

A Study on the Potential Risk of Rabies from the Perspective of Economic Burden: An Analysis based on Data from Guangzhou, China

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ABSTRACT

In this paper, we conducted a study on "daily life risk awareness test", "exposure to stray animals test", and "animal infectious disease knowledge test", and discussed the potential risk of rabies based on the economic burden. The study concludes that, first, the continuous improvement of the social security system brought about by the high economic development will reduce the awareness of risk in daily life by easing the financial burden of the residents. Second, rising per capita disposable income, in turn, may increase the population's propensity to come into contact with stray animals by lowering their financial burden and raising their demand for pet companionship. Third, regions with higher levels of economic development are more conducive to investing in high educational expenses due to the lower economic burden, which helps to spread the knowledge of animal infectious diseases.

Keywords: rabies; risk; economic burden; Guangzhou city; stray animals.

1. INTRODUCTION

Rabies is a human-animal disease of the central nervous system caused by rabies virus infection and is a Class B infectious disease reported under the Prevention and Control of Infectious Diseases Law of the People's Republic of China. Once rabies develops, there is no effective clinical treatment and almost 100% death. An important economic component of rabies is that rabies vaccine and immunoglobulin are currently not covered by health insurance in the vast majority of China, so the economic burden will directly affect the potential risk of rabies. In this study, an online survey will be conducted on the potential risk of rabies. The questionnaire will consist of three sections: "Awareness of daily life risks", "Tendency to come into contact with stray animals" and "Knowledge of animal infectious diseases". The main population of this study was secondary school students in Guangdong Province, with 208 valid questionnaires. This paper examines the potential risk of rabies from the perspective of economic burden.

2. LITERATURE REVIEW

In a study related to this paper, Feng [1] noted that

increasing vaccination rates among older adults and reducing the risk of infectious diseases and related complications could improve the health and quality of life of older adults and would reduce the economic burden on society and families. Li [2] concluded that the elderly population with chronic diseases are at higher economic risk of disease relative to the elderly population with non-chronic diseases. Wang [3] found that elderly lung cancer patients have a high annual per capita direct financial burden, with non-medical costs adding to the financial burden of illness and the direct financial burden of illness accounting for a significant proportion of household income. Wang [4] found that low-income households have a higher probability of illness, a higher financial burden of illness and a higher economic risk of illness. Feng [5] found that the financial burden and risk was higher for people with diabetes than for people with hypertension and chronic diseases. Run [6] point out that the economic risk of illness varies greatly between different health care systems, with urban residents' medical insurance and new rural cooperative participants having a higher economic burden of illness. Ma et al. [7] focused on a review of the disease burden of acute respiratory infectious diseases and their evaluation methods. Hou et al. [8] reviewed the global

epidemiological characteristics of diabetes, as well as the direct and indirect economic burden of diabetes, and focused on outlining the current disease burden of diabetes in China. Leng et al. [9] measured and analyzed the economic burden of disease among middle-aged and elderly diabetic patients in China, and showed that the economic burden of disease among diabetic patients increased with the number of comorbidities. Li and Wang [10] provide a review of influenza disease burden studies in China in recent years.

Based on the above literature, there are three possible contributions to the text. Firstly, in terms of subject matter, few articles focus on the potential risk of rabies from an economic burden perspective. This paper explores the impact of economic burden on the potential risk of rabies based on three channels: awareness of daily life risks, propensity to come into contact with stray animals, and knowledge of animal infectious diseases. Secondly, this paper uses research data and incorporates economic macro data, which is more conducive to reflecting the true picture of the potential risk of rabies in the population and helps to draw more accurate and time-sensitive economic conclusions. Thirdly, in the context of high rabies mortality rates, it is particularly important to study the impact of economic burden on the potential risk

of rabies. Therefore, the conclusions and policy recommendations in this paper are of great theoretical and practical value, and can provide valuable Chinese cases, experiences and solutions for other countries in the world.

3. PATHWAY ANALYSIS OF ECONOMIC BURDEN AFFECTING RABIES RISK

3.1 The impact of financial burden on awareness of everyday risks

Table 1 shows the results of the "daily life risk awareness test". The results of the test show that only 70% of the respondents would definitely wear seat belts, 57.27% would definitely not eat expired food, 49.34% would not run red lights, 40.53% would not meet online friends and 26.43% would definitely not take a shortcut when it is dark, and only 13.22% would definitely see a doctor when they are sick. The percentage of people who would definitely consult a doctor first when they are sick is only 13.22%. This shows that there is a low level of risk awareness and a high level of risk potential among the respondents.

Table 1: Awareness of risks in daily life (%)

Title	Definitely	Likely	Neutral	Unlikely	Definitely not
Do you usually wear a seat belt in the car?	70.48	16.74	7.49	4.41	0.88
Do you eat expired food?	0.88	7.05	7.49	27.31	57.27
Do you run red lights?	1.32	6.17	10.13	33.04	49.34
Do you agree to meet online friends?	3.52	6.17	19.82	29.96	40.53
Do you see a doctor first when you are sick?	13.22	34.80	35.24	15.86	0.88
Do you take shortcuts when it's dark?	2.20	21.59	18.50	31.28	26.43

Data source: Research questionnaire

Meanwhile, Table 2 shows the GDP of 31 provinces in China in 2020, and the results of Table 2 show that Guangdong Province ranks first among the provincial regions in China in terms of GDP. As the early frontier of reform and opening up, Guangdong Province was ahead of other regions in terms of market-oriented reforms and was the first to have access to rich overseas resources and new technologies due to its superior geographical location, competitive market advantages and favourable national policies, thus leading the way in terms of level and speed of development.

In summary, this paper argues that along with China's rapid economic development, the social security system in various regions, especially in more developed cities (such as Guangzhou, Guangdong Province), has been improving, the financial burden of daily life risks is less, and the ability of people in the region to resist daily life risks (such as traffic accidents, illness, etc.) has been increasing. However, the lower financial burden also makes urban dwellers less aware of the risks involved in everyday life, resulting in risky behaviour such as 'not wearing seat belts in cars', 'running red lights' and 'eating expired food'.

Table 2: GDP of 31 Chinese provinces in 2020 (billion yuan)

Region	GDP	Sort	Region	GDP	Sort
Guangdong	110760.9	1	Liaoning	25115	16
Jiangsu	102719	2	Chongqing	25002.8	17
Shandong	73129	3	Yunnan	24521.9	18
Zhejiang	64613.3	4	Guangxi	22156.7	19

Henan	54997.1	5	Guizhou	17826.6	20
Sichuan	48598.8	6	Shanxi	17651.9	21
Fujian	43903.9	7	Inner Mongolia	17359.8	22
Hubei	43443.5	8	Tianjin	14083.7	23
Hunan	41781.5	9	Xinjiang	13797.6	24
Shanghai	38700.6	10	Heilongjiang	13698.5	25
Anhui	38680.6	11	Jilin	12311.3	26
Hebei	36206.9	12	Gansu	9016.7	27
Beijing	36102.6	13	Hainan	5532.4	28
Shaanxi	26181.9	14	Ningxia	3920.5	29
Jiangxi	25691.5	15	Qinghai	3005.9	30
			Tibet	1902.7	31

Data source: National Bureau of Statistics

3.2 The impact of economic burden on the tendency to contact stray animals

Table 3 shows the results of the 'propensity to come into contact with stray animals' test, which shows that a certain percentage of people still come into contact with

stray animals outdoors in an unprotected manner, especially injured or pregnant animals. Even after being scratched by a stray dog or cat, only 42.29% would definitely get the rabies vaccine, not more than half, and 6.17% would definitely not get the rabies vaccine. This shows that there is a high tendency for people surveyed to come into contact with stray animals today.

Table 3: Test results of the tendency to contact stray animals (%)

Title	Definitely	Likely	Neutral	Unlikely	Definitely not
It's a dry day and the hand barb next to your nail is distracting, you pull it out and a little blood seeps out but it stops quickly. Then you come across a very cute little stray yellow cat with a slightly bulging belly, probably pregnant, watching you from five metres away. You happen to have half of your leftover hard-boiled egg in your hand, will you approach and feed it?	8.37	16.74	7.93	30.4	36.56
You are walking with your best friend on your way to a tutorial class when your friend suddenly points to a tiny cat that is dying on the side of the road and exclaims. Despite the distance, the clear bloodstains on the kitten are still alarming. Your best friend pulls you closer to it, anxiousness on his face, do you stop and refuse to go?	15.86	22.47	24.23	25.11	12.33
Your mum gave you a beautifully formed cat on your birthday, saying it was a stray she had found on the side of the road, had been rinsed by a pet shop and brought back to keep. Perhaps the cat was a bit squeamish and scraped you with its light fleshy paws, you looked at it and there was no obvious bleeding or breakage, would you get a rabies vaccination?	42.29	21.59	11.89	18.06	6.17

Data source: Research questionnaire

Figure 1 shows the disposable income per capita in Guangdong Province, China, for the period 2013-2020. As can be seen from Figure 1, the per capita disposable income of both Guangdong residents as a whole and

urban and rural residents is rising, which shows that the household financial burden of residents is also decreasing. People's perceptions of pets and stray animals will change as they benefit from rising economic incomes and

declining financial burdens. Demand for pet companionship will increase, and those who do not own pets may go on to spend money on pets or take in stray animals. As a result, Guangzhou, a high income area, may have a certain percentage of exposure to stray animals due to the rising per capita disposable income and the consequent decreasing financial burden, as people begin to focus on and desire the companionship of pets and become more affectionate towards stray animals.

3.3 Impact of economic burden on the level of knowledge of infectious diseases

Table 4 shows the test on "knowledge level of animal infectious diseases". From the test results of the respondents, it can be seen that the correct response rate of each research question is more than 50%, and the respondents have a certain reserve of knowledge about animal infectious diseases, but there is still a high proportion of people who have the attitude of "don't know" about the research questions, and there is even a certain proportion of people who have wrong judgment

about the research questions. It can be seen that the prevalence rate of knowledge about animal infectious diseases is high in the studied area, Guangzhou, at more than 50%, but there is still room for popularization.

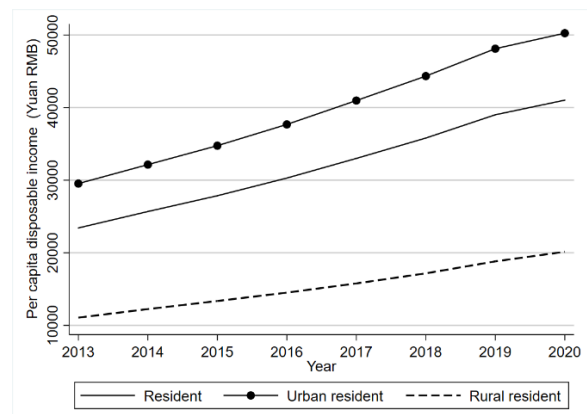


Figure 1: Per capita Disposable Income of Guangdong, China, 2013-2020 (RMB)

Data source: National Bureau of Statistics

Table 4: Animal infectious disease knowledge level test (%)

Title	Yes	No	Don't know
Someone thought about being bitten by a dog years ago, but it still makes sense to get a rabies vaccination now.	19.82	54.63	25.55
A bite from a stray animal that scratches but does not break the skin does not require rabies vaccination.	18.5	67.4	14.1
A cat that has never been traumatized will not have rabies.	0.88	83.26	15.86
When a man was bitten by a stray animal and people around him advised him to get a rabies vaccine, he said, "I use the ten-day observation method, and if the animal does not develop and die, then I am safe."	4.41	88.11	7.49
You should go to the hospital immediately after being bitten by a stray dog.	95.15	3.52	1.32
A person accidentally fell and did not break the skin but his hand pressed on a pile of dog shit, and he was at risk of contracting rabies as a result.	18.5	56.39	25.11

Data source: Research questionnaire

Table 5 shows the education expenditure of 31 provinces in China in 2018. As can be seen from Table 5, Guangdong Province, which ranks first among Chinese provinces in terms of development level and development speed, ranks first among Chinese provinces in terms of investment in education funding due to the smaller regional economic burden. Higher investment in

regional education funding, better equipped to carry out the prevention and treatment of animal-inflicted injuries and knowledge education and publicity, which will help popularize knowledge of animal infectious diseases, further enhance the public's awareness of self-protection, and achieve comprehensive popularization of susceptible and vulnerable populations.

Table 5: Education Expenditure in 31 Chinese Provinces, 2018 (RMB million)

Region	Education Funding	Sort	Region	Education Funding	Sort
Guangdong	42684258	1	Guizhou	12732768	16
Jiangsu	28276374	2	Fujian	12547951	17
Shandong	26349273	3	Shaanxi	11375081	18
Henan	24293502	4	Chongqing	10216274	19

Zhejiang	24009012	5	Liaoning	9759379	20
Sichuan	20767987	6	Xinjiang	9522617	21
Hebei	17389625	7	Shanxi	9134205	22
Hunan	16300603	8	Mongolia	7759014	23
Anhui	15011779	9	Heilongjiang	7612173	24
Hubei	14578340	10	Gansu	7404892	25
Yunnan	14543783	11	Jilin	6866495	26
Beijing	13525400	12	Tianjin	6351712	27
Shanghai	13412840	13	Hainan	3777479	28
Jiangxi	13152969	14	Qinghai	2640309	29
Guangxi	12836618	15	Tibet	2562958	30
			Ningxia	2346978	31

Data source: Research questionnaire

4. CONCLUSIONS

The study in this paper draws three conclusions. First, the continuous improvement of the social security system brought about by the rapid economic development will reduce the financial burden caused by the risks in the daily life of the residents, but furthermore, it will also reduce the awareness of the risks in the daily life of the residents. Second, rising per capita disposable income, in turn, may increase the population's propensity to come into contact with stray animals by lowering their financial burden and raising their demand for pet companionship. Third, regions with higher levels of economic development are more conducive to investing in high educational expenses due to the lower economic burden, which helps to spread the knowledge of animal infectious diseases.

REFERENCES

- [1] Feng Luzhao, Yang Tao, Wang Qing, Yang Yuan, Leng Zhiwei, Chen Siya, Jia Mengmeng, Zhang Ting, Chen Fangyuan, Zhang Xingsheng, Yang Weizhong. Scientific vaccination to reduce the risk of infectious diseases and protect the health of the elderly[J]. Chinese Journal of Medicine,2020,100(48):3821-3826.
- [2] Li Xiangjun,Wang Zhonghua. Economic burden and economic risk of chronic noncommunicable diseases in middle-aged and elderly populations based on disease differences[J]. Chinese Journal of Gerontology,2017,37(11):2817-2820.
- [3] Wang Tingyan, Hu Yue, Ouyang Jing. Chinese journal of gerontology,2018,38(15):3780-3782.
- [4] Wang Jing, Chen Li Na, Zhang Liang, Ma Jingdong. Economic risk analysis of disease in rural households with different incomes [J]. Chinese health economics,2013,32(10):44-47.
- [5] Feng Da, Zhao Rui, Tian Miaomiao, Hou Wenjing, Feng Zhanchun. Research on economic burden and risk of chronic diseases in rural areas of Shanxi Province [J]. Chinese health economics,2013,32(10):48-50.
- [6] Yan Yongliang, Yan Ju-e, Lai Sha, Xu Yan, Wang Mingqi, Wang Yaru, Gao Jianmin. Research on the economic risk and burden of disease among participants of three medical security systems [J]. Chinese health economics, 2012, 31(02):30-32.
- [7] Ma Wang, Huo Xiang, Zhou Minghao. Research progress on disease burden of acute respiratory infectious diseases and evaluation methods[J]. China Public Health,2017,33(02):266-270.
- [8] Hou Qingtao, Li Yun, Li Sheyu,Tian Haoming. Current status of global diabetes disease burden[J]. Chinese Journal of Diabetes,2016,24(01):92-96.
- [9] Leng Yao, Li Yanmang, Deng Jing. Analysis of the economic burden of disease among middle-aged and elderly diabetic patients in China[J]. Health Economics Research,2018(10):46-49.
- [10] Li Wenjuan, Wang Dayan. Progress of research related to influenza disease burden in China[J]. Chinese Journal of Human-Veterinary Diseases,2019,35(10):928-933.