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Note

Running head: FACTORS AFFECTING VPCAMP APPLICANTS

Title: Factors affecting the number of applicants for the veterinary public health internship programs (VPcamp programs)

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ABSTRACT

During fiscal years 2014-2018, a total of 254 internship programs were held by local government organizations under the VPcamp project, a project sponsored by the Japanese Ministry of Education, Science and Technology. We conducted a Poisson regression analysis using the number of applicants for each program as dependent variable and potential factors as independent variables that might affect the number of applicants. The factors that were found to significantly affect the number of applicants were: the program opening date; the type of venue where the program took place; the target grades of veterinary students; the regional location of the local government that organized the program; and the proximity of the local government from a veterinary school.

KEY WORDS

Poisson regression analysis, veterinary education, veterinary public health internship programs (VPcamp programs)

There is an increasing demand for civil servant veterinarians to have a practical and advanced knowledge and skills in animal and public health [6]. To this end, a project sponsored by the Ministry of Education, Culture, Science and Technology, has been underway since 2011 to establish a system that provides veterinary public health internship programs (VPcamp programs) targeting veterinary students who wish to become civil servants. VPcamp programs take place at national and local government sites. The aim of these programs is to provide veterinary students with opportunities to gain advanced and practical knowledge on animal health and veterinary public health as well as providing opportunities for them to experience official duties of civil servant veterinarians. The VPcamp programs are provided in spring and summer seasons when most veterinary students are free from school duties. During the course of undertaking this project as a secretariat, we found that some programs are popular with many applicants while others were not, in particular those organized by local governments. In this study, we analyzed data on VPcamp programs organized by local governments with the aim of identifying factors that would affect the number of applicants for these programs [7].

There are 17 veterinary schools in Japan--ten national, one prefectural and six private schools. Geographically, three schools are located in Hokkaido, two in Tohoku, five in Kanto, one in Chubu, one in Kinki, two in Chugoku, one in Shikoku and two in Kyushu regions. The one in Shikoku was established in 2018. Around 1,000 students enter these schools every year and undergo six year course of veterinary education. As a result, there are always around 6,000 veterinary students who are eligible to apply for VPcamp programs. In 2017, 21% of newly licensed veterinarians went into the public sector and became either national or local government civil servants upon graduation. Of the total of 38,975 veterinarians registered as of 31 December 2016, 9,350 (24%) were civil servants engaged in undertaking official animal and public health duties [4].

VPcamp programs are held during summer season (1 August-30 September) and spring season (mid-February-31 March) every year when most veterinary students are free from school duties. National and local government entities that are willing to offer programs develop VPcamp programs by mid-May and mid-December for summer and spring seasons, respectively. The VPcamp Secretariat uploaded details of these programs on its website (<https://www.vetintern.jp/>) by the end of May and by mid-December to inform students of the programs to be held in the coming summer and spring seasons, respectively. Students who wish to participate in one of these programs apply using the application system on the website, in June to early July and in mid-December to January [5]. The information about the programs provided through the website includes opening date, duration, internship venue and daily schedule of each program, maximum number of students to be accepted and target grades of students. Students who have successfully gone through the application process participate in a program and undergo practical internship training on animal health and veterinary public health. A veterinary student is eligible to apply for one program in one season [5]. Internship venues include such facilities as National Institute of Animal Health, National Institute of Infectious Diseases, Animal Quarantine Service, National Veterinary Assay Laboratory, prefectural or municipal public health centers, environment hygiene related facilities, meat hygiene inspection centers, slaughterhouses, livestock hygiene service centers, zoological parks and animal shelters and other animal welfare-related facilities [5].

A total of 273 programs were held throughout the nine seasons from the spring season of fiscal year 2014 to spring season of fiscal year 2018. Of these programs, 21 programs were organized by national government entities and 252 programs by local government entities [8-10]. While most of the programs organized by national government entities are popular and gain many applicants, fulfilling the maximum number of students to be accepted, there are programs organized by local governments for which only a few or no students apply. For this reason, we have subjected the 252

programs organized by local governments to our analysis with an objective of identifying factors that might affect the number of applicants for these programs. Data included in the database for each program are: number of applicants, maximum number of students to be accepted, duration, fiscal year when the program is held, opening date of the program (by half month), internship venue where the program took place, type of the local government, whether the program was open to all grades or limited grades, proximity of the prefecture where the program was held to the nearest veterinary school, regional location of the prefecture where the program was held (Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, Kyushu and Okinawa regions), annual number of tourists who visited the prefecture and number of livestock units of the prefecture where the program was held [3]. We included the last two factors because we considered that the touristic attractiveness and the importance of livestock industry of the prefecture might affect the willingness of the students to apply for the program organized by entities of that prefecture. The annual number of tourists visiting each prefecture was based on the statistical study conducted by the Japan Tourism Agency [1]. The number of livestock units for each prefecture was calculated using the number of dairy and beef cattle, pigs and layer and broiler chickens reared in each prefecture with conversion factor of 1, 5 and 100 respectively [3].

We assumed that the number of applicants for each program follows Poisson distribution and that the probability of a student applying for a program is affected by the aforementioned potential factors. Based on such an assumption, we constructed a Poisson regression model with the number of applicants as dependent variable, and with the potential factors as independent variables. The distributions of variables used in the analysis are summarized in Table 1. Using a stepwise method and AIC value, we adopted a model with the maximum number of acceptable students, opening date of program, types of internship venue in the programs, whether or not the program is open to all grades or limited grades, regional location of the local government, proximity of the local

government from a veterinary school, as independent variables. Statistical analysis was performed using a free software R (R Foundation for Statistical Computing, Vienna, Austria). We checked that the observed data fitted a Poisson distribution using a normal Q-Q plot.

As a result of the Poisson regression analysis, the factors that were found to significantly affect the number of applicants include: the fiscal year when the program was held; opening date of program; type of internship venue in the program; target grades of veterinary students; regional location of the local government that organized the program; proximity of the local government from a veterinary school.

The fiscal year when the program was held: As the number of programs held per year increased over the years, the number of applicants per program have tended to decrease, with significant reduction by 46.9% ($e^{-0.633}-1 = -0.469$) in the fiscal year 2018 compared with the fiscal year 2014.

The opening date of program: Programs held in the first half of August was 51% less attractive ($e^{-0.715}-1 = -0.510$) in terms of the number of applicants than the programs held in other time of year. This is probably because in many veterinary schools, end-of-term examinations are held at this time of the year.

Type of internship venues where the program took place: Programs that include animal welfare-related facility as internship venue were 37% more attractive ($e^{0.315}-1 = 0.37$) than those that do not. Programs that have environmental hygiene facilities and zoological parks were more attractive than those that do not, with no significant difference.

Target grades of veterinary students: Programs that are open to all grades of students were 53% more attractive than those that are open to limited grades ($e^{0.426}-1 = 0.531$).

Regional location of the local government that organize the program: Programs organized by a local government in Hokkaido and Tohoku region, Kanto region and Kinki region were 69%, 114% and 47% more attractive, respectively ($e^{0.525}-1 = 0.69$, $e^{0.763}-1 = 1.14$ and $e^{0.387}-1 = 0.47$, respectively)

than those organized by a local government in Kyushu and Okinawa region. On the contrary, programs organized by a local government in Chugoku region were 41% less attractive ($e^{-0.523}-1 = -0.41$) than those organized in Kyushu with no significant difference.

Proximity of the local government from a veterinary school: Programs organized in the proximity of a veterinary school attracted 86% more students ($e^{0.620}-1 = 0.86$) than those organized by a local government in a far distance from a veterinary school.

This study is the first attempt to identify factors that affect the number of applicants for internship programs for veterinary students. In Japan a relatively large proportion of veterinary students go into the public sector upon graduation compared with most European and other countries [4]. Since the uneven geographical distribution of civil servant veterinarians by prefecture is a big political issue in Japan, there has always been a discussion on how to improve this situation [2]. The results of this study provide information useful in developing more attractive VPcamp programs in the future, in particular, programs in regions other than Hokkaido, Tohoku and Kanto regions and remote from veterinary schools. This can be achieved by conducting programs in these regions during the most attractive season, at animal welfare-related facilities as internship venue with students of any grades. The VPcamp will thus create more matching opportunities between local governments and veterinary students who want to become civil servants.

References

1. Japan Tourism Agency. 2018. Overnight Travel Statistics Survey (second preliminary report for December 2018). http://www.mlit.go.jp/kankocho/en/kouhou/page01_000326.html [accessed on March28, 2019]
2. Ministry of Agriculture, Forestry and Fisheries. 2010. Basic Policy to Improve System that Provides Veterinary Medical Service in Japan, August 2010. <http://www.maff.go.jp/j/syouan/tikusui/attach/pdf/vetkakuho-7.pdf> [accessed on March28, 2019]
3. Ministry of Agriculture, Forestry and Fisheries. 2019. Livestock Statistics 2018. <http://www.maff.go.jp/j/tokei/kouhyou/tikusan/> [accessed on March28, 2019]
4. Ministry of Agriculture, Forestry and Fisheries. 2019. Situation of Veterinary Profession in Japan. <http://www.maff.go.jp/j/syouan/tikusui/zyui/attach/pdf/index-8.pdf> [accessed on March28, 2019]
5. Ministry of Education, Culture, Science and Technology, 2015. VPcamp Manual. http://www.mext.go.jp/component/a_menu/education/detail/_icsFiles/afieldfile/2016/11/16/1379513_2_4.pdf [accessed on March28, 2019]
6. Ministry of Education, Science and Technology. 2014. Discussion Outline of the Conference between Study and Research Collaborators on the Improvement and Enforcement of Veterinary Education in Japan June 2014. http://www.mext.go.jp/b_menu/shingi/chousa/koutou/051/gaiyou/_icsFiles/afieldfile/2014/07/08/1349326_01_1_1.pdf [accessed on March28, 2019]
7. Takahata, N. and Sugiura, K. 2017. Developing Advanced Internship Programs for Veterinary Students Wanting To Become Official Veterinarian. *Japan Journal of Veterinary Epidemiology* **21**: 137-139.

8. VPcamp Secretariat. 2015. Annual Report for Fiscal Year 2014 on the Project Promoting Education for Official Veterinary Duties.
<https://www.vetintern.jp/wp/wp-content/uploads/2017/12/2d4fbcfee563c8aa9c737ce5d41725c9.pdf> [accessed on March28, 2019]
9. VPcamp Secretariat. 2016. Annual Report for Fiscal Year 2015 on the Project Promoting Education for Official Veterinary Duties.
<https://www.vetintern.jp/wp/wp-content/uploads/2017/12/f879a02ac758144d2db51dd695865c6e.pdf> [accessed on March28, 2019]
10. VPcamp Secretariat. 2017. Annual Report for Fiscal Year 2016 on the Project Promoting Education for Official Veterinary Duties.
<https://www.vetintern.jp/wp/wp-content/uploads/2017/12/f879a02ac758144d2db51dd695865c6e.pdf> [accessed on March28, 2019]

Table 1 Distribution of variables (n=252)

Variable	Distribution
Number of applicants	Average: 1.774; Standard deviation (SD): 2.120; Minimum:0; Maximum: 16
Maximum number of students to be accepted	Average: 2.929; SD: 1.817; Minimum: 1; Maximum: 15
Program duration (days)	Average: 4.972; SD: 0.996; Minimum: 3; Maximum: 10
Fiscal year when the program was held	Fiscal year 2014: 4.0%; fiscal year 2015: 17.1%; fiscal year 2016: 26.6%; fiscal year 2017: 23.4%; fiscal year 2018: 29.0%
Opening date of the program	First half of August:11.1%; second half of August: 41.6%; first half of September: 25.4%; second half of September: 3.6%; first half of February: 3.5%; second half of February: 18.3%; first half of March: 23.4%; second half of March: 3.6%
Type of facility that receives veterinary students in the program	Prefecture or municipal head office and Public Health Service Center: 68.7%; Environmental hygiene related facilities: 38.1%; Meat hygiene inspection centers and slaughterhouses: 77.4%; Animal welfare related facilities: 64.7%; Zoological parks and aquariums: 8.7%; Livestock hygiene service center: 11.9%
Target grades of students	Open to limited grades: 84.5%; open to all grades: 15.5%
Type of local government organizing the program	Prefectural government: 67.5%; Cities designated by Cabinet Order: 16.7%; Core cities: 15.8%
Regional location of the local government organizing the program	Hokkaido and Tohoku region: 9.9%; Kanto region: 13.9%; Chubu region:27.0% ; Kinki region: 13.1%; Chugoku region: 11.1%; Shikoku region:10.7%; Kyushu and Okinawa region: 14.3%
Proximity of the local government from a veterinary school	A veterinary school exists in the prefecture where the program is held or in the neighboring prefectures: 57.9%; no veterinary school exist in the prefecture where the program is held or in the neighboring prefectures: 42.1%
Annual number of tourists visited in the prefecture where the program was held	Average: 3,077,000; SD: 2,246,000; Minimum: 701,000; Maximum: 9,398,000
Number of livestock units in the prefecture where the program was held	Average: 134,665; SD: 276,176; Minimum: 2,718; Maximum: 1,422,128

Table 2 Result of the Poisson regression analysis

Coefficients	Estimate	Standard error	Z value	P value	
(Intercept)	-0.417	0.321	-1.299	0.1939	
Maximum number of students allowed for the program	0.149	0.021	6.975	0.0000	***
Fiscal year when the program was held (Reference: fiscal year 2014)					
Fiscal year 2015	-0.296	0.250	-1.184	0.2365	
Fiscal year 2016	-0.331	0.238	-1.394	0.1633	
Fiscal year 2017	-0.164	0.238	-0.687	0.4920	
Fiscal year 2018	-0.633	0.250	-2.537	0.0112	*
Opening date of the program					
First half of August	-0.715	0.207	-3.454	0.0006	***
Second half of August	-0.019	0.162	-0.117	0.9069	
First half of September	0.054	0.157	0.341	0.7332	
Second half of September	0.065	0.291	0.224	0.8230	
First half of February	-0.397	0.338	-1.172	0.2411	
Second half of February	-0.078	0.168	-0.464	0.6426	
First half of March	-0.277	0.156	-1.778	0.0754	.
Second half of March	0.128	0.234	0.546	0.5853	
Type of facility that received veterinary students in the program					
Prefecture or municipal head office and Public Health Service Center	0.052	0.130	-0.398	0.6909	
Environmental hygiene related facilities	-0.155	0.118	-1.309	0.1905	
Meat hygiene inspection centers and slaughterhouses	0.013	0.129	0.103	0.9181	

Animal welfare related facilities	0.315	0.131	2.409	0.0160	*
Zoological parks and aquariums	0.246	0.192	1.283	0.1996	
Livestock Hygiene Service Centers	0.133	0.200	0.668	0.5041	
Grades of target students for the program (Reference: open to limited grades)					
Open to all grades	0.426	0.151	2.812	0.0049	**
Proximity to veterinary schools (Reference: local government located far from a veterinary school)					
Local government located in the proximity of a veterinary school	0.620	0.138	4.508	0.0000	***
Regional location of the local government (Reference: Kyushu and Okinawa)					
Hokkaido and Tohoku	0.525	0.252	2.081	0.0374	*
Kanto	0.763	0.219	3.482	0.0005	***
Chubu	-0.014	0.223	-0.062	0.9503	
Kinki	0.387	0.217	1.777	0.0755	.
Chugoku	-0.523	0.298	-1.754	0.0795	.
Shikoku	-0.121	0.275	-0.44	0.6599	

Significantly different from the reference ($P < 0.1$, $*P < 0.05$, $**P < 0.01$, $***P < 0.001$).