

# Factors affecting the internal brain drain of Saudi healthcare professionals

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## ABSTRACT

**الأهداف:** تقييم العوامل التي تؤثر على نزوح الأدمغة الداخلية لتخصصي الرعاية الصحية في المملكة العربية السعودية.

**الطريقة:** لقد قمنا بإجراء دراسة مقطعية بواسطة التوزيع الإلكتروني لطلبات الاستبيان الذاتي التعبئة إلى مجموعة من الطلبة السعوديين في مجال الرعاية الصحية بأمريكا الشمالية. ولقد قمنا بجمع البيانات خلال الفترة من يناير إلى مارس 2008م. وقمنا بتحليل نتائج الدراسة باستخدام الانحدار اللوجستي.

**النتائج:** شملت الدراسة ما مجموعه 377 من طلبات الاستبيان التي رجعت إلينا بعد تعبئتها. وأشارت نتائج الدراسة بأن 71% من الطلبة كانوا ينوون العودة للعمل في مدينتي الرياض وجدة. ولقد كانت نسبة الطلبة الذين أكملوا دراستهم قبل التخرج في المدن الكبيرة يرغبون بالعمل في نفس المدينة وذلك بالمقارنة مع الطلبة الآخرين (2.0-5.2% = 95% CI;  $p=0.000$ ;  $OR=3.2$ ). وقد كان 51% من الطلبة يرغبون بالعمل في المدن الريفية إذا كان هناك زيادة في الراتب بنسبة 50% أو أكثر من ذلك. وكان الذكور أكثر رغبة بالعمل في المناطق الريفية مقارنة بالإناث وذلك من أجل الحافز المادي (1.3-4.3% = 95% CI;  $p=0.006$ ;  $OR=2.3$ ).

**خاتمة:** أظهرت الدراسة بأن الحافز المادي لا يكفي لجذب السعوديين للعمل في المناطق الريفية، ويعد توفير المدارس الصحية في المدن الصغيرة والمناطق الريفية فعالاً من أجل تحسين سوء توزيع الوظائف الصحية بين المناطق.

**Objectives:** To investigate factors affecting the internal brain drain of healthcare professionals in the Kingdom of Saudi Arabia.

**Methods:** A cross-sectional study was conducted using an anonymous self-administered online questionnaire sent to all Saudi students enrolled in healthcare profession programs in North America. The data was collected between January and March 2008 at the University of Illinois at Chicago, Chicago, Illinois, United States of America. Results were analyzed using logistic regression analyses.

**Results:** A total of 377 completed questionnaires were returned. Results revealed that 71% of respondents intended to return to work within the 2 major urban cities (Riyadh and Jeddah). Respondents who completed their undergraduate studies in a large city were more likely to work in the same city (odds ratio [OR]=3.2;  $p=0.000$ ; 95% confidence interval [CI] = 2.0-5.2). Furthermore, 51% of the students were willing to work in a rural area for a 50% or more increase in their salary. Finally, men were more willing to work in a rural area for a financial incentive (OR=2.3;  $p=0.006$ , 95% CI = 1.3-4.3).

**Conclusion:** This study suggests that realistic financial incentives would probably not suffice to attract Saudi healthcare providers to rural areas. The provision of medical schools in smaller cities and rural areas is predicted to be a more effective method for improving the current maldistribution of healthcare providers.

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**B**rain drain involves the transfer of human knowledge, experience, skill, and expertise from one area, region, country, or geographic location to another.<sup>1</sup> This process may occur within a country from less developed rural areas to more developed urban areas (internal brain drain), or between countries from underdeveloped poorer countries to developing and/or highly developed rich countries (external brain drain). The internal brain drain of educated and skilled people has become a problem in many African countries,<sup>1</sup> USA,<sup>2</sup> Canada,<sup>3</sup> Norway,<sup>4</sup> Kingdom of Saudi Arabia (KSA),<sup>5</sup> and others. The migration of healthcare professionals from rural to a more developed areas has been associated with many factors, including availability of professional support, the availability of facilities, and opportunity for continuing education.<sup>6</sup> Personal factors, such as closeness to family and friends, availability of child activities, and spouse preferences have also been reported as impacting factors.<sup>6</sup> Finally, economic factors such as higher income opportunities, practice cost, and employment opportunities for the spouse have also been reported as possible factors for the migration.<sup>6</sup> Wealthy and more developed areas with good facilities and financial resources attract more health professionals, than areas without such facilities, or financial resources.<sup>7</sup> In all countries regardless of per capita income, healthcare professionals disproportionately live in highly developed urban areas.<sup>7</sup> Worldwide, more than 75% of physicians, over 60% of nurses, and 58% of other health workers live in urban areas, and less than 55% of the overall population live in urban areas.<sup>7</sup> Similar to other countries, the imbalance of healthcare professionals' distribution among cities is also a problem in KSA. Major cities have attracted most Saudi healthcare professionals leaving a small proportion only for smaller cities and rural areas. In 1997, 85% of Saudi medical graduates reported they intended to practice in large cities.<sup>8</sup> However, studies have not explored factors affecting the choice of urban areas, and this study was conducted to investigate this issue in KSA. Proper allocation of human resources in any society helps provide equal access to health services and improve overall health outcomes. Serneels et al<sup>9</sup> in 2005 found that shortages of health professionals and the lack of coverage of health interventions affects the capacity to deliver services both in terms of volume and quality, concluding that the public's health suffers when health professionals are scarce. Therefore, the objective of this study was to investigate factors affecting the internal brain drain of healthcare professionals in KSA.

**Methods.** The research protocol was approved by the institutional review board (IRB) at the University of Illinois at Chicago as part of a dissertation research<sup>10</sup> (IRB#2006-0855). A cross-sectional study design was used. Data was collected using an anonymous self-administered online questionnaire sent to Saudi students pursuing healthcare professions in the United States and Canada between January and March 2008. This study was conducted at the University of Illinois at Chicago, Chicago, Illinois, United States of America. The questionnaire used in this study was original and written in English. An online survey website (<http://www.surveymonkey.com/>) was used to collect the responses. The Saudi Cultural Mission in the United States, at which all students were registered, provided the e-mail addresses of the students. A link to the survey's web page was sent to the participants via e-mail. Three follow up reminder e-mails were sent every 2 weeks. The study was conducted over 2 stages: a pilot and the final survey. A random sample of 30 students was invited to participate in the pilot study. The total population of 1249 students was included in the final study to have more precise data, and to eliminate the need for advanced knowledge of the population's characteristics. The survey questionnaire focused on the participant's choice for work location and factors, identified from the literature, which may affect their choice. More specifically, factors that would affect their choice to work in a rural area and/or small city (internal brain drain).

All analyses were carried out using the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL, USA) software for Windows version 16. Results were analyzed using binary logistic regression analyses, as all dependent variables used in different models were dichotomous. Univariate (simple) logistic regressions were first carried out to identify variables significantly related to the dependent variables (outcomes). To obtain the relative contribution of each predictor variable while controlling for the influence of the other variables, a multivariate logistic regression model was then fitted using a forward stepwise variable selection method when more than one variable was found significant in the univariate analyses. The chi-square for entry and removal was based on the likelihood ratio test. Two-sided  $p < 0.05$  was considered statistically significant. The Hosmer-Lemeshow test was used to assess the goodness of fit of the final model.

**Results.** The pilot study validated all but one question for the final study. Of the estimated 1249 participants contacted, 540 responded (43% response

rate). However, only 391 participants fully completed the questionnaire. Results from the final study showed that 14 students (4%) did not intend to return back to KSA. Of those returning (n=377), 71% chose to work in one of the 2 largest cities in the country (Riyadh or Jeddah). The proportion of students choosing to return to any city with a population size larger than one million (Dammam, Makkah, and Madinah) was 77%. Most students planned to work in the city where they were raised (67%), or in the city where they completed their undergraduate studies (57%). The total response count for the variables used in the regression analyses is shown in Table 1. Results of the univariate logistic regression analyses for factors affecting the working city of choice revealed that all factors were statistically significant except for age (odds ratio (OR) = 1.2;  $p=0.072$ ; 95% confidence interval (CI) = 0.98 - 1.5). The following

**Table 1** - Responses for regression variables and categories (N=377) results in a study conducted at the University of Illinois at Chicago, Chicago, Illinois, United States of America.

Explanatory variables	Categories	n	(%)
<i>Working city of choice</i>			
Large city (Riyadh or Jeddah)		266	(71.0)
Small city (others)		111	(29.0)
Work where undergraduate study was completed	Yes	215	(57.0)
Work where he/she was raised	Yes	251	(67.0)
Willingness to work in a rural area	Yes	323	(86.0)
Married		270	(72.0)
<i>Age</i>			
Less than 30 years		170	(45.0)
30 years and older		207	(55.0)
<i>Gender</i>			
Men		287	(76.0)
Women		90	(24.0)

factors increased the likelihood of choosing to work in a large city (Riyadh or Jeddah): working where undergraduate study was completed (OR = 3.4;  $p=0.000$ ; 95% CI = 2.1-5.4); working where the health professional was raised (OR = 1.7;  $p=0.018$ ; 95% CI = 1.1-2.8); being married (OR = 1.7;  $p=0.034$ ; 95% CI = 1.0-2.7); and being a woman (OR = 1.5;  $p=0.006$ ; 95% CI = 1.1-2.0). Multivariate logistic regression analysis results using the forward stepwise variable selection method are shown in Table 2. The dependent variable was also the choice of working city after completing postgraduate studies: large city (Riyadh or Jeddah) or small city (others). Work where undergraduate study was completed, marital status, and gender were entered into the model. Unlike the univariate analyses, work where the healthcare professional was raised (score = 1.61,  $p=0.205$ ), and age (score = 1.72,  $p=0.189$ ) were both removed due to statistical insignificance. The final model for the working city of choice was statistically significant ( $\chi^2 = 38.73$ ;  $p=0.000$ ). The goodness of fit (Hosmer-Lemeshow test results:  $\chi^2 = 2.76$ ,  $p=0.738$ ) indicate that the model adequately fit the data. Logistic regression results revealed that individuals who completed their undergraduate studies in a large city (Jeddah or Riyadh) were more likely to work in the same city (OR = 3.2;  $p=0.000$ ; 95% CI = 2.0-5.2). Furthermore, married healthcare professionals and women were more likely to work in large cities.

Data regarding the willingness to work in a rural area showed that 79% of men were willing to working in a rural area for financial incentive compared to women (21%). Fifty-one percent of the students were willing to work in the rural area for a 50% or more increase in their salary. Other students (22%) would accept working in the rural area for a 30-40% increase. While only 6% of

**Table 2** - Multivariate logistic regression model for factors affecting the working city of choice results in a study conducted at the University of Illinois at Chicago, Chicago, Illinois, United States of America.\*

Explanatory variables <sup>††</sup>	$\beta$	SE	Wald's $\chi^2$	P-value	Adjusted odds ratio (95% confidence interval)
Work where undergraduate study was completed, yes	1.17	0.24	23.73	0.000	3.2 (2.0-5.2)
Married	0.61	0.26	5.62	0.018	1.8 (1.1-3.1)
Women	0.36	0.16	5.24	0.022	1.4 (1.0- 2.0)
Constant	-0.30	0.25	1.43	0.232	0.7 (not applicable)
<i>Test</i>					
<i>Overall model evaluation</i>			38.73	0.000	
Wald's test					
<i>Goodness-of-fit test</i>					
Hosmer and Lemeshow			2.76	0.738	

\*The reference category of the dependent variable is: willingness to work in a small city (n=111). <sup>††</sup>The parameters of working where undergraduate study was completed = No, Marital status = unmarried; and Gender = Men were set to zero due to redundancy. <sup>\*</sup>Variables excluded from the model: Working where the healthcare professional worker was raised (Score = 1.61,  $p=0.205$ ), and Age (Score = 1.72,  $p=0.189$ ). SE - standard error

the students were willing to work in the rural area for the same salary as in their preferred city, 15% would never consider working in a rural area. The logistic regression analysis results for the willingness to work in a rural area showed that only gender had a statistical significant effect. Men were more willing to work in a rural area for a financial incentive (OR=2.3;  $p=0.006$ ; 95% CI=1.3-4.3). Many students commented on the waste of knowledge that occurs, if one was to move to a small city for practice, in addition to the income difference encountered. Respondents also mentioned that family reasons, such as spouses' work and the presence of school children made it impractical, if not impossible, to move to a truly underdeveloped rural areas. However, many respondents commented on their willingness to serve part-time in rural areas, to improve the shortage of healthcare providers in those areas.

**Discussion.** Internal brain drain caused by the preference of healthcare professionals for major cities has been a problem in many underdeveloped and developed countries including KSA.<sup>1-5</sup> The current study found that more than two-thirds of the respondents intended to return to one of the 2 major cities in KSA, and that more than three-fourths intended to return to a city with a population size larger than one million. This would aggravate the intra-country health disparities, and lead to public health crisis. Females were less likely to work both in rural areas and in smaller cities. Finally, the use of realistic financial incentives is not adequate to attract healthcare professionals to rural areas.

Professional characteristics, such as the presence of medical facilities and healthcare infrastructure can affect the choice of practice location. India's urban areas rejoice in almost 75% of all health infrastructure, medical manpower and other health resources, where only 25% of the population resides.<sup>11</sup> Similarly in KSA, with 71% of the private sector clinics and 50% of the medical dispensaries being concentrated in its 2 major cities (Riyadh and Jeddah),<sup>5</sup> it is not surprising to find that most healthcare professionals will be returning to these 2 cities, where they can apply their postgraduate knowledge and experience. Similar findings were reported in the USA, where the more highly specialized the physician was, the less likely he or she was to reside in a rural area.<sup>12</sup> In addition to the professional characteristics, demographic characteristics, such as gender are also influencing the choice of practice location. While the finding that men are more likely to work in a rural area might be attributed to the cultural and social environment of the country, the same was reported in the USA.<sup>12</sup> As the proportion of women in

medical schools has increased, there have been concerns that the supply of rural physicians might decrease if women continue to reside almost exclusively in urban areas, and the largest rural cities.<sup>13</sup> This problem was even more significant in the current study, as females were less likely to work both in rural areas, and in smaller cities.

The first and simpler method for reducing the problem and attracting healthcare professionals to rural areas would be a change in school admission policies to include more students with rural backgrounds. This has been suggested by other research studies based on the findings that students with rural origins are more likely to return to rural areas.<sup>14,15</sup> The findings of the initial univariate analysis of the current study further support the previous research conclusions. The second, more complex, and long-term effective method to attract healthcare professionals to rural areas includes the opening of new medical schools in rural areas and smaller cities. Other studies have found that rural postgraduate training can be successfully implemented,<sup>4</sup> and that it is strongly associated with ongoing rural practice, especially if the duration of study was longer.<sup>14,16</sup> In the current study, the final logistic regression model has further demonstrated that working where undergraduate studies were completed was more important for the choice of working city than where students were raised. The opening of medical schools for undergraduate studies would, therefore, be currently a more effective method to attracting healthcare providers. Finally, rural shortages may benefit from adopting the 'rural pipelines approach' as was carried out successfully in the USA, Canada, and Australia.<sup>17</sup> This approach focuses not only on early recruitment and admissions, but also on locating clinical education in rural settings, rural health focus to curriculum, and support for rural practice.<sup>17</sup>

Future research using multinational students investigating motives behind choosing the working city would shed additional light on the current problem. Furthermore, government sectors should investigate the effectiveness of part time employment, and the needed incentives for currently working physicians as a method to provide services to rural areas. Finally, more government scholarships should be allocated to the new medical schools in smaller cities in KSA to help further the increase of health professionals returning to these areas.

While the current study was limited to Saudi students studying in the US and Canada with a relatively low response rate, other studies with similar findings<sup>1-5</sup> have shown that the internal brain drain is a global problem. Most students in the current study were on scholarships

from the Saudi government, and are required to return to Saudi following their studies. Although the survey was anonymous, it would not be surprising that many students would not complete the survey for fear of affecting their scholarship, or due to possibilities of not intending to return to Saudi following their education. While this would more likely affect the external brain drain of healthcare professionals in Saudi, and not the internal brain drain studied in the current study, it would even cause a more serious problem to the country. Student's studying abroad should be made aware of the current problems in the country. This would possibly raise a sense of moral obligation to serve, at least for a time period, the country that provided them with the scholarships.

In conclusion, the current study has provided some insight into ways to reduce the maldistribution of healthcare providers not only for KSA, but also for other countries with similar problems. The findings have suggested that realistic financial incentives would probably not suffice to improve the distribution of healthcare providers. The provision of medical schools in smaller cities and rural areas and better research facilities would, therefore; be a more effective method to reducing the current and possibly future internal brain drain of healthcare professionals.

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