

Shift Towards Vegan in China During COVID-19: An Online Behavioral Survey Study

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ABSTRACT

This paper investigates why Chinese people are shifting towards a more plant-based diet after the COVID-19 pandemic by analysing the online results obtained from 146 Chinese people all over the world. Reasons included social stigma, and that vegetables are healthier, safer, and better for weight loss. The results show that inside China, there was an actual increase in vegetable intake, but deviated from the hypothesis that social stigma can be a significant driver. The results show that people seem to change due to their willingness to lose weight and in the concern of safety issues more than social stigma.

Keywords: Behavioral economics, vegetarian, habits, social pressure.

1. INTRODUCTION

The breakout of coronavirus in Wuhan at the beginning of January 2020 had caused panic and anxiety spreading throughout the country. The number of people who tested positive was increasing at a rampant speed, and the advanced transportation system had exacerbated the situation and brought the virus to the rest parts of the nation. To stagnate the spread of COVID-19, the Chinese government imposed a stringent and never-before-seen lockdown on Wuhan, the fifth powerful city of China, which shielded 11 million people. The quarantine started on January 23rd and ended on April 8th. All the public transports, including buses, trains, and airplanes, were suspended. Citizens were not allowed to leave Wuhan without formal permission, even on their return homes.

Experts and researchers had explored the effect of this unprecedented confinement. The strict quarantine of Wuhan reduced inflow into Wuhan by 76.64%, outflows from Wuhan by 56.35%, and within-Wuhan movements by 54.15% [1]. A significantly decreased growth rate in cases was observed, and a more strict restriction of people in high-risk areas like Wuhan seems to have the potential to slow the spread of COVID-19 [2]. Isolations also triggered a variety of psychological issues, such as panic disorder, depression, and anxiety. In a study of 52,730 responses from 36 provinces of China, almost 35% of respondents experienced psychological distress [3]. Except for mental impacts, there were also physical changes such as weight gain during the lockdown.

However, there is an interesting shift during the COVID-19 epidemic period that is overlooked—Chinese people are shifting to more plant-based food consumption, which is critically important for the sustainable development of this nation. A non-profit organization (Yu Hua vegan restaurant) that provides vegetarian food for medical workers in several

main hospitals in Wuhan recorded a spike in orders throughout the COVID-19. Stemmed from this, we dug deeper and tried to expand our focus to not only medical workers but among Chinese people from a variety of places with different jobs. Hence we did the 2nd survey and received 146 answers. However, we not only should view the phenomena, but also need to know the reason behind it, and how COVID-19 plays a role in their decision-making on food. In this study, we assumed that social stigma is an underlying driver of the shift. By analysing the dataset, we will test our hypothesis, and if stigma is not the answer, we would like to find out the possible trigger.

2. LITERATURE REVIEW

2.1. The Pilot Test

According to the phenomena aforementioned, we did our first online survey among medical workers from major hospitals in Wuhan, such as XieHe, TongJi, and etc. We received 82 valid responses from doctors and nurses in this one-week online survey. The questionnaire included 8 simple questions—age, gender, marital status, change on consumption of vegetables before and after the virus, and the reason for choosing vegan food. 86.59% (71 out of 82) of the respondents were female, only 13.41% were men. What worth mentioning is that the results were consistent with Yu Hua vegan restaurant's saying: 56.1% of them (46) showed an increase in choosing plant-based meals, only 2.44% saw a decrease while 41.46% remained the same before and after the pandemic. Besides, the proportion of participants who did not consume vegetables at all had decreased from 41.46% to 1.22%.

2.2. The Importance of Plant-based Food Consumption

Whether to eat meat can be a very personal decision, but motivations of being vegetarian can vary, such as health benefits, environmental concern, repulsion with meat, or animal welfare. For individuals, the benefit of choosing a more plant-based food consumption is related to health issues. Previous studies claim that replacing animal-based products with plant-based products can reduce the risk of cardiovascular diseases and type 2 diabetes [4], along with benefits like lower blood pressure and reduced body mass. Besides personal health status, the phrase ‘environmental vegetarian’ has revealed that some people are motivated by their concern about our environment. A person can save the same amount of emissions as taking a small family car off the road for 6 months by eating vegetarian food [5] as he or she may not be able to stop using cars in day-to-day life but can choose to eat veggie food. A decrease in consumption of the animal product can cut carbon emissions and compensate for the negative effect brought by human production [6]. To promote vegetarianism, activities including the campaigns in UK and Denmark and the WHO’s healthy eating recommendations raise the attention of European consumers towards a healthier food consumption [7] and an obvious cut in meat consumption was shown in Denmark from 58.4kg [8] to 32kg [9] per person per year.

2.3. Barriers Towards A More Plant-based Food Consumption

However, the awareness of the benefits of plant-based food consumption is not strong enough for people to meet the recommended intake of fruits and vegetables, as individuals are not perfectly rational and have bounded self-control. Vegetarian-to-be may encounter obstacles such as taste preferences, unsupportive family members, along with practical issues like the inconvenience of buying plant-based food or lack of cooking skills [10]. Researchers believe the main culprits are the joy of eating meat and the reluctance of altering eating habits. Besides, family food preferences are also a significant hindrance. Study shows that elderly people have a stronger belief than younger ones that humans are ‘meant’ to eat meat, which means they may try to stop their child from having a greener diet [11]. A research study done by ‘Faunalytics’ pointed out another possible obstacle for men is that vegetarianism has an impression of a thin body image type, which can be a disadvantage in a patriarchal society. Men and women face different pressures related to body image: women idealize losing weight, whereas men worry about losing too much weight—focusing more on building muscles, which requires protein intake [12].

2.4. The Influential Vegetarian Stigma

Among all the barriers stopped meat-eaters from going vegetarian, there is a unique one worth mentioning—social

stigma towards vegetarian. Researchers conducted experiments to test whether bias existed towards people who were eating green, and it was proven that omnivores evaluated vegans or vegetarians equally and even more negatively than several common target groups that were stigmatized (e.g. Black) [13]. Another recent study examined how a group of vegan, vegetarian and omnivorous college students feel among vegans and vegetarians, and one of the conclusions was that non-vegan reported socially distancing themselves from vegans both physically and verbally [14]. Moreover, the social devaluation of vegetarian towards vegetarian has reached a state of garnered its own label—‘veganobia’ [15]. Hence, except for the aforementioned barriers like the inconvenience or inadequate taste, the psychological feelings among vegetarians or vegans also serve as a bane and affect the openness towards a plant-based diet.

3. METHODOLOGY AND DATA DESCRIPTION

3.1. Data Collection

To ensure the diversity in participants, as well as to unravel to the relationship between social stigma and shift in dietary habit, this study conducts an online survey (quantitative method) for one month during this July, and a total of 146 valid replies were received. For respondents, they first read the information explained the organizer of the questionnaire and the aim of the study, then they complete their basic information, including gender, age, education level, marital status, employment, and location during the COVID-19. After this, they answered questions related to deviation in food consumption, the underlying reason for the change, anxiety level during the lockdown, and whether they feel social stigma.

Primary data was collected through an online questionnaire in China, and the questionnaire reached participants cross the nation via social media Wechat. The survey was developed in the WenJuanXing platform, which is a little program ran in Wechat used for conducting questionnaires. Hereafter all the anonymous replies were exported to Excel for further analysis, and regression was done by STATA.

3.2. Measurement

The questionnaire had 15 questions in total and could be divided into two parts. In the first part (6 questions), questions were designed to gather socio-demographic characteristics of the sample: including sex (male, female), age (categorized by a decade), career (employer, employee), marital status (married, unmarried, other), education level (elementary, senior high, junior high, undergraduate, master, Ph.D.) and

location (Wuhan, other cities in Hubei, Cities outside of Hubei, Overseas)—we believed social stigma towards Wuhan citizens was the strongest, with Other cities in Hubei the second, and Cities outside Hubei the third, Overseas would be the last. (shown in Table 1. Socio-demographic characteristics of participants)

In the second part (7questions), participants stated their dietary habits (vegan, vegetarian, omnivorous, carnivorous) before and after the epidemic, and they also answered the proportion of vegetable intake (range from 0 to 100) in each meal before and after. Thereafter, they replied to the change in their vegetable consumption: increasing, decreasing, or keeping almost the same amount, followed by reason to their changes. Respectively, for increased consumption, several choices were presented: vegetables are healthier, vegetables are safer, vegetables are cheaper, consuming more vegetables can lose weight. While for decreased consumption, we had two options. (shown in Table 2. Descriptive data related to vegetable consumption of consumers)

Participants also reported their anxiety level during the strict lockdown, scored from 1-5 with 1 stands for very weak and 5 for very strong. “Whether they feel social stigma during the COVID-19 period” was the last question of the questionnaire, which was also the possible reason we had assumed for the shift, and 4 categories were given to them: not at all—1, a little—2, some—3, strong—4. (shown in Table 3. Anxiety level and social stigma)

3.3. Analytical Strategy

The STATA software was used for data analysis, and regressions were used to figure out the relationship between different variables and shift in vegetable intake. For independent variables, we use “gender”, “age”, “marital status”, “education”, “city”, “social stigma”, “anxiety level”, “green”, “safer”, “healthier”, “cheaper”, “lose weight”, while the dependent variable is “delta-diet”, which is calculated by post-proportion of vegetable consumption

ineach meal minus pre-proportion of vegetable consumption in each meal.

4. RESULTS

4.1. Descriptive Statistics

Table 1 shows the socio-demographic characteristics of the sample, and a total of 146 individuals answered the survey. As Table 1 revealed, females are the majority(67.12%). The most frequent age group is 20-30 (34.93%), while the majority of participants are employed (36.99%) or still in the middle of their education (30.14%). Plus, the majority of the sample (47.26%) were in Wuhan during the lockdown.

Table 2 focuses on the change of dietary habits of participants and how the proportion of vegetable intake varies before and after the epidemic. The majority showed a rise in vegetable consumption, 53.42% had, in fact, a positive delta-diet; 16.44% had a negative score, and 30.14% had no change in their dietary habits. Additionally, the distribution of reasons related to dietary change is also included, and the main reason (47.26%) for choosing vegetables is that they are thought to be healthier; 34.93% increased their consumption because they think vegetables are safer, which is the second most important reason. To conclude, 26.71% increased vegetable intake to lose weight, and 11.64% did it because of the lower price.

Table 3 reveals the level of anxiety and social stigma. The largest proportion of respondents (36.99%) rated 3 for their anxiety level during the lockdown, while 26.03% rated 1 (very weak), 27.40% for 2 (weak), 5.48% for 4 (strong), and 4.11% for very strong. When it comes to the feeling of perceived social stigma, 55.48% of the sample claimed that they did not feel any at all, 36.30% felt a little, 6.85% for some, and 1.47% chose strong.

Table 1 Socio-demographic characteristics of participant

Variables	Percentage	Variables	Percentage
Gender		Age	
Male	32.88%	Under 20	22.60%
Female	67.12%	20-30	34.93%
Career		Marital Status	
Employed	36.99%	Married	41.10%
Self-employed	11.64%	Unmarried	55.48%
Retired	0.68%	Other	3.42%
Homemaker	2.05%	Education	
Student	30.14%	Elementary School	2.05%
Other	18.49%	Junior High School	4.79%
Location		Senior High School	35.62%
Wuhan	47.26%	Undergraduate	41.10%
Other Cities in Hubei	16.44%	Master	8.90%
Cities Outside Hubei	29.45%	Ph.D.	5.48%

Overseas	6.85%	Other	2.05%
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Table 2 Descriptive data related to vegetables consumption of participants

Variables	Percentage	Variables	Percentage
Delta-diet		Reasons	
Unchanged	30.14%	Healthier	47.26%
Positive	53.42%	Safer	34.93%
Negative	16.44%	Lose weight	26.71%
		Cheaper	11.64%

Table 3 Anxiety level and social stigma.

Variables	Percentage	Variables	Percentage
Anxiety Level		Social Stigma	
Very weak	26.03%	Not at all	55.48%
Weak	27.40%	A little	36.30%
Normal	36.99%	Some	6.85%
Strong	5.48%	Strong	1.37%
Very Strong	4.11%		

4.2. Inferential Statistics

Table 4 describes the results of the OLS regression on the dietary change in vegetable consumption. Most of the variables do not have an significant effect on the outcome variable. The only three significant results are living outside China, master's degree, and weight loss. For the group living outside China, it showed a decrease in vegetable intake by -

12.45% compared to living outside Hubei. In fact, this is the only geographical category that differs from the other three. Another significant regressor is participants with master's degree, who cut their vegetable consumption by -6.96% compared to those who were undergraduates. Last but not least, among reasons of shift, lose weight is the only one which is significant, indicating that losing weight played a role in the shift.

Table 4 OLS regression

Variables	Coefficient (Robust standard error)	Variables	Coefficient (Robust standard error)
Gender	2.68 -2.87	Marital Status	
Age		Unmarried	-6.32 -5.91
20-30	-1.01 -5.15	Other	1.77 -3.38
30-40	2.81 -5.55	Location	
40-50	3.47 -6.52	Other cities in Hubei	-4.7 -4.83
50-60	2.79 -6.26	Overseas	-12.45* -3.89
Above 60	13.66 -8.9	Wuhan	-4.25 -3.64
Education		Social Stigma	1.91 -2.87
Elementary School	-9.2 -5.45	Anxiety Level	2.3 -1.8
Junior High School	0.88 -6.94	Reasons of Shift	
Senior High School	-2.21	Safer	-0.19

	-4.36		-3.06
Master	-6.96*	Healthier	5.39
	-3.11		-2.97
Ph.D.	2.67	Cheaper	1.92
	-6.49		-5.32
Other	6.86	Lose Weight	6.92*
	-10.4		-2.99
Overseas	6.85%		

5. DISCUSSION

In this study, we investigate a possible shift in citizens' consumption towards a more plant-based diet, focusing on social stigma as a possible cause. The results show that the majority of individuals indeed shifted towards a more plant-based diet, some did it because of safety reasons, probably acknowledging a possible role of meat consumption in the transmission of COVID-19. A recent example was the reduction in the consumption of salmon in China. On 11th June, the virus was found in the salmon exported from Norway and sold at the Beijing seafood market. According to the newspaper 'national business daily' on 28th June, several merchants in south China's largest aquatic market have stopped selling salmon, and the seller claimed that although salmon was not banned, they sold less than 0.5 kg per week. However, it is, in fact, not scientifically demonstrated before.

However, self-reported social stigma has no significant effect on the phenomena, which means the shift may not be related to behavioral dynamics, and the major cause for the shift is to lose weight instead. Hence the main hypothesis can be rejected. Consistent with the previous study, 48% out of 2,254 people said they have put on weight during the lockdown in a new King's College London and Ipsos MORI survey[16], it makes sense that people wanted to go through diet. What worth mentioning is the result does indicate that there is an increase in vegetable intake, not only for medical workers in Wuhan but for all the Chinese people. Another interesting fact is that out of China there has been a huge reduction in vegetables, the opposite of what happened in China.

5.1. Limitations

It should be noted that this study has limitations, as the main strategy of gathering data is by self-report via an online questionnaire. Although self-report has its advantages (easy to obtain, can be gathered quickly and cheaply from different groups and large sample, and etc.), it also has weaknesses, such as lack of flexibility due to fixed choices and misunderstanding of questions. Unlike questions with a fixed measurement like weight, height, age, there is no gold standard for self-report measures on social stigma, as the evaluation is a subjective one and each individual can have different standards[17]. Besides, social desirability bias—

people want to seem good—may further lower the validity and reliability of the result.

Timing is another limitation of the result, since people may address the level of social stigma differently at different times—answering the question in the middle of the lockdown and two months after the closure are definitely not the same, and my questionnaire was sent out two months after. Even if they should rate their feelings according to what they felt during the quarantine, they may not recall well and lead to deviations.

5.2. Conclusion

The study based on a sample of 146 participants from Chinese people all over the world found that the majority of Chinese people inside China shift towards vegetables during the lockdown, and they did it to lose weight and also considered vegetables as a safer choice for food. This paper highlights a cultural shift that happened among Chinese people inside China—they increased the proportion of vegetable consumption, although may for different reasons. What worth mentioning is that the COVID-19 virus may also contribute to the shift as it leads to distrust in meat. Except for behavioral literature, it can be used to inform policymakers in China as the shift to a more sustainable diet can be crucially important to the sustainable development of the country, as it will cut the carbon emission and also serve as a boon in reducing risks of getting particular health issues of citizens—which means the government can cut their burden on medical expense and invest into other areas.

REFERENCES

- [1] Fang H, Wang L, Yang Y, Human mobility restrictions and the spread of the novel coronavirus (2019-ncov), National Bureau of Economic Research, China, 2020. DOI: <http://doi.org/10.2139/ssrn.3561645>
- [2] Lau H, Khosrawipour V, Kocbach P, et al, The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China. *Journal of travel medicine*, 2020, DOI: <http://doi.org/10.1093/jtm/taaa037>

- [3] Qiu J, Shen B, Zhao M, et al. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General psychiatry*, 2020. DOI:<https://doi.org/10.1136/gpsych-2020-100213>
- [4] C.K. Richter, A.C. Skulas-Ray, P.M. Kris-Etherton, Recommended Intake of Fish and Fish Oils Worldwide, *Fish and Fish Oil in Health and Disease Prevention*, 2016. DOI:<http://doi.org/10.1016/B978-0-12-802844-5.00003-8>
- [5] Eat to beat climate change: The Vegetarian Society. (n.d.). Retrieved September 17, 2020, from <https://vegsoc.org/change/>
- [6] Friel S, Dangour A D, Garnett T, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: food and agriculture. *The Lancet*, 2009. DOI:[https://doi.org/10.1016/S0140-6736\(09\)61753-0](https://doi.org/10.1016/S0140-6736(09)61753-0)
- [7] National Diet and Nutrition Survey Results from Years 5 and 6 (combined) of the Rolling Programme (2012/2013 – 2013/2014), Public Health England and Food Standards Agency, from: <https://www.gov.uk/government/statistics/ndns-results-from-years-5-and-6-combined>
- [8] A N, Christensen T, Matthiessen J, et al, Hovedresultater (Dietary Habits in Denmark 2011-2013. Main Results). Søborg (Denmark): National Food Institute, Technical University of Denmark, 2015.
- [9] McMichael A J, Powles J W, Butler C D, et al, Food, livestock production, energy, climate change, and health, *The Lancet*, 2007. DOI: [https://doi.org/10.1016/S0140-6736\(07\)61256-2](https://doi.org/10.1016/S0140-6736(07)61256-2)
- [10] Reipurth, M. F., Hørby, L., Gregersen, C. G., Bonke, A., & Cueto, F. J., Barriers and facilitators towards adopting a more plant-based diet in a sample of Danish consumers, *Food Quality and Preference*, 73, pp. 288-292. DOI: <https://doi.org/10.1016/j.foodqual.2018.10.012>
- [11] Lea, E., & Worsley, A. Benefits and barriers to the consumption of a vegetarian diet in Australia, *Public Health Nutrition*, 6(5), 505-511, 2003. DOI: <https://doi.org/10.1079/PHN2002452>.
- [12] F. Liberty Mulkani. Men and Vegetarianism: Motivations and Barriers to Becoming Vegetarian, 2007. Retrieved September 17, 2020, from <https://faunalytics.org/wp-content/uploads/2015/05/Citation621.pdf>
- [13] Macinnis, C. C., & Hodson, G., It ain't easy eating greens: Evidence of bias toward vegetarians and vegans from both source and target. *Group Processes & Intergroup Relations*, 20(6), 721-744, 2015. DOI: <https://doi.org/10.1177/1368430215618253>.
- [14] Kelly L. Markowski, Susan Roxburgh, If I became a vegan, my family and friends would hate me, *Anticipating vegan stigma as a barrier to plant-based diets*, *Appetite*, pp. 1-9, 2019. DOI:<https://doi.org/10.1016/j.appet.2018.12.040>.
- [15] Cole M, Morgan K. Vegaphobia: derogatory discourses of veganism and the reproduction of speciesism in UK national newspapers 1. *The British Journal of Sociology*, 62(1): 134-153, 2011. DOI: <https://doi.org/10.1111/j.1468-4446.2010.01348.x>
- [16] Lockdown and weight gain – should you worry? (2020, May 30). Retrieved September 17, 2020, from: https://www.bbc.co.uk/food/articles/lockdown_health_tips
- [17] Lucas, R. E. Reevaluating the strengths and weaknesses of self-report measures of subjective well-being. In E. Diener, S. Oishi, & L. Tay (Eds.), *Handbook of well-being*. Salt Lake City, UT: DEF Publishers. 2018.