



Medical School Entrance Examination Reform and Affirmative Action as Counter Measures to Improve the Lower Incidence of Female Doctors in Japan

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ABSTRACT

Objective: In many Japanese medical schools, pass rates of males were higher than those of females although in Japan there are already fewer female candidates for medical schools in comparison with Western countries. Thus, we investigated some factors that cause an inordinately large effect on lower female success rates or higher female enrolment ratios for medical schools, from public medical schools by multiple regression analysis. **Methods:** A multiple regression analysis was conducted on the two dependent variables, female success ratio and female enrolment ratio. Explanatory variables included the weightage of the second exam; the value given to maths and science subjects; the quotas for the second intake; the ranking of the medical school; the year of establishment of the medical school; and the population of the city where the medical school is located. **Results:** Increased weightage accorded to maths and science subjects caused significantly severe difficulties in the candidature of female candidates. Furthermore, medical schools with significantly higher female enrolment ratios were relatively new. **Conclusion:** These results represent the backwardness of Japan in gender equality. To mitigate this situation, the entrance examination process of medical schools must first be reformed.

Keywords: Gender gap, Medical school, Quota restrictions, STEM education

INTRODUCTION

So far, many published papers pertained to the gender gap, disparity, and inequality in authorship, peer reviews, and scientific positions, especially in Japan [1-7]. Furthermore, Japanese mass media reported dishonorable news on the gender disparity in the average success rates in the entrance examinations of a certain medical school in Japan [8-10]. In response to this news, the Japanese Ministry of Education investigated the entrance examination outcomes for the last 6 years at all 81 medical schools, including 50 public and 31 private institutions. The survey yielded the results in 63 (78%) medical schools; pass rates of males were higher than those of females although in Japan there are already fewer female candidates for medical schools in comparison with Europe and the United States [11]. In Western countries, more women have entered the medical profession in the past 20 years, changing the situations towards greater gender balance in the field [12].

Why then, are the number of female applicants to medical school fewer, and why are the numbers of women doctors so low in Japan when compared with other Organization for Economic Co-operation and Development (OECD)-associated countries? The reasons appear to lie not only in the lower female success rate in entrance examinations for medical schools but also in certain cultural differences between Japan and the Western nations. In Japan, medicine has been considered to be a male profession since ancient times, and this long-established belief perhaps still plays a latent role in medical school admissions. It could be posited that female preparatory students tend to avoid entering difficult university courses across departments and/or their parents encourage them to select easier subjects more suited to their social roles because of concerns about the women remaining single. Alternatively, female students may select a medical school in urban areas close to their family homes as most candidates reside in cities and towns and their parents do not permit them to live alone at remote locations. Generally, medical schools in urban locations in Japan are

more difficult to enter than those in the provinces. In addition, admission into Japanese medical schools is inherently the most difficult among all the disciplines of higher education because of the quota restrictions.

Total 31 private medical schools in Japan wield absolute discretion on selection, and it is hard to compare them, but 50 public medical schools employ similar methods of screening candidates. These institutions hold either one or two selection processes for admission each year. Applicants are chosen on the basis of scores obtained in the common entrance exam for university (the National Center Test for University Admissions), followed by a second testing procedure operated by the individual medical school at each intake and a viva voce or an interview.

Thus, the authors of this article investigated some factors that cause an inordinately large effect on lower female success rates or higher female enrolment ratios for medical schools, using 2018 data from all 50 public medical schools by multiple regression analysis.

MATERIALS AND METHODS

A multiple regression analysis was conducted on the two dependent variables, female success ratio, and female enrolment ratio. Explanatory variables included the weightage of the second exam; the value given to maths and science subjects, which are based on STEM (Science, Technology, Engineering, Mathematics) education in Japan; the quotas for the second intake; the ranking of the medical school; the year of establishment of the medical school; and the population of the city where the medical school is located. Data were obtained from published information of general entrance exam in each medical universities. Forced entry methods were used in performing multivariate analysis.

SPSS version 23.0 Japan for Windows (SPSS Inc., Chicago, IL, USA) was used to perform a statistical test. Two-tailed p-values of <0.05 were considered significant. Ethical approval was granted by the GUGSM Ethics Committee (date: 11/30/2016, reference number: 28-333).

RESULTS

Two public medical schools did not disclose the ratio of female success, and one medical schools did not disclose both female success ratio and female enrolment ratio. Thus, the authors of this article analyzed completed data obtained from 47 public medical schools.

The results revealed that increased weightage accorded to maths and science subjects caused significantly severe difficulties in the candidature of female candidates (Table 1). Moreover, the low success rates of female candidates were negatively related to increased weightage in the second examination and the quotas applicable to the latter intake.

Table 1 Multiple regression analysis with dependent variables as female success ratio for medical school

Variable	Estimate	Std. Error	t value	p-value
(Intercept)	-0.1339	1.691	-0.079	0.9373
Established year of medical school	-0.00386	0.002301	-1.678	0.1012
Population of the city where has the medical school	0.000066	0.000261	-0.253	0.8019
Ranking of medical school	0.0305	0.0272	1.121	0.2688
Rate of quota at latter term	-0.3264	0.2066	-1.58	0.122
Much importance on the second exam	-0.07512	0.4234	-0.177	0.8601
Much importance on maths and science subjects	-1.262	0.5615	-2.248	0.0301

Conversely, Table 2 demonstrates that medical schools with significantly higher female enrolment ratios are relatively new. Variance inflation factors for each variable were less than 3.

Table 2 Multiple regression analysis with dependent variables as female enrolment ratio for medical school

Variable	Estimate	Std. Error	t value	p-value
(Intercept)	13.76211	45.011542	0.306	0.76131
Established year of medical school	-0.204988	0.061169	-3.351	0.00171
Population of the city where has the medical school	0.001463	0.006146	0.238	0.81298
Ranking of medical school	0.777793	0.730747	1.064	0.29324
Rate of quota at latter term	-9.081134	5.497162	-1.652	0.106
Much importance on the second exam	-20.817602	12.070431	-1.725	0.09194
Much importance on maths and science subjects	-17.353055	15.181602	-1.143	0.2595

DISCUSSION

This finding may indicate the existence of the conceptual cultural construct of the suitability of the medical occupation for women and the tendencies and thought processes behind the selection of disciplines and institutions as have been previously described. Table 1 shows that increased weightage of maths and science subjects gets males an advantage in Japan. Several articles suggest that there is no difference between men and women who score points of the maths and science in more advanced [13,14]. The result of Table 1 reveals the backwardness of Japan in gender equality.

Moreover, Table 2 indicates that Japanese male candidates tend to choose more authorized universities than female candidates. As graduates from authorized universities can become a leader of the institution, these results may affect the backwardness of Japan in gender equality.

To raise the number of female doctors to the levels of those in other OECD-associated countries, people across all strata of Japanese society must collaborate to transform the lifestyles of women through a long-term education programme. In spite of the fact that Prime Minister, Shinzo Abe has trumpeted his belief in the promotion of gender equality as a part of the reform of working practices, the issue has not essentially changed for hundreds of years in Japanese society, due to the observance of senses of ethics, morality and to values for the doctor. To mitigate this situation, the entrance examination process of medical schools must first be reformed. The undue weightage accorded to maths and science subjects at the secondary level; the reduction of the value placed on the second testing procedure; and a decrease in the quotas for the latter intake are desirable for more women to apply and be accepted into medical schools. These reforms are, however, expected to be minimally effective. For a more drastic transformation, an affirmative action policy should be mandated for women who wish to enter medical schools.

CONCLUSION

These results represent the backwardness of Japan in gender equality. To mitigate this situation, the entrance examination process of medical schools must first be reformed.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

- [1] Restar, Arjee J., and Don Operario. "The missing trans women of science, medicine, and global health." *The Lancet*, Vol. 393, No. 10171, 2019, pp. 506-08.
- [2] Matsui, Tomoko, et al. "Professional identity formation of female doctors in Japan-gap between the married and unmarried." *BMC Medical Education*, Vol. 19, No. 1, 2019, 55.

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- [3] Katai, Miyuki, et al. "Reducing the gender gap in academic activities: a 10-year progress report by the Japan Endocrine Society Women Endocrinologists Association, JES-We-Can." *Endocrine Journal*, 2019, EJ18-0501.
- [4] Steinberg, Jacob J., Catherine Skae, and Barbara Sampson. "Gender gap, disparity, and inequality in peer review." *The Lancet*, Vol. 391, No. 10140, 2018, pp. 2602-03.
- [5] Yamazaki, Yuka, et al. "Exploring attractiveness of the basic sciences for female physicians." *The Tohoku Journal of Experimental Medicine*, Vol. 244, No. 1, 2018, pp. 7-14.
- [6] Chatani, Yuki, et al. "Factors associated with attainment of specialty board qualifications and doctor of medical science degrees among Japanese female doctors." *Academic Medicine*, Vol. 91, No. 8, 2016, pp. 1173-80.
- [7] Nomura, Kyoko, et al. "The difficulty of professional continuation among female doctors in Japan: a qualitative study of alumnae of 13 medical schools in Japan." *BMJ Open*, Vol. 5, No. 3, 2015, e005845.
- [8] Kyodo News. "Tokyo Medical University discriminated against female applicants by lowering entrance exam scores." *The Japan Times*, Aug 8, 2018, <https://www.japantimes.co.jp/news/2018/08/02/national/tokyo-medical-university-discriminated-female-applicants-lowering-entrance-exam-scores-sources/#.XK1-9ugzbIU>.
- [9] McCurry, Justin. "Tokyo medical school admits changing results to exclude women." *The Guardian*, Vol. 8, 2018.
- [10] Dyer, Owen. "Tokyo medical school investigates claims that it rigged exam results to turn women away." 2018, *The BMJ*, Vol. 362, k3416.
- [11] Kyodo News. "More men pass entrance exams than women at 80% of Japan's medical schools: survey." *The Japan Times*, Sep 5, 2018, <https://www.japantimes.co.jp/news/2018/09/05/national/social-issues/men-pass-entrance-exams-women-80-japans-medical-schools-survey/#.XK2A3-gzbIU>.
- [12] Brüggmann, Dörthe, and David A. Groneberg. "An index to characterize female career promotion in academic medicine." *Journal of Occupational Medicine and Toxicology*, Vol. 12, No. 1, 2017, 18.
- [13] Stoet, Gijsbert, and David C. Geary. "Sex differences in academic achievement are not related to political, economic, or social equality." *Intelligence*, Vol. 48, 2015, pp. 137-51.
- [14] O'Dea, R. E., et al. "Gender differences in individual variation in academic grades fail to fit expected patterns for STEM." *Nature Communications*, Vol. 9, No. 1, 2018, 3777.