



ORIGINAL RESEARCH ARTICLE

# Central Admission to Medical Colleges and its impact on the rates of medical specialties in Iraq

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## Abstract

This study was conducted to identify the ration of males to females among graduate medical students, and to identify the impact of such ratio on the most required medical specialization in the Iraqi community. The study was conducted for the period from May 1 to July 31, 2012, as a retrospective study to the records of postgraduate medical students, and the reports of current medical specialization working in the Ministry of health. The results reveal an increase of female students from Iraqi Medical Colleges than that of males for the last 8 years. The study also reveals that there is a shortage of medical specialization particularly in general surgery and medicine and its sub-specialty all over Iraqi governorates. The study recommends giving more chance to the males in admission to Medical Colleges and the emphasis on the availability of at most needed medical specialization for females and males whom were graduated from medical colleges.

**Keywords:** medical students, graduates of medical college, gender & medical specialty

## Introduction

During the past century, some studies indicated that there was an increase of the females among physicians, accordingly the important medical specialties like surgery, medicine and its branches, declined because females prefer the easier type of medicine that in character with their body ability and appropriate socially<sup>1</sup>.

The provisions of secondary school students acceptance in college of medicine do not include any limitations other than their resulted marks in the last year of the secondary school, and not include public demand, community needs, or other factors like their genders, numbers, medical specialty, and that is to say appropriate limitations<sup>2</sup>. The present study designed to estimate the ratios of the males to the females students who are graduates from some Iraqi medical colleges, and its impact on the availability of the main medical specialties needed for public health.

This study estimates the ratios of the males to the female students who are graduates from some Iraqi medical colleges, and identifies the effect of male to female ratios of the graduated student from medical colleges, on the important medical specialties which are more needed by the Iraqi community (surgery and medicine).

## Samples and Methods

The present study depended on the retrospective measurements of the numbers of the students and their genders accepted in the Iraqi medical colleges and the lists of the graduated students during the last 9 years and from lists in the directory of the medical colleges. The available medical specialties also were measured, from the directories lists and reports of the health institutions, health centers and hospitals which belong to Iraqi Ministry of Health, then comparisons were made for those resulted data.

## Statistical analysis

Denominative and Inferential Statistical method were including observed frequency and percentages dependent to analyze the data by applying linear & non-linear regression model such as (inverse, quadratic, cubic, power, compound, S-shape, logistic, growth and exponential). They were illustrated the followings:

- Correlationship (person-coefficient).
- Long-term trend of linear & non-linear models.

$$\text{- Growth rate (r)} = \left( \frac{U_n}{a} \right)^{\frac{1}{n-1}}$$

Where  $n$  is the number of series (years),  $U_n$  is the series value at the end period, is the series value at the begging of

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the period. All calculation of results were obtained through applying SPSS and Excel programs.

**Results**

The results showed that there are continuous increases in the percentages of the graduated females from the Iraqi medical colleges, in comparisons with the graduated males students particularly at the end of the last eight years. This is clear in Tables 1–11 for Baghdad, Al-kindy, Al-Mustenseria, Neynawa, AL-Anbar, Al-Kufa, Diyala, Theiqar, Babil and Al-kadysiea Medical Colleges, respectively. The greatest increases of the female graduated students appeared in Table 9, which belongs to the Theiqar Medical College (86%) during the year 2010–2011. While the percentages of the females were 70% and more, in Diyala, Babil, Al-kadysea, and Al-Kufa Medical Colleges. (Tables 6–8, 10, 11, 6).

In review of medical specialties in the health institutions belong to Iraqi Ministry of Health, it appears there was a great demand for most of the medical specialties all over Iraqi governorates. The greatest demands were in the surgery and internal medicine and its subspecialties, such specialties were most probably occupied by male physicians (Table 12).

The reports of the Ministry of Health, for the year 2010 didn't show the distributions of the all medical specialties according to gender, but it showed the proportional of specialist to the 100.000 population<sup>14</sup>.

The growth rate will be fully stable at number 1, and decreasing when it achieves the result, which is less than the correct

**Table 1 Distribution of medical students by gender and academic years in the Faculty of Medicine - University of Baghdad**

Academic year	Males no.	%	Females no.	%
2003–2004	174	56.0	136	44
2004–2005	146	62.6	87	37.3
2005–2006	153	65.0	82	35.0
2006–2007	116	55.5	93	44.5
2007–2008	157	58.3	112	41.7
2008–2009	138	48.4	147	51.6
2009–2010	107	44.2	135	55.8
2010–2011	135	47.5	155	53.5
Growth rate	0.964		1.019	
Model	Inverse		Cubic	
Auto correlation	0.69070		0.95941	
Level of significant	0.058		0.011	
Long term trend				

**Table 2 Distribution of medical students by gender and academic year in Al-Kindi Faculty of Medicine - University of Baghdad**

Academic year	Males no.	Males %	Females no.	Females %
2004–2005	60	69	27	31
2005–2006	63	72.4	24	27.6
2006–2007	75	75.8	24	24.2
2007–2008	73	65.8	38	34.2
2008–2009	28	41.8	39	58.2
2009–2010	26	40.6	38	59.4
2010–2011	23	36	41	64
Growth rate	0.852		1.072	
Model	Linear		Linear	
Auto correlation	0.77368		0.86109	
Level of significant	0.0413		0.0128	
Long-term trend				

**Table 3 Distribution of medical students by gender and academic year in the Faculty of Medicine - Al-Mustansiriya University**

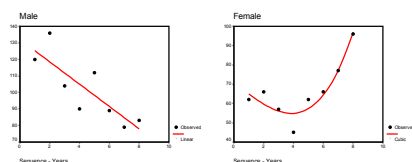
Academic year	Males no.	%	Females no.	%
2001–2002	233	59.4	159	40.6
2002–2003	163	57.5	120	42.5
2003–2004	129	51.4	122	48.6
2005–2006	100	50	100	50
2006–2007	84	45.6	108	54.3
2007–2008	120	52.4	119	47.6
2008–2009	105	45.6	135	54.4
2009–2010	105	48.6	111	51.4
Growth rate	0.892		0.950	
Model	Linear		Inverse	
Auto correlation	0.74810		0.75251	
Level of significant	0.0328		0.0312	
Long-term trend				

one and be growing the greater its value from the correct one. The results of the analysis model regression self-auto-regressive linear or non-linear time series surveyed rely on the analysis of variance self-regression to select the optimal model. Among the many models assumed was estimated correlation coefficient and self-test the Manueth with an indication of Figure

**Table 4 Distribution of medical students by gender and academic year in the Faculty of Medicine/Al-Musel 3+-University**

Academic year	Males no.	Males %	Females no.	Females %
2001–2002	120	14.76	62	11.68
2002–2003	136	16.73	66	12.43
2003–2004	104	12.79	57	10.73
2005–2006	90	11.07	45	8.47
2006–2007	112	13.78	62	11.68
2007–2008	89	10.95	66	12.43
2008–2009	79	9.72	77	14.50
2009–2010	83	10.21	96	18.08
Growth rate	0.949		1.064	
Model	Linear		Cubic	
Auto correlation	0.8288		0.9440	
Level of significant	0.011		0.021	

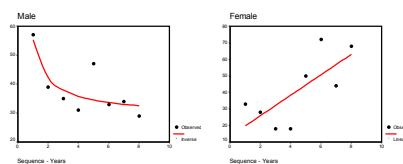
Long term trend



**Table 6 Distribution of medical students by gender and academic year in the Faculty of Medicine/Al-Kufa University**

Academic year	Males no.	Males %	Females no.	Females %
2003–2004	57	63.3	33	36.6
2004–2005	39	58.2	28	41.8
2005–2006	35	63.2	18	36.8
2006–2007	31	63.2	18	36.8
2007–2008	47	48.4	50	51.6
2008–2009	33	31.4	72	68.6
2009–2010	34	45.6	44	54.4
2010–2011	29	30.0	68	70.0
Growth rate	0.908		1.109	
Model	Inverse		Linear	
Auto correlation	0.80838		0.72269	
Level of significant	0.0152		0.0428	

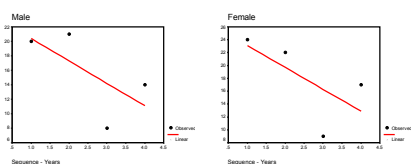
Long-term trend



**Table 5 Distribution of medical students by gender and academic year in the Ninawa Faculty of Medicine/Al-Musial University**

Academic year	Males no.	Males %	Females no.	Females %
2007–2008	20	45.5	24	54.5
2008–2009	21	47.7	22	52.3
2009–2010	8	47.0	9	53.0
2010–2011	14	45.0	17	55.0
Growth rate	0.888		0.891	
Model	Linear		Linear	
Auto correlation	0.66471		0.65677	
Level of significant	0.3353		0.3432	

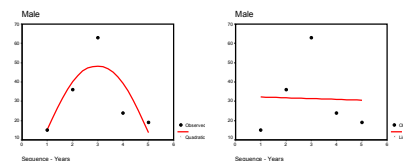
Long-term trend



**Table 7 Distribution of medical students by gender and academic year in the Faculty of Medicine/Al-Unbar University**

Academic year	Males no.	Males %	Females no.	Females %
2000–2001	15	40.5	22	59.5
2001–2002	36	58.2	19	41.8
2002–2003	63	60.5	41	39.5
2006–2007	24	60.0	16	40.0
2010–2011	19	32.7	39	67.3
Growth rate	1.061		1.154	
Model	Quadratic		Linear	
Auto correlation	0.816		0.033	
Level of significant	0.335		0.958	

Long-term trend

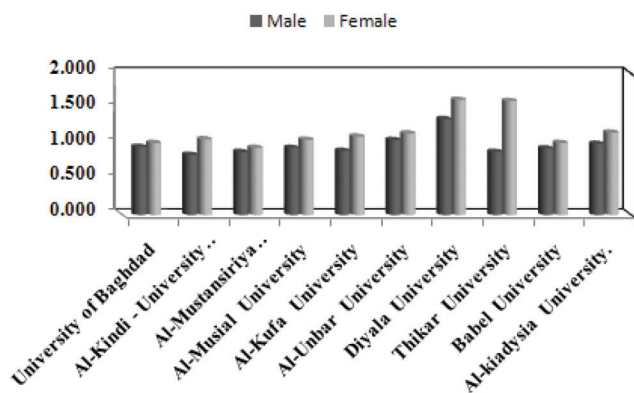


regression line associated timetable rebound of one degree lag 1 (i.e. the number of admissions in year  $t$  is affected by the number of admissions per year  $t-1$  ( Tables 1–11).

**Discussion**

The results of a current study reveal that there is an increase in the percentage of females between the grad-

uated medical students. These results were in agreement with the results of studies conducted in other countries in the Arab region or other World countries. In his study, Mohamed Al-Hamzany found that the number of female medical students was more than that of males in Saudia Arabia Universities. In spite of that, the number of female academic staff was less than that of male university staff.



**Figure 1** Cluster bar chart for the growth rates by gender and academic years in the Faculty of Medicine at the studied Universities.

**Table 8** Distribution of medical students by gender and academic year in the Faculty of Medicine/Diyala University

Academic year	Males no.	Males %	Females no.	Females %
2008–2009	4	22	14	78
2009–2010	10	30	23	70
2010–2011	12	34	23	66
2011–2012	10	31	22	69
Growth rate	1.357		1.630	
Model	Quadratic		S-Shape	
Auto correlation	1.000		0.927	
Level of significant	0.000		0.073	
Long-term trend				

**Table 9** Distribution of medical students by gender and academic year in the Faculty of Medicine/Thikar University

Academic year	Males no.	Males %	Females no.	Females %
2008–2009	5	17.6	10	82.4
2009–2010	10	50.0	10	50.0
2010–2011	4	13.3	26	86.7
Growth rate	0.894		1.612	
Model	Compound		Compound	
Auto correlation	0.23350		0.86603	
Level of significant	0.850		0.333	
Long-term trend				

**Table 10** Distribution of medical students by gender and academic year in the Faculty of Medicine/Babel University

Academic year	Males no.	Males %	Females no.	Females %
2003–2004	76	68.4	35	31.6
2004–2005	63	64.2	35	35.8
2005–2006	60	68.8	28	31.2
2006–2007	37	50.0	37	50.0
2007–2008	38	40.0	55	60.0
2008–2009	27	28.7	67	71.2
2009–2010	23	30.3	53	69.7
2010–2011	50	55.0	40	45.0
Growth rate	0.942		1.019	
Model	Cubic		Cubic	
Auto correlation	0.96340		0.93410	
Level of significant	0.0094		0.0291	
Long-term trend				

**Table 11** Distribution of medical students by gender and academic year in the Faculty of Medicine/Al-kiadysia University

Academic year	Males no.	Males %	Females no.	Females %
2002–2003	20	68.4	17	31.6
2003–2004	17	51.0	16	49.0
2004–2005	21	65.6	11	34.4
2005–2006	14	48.2	15	51.8
2006–2007	17	51.0	16	49.0
2007–2008	11	44.0	14	56.0
2008–2009	35	57.3	26	46.7
2009–2010	21	29.6	50	70.4
Growth rate	1.007		1.167	
Model	Linear		Cubic	
Auto correlation	0.28464		0.97805	
Level of significant	0.4944		0.0035	
Long-term trend				

On the other hand, the males chose the most dangerous and critical specialties. Al-Hamazany stated that the acceptance rate to the medical colleges was 25%, increased to 50% during the last 20 years<sup>1</sup>. Two-third of accepted students to Kuwait University was females. Those females get

**Table 12-1 Distribution of medical specialties in health institutions in Iraq ( Source : Report of Ministry of Health/2010)**

Name of specialty	Bagdad no.	Physician/ 100,000 pop	Diyala no.	Physician/ 100,000 pop	Highest rate	Lowest rate	Total/Iraq no./ rate 100,000 pop.
Internal medicine	228	2.98	20	1.17	4.23 Basra	1.17 Diyala	899/2.98
General surgery	260	2.40	31	1.18	4.23 Basra	1.35 Thiqr	884/2.93
Gynecology & obstetrics	252	2.20	31	1.81	5.7 Basra	1.4 Mesan. Unbar	867/2.87
Pediatrics	303	2.96	36	2.10	6.20 Karbala	1.11 Muthana	1026/3.40
Infertility	9	0.12	0	0.00	0.12 Baghdad	0.00 most gov	11/0.05
Ear, Nose, Thorax	103	1.35	12	0.7	1.62 Basra	0.56 Thiqr	345/1.14
Ophthalmology	71	0.93	3	0.17	1.59 Najaf	0.81 Diyala	363/1.20
Orthopedics	111	1.45	9	0.52	2.36 Basra	0.00 Thiqr	117/0.39
Uro-surgery	40	5.52	4	0.52	0.96 Sulymaniah	0.00 most gov	159/0.53
Nero-surgery	42	0.55	2	0.12	2.36	0.00 Thiqr	117/0.39
Dermatology	67	0.88	6	0.35	0.88 Baghdad	0.29 Muthana	205/0.68
Neurology	18	0.24	3	0,17	0.24	0.00 Muthana	59/0.20
Pediatrics surgery	9	0.12	1	0,06	0.12 Baghdad	Mesan, waste	49/0,16
Emergency	7	0.09	2	0,12	0,09 Baghdad	Most gov	13/0,04

**Table 12-2 Distribution of medical specialties in health institutions in Iraq (Source: Report of Ministry of Health/2010)**

Name of specialty	Baghdad number	Baghdad rate physician/ 100,000 pop	Diyala no.	Diyala rate physician/ 100,000 pop	Highest rate	Lowest rate	Total/Iraq no./rate
Urology	2	0.03	0	0.00	0.03 Baghdad	0.00 most gov	6/0.02
Cardiology	45	0.59	0	0.00	0.59 Baghdad	Most gov 0.00	64/0.23
Gastroenterology	0	0.00	0	0.00	0.22 Babel	0.00 most gov	9/0.03
Immunity	17	0.22	0	0.00	0.22 Baghdad	0.00 most gov	46/0.15
Oncology	27	0.35	0	0.00	0.35 Baghdad	0.00most gov	31/0.10
Genetics	1	0.01	0	0.00	0.01 Baghdad	0.00 most gov	1/0.01
Hematology	54	0.71	4	0.23	0.71 Baghdad	0.00 most gov	128/0.42
Family medicine	71	0.93	2	0.12	0.93	0.00 Unbar. Muthana	140/0.46
Pharmacology	3	0.04	0	0.00	0.3 Basra	0.00 most gov	18/0.06

the best academic performance, so they occupy 60–70% of medical seats. While the males will get 30–40% of the seats only<sup>2</sup>, the increase of females in the medical colleges as the current study reveals, may be due to the effects of social environment on the males more than females. Engagement of males with their peers outside homes to some critical social activities having fun at a play or smoking halls particularly a young people to spend a long time outside the home and away from parental control, and is far from academic communication, which affect his progress in education. The presence of females in the house under the supervision of her parents supports her to promote from the education point of view.

Physicians in the Royal College, London, finds in their study that the number of female doctors will be more than that of male doctors within the next decade<sup>1</sup>. But the study cautioned that women were more likely to choose specialties that offer flexibility; thus sparking shortages

in fields like emergency medicine and surgery. Across that study, 43% of all women doctors are under the age of 35, so many will not yet have started families<sup>1</sup>. To determine the impact of increasing numbers of females in medicine, on the physician work force in Australia, Canada, England, and the United States, McMurry *et al.* in his study, stated that women now make up nearly half of all medical students in all 4 countries and 20% to 30% of all practicing physicians. Most women are concentrated in primary care specialties and obstetrics/gynecology and are underrepresented in surgical training programs. Women physicians practice largely in urban settings and work 7 to 11 fewer hours per week than men do for lower pay<sup>2</sup>. About 20–50% of women as a primary care physicians are in part-time practice. McMurry *et al.* concluded that work force planners should anticipate larger decreases in physician full-time equivalence than previously expected because of the increased number of women in practice and

their tendency to work fewer hours and to be in part-time practice, especially in primary care<sup>1-3</sup>. For the mentioned results, Canada has developed a detailed database of work/family issues; England has pioneered flexible training schemes and reentry training programs, and Australia has joined consumers, physicians, and educators in improving training opportunities and the work climate for women. Improved access to surgical and subspecialty fields, training and practice settings that provide balance for work/family issues, and improved recruitment and retention of women physicians in rural areas will increase the contributions of women physicians<sup>2,4</sup>. A study was conducted in Nepal to find perceived perceptions for the increase of females, and to study the perceived impact on teaching-learning activities, medical school infrastructure and possible perceived changes in the doctor-patient relationship<sup>6,9,11</sup>. The results showed that women doctors can serve as a source of inspiration and the overall impact on Nepal would be positive. The study concluded that participating students perceived the increasing number of female medical students, which may be due to changes in the Nepalese society<sup>3,5,8</sup>. The recent Canadian study found that significant differences in practice characteristics and service mix and pattern between men and women. Another change involves differences in the way of men and women communicate. One lawyer noted that most medical lawsuits involve a breakdown in communication between doctor and patient. He stated that very few female physicians have been the target of malpractice suits even in high-risk specialties such as obstetrics and anesthesiology<sup>4,10</sup>. Regarding the rates of medical specialty in Iraq, the report of the Iraqi Ministry of Health displayed<sup>14</sup>. Although these rates calculated per 100,000 pop., it is calculated per 10,000 pop in other countries according to the WHO reports<sup>13</sup>. Highest rate of the medical specialty in Iraq ranges from 4 to 6/100,000 pop. It means that 0.4–0.6/10,000 pop. While the rates of medical specialty in Algeria (11/10,000), in Saudi Arabia were (24.3 /10,000 pop.), in Al-Bhrin (27/10,000 pop.). In Canada, Bulgaria, Beljika, in Belorussia and Cuba, the rates were (19/10,000), (37/10,000), (42/10,000), (42/10,000) and (59/10,000 pop.), respectively. In comparison with some African countries showed that Chad (<1/10,000), Congo (1/10,000), and Djibouti (2/10,000 pop)<sup>13</sup>.

### Conclusion and Recommendations

Iraqi work force planners should anticipate a larger decrease of males in the most needed Medical specialty because of the increased number women doctors in practice and their

tendency to get the most flexible specialty, and to work fewer hours especially in primary health care. Also the rates of medical specialty were low when compared with that of other countries.

Recommendation to the Health system in Iraq to focus on increasing rates of medical specialties in a scientific, realistic and particular specialties, giving more opportunity for males for admission to medical schools. As well as to encourage females to apply for critical specialties and competencies witnessing a clear lack such as surgical specialties and sub-specialties of internal medicine. Conduct a detailed national study to visualize and verify accurate information about the distribution of medical specialties according to gender in all health institutions with support from the Ministry of Health and Ministry of Higher Education and Scientific Research. Lastly to conduct a study about the deteriorated academic achievement of the male students, which decreases their rate for admission to the medical colleges.

### Competing interests

The authors declare that they have no competing interests.

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