals in Baghdad (6 hospitals), Basra (2), Erbil (2), and Mosul (2), the four principal cities of Iraq. The population of the Baghdad governorate was estimated at 5.8 million in 2004, and the three other governorates had a combined estimated population 6.5 million (Ministry of Planning and Development Cooperation, 2005). Each city has one medical school, except Baghdad which has four. We chose one teaching hospital and one general hospital for each of the three smaller cities. In Baghdad, three teaching hospitals and three general hospitals were selected. If multiple teaching hospitals were associated with one University, or multiple general hospitals present in a city, the largest was selected. The twelve tertiary hospitals included six in Baghdad (Al Karkh General Hospital, Al Hakeem General Hospital, Al Zahraa General Hospital, the hospitals of Baghdad Medical City, Kadhumia Teaching Hospital, and Yarmook Teaching Hospital) and six in the other cities: Basra (Basra General Hospital and Basra Teaching Hospital); Erbil (Erbil Emergency Hospital and Erbil Teaching Hospital); and Mosul (Mosul Maternity Hospital and Mosul Teaching Hospital).

We reviewed medical staff personnel records from January 2004 through the third quarter of 2007. Because of sensitivities about identification of doctors in an environment where doctors are specifically targeted, a well-known doctor from Baghdad was accompanied by a respected doctor from the local governorate when visiting hospitals for data collection. Four male and two female data collectors were used. Data collectors received two days of training prior to data collection. Data forms were developed in English and tested against hospital personnel records. All data collectors were fluent in English. No unique identifiers of any doctor were recorded. After each hospital visit, forms were reviewed for completeness and quality by study investigators and if data were missing, return visits were made. Often it was necessary to query clerical and departmental staff about destination of doctors leaving Iraq and violent events occurring to departing doctors. Several days were usually required to complete data collection for each hospital. Data most commonly not recorded in written records were age (198), specialty (247) and destination, (341)—particularly for those leaving Iraq. Randomly scheduled callbacks were made by the study coordinator to eight of the 12 hospitals (Baghdad and Mosul) were made to assess accuracy and reporting quality of initially collected data against that written in

the hospital's personnel records. Information on numbers of specialists leaving as well as joining the hospital during a calendar year were recorded. Specialties and ages were noted.

Specialties were grouped into three categories: the surgical specialties—general surgery, orthopaedics, neurosurgery, otolaryngology, thoracic, ophthalmology, urology, plastic surgery, anaesthesia/intensive care, and other surgical sub-specialties; the medical specialties—internal medicine, cardiology, and other medical sub-specialties; and other specialties and practices areas—paediatrics, obstetrics and gynaecology, dermatology, psychiatry, radiology, pathology, family medicine, community medicine, and others. The study did not include primary health centres, which are largely staffed by family doctors, or specialists working in smaller hospitals, nor were residents and other trainees included. All specialists were employees of the Ministry of Health or the Ministry of Higher Education.

Denominators for annual interval rates for doctors present were calculated using a mid-interval population equal to the starting population $+ \frac{1}{2}$ gains $- \frac{1}{2}$ losses. For period mid-interval rates the January 1, 2006 population was used because it approximated the mid-point of the study period. Violent event rates were determined using violence as a reason for departure as the numerator and the mid-interval specialist population as the denominator. Odds ratios were calculated to determine differences between groups in likelihood to leave positions. Data were entered in Excel and data analysis was performed using STATA Version 10 (Stata Corp, College Station, TX) and SPSS Version 13 (SPSS Inc., Chicago, IL).

The study was approved by Al Mustansiriyah University and certified as exempt by the Johns Hopkins School of Public Health Institutional Review Board. Permission for the survey was granted by medical authorities in Iraq.

Funding

This survey was funded by the Johns Hopkins Bloomberg School of Public Health Center for Refugee and Disaster Response.

Results

A total of 1243 specialists were recorded as employed in the twelve facilities on January 1, 2004. This number had declined to 1166 or 94% (95 CI: 92–95) of the original specialist population at the end of the study period in late 2007. The number of specialists, gains, losses, net change, and proportion of specialists in 2007 as compared to 2004 are summarized in Table 1. Trends by specialty area region are summarized in Fig. 1. The number of specialists in Baghdad decreased to 78% (95 CI: 76–81) of the 2004 level by late 2007, whereas the non-Baghdad numbers increased to 134% (95 CI: 127–142) of the 2004 count during this same period.

The distribution of specialist doctors in the 12 hospitals changed in the post-invasion period. In 2004, specialists in Baghdad hospitals accounted for 72% of the doctors, with 28% of specialists located in facilities outside Baghdad. By the study end date in late 2007, 60% of remaining specialist were in Baghdad and 40% in the other three cities ($p < 0.001$). During 2004 and 2005, Baghdad hospital replacements matched losses, but in 2006 and 2007 Baghdad hospitals suffered a net loss of specialists. For hospitals outside of Baghdad, gains in specialists exceeded losses in all years. Specialist loss rates¹ for Baghdad were significantly greater than in other areas and are illustrated in Fig. 2. Loss rates remained relatively constant and low outside of Baghdad, at approximately 4% per year.

¹ Using the mid-year doctor population as denominator; 2007 is annualized rate.

Table 1
Number of specialists in 12 Iraq tertiary hospitals.

	Specialists by region and time				p-Value*	Gains and losses			End 2007 as a percent of 2004	
	January 2004		Late 2007			Gains	Losses	Net change	Percent	95% CI ^a
	N	Percent	N	Percent						
<i>Surgical specialties</i>										
Baghdad	387	72.6%	325	62.7%	<0.001	162	229	-67	84%	80–88%
Non-Baghdad	146	27.4%	193	37.3%		73	26	47	132%	122–145%
All facilities	533	100.0%	518	100.0%	-	235	255	-20	97%	95–98%
<i>Medical specialties</i>										
Baghdad	151	80.3%	110	67.5%	0.006	39	79	-40	73%	65–80%
Non-Baghdad	37	19.7%	53	32.5%		22	6	16	143%	122–180%
All facilities	188	100.0%	163	100.0%	-	61	85	-24	87%	81–91%
<i>Other specialties and practice areas</i>										
Baghdad	360	68.8%	274	55.8%	<0.001	124	210	-86	76%	71–80%
Non-Baghdad	163	31.2%	217	44.2%		80	26	54	133%	124–145%
All facilities	523	100.0%	491	100.0%	-	204	236	-32	94%	91–96%
<i>All specialties combined</i>										
Baghdad	898	72.2%	704	60.3%	<0.001	325	518	-193	78%	76–81%
Non-Baghdad	346	27.8%	463	39.7%		175	58	117	134%	127–142%
All facilities	1244	100.0%	1167	100.0%	-	500	576	-76	94%	92–95%

* Chi-square *p*-value for change in regional distribution from 2004 to 2007.

^a Change is statistically significant if 100 is not included in the confidence interval.

In Baghdad, loss rates were lowest in 2004 (4%) and increased through 2006, when they peaked at 29%.

A total of 576 specialists left their positions in the 12 hospitals between January 1, 2004 and the end of the study period. Information was available on 563, or 98% of departing specialists. Of the 563 departures, 8% were in 2004, 20% in 2005, 46% in 2006, and 27% in the first nine months of 2007. No significant differences in proportion of departures were observed between Baghdad and non-Baghdad hospitals ($p = 0.353$) or by hospital type ($p = 0.129$). Overall, mean age for departing specialists was 49 years ($SD = 10$, $n = 366$). Specialists departing from Baghdad, for reasons other than retirement, had a mean age of 48 compared with 44 for other cities ($p = 0.001$). The mean age of non-retiring departing specialist doctors from teaching hospital departures was 49 years as compared to 44 years in general hospitals ($p < 0.001$). Age at retirement was available for 36 (53%) of 68 retirees. Mean retirement age was 60 years ($SD = 6.9$), and retiring specialists had an

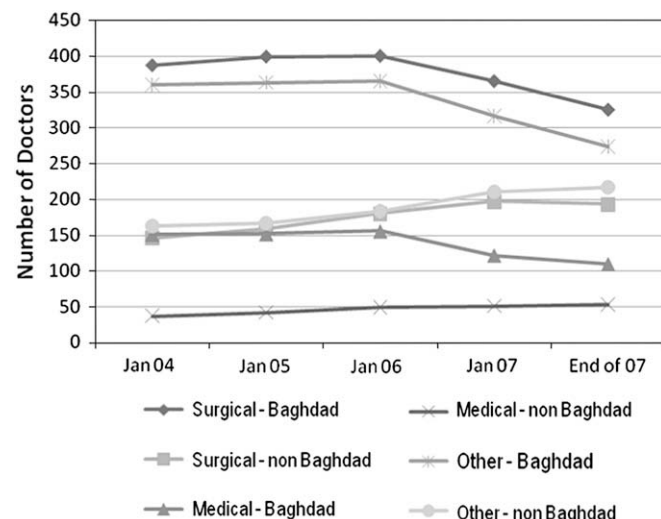


Fig. 1. Iraqi Hospital Physician Counts by Region and Speciality Area.

average of 29.7 years ($SD = 7.4$, $n = 53$) of specialty work. There were no differences in retirement age by year of departure ($p = 0.604$) or specialty area ($p = 0.750$).

Reasons for departure were available for 549 (95%) specialists and included moving/transferring (74%), retirement (12%), escaping threats (7%), violent deaths (4%), kidnapping or threats (2%) and non-violent deaths (1%). No significant difference in the distribution of departure reasons was observed between specialists in Baghdad versus those in other areas ($p = 0.180$). Significant differences in reason for departure were observed by specialty area ($p = 0.028$) and between teaching hospitals and the general hospitals ($p < 0.001$), and are summarized in Table 2. During the study period, 15% of specialists in teaching hospitals retired, as compared to none from general hospitals and a substantially larger proportion of specialists from teaching hospitals reported moving or transferring (91%) as compared to general hospitals (70%).

Violent event rates among specialist leaving their posts in all 12 hospitals during the study period included threats, 30/1000 (95 CI: 21.5–40.6); kidnappings 6.7/1000 (95 CI: 3.1–12.8); violent deaths 16.5/1000 (10.4–24.9). The risk rate for all violent events combined was 36.7/1000 (27.3–48.2). Violence experienced by specialty area, location, and hospital type is summarized in Table 3. Specialists

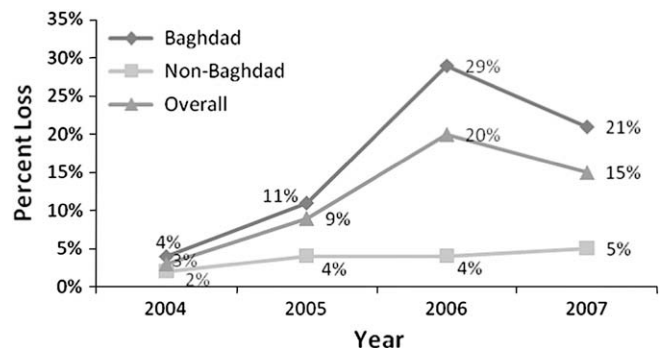


Fig. 2. Annual Loss Rates for Doctors.

Table 2
Reasons given for departure of specialists.

	Total number	Moved or transferred		Retired ^a		Threatened		Kidnapped		Died (violent)		Died (non-violent)		p-Value
		N	%	N	%	N	%	N	%	N	%	N	%	
<i>Surgical specialties</i>														
Non-teaching	59	55	93%	0	0%	2	3%	0	0%	2	3%	0	0%	0.019
Teaching	193	137	71%	16	8%	22	11%	5	3%	11	6%	2	1%	
<i>All facilities</i>	252	192	76%	16	6%	24	10%	5	2%	13	5%	2	1%	
<i>Medical specialties</i>														
Non-teaching	14	12	86%	0	0%	0	0%	1	7%	0	0%	1	7%	0.015
Teaching	66	46	70%	14	21%	3	5%	0	0%	3	5%	0	0%	
<i>All facilities</i>	80	58	73%	14	18%	3	4%	1	1%	3	4%	1	1%	
<i>Other specialties and practice areas</i>														
Non-teaching	33	29	88%	0	0%	4	12%	0	0%	0	0%	0	0%	0.024
Teaching	184	125	68%	38	21%	9	5%	3	2%	6	3%	3	2%	
<i>All facilities</i>	217	154	71%	38	18%	13	6%	3	1%	6	3%	3	1%	
<i>All specialties combined</i>														
Non-teaching	106	96	91%	0	0%	6	6%	1	1%	2	2%	1	1%	<.001
Teaching	443	308	70%	68	15%	34	8%	8	2%	20	5%	5	1%	
<i>All facilities</i>	549	404	74%	68	12%	40	7%	9	2%	22	4%	6	1%	

^a Retirement was easier for employees of the Ministry of Higher Education than Ministry of Health until recently.

leaving Baghdad hospitals were 2.5 (95 CI: 1.3–5.4) times more likely to have experienced a violent event than those in other areas of Iraq. Specialists leaving teaching hospitals were 2.3 (95 CI: 1.1–5.4) times as likely to experience a violent event in comparison to those in general hospitals. Specialists who left Baghdad teaching hospitals were associated with a greatest risk of violence. As compared with specialists elsewhere they were 4.8 (95 CI 2.4–10.2) times more likely to experience a violent event and 5.3 times (95 CI: 1.6–28.2) more likely to have met a violent death.

Of the 430 specialists who left for reasons other than retirement, 39% (95 CI: 34–43) remained in Iraq and 61% (95 CI: 57–66) migrated to other countries. Among Baghdad specialists leaving their posts, 36% moved within Iraq and 64% left the country. Among specialists outside Baghdad, 48% remained in Iraq and 52% left the country ($p = 0.050$). No significant differences in internal displacement and emigration proportions were found by specialty areas ($p = 0.783$) or between teaching hospitals and with general hospitals ($p = 0.111$). Among the 143 specialists that were reported to have relocated within Iraq, 32% moved to the North, 19% to the South, 9% to Central areas, 14% to Baghdad, and for 27% the destination was unspecified.

Of the 31 specialists moving to foreign countries where country of destination was specified, 35% went to Jordan, 35% to the United Arab Emirates, 23% to Europe and 6% to Syria.

Discussion

With relatively intact staffing records, the tertiary hospitals of Iraq offered an opportunity to quantify the effects of insecurity on migration of specialists, as well as the health system capacity to replace those leaving. Since 2004, there has been a substantial internal and external migration of specialist doctors from tertiary hospitals in Iraq's four principal cities. Most migration occurred from Baghdad which at the time of the 2003 US-led invasion was thought to have half of Iraq's doctors, but had only 20% of the country's population. Migration from Baghdad was greatest in 2006, a time of particularly intense violence. By late 2007 the number of specialist doctors at the six Baghdad tertiary hospitals had declined to 76% of the 2004 number. By contrast, in the six tertiary hospitals outside Baghdad the number of specialists increased by 34% in the six tertiary hospitals outside Baghdad; this

Table 3
Violent event rates by specialty, location, and hospital type among doctors leaving hospital.

	Midpoint population	Threatened			Kidnapped			Violent death			All violent events		
		N	Events/1000	(95% CI)	N	Events/1000	(95% CI)	N	Events/1000	(95% CI)	N	Events/1000	(95% CI)
Overall	1334	40	30.0	21.5–40.6	9	6.7	3.1–12.8	22	16.5	10.4–24.9	49	36.7	27.3–48.2
Surgical specialties	580	24	41.4	26.7–60.9	5	8.6	2.7–20.0	13	22.4	12.0–38.0	42	72.4	33.7–71.0
Medical specialties	245	3	12.2	2.5–35.4	1	4.1	0.1–2.3	3	12.2	2.5–35.4	7	28.6	4.5–41.3
Other specialties*	549	13	23.7	12.7–40.2	3	5.5	1.1–15.9	6	10.9	4.0–23.6	22	40.1	16.7–46.9
<i>Odds ratio-surgical</i>	–		1.8	0.9–3.8		1.6	0.3–10.2		2.1	0.7–6.7		1.9	1.1–3.3
<i>Odds ratio-medical</i>	–		0.5	0.1–1.9		0.8	0.1–9.3		2.9	0.8–15.3		0.7	0.3–1.7
Baghdad	921	33	35.8	24.8–50.0	8	8.7	3.8–17.0	19	20.6	12.5–32.0	60	65.1	32.1–60.0
Non-Baghdad	413	7	16.9	6.8–34.6	1	2.4	0.1–13.4	3	7.3	1.5–21.1	11	26.6	8.4–37.8
<i>Odds ratio</i>	–		2.2	0.9–5.8		3.6	0.5–160.5					2.5	1.3–5.4
Teaching	1007	34	33.8	23.5–46.9	8	7.9	23.5–46.9	20	19.9	12.2–30.5	62	61.6	30.2–56.0
Non-teaching	327	6	18.3	6.7–39.5	1	3.1	0.1–16.9	2	6.1	7.4–21.9	9	27.5	8.6–43.6
<i>Odds ratio</i>	–		1.9	0.8–5.5		3.3	0.8–29.2		3.3	0.8–29.1		2.3	1.1–5.4

* Used as a reference category for odds ratios by specialty area.

was in spite of several violent periods in Basra and Mosul. The departure of specialists followed the general flow of refugee migration, with the largest number of specialists departing in 2006, decreasing somewhat in 2007 (UNHCR, 2004). Replacements for departing specialists exceeded losses in the six Baghdad tertiary hospitals for 2004 and 2005, but fell behind losses in 2006, and by 2007 there were almost a quarter fewer specialists in the Baghdad hospitals than there had been in 2004.

The majority of departing specialists left Iraq, rather than moving elsewhere within the country, and this was more so for the specialists in Baghdad. This migration pattern may actually be less straightforward, as some may have moved within the country as the first step in a planned cross-border migration. In almost half of instances the ultimate destination of the departing specialists was unknown. This has been a favoured destination for Iraqi minorities. This is particularly so for minorities within Iraq (Shea, 2007). Those leaving as refugees were likely to choose Jordan or the United Arab Emirates, though these may be transit locations, as many younger Iraqi doctors express a wish to immigrate to Australia, Canada, the United States or the United Kingdom. As English is the medium of Iraqi medical education, these countries are traditionally favoured by Iraqi doctors.

There were 111 specialists who departed in response to threats, or kidnappings or meeting a violent death. Doctors and other professionals are specifically being targeted for assassination, and the Iraq Medical Association reports 2000 doctors having been killed since the 2003 invasion (Brookings Institution, 2007). Some received notice to leave Iraq within 24 h or be killed. Others were kidnapped for ransom, and often executed in spite of ransom payments (Ozerniy, 2004). The departure of doctors from teaching hospitals was more likely to have been associated with threats or violent events. It is not clear whether this occurred because of the physical location of these hospitals or as part of the campaign of violence against academics, or neither. Several of the hospitals reported frequent violence in their immediate proximity, yet there seemed to be no association of this violence with the departure of specialists. Other factors such as political, group membership or household factors could have played a role in departures.

The decrease in surgical specialists from Baghdad (16%) was less than that of the medical (27%) or other (24%) specialties. It is likely that the need for surgical services was high with the increasing levels of violence, but is not clear how this might have limited loss of the surgical specialists. Over the four-year study period of Baghdad specialists, the risk rate for departure associated with threats alone was 30/1000 specialists, kidnapping 6.7/1000, and violent deaths 16.5/1000 or 36.7/1000 for all violent events. This is most certainly a substantial underestimate. Specialists who move because of threats against themselves or their families typically did so quickly and quietly, not telling anyone about destinations. Only later, when all are safely out of danger's way, might information filter back to their former hospital. Although the surgical specialists had a lower rate of departure than the other specialties, violent events were more common among the surgical specialists who left from Baghdad than among the other specialties. The reason for this is not clear.

This study has a number of limitations. Data include only the movement of specialist doctors at 12 tertiary hospitals in the four principal cities, a purposeful sample of specialists working at the apex of the Iraq health system where the opportunities and rewards may exceed other levels of the system. A sample from all strata of hospitals and health facilities in Iraq could paint a much different picture.

Hospital records were not always complete or current. Some information, most notably destinations of departing specialists, were not available, either by records or clerical staff. Recall problems with dates and events are probable, and likely compounded by high turnover rates of clerical staff. Information could have also

been withheld because of its sensitive nature. Some hospitals have had sectarian undercurrents among staff, which may have limited data availability. Violent events were calculated using a mid-interval population; in conjunction with under-reporting, this may have led to an underestimate of rates as the numbers of specialists in the study population declined. Retirement information may not be particularly informative as until recently only the Ministry of Higher Education had a retirement policy for doctors.

Conclusions

The migration of doctors from fragile states and in the face of conflict, though perhaps to be anticipated, is not at all well studied (Doull & Campbell, 2008; Interagency Health Evaluation Steering Committee, 2005). In the case of Iraq, the push and pull factors for the migration of doctors are complex. These include professional, religious and criminal factors which could likely differ among various strata in the health system. In addition to personal and family risks from violence, the deterioration of professional working conditions, collapse of living standards, as well as opportunities and financial rewards in more settled locations all potentially contribute to decisions to leave hospital positions. Although our data show a substantial migration of specialists from tertiary hospitals, this movement is less than suggested in various press reports. It may be that specialists at tertiary hospitals have a large personal investment in remaining and that the migration pattern among more recent graduates, family doctors, and junior level specialists is markedly different. Even when security returns, Iraq will remain a fragile state for some time. Those who have left Iraq in times of violence are unlikely to return when circumstances improve, at least not quickly. Human resource planning should consider this.

References

- Amin, N. M. M., & Khoshnaw, M. Q. (2003). Medical education and training in Iraq. *Lancet*, 362, 1326.
- Arah, O. A., Ogbu, U. C., & Okeke, C. E. (2008). Too poor to leave, too rich to stay: developmental and global health correlates of physician migration to the United States, Canada, Australia and the United Kingdom. *American Journal of Public Health*, 98, 148–154.
- Brookings Institution. (October 2007). Iraq index. <http://www.brookings.edu/fp/saban/iraq/index.pdf>. Accessed 24.04.08.
- De Vos, P. (2006). "No one left abandoned": Cuba's national health system since the 1959 revolution. *International Journal of Health Services*, 35, 189–207.
- Doull, L., & Campbell, F. (2008). Human resources for health in fragile states. *Lancet*, 371, 626–627.
- Hagopian, A., Thompson, M. J., Fordyce, M., Johnson, K. E., & Hart, L. G. (2004). The migration of physicians from sub-Saharan Africa to the United States of America: measures of the African brain drain. *Human Resources for Health*, 2, 17.
- Huddart, J., & Picazo, O. (2003). *The health sector: Human resource crisis in Africa: An issues paper*. Washington DC: USAID, Office of Sustainable Development.
- Kronfol, N. M., Sibai, A. M., & Rafeh, N. (1992). The impact of civil disturbances on the migration of physicians: the case of Lebanon. *Medical Care*, 30, 208–215.
- Leather, A., Ishmael, E. A., Abdi, Y. A., Abbey, M. H., Gulaid, S. A., Walhad, S. A., et al. (2006). Working together to rebuild health care in post-conflict Somaliland. *Lancet*, 368, 1119–1125.
- Massey, D. S. T., & Edward, J. (1993). Theories of international migration: a review and appraisal. *Population and Development Review*, 19, 431–440.
- Mathauer, I., & Imhoff, I. (2006). Health worker motivation in Africa: the role of non-financial incentives and human resource management tools. *Human Resources for Health*, 4, 12.
- MEDACT. (2008). *Rehabilitation under fire: Health care in Iraq 2003–2007*. London: MEDACT.
- Ministry of Planning and Development Cooperation, Government of Iraq. (2005) *Iraq living conditions survey 2004, Vol. 1*. Baghdad: Ministry of Planning, p. 15.
- Ministry of Planning and Economic Affairs, Government of Liberia. (2006). *National human development report Liberia, 2006*. Monrovia: Government of Liberia.
- Morton, M., & Burnham, G. (2008). Iraq's internally displaced persons. *JAMA*, 300, 727–729.
- Mowafi, H., & Spiegel, P. (2008). The Iraq refugee crisis. *JAMA*, 299, 1713–1715.
- Mullan, F. (2005). The metrics of the physician brain drain. *New England Journal of Medicine*, 353, 1810–1818.
- Norcini, J. J., & Mazmanian, P. E. (2005). Physician migration, education and health care. *Journal of Continuing Education in the Health Professions*, 25, 4–7.

- Ozerniy, I. (28 June, 2004). When doctors are victims. *US News and World Report* 30.
- Pincock, S. (2006). Salam Ismael. *Lancet*, 368, 359.
- Salman, S. (2006). A letter for a rheumatology colleague in Baghdad. *Journal of Clinical Rheumatology* 267–268.
- Shea, N. (27 August, 2007). Iraq's endangered minorities. *Washington Post*.
- UNHCR (2004, 2005, 2006, 2007). Refugees by numbers. www.unhcr.org. Accessed 25.04.08.
- UNHCR. (2005). Interagency Health Evaluation, Liberia, 2005: final report <http://www.unhcr.org/research/RESEARCH/456ac0682.pdf>. Accessed 20.12.08.
- Vujcic, M., Zurn, P., Diallo, K., Adams, O., & Dal Poz, M. R. (2004). The role of wages in the migration of health care professionals from developing countries. *Human Resources for Health*, 2, 3.
- Willis, E. A., & Taghipour, J. (1992). Effects of prolonged war and repression on a country's health status and medical services: some evidence from Iran 1979–90. *Medicine and War*, 8, 185–199.
- World Health Organization. (2008). http://www.who.int/whosis/database/core/core_select_process.cfm?country=irq&indicators=healthpersonnel Accessed 25.04.08.