

Research on the Influence and Strategy of Cigarette Packages with Health Warnings on Consumer Perceptions and Consumer Demand

Zeye Li^{1, †}, Haojun Yu^{2, *, †} and Yining Zhang^{3, †}

¹Shanghai International Studies University Bilingual School, Shanghai, 200093, China

²Utahloy International School Guangzhou, Guangzhou, 510515, China

³Qinghua Zhiqing High School, BeiJing, 100080, China

*Corresponding author: 23hyu@student.uisgz.org

†These authors contributed equally

Abstract. Nowadays, much more people are threatened by cigarettes. Many people die yearly because of cigarettes, leading to serious economic problems. This problem is very big in China because cigarette packaging is gorgeous. Compared with cigarettes in other countries, some pictures of health warnings will be inserted to guide people to stop smoking. This paper explores cigarette packaging with health warning pictures that affect smokers' demand for cigarettes and its impact and strategies. Research on people of different ages and study the views of people of different ages on pictures with health warnings and whether they will continue to buy will be made to the people in Guangzhou, Guangdong Province, China. The investigation concluded the impact and strategy of changing packaging on the cigarette economy. It can be concluded that the packaging of cigarettes will have a great impact on smokers, as well as a serious attack on the economy.

Keywords: Cigarettes; Behavior economic; Nudge theory; Healthy; China.

1. Introduction

1.1 Research background

The World health organization's "fact sheets-tobacco" state that smoke can bring a range of significant healthy cost to consumers. The healthy and financial costs incur by smoking is continuing increasing as the group of smokers is ever-expanding. Many cigarette substances, such as nicotine and tar, will enter the human body when people smoke which cause physical harm to the human body. Consumers who smoke have significantly higher rates of cancer and diseases such as lung cancer and heart disease than non-smokers [1]. More than 7.5 million people die each year from smoking [2]. Smoker will have to undertake extra financial costs. Beside money for cigarette, medical treatment for smoking-related illnesses is also very expensive. Among the mixed population of smokers and non-smokers, smoking-related illnesses accounted for 19% of total costs for men and 12% of total costs for women [3]. Smoker's money which used to maintain daily expense will be dispersed by those extra cost mentioned above. In addition, smoking also incur the secondhand smoke problem which considered a negative externality of the smoking, which incur extra cost to the third party. To sum up, the cigarettes can be considered as a demerit good.

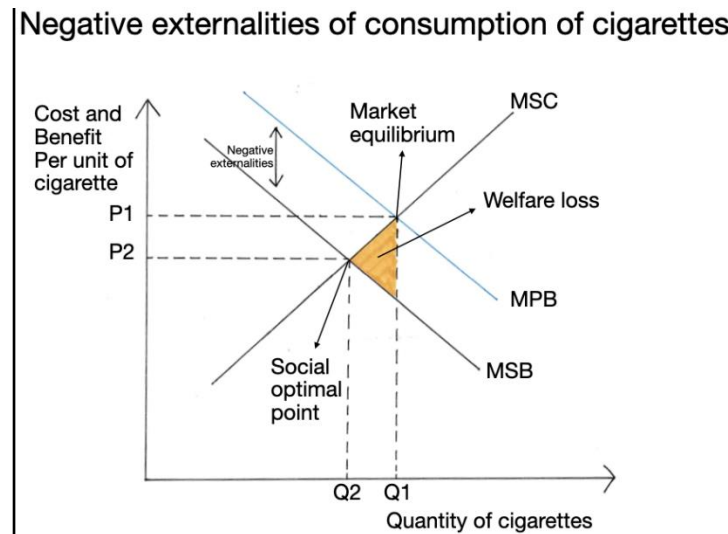


Fig. 1 Negative externalities of consumption of cigarettes

Chinese smoker is the major group of cigarette consumers in the worldwide. China contain 34% (341 million) of the smoking population in the world (2019). Smoking kills approximate 1.4 million people in China (2015), a direct economic loss about 166.56 billion RMB generated by it[4]. According to this trend, aggregated extra economic cost incur by smoking will keep increase as number of smoker ever-increasing.

To reverse this situation by reduce amount of national cigarette consumption, Chinese government already implemented a range of strategic to achieve this goal. Nevertheless, the Chinese government does not force cigarette manufacturers to include health warning images on cigarette packages, as many governments in developed countries did. To clarify whether this method will be effective in Chinese market, this paper will research and study about the influence and strategy of cigarette packages with health warnings on consumer perceptions and consumer demand.



Fig. 2 Cigarette packages with pictorial warning

1.2 Literature review

1.2.1 The theory from Becker and Murphy

According to the content above, smoking already cause a lot of costs (both financial and healthy) in the worldwide. In the academic community of microeconomics, the consensus of the nature of smoking (rational behavior or irrational behavior) has not been made. As of today, three theories that are well known to the public have been proposed, including: 1. short-sighted addiction model, 2. incomplete rational addiction model, 3. rational addiction model. The first theory mentioned above which published by Becker in 1988 is the most academically accepted theory. In his theory, Becker state: smoking can be considered have consistent preferences and choices. Nevertheless, there are also some criticize from some economists. For instance, Song Chaoying state that Backer's theory neglects the theory of limited consumer cognitive, incomplete information, recurrence problem, and situation of withdrawal [5].

1.2.2 Product package impact on consumer demand

Product package is included in marketing strategy. Suppliers often use interesting and attractive packaging to guide consumer spending. Theoretical, this marketing strategy is effective. In terms of design psychology, if the product packing communicates a simple and appealing visual message, consumer will be more likely to buy the product [6]. With regard to behavioral economics, whether one is aware of it or not, the choice architecture is always there. So packaging is a factor that affects consumer choice and demand (taste and preference). According to the analysis mentioned above, product packaging can influence the amount of consumption of a good in both positive and negative way.

According to Joseph G. L. Lee's research report, they commented on a realistic level. Joseph G. L. Lee changed cigarette packs' color saturation, size, and logo in their study, he separates those features into three group (option), provided those cigarettes with different packaging to smokers, and then observed and recorded their choices (2021). The final results of their study showed that all of the above characteristics are factors that consumers consider when choosing cigarettes and affect their choice in the real world [7].

1.2.3 Consumer's perception of healthy and consumer demand

The health awareness is also a crucial element which affect consumer choice beside packaging. Annette R. Kaufman state: the likelihood of smoker to quit cigarette consumption will be affect by their knowledge about cigarette-related diseases. thus, "smoking-related health cognitions and emotions are associated with smoking cessation" [8]. Which means the health perceptions of consumers will affect consumers' decisions.

There are no pictorial health warnings on cigarette packages in Guangzhou, or even in the whole China. It is worth examining whether the pictorial health warning will decrease cigarette consumption in Guangzhou China by change consumer health perceptions by transmit a message to consumers (for example: "smoking cigarettes may cause a certain disease"). Is a question to be answered in Guangzhou, China.

2. Method

In order to make the research in this paper more effective and focused, the scope of this paper will only cover Guangzhou, China. Also, most of the discussion in this paper will be based on primary sources

To obtain sufficient and validity primary resources, In this paper, we will use survey to collect data, which means use questionnaires. the advantage of using this method is that a lot of quantitative data can be collected. In addition to this, another benefit of survey is that it is cost effective. In order to be able to collect high quality responses in a short period of time, we used "Questionnaire Star" to create the questionnaire and post it online to seek responses from others.

However, there are several disadvantages to using this method: 1. some respondents may fill out the questionnaire haphazardly, resulting in less reliable responses; 2. researcher bias may also affect the reliability of the responses; and 3. the options provided may limit the respondents' room for maneuver. To mitigate the effects of these factors mentioned above. The questionnaire covered eight questions about personal information, which made it possible to discuss the impact of cigarette packaging from multiple perspectives.

The sample and data were screened to improve the reliability of the survey for this paper. Respondents who answered the questionnaire should have the following qualities. 1. they still retain the habit of smoking, 2. this consumer smokes at least one cigarette per day, and 3. is an adult. In addition, the Cluster sampling method has been used.

As of January 11, 2022, the questionnaire in this paper collected 357 responses, of which 247 responses were valid data. This paper uses python to organize and analyze all the obtained data.

3. Result: Health awareness and consumer preference

It is important to determine the nature of smoking (rational or irrational), which affects the strategies used to reduce cigarette consumption.

Becker treats cigarette consumption as a rational addiction by analyzing consumers' choice preferences. However, this theory also ignores some factors (as mentioned above) [9].

Incomplete information can have some impact on the ability of consumers to make rational choices (theory of information asymmetry and the assumption of rational consumer choice). This means that incomplete information will allow consumers to make choices that are considered irrational. Therefore, this paper will analyze the basic nature of cigarette consumption (rational or irrational) based on the basics of behavioral economics and the theory of imperfect information. (*ceteris paribus*)

In order to more accurately discuss and explore changes in the choices made by consumers, this paper assumes that only the packaging of cigarettes has changed (*ibid.*). Information about the health costs of smoking is conveyed to consumers through cigarette packages with graphic health warnings [10].

From the statistics of the data collected by the questionnaire we can observe that out of the 247 included in the statistics, after the cigarette package was added with a graphic health warning. About 12.96% of smokers chose to increase their consumption of cigarettes from their current consumption, 17.81% chose to reduce their consumption of cigarettes from their current consumption, and 27.53% chose not to smoke anymore. In addition to this, about 43.32% of smokers did not choose to change their consumption due to the change in packaging. In summary, more than 50% of smokers chose to change their consumption after the packaging change. Of these, 108 smokers had a decreasing trend in overall consumption, which is numerically more than the 32 smokers who chose to increase their consumption.

Table 1. Contrast of Consumer choice (Number of people and consumption)

	Average value	Sample size
Increased cigarette consumption after the packaging change (person%)	12.9555	32
Reduced cigarette consumption after the packaging change (person%)	17.8138	44
Increased cigarette consumption after the packaging change (sticks/day)	1.4375	32
Reduced cigarette consumption after the packaging change (sticks/day)	2	44
Same cigarette consumption after the packaging change (person%)	43.3198	107

Overall, comparing the average daily cigarette consumption per smoker, the average number of cigarettes consumed per person per day (before the packaging change) was 7.166, and after the packaging change the average consumption per person became 5.1375. The average person consumed 2.0285 fewer cigarettes per day.

Table 2. Contrast of consumer choice (average consumption)

Before change	After change	Variance
7.166 (sticks/day/per person)	5.1375 (sticks/day/per person)	-2.0283 (sticks/day/per person)

Based on the results just analyzed, a supply and demand graph is drawn to describe this change (Figure 3). As the demand curve shifts to the left, a SURPLUS is created (Q2 to Q1) and consumers can buy more cigarettes for less money. According to the law of supply, producers will thus offer less product. Eventually, the market equilibrium quantity will decrease from Q1 to Q3.

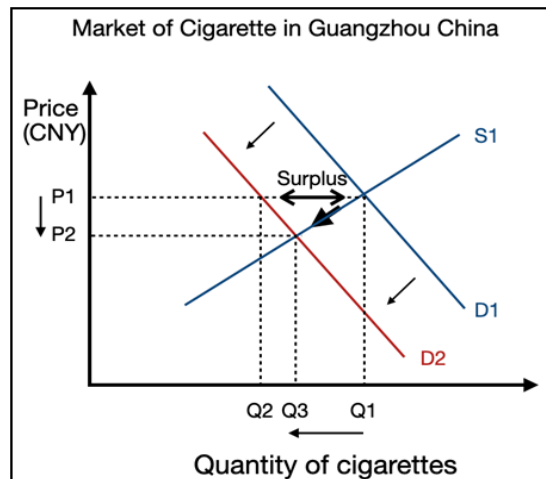


Fig. 3 Market of Cigarettes in Guangzhou, China

Because the amount of market consumption is reduced, the distance between MPB and MSB will be reduced, which represents that the welfare loss of the society will be reduced.

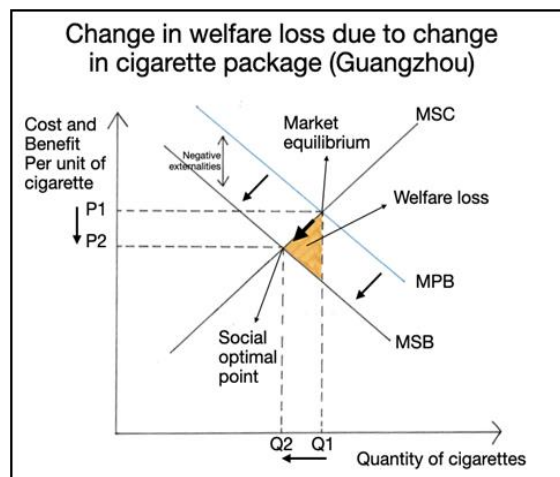


Fig. 4 Change in welfare loss due to change in cigarette package (Guangzhou)

According to the theory of rational consumers, perfect information can provide consumers with perfect conditions for analysis and help them to make rational choices. In Figure 4 we can observe that the demand curve shifts to the left. This means that, in general, the "more rational choice" chosen by most smokers is to reduce their consumption of cigarettes. However, this does not allow us to conclude the nature of smoking. We do not have accurate data on the utilities associated with smoking, and there are still some respondents who have made the choice to increase their cigarette consumption. Academics currently do not provide a theory that can explain this situation. Therefore, in order to clarify the nature of this situation, this paper will define the nature of smoking as "pervasive irrational behavior" (considering most people as major of society and defining this behavior by the choices of major of society, define smoking as irrational behavior)

Now, we can analyze what exactly causes cigarette packaging to influence smoker's choice, taking into account the definitions analyzed in the previous section and the basic theories of behavioral economics. In more detail, why does "having more information" allow smoker to make a more rational decision: consume fewer cigarettes? Starting with the theory of nudge theory, the theory was first published by a book called "Nudge: Improving Decisions About Health, Wealth and Happiness" by Richard Thaler. The definition of this term is: using gentle reinforcement and suggestions to influence market participants toward the de-sired behavior. Moreover, the method called: "provide

information” is included in it. This method will help smoker to reduce the impact of cognitive bias (Anchoring heuristic and Availability heuristic) in decision making process. Which been considered as the main factor that affect consumer to make “best choice”

The name of the first factor is: the anchoring heuristic. It describes the way people think about something they don't know: people guess at an unknown by matching what they know about food with what they don't know. When consumers are given more information, they can make more accurate associations and guesses about the health costs associated with smoking. Guesses that are closer to the truth allow consumers to make more accurate assessments and thus make better choices.

The second key factor is the availability heuristic. It suggests another mode of thinking: when people try to find out how likely an event is to occur, they make judgments by how often they remember that event or similar times occurring. This means that the memories consumers have will influence the process by which they make their judgments. When smokers see a package with a pictorial health warning, their brains unconsciously remember the information, which allows consumers to recall the information the next time they make a choice. If information about the dangers of cigarettes is not communicated to consumers, they may underestimate the health costs of cigarettes the next time they make a choice about whether to buy them because of a lack of information.

4. Discussion: Health perception and consumer choice

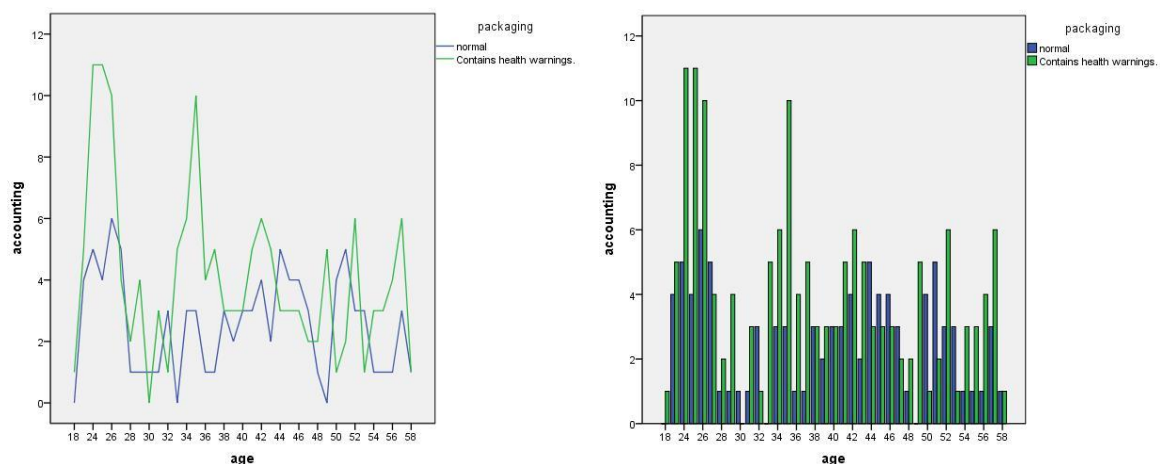


Fig. 5 Different age groups (ceteris paribus)

The results of the data statistics are presented in Figure 5. smoker generally chooses to buy cigarettes whose packaging has been changed. Age differences affect smoker's response to cigarette package changes to some extent. Smokers between the ages of 18 and 30 will respond the most to changes in cigarette packaging (the greatest change in the number of cigarettes consumed). This group of smokers is the youngest, and they may therefore be more focused on their future health and utilities. this may be the reason for the greatest change in the number of cigarettes consumed by this group of consumers.

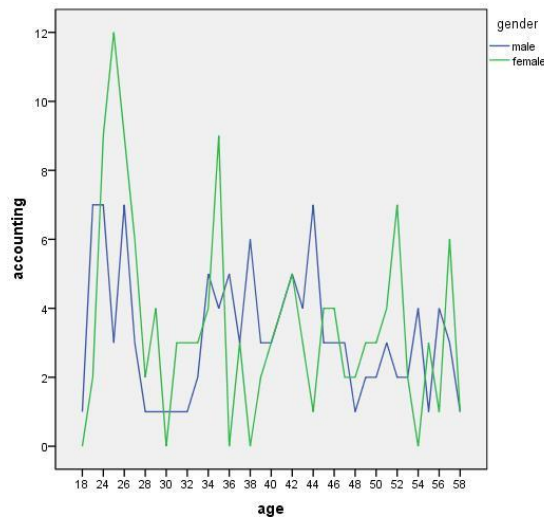


Fig. 6 Different gender groups (ceteris paribus)

Data shows in Figure 6 shows the fluctuation of the smoking proportion of women in most age groups is larger than that of men, reflecting the differences in the living habits of women in different age groups.

Table 3. Different choices made by different genders

	Sample size	Average value	Minimum	Maximum
Male:				
Cigarettee consumption (sticks/day), plain package	118	7.4068	1	15
Cigarette consumption (sticks/day), warning package	118	5.5339	0	4
Difference	118	-1.8729	-14	2
Female:				
Cigarettee consumption (sticks/day), plain package	129	6.9457	1	14
Cigarette consumption (sticks/day), warning package	129	4.7752	0	14
Difference	129	-2.1705	-14	2

Comparing the changes in consumption of the variation exhibited by female smokers was significantly greater than that exhibited by male smokers, where the difference between the two exhibited was approximately 0.2976 (as shown in Table 3). Therefore, we can judge that female smokers attach more importance to their future utilities to some extent.

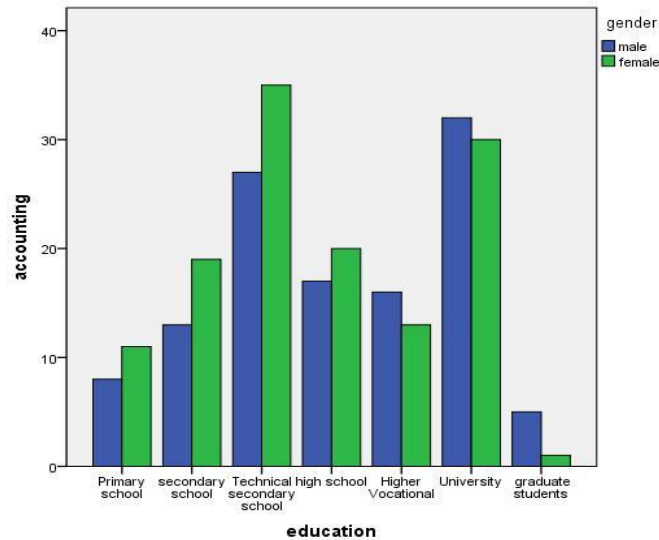


Fig. 7 Different levels of education (ceteris paribus)

As can be seen from Figure 7, women generally buy more cigarettes than men when their education is low, while men buy more cigarettes than women when their education is high. Among them, the overall proportion of secondary school and undergraduate students buying cigarettes is the largest.

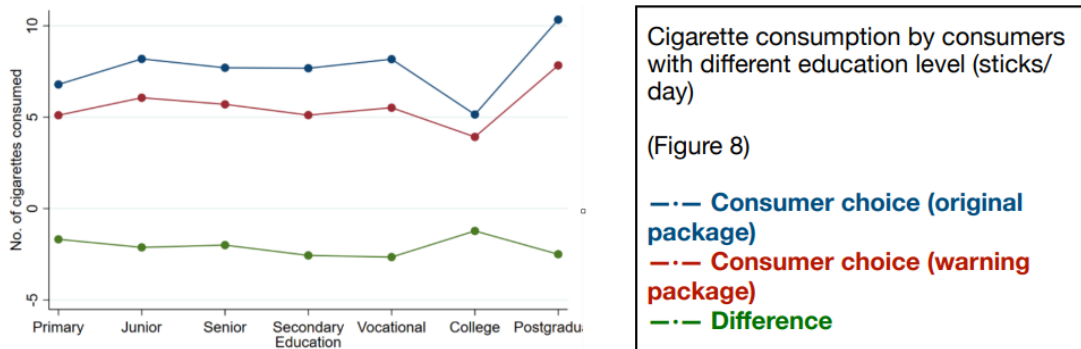


Fig. 8 Overall trend of consumers with different education levels

Grouping according to different levels of education, we can find no significant differences among the different groups. Only some of the groups showed subtle differences in their choices, but there was no clear pattern to this difference and we could not analyze the reasons for this difference.

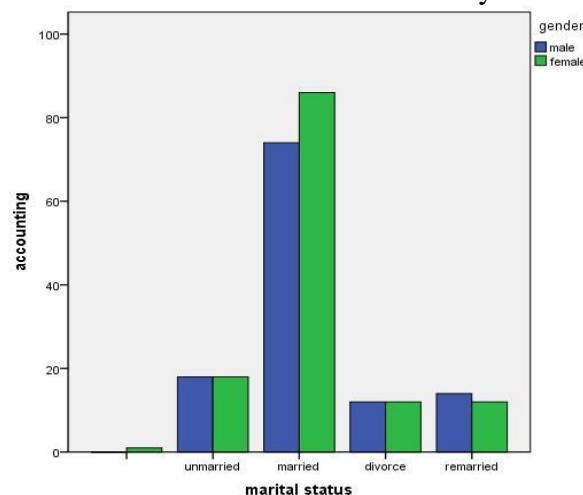


Fig. 9 Different marital statuses (ceteris paribus)

Married men and women account for a huge proportion of cigarette purchases, far ahead of unmarried, remarried, and divorced men and women, as shown in Figure 9.

For ease of understanding and analysis, smokers with the same family traits were grouped into the same group (e.g., divorced and unmarried both fall into the no-partner category).

Table 4. Different choices made by different consumers with different marital status

	Sample size	Average value	Minimum	Maximum
Spinsterhood:				
Cigarettee consumption (sticks/day), plain package	60	5.7333	1	15
Cigarette consumption (sticks/day), warning package	60	4.0167	0	4
Difference	60	-1.7167	-11	2
Married:				
Cigarettee consumption (sticks/day), plain package	187	7.6257	3	14
Cigarette consumption (sticks/day), warning package	187	5.4973	0	14
Difference	187	-2.1283	-14	2

The statistics are presented in Figure 4. Smoker with a partner responded significantly more to the cigarette package change than without a partner, with a difference of 0.4116 cigarettes/day between the two. This may be because the information provided by the packages with health warnings triggered the smoker to think about the additional costs associated with smoking. The health warnings prompted smoker to consider the extent to which smoking affects their partner when they have a partner (secondhand smoke). According to the theory of bounded selfishness, people exhibit limited selfishness in the real world and cooperate with others. This means that smoker may reduce the number of smoking pairs in order to reduce the impact of his own smoking on family members.

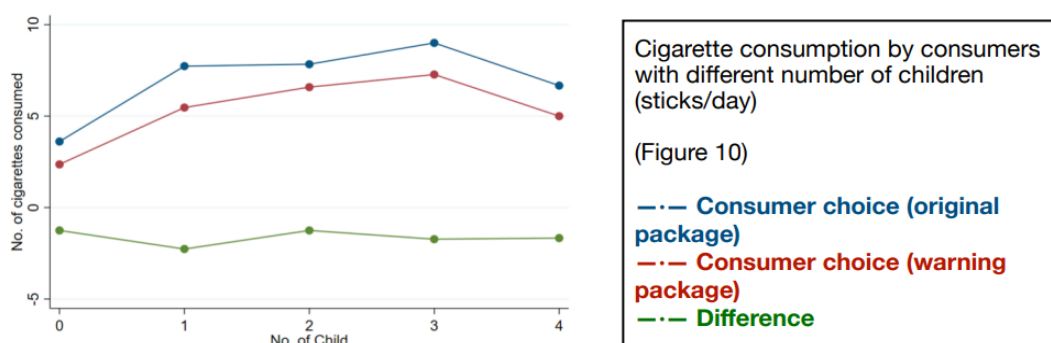


Fig. 10 Different number of offspring (ceteris paribus)

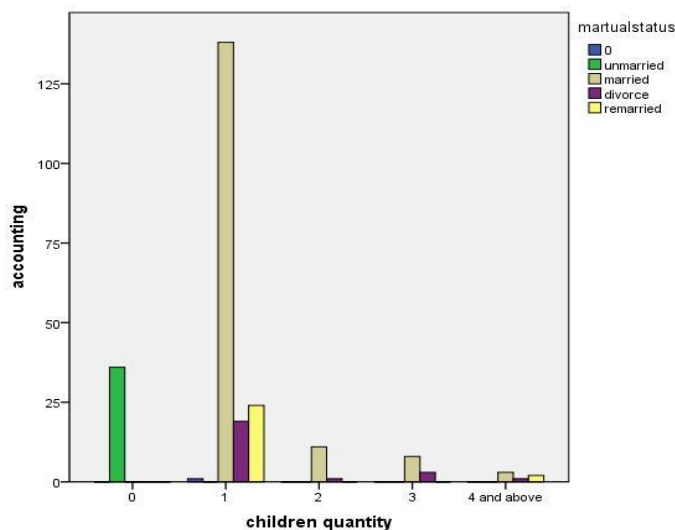


Fig. 11 Different marital statuses by cigarettes consumption quantity

In the statistics exhibited by figure 10, it is easy to see that these variations are not regular. And there is no significant difference between the number of each change. So there is no way to accurately analyze the impact of this variable through this data. But from Figure 11, we know that among married households, those with one child buy the most cigarettes. At the same time, married households buy more cigarettes than remarried and divorced households when families have at least two or four children.

5. Conclusion

According to the passage, the nicotine will first harm your body. This is because nicotine and tar produced by cigarettes will be sucked into your lungs along your respiratory tract, making smokers dependent for a long time. They will cause serious damage to the smoker’s body. It is believed that the World health organization (WHO), on July 26, 2021, smoking can have a serious impact on the smoker's body functions. Furthermore, smokers also need to spend money to cure their health problems. For instance, since smokers have been smoking for a long time, they must spend money in hospitals.

According to all the articles, it can be concluded that smoking can also make people poorer because they need money to buy cigarettes, so it is a burden on smokers’ funds. Smokers spend a lot of money to buy tobacco, and also because tobacco can kill many people. The data show that the number of tobacco deaths is 1.4 million, causing a direct economic loss to the country of 166.56 billion. This data will continue to grow proportional.

Questions about whether cigarette packaging will affect cigarette sales can be concluded that good-looking packaging can arouse people’s desire to buy. Still, packaging with no beautiful illustrations will eliminate smokers’ desire to buy because packaging will directly affect whether some smokers will continue to buy cigarettes. The survey found that most people aged 18-30 will consider the packaging of cigarettes to decide to buy cigarettes, so younger people will not be willing to buy cigarettes with illustrated packaging. This is believed that over 50% of consumers choose to decline their number of cigarettes and stop smoking.

Smokers’ choice of packaging directly affects smokers’ desire to buy. Smokers usually choose better-looking tobacco packaging because smokers also affect their mood when using it. For example, smokers will be happier about good-looking cigarette boxes, but bad-looking pack-aging will feel uncomfortable when smokers use it.

Cigarettes with bad pictures will make fewer smokers, and fewer customers will lead to a decline in production. Because of fewer customers, manufacturers will reduce prices, and customers will buy

in large quantities because of the price reduction, so manufacturers will also reduce production not to lose money.

Finally, it can be concluded that the packaging of cigarettes will have a great impact on smokers, as well as a serious attack on the economy.

References

- [1] The Government of Hong Kong Special Administrative Region - Department of health. Smoking. Non-communicable Disease and Healthy living. <https://www.chp.gov.hk/en/healthtopics/content/25/8806.html> November 9 2018.
- [2] World health organization. Tobacco. <https://www.who.int/news-room/fact-sheets/detail/tobacco> May 24 2022.
- [3] Jan J. Barendregt, M.A., Luc Bonneux, M.D., and Paul J. van der Maas, Ph.D. The Health Care Costs of Smoking. October 9, 1997. 1052-1057.
- [4] Gao Song, Liu Hong, Meng Xiangyi. Tobacco demand, tobacco tax and its impact in China: An empirical study based on tobacco addiction model [J]. Chinese Economics,2010(00):3-37.
- [5] Song Chaoying Xia Yun. Smoking is addictive behavior economics analysis [J]. Journal of qinghai sociology, 2008 (02): 18 to 21, DOI: 10.14154 / j. carol carroll nki QSS. 2008.02.030.
- [6] Guo aili. Application of design psychology in packaging design [J]. Western leath-er,2021,43(23):89-90.
- [7] Lee JG L, O'Brien KF, Blanchflower TM, Swanson G, Averett PE, Gregory KR. Changes to cigarette packaging influence US consumers' choices: Results of two discrete-choice experiments to inform regulation. Tobacco Induced Diseases. 2021;19(September):70. doi:10.18332/tid/140137.
- [8] Annette R. Kaufman; Laura A. Dwyer; Stephanie R. Land. et al. Smoking-related health beliefs and smoking behavior in the National Lung Screening Trial. 2018: 27-32.
- [9] Sina. Do men drink and smoke less when they get married? 2021.1.20, 2022.8.20, www.sohu.com/a/445754012_120051629. 2021.1.20
- [10] Zhang Xiulan. The reporter of Beijing News Express. baijiahao.baidu.com/s?id=1600517079482640973&wfr=spider&for=pc 2018.5.5