Chinese College Student Choice Concerning Disposable and Reusable Chopsticks

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ABSTRACT

This study examines associations between demography, attitudes, knowledge level, and consumer choice concerning the use of disposable and reusable chopsticks in campus dining halls and off-campus restaurants by Chinese college students in Beijing, China. I conducted an online survey, the results of which showed no significant association between demography and consumer choice in both dining areas. However, there was a strong relationship between attitudes concerning environmental and health costs associated with chopsticks and consumer choice, which indicates that the Chinese government should focus on specific consumer preferences such as concern for safety and hygiene when seeking to reduce disposable chopstick use in both dining areas. The results also showed strong association between knowledge level and consumer choice, which indicates that education on the impacts associated with disposable chopstick use is also necessary. Disposable chopstick use may be reduced by strengthening education on the issue, by establishing policies restricting the use of disposable chopsticks, and developing new technologies for chopstick manufacturing and waste treatment processes.

KEYWORDS

Beijing universities, restaurants, consumer behavior, attitudes, knowledge

INTRODUCTION

Because of rapid economic growth, consumerism in China is on the rise, with Chinese citizens and increasing numbers of tourists eating in restaurants more often. China is expected to become the largest tourist destination country and fourth largest tourist source country in the world by 2020, which will also contribute to increased food consumption in restaurants (Tang et al. 2011). Like other leisure activities, dining out reflects a consumer ethic and the importance of commodities in the mediation of interpersonal relations (Finkelstein 1989). Increasing numbers of restaurants have opened in recent years to satisfy the demand for dining options by residents and tourists. At the turn of the century, Beijing had over thirty thousand restaurants (Beijing Statistic Bureau 2000), and many more have been established since then. Due in part to their popularity in restaurants, China currently consumes 45 billion pairs of disposable chopsticks annually (Saffron 2001). This increased use of disposable chopsticks drives deforestation and waste management issues in China. Chopstick manufacturing causes over 25 million wooden trees to be cut down each year, leading to large scale deforestation (Saffron 2001). Faced with consequences of natural resources depletion and related environmental problems, the Chinese government has begun searching for large-scale solutions to mitigate the environmental impacts of increasing consumerism.

China has attempted to decrease the use and impact of disposable chopsticks through legislation, recycling initiatives, and the development of plantations. To manage the use of raw materials for disposable chopsticks production, the government has established extensive plantations of species used for chopsticks (e.g., poplar and aspen trees), which has reduced deforestation (Li et al. 2005). The government has also implemented taxes (effective October 1, 2000) on disposable chopsticks to help reduce natural resources consumption by restaurants (Hood 2001). Finally, the government has focused on recycling research, in areas such as recycling fiber from disposable chopsticks to reduce the amount of waste and cost of Poly Lactic Acid (PLA) products, producing ethanol from disposable aspen chopsticks using delignification pretreatments, and producing hydrogen energy through low temperature catalytic gasification (Shih et al. 2010, Asada et al. 2011, Chiang et al. 2012). Although these methods have mitigated some problems associated with increased chopstick use, a complete resolution of the large scale problem will require policymakers to consider social and behavioral characteristics of individual consumers.

Because there are different types of chopsticks available in Chinese restaurants, the properties of chopsticks, hygiene issues, and possible health issues can affect consumer choice of chopsticks. Utensil properties play an important role in the meal quality (Piqueras-Fiszman and Spence 2011). For example, the shape of disposable chopsticks may affect the ease of picking up food (Chen 1998). The raw materials in disposable chopsticks also may lower the food quality by affecting the taste (Piqueras-Fiszman and Spence 2011, Schifferstein 2009). Besides the properties that directly affect the meal, there are additional concerns related to hygiene and health issues. Many people think disposable chopsticks are cleaner than reusable ones, because a paper cover typically protects the chopsticks from being touched. However, more severe health issues can be caused by the introduction of heavy metal residues in disposable chopsticks, as the use of artificial preservatives during the manufacturing process strongly increases the amount of manganese, zinc, and copper (Shen et al. 2008). Relatively high amounts of these trace elements in the human body can induce oxidative stress and even cause Parkinson's disease (Li et al. 2004, Luchhini et al. 2007). Knowledge of these negative health consequences associated with disposable chopstick use might play a key role in consumer preferences and behavior. It is not known, for example, that consumer knowledge of production input, waste treatment, and health issues; consumer attitudes toward hygiene problems and properties of utensils; and the demography of consumers are all important factors that can affect consumer choice. To effectively design government policy to reduce disposable chopstick use, determining the impact of consumer knowledge and perception on selection of chopsticks is important, particularly for segments of the population that have strong purchasing power and will have large impacts on future consumption.

In this study I identified the central factors underlying consumer behaviors in choosing disposable or reusable chopsticks when eating out at restaurants or dining halls. In particular, I examined whether knowledge level, attitude, or demographic factors influence consumer choices by providing online surveys to college students, who constitute the next generation of highly educated consumers with strong future purchasing power in China.

METHODS

Study system description

I conducted online surveys of college students in Beijing, China. Beijing, the capital city of China, has over thirty thousand restaurants, many of which are located near university campus areas and are easily accessible to college students. Tsinghua University is an example of a typical college campus (Figure 1, Figure 2) with more than five campus dining halls and over 100 off-campus restaurants within a 3-mile radius of the campus. Beijing has a population of 19,612,368 people (2010 estimate), who live in 16 urban and suburban districts and two rural counties (Beijing Statistic Bureau 2000, NBSC 2011). Over 982,400 college students attend universities in Beijing, in which the survey respondents were from 33 different universities (2009 estimate) (NBSC 2011, Table 1, Figure 3). I chose college students because they constitute the next generation of highly-educated Beijing consumers, and will influence green product consumption in the future.

Figure 1. Locations of campus dining halls in Tsinghua University.

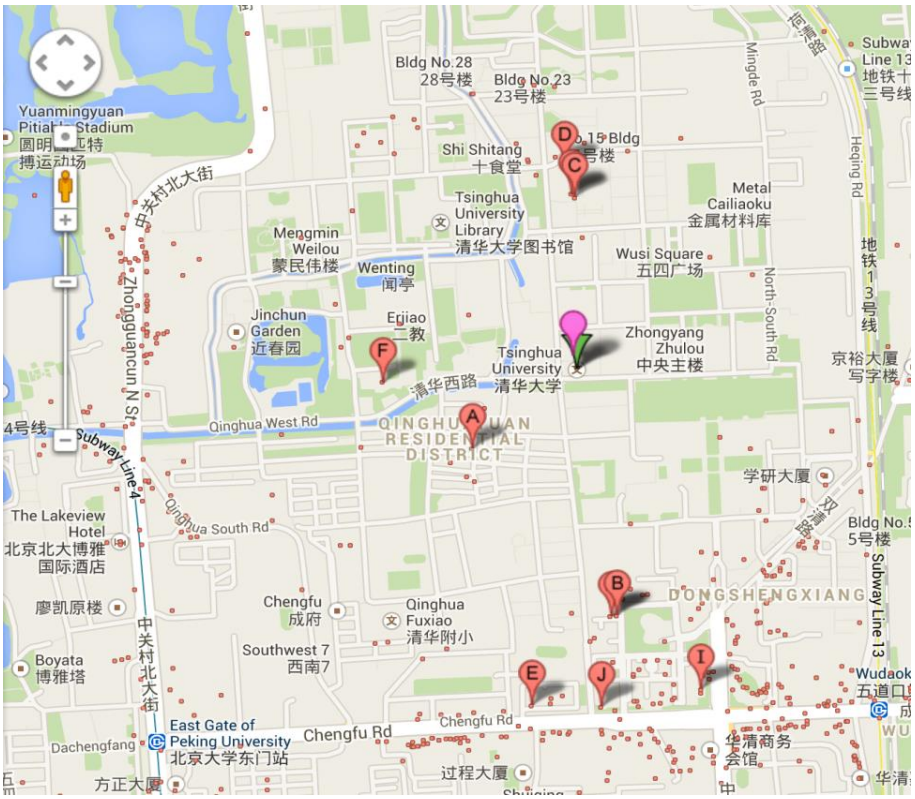

Figure 2. Locations of off-campus restaurants around Tsinghua University. *Red dots indicate restaurants. Large red pins indicate large iconic restaurants.

Table 1. 33 universities in Beijing. Respondents were from 33 out of all the universities in Beijing, China. (Source was downloaded from CERNET database.)

33 Universities in Beijing, China		
Tsinghua University	University of International Business and Economics	China Agricultural University
Peking University	Peking University Health Science Center	Beijing Language and Culture University
Beijing University of Aeronautics and Astronautics	Beijing People's Police College	Capital University of Economics and Business
Renmin University of China	Central University of Finance and Economics	China University of Mining and Technology
Beijing Normal University	North China Electric Power University	University of Petroleum
Beijing Jiaotong University	Beijing Forestry University	Beijing University of Chinese Medicine
Chinese People's Public Security University	Beijing Broadcasting Institute	Chinese Peking Union Medical College
Beijing Union University	Beijing Materials University	Beijing University of Agriculture

Beijing Sport University	Beijing Institute of Graphic Communication	Beijing Dance Academy
China Youth University	Beijing Institute of Petrochemical Technology	Chinese Conservatory of Music
China Foreign Affairs University	North China institute of science and technology	Beijing Youth Politics College

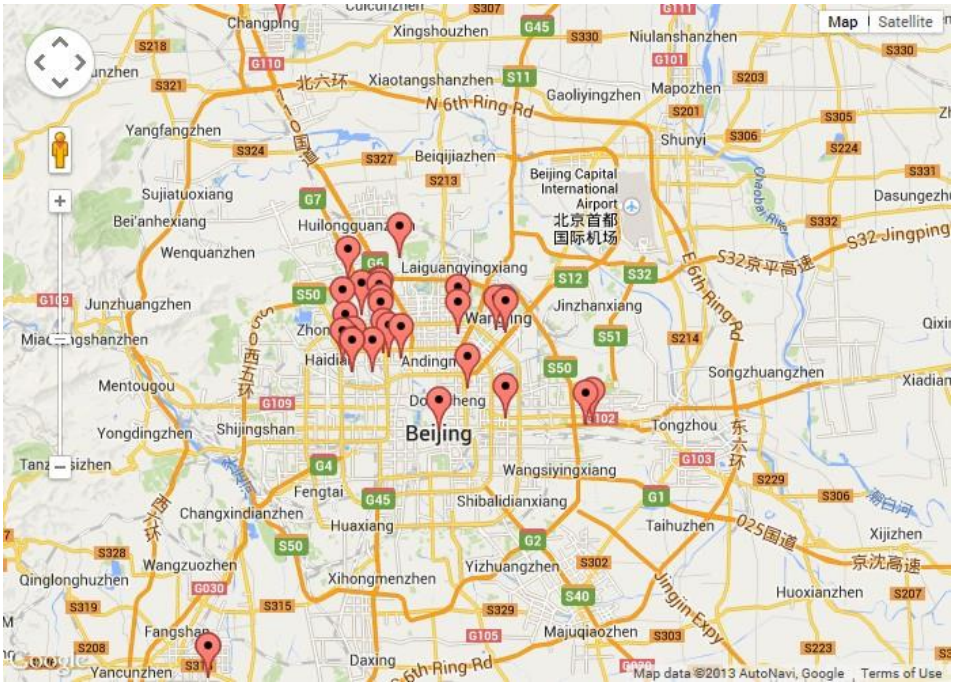

Figure 3. Locations of major Beijing universities

Data collection

I surveyed 165 college students in Beijing using the Chinese online survey generator "wen juan xing." Online surveys take advantage of the internet's ability to provide access to groups and individuals who would be difficult to reach through other channels (Garton et al. 1999, Wellman 1997). In this case, I posted the survey link on the website of the survey generator and paid the website to find people to fill out the surveys. The survey has thirty questions, and required approximately five minutes to complete (Appendix A).

Survey instrument

I divided the survey into sub-sections focusing on actual behaviors, demographics, attitudes, and knowledge level. To understand the difference between campus dining halls and off-campus restaurants, I asked the same set of questions to each group. To determine the actual practices of college students in Beijing, I included questions about frequency of dining out, preferred types of chopsticks, and recycling behaviors. To gather demographic information about college students in Beijing, I collected information on gender, age, year, college major, race, and monthly family income. This set of questions helped me determine the relationship between consumer backgrounds and their behaviors. To understand consumer attitudes toward disposable chopstick use, I asked questions related to opinions about environmental and social consequences of disposable chopsticks, and personal preferences regarding chopstick characteristics. In the questions about environmental consequences, I asked about attitudes regarding production input (raw materials), recycling, and waste treatment. For the questions about social consequences, I asked about utensil properties and possible hygiene and health issues. To determine respondent knowledge level, I asked questions to assess their familiarity with environmental consequences and possible public health issues from heavy metal residuals in disposable chopsticks. To increase accuracy, avoid leading the respondent, and gauge true knowledge levels, I included an option for open-ended responses in addition to my ranking and multiple choice options in this section of the survey.

Analysis

I used Excel spreadsheets to code categorical and text responses, and used the statistical software R and R commander to analyze and organize data (R commander 2011). Using Excel and R I also calculated summary statistics for several survey variables. I then used R commander to run statistical analysis on my data.

Study population

To characterize my study population and understand overall disposable chopstick use, I compared the total number of respondents who use disposable chopsticks more often to those who use reusable ones more often. Considering that there might be difference between campus dining halls and off-campus restaurants, I also compared the dining frequency and the actual pattern of usage of different types of chopsticks between these two places.

Impacts of attitude on consumer choice

To test my working hypotheses on consumer attitudes towards using different types of chopsticks, I compared the results of attitudes toward different issues with consumer's actual behaviors. I first compared the Likert scale rankings on attitude toward Government efforts to reduce disposable chopstick use by using bar chart. Then I compared respondent's chopsticks choice preference under different supplement situations in both dining halls and restaurants. When analyzing the relationship between choices and respondent attitudes toward different factors, I coded the responses to different factors (safety, cleanliness, convenience, no other option, and utensil properties) into a scale of 0-5 with 0 indicating no selection and 5 meaning that all the factors were selected. Because there might have been differences between campus dining halls and off-campus restaurants, I used both Chi-Squared Tests and ANOVA tests to test the relationships between choices and attitude factors separately in both dining areas.

Impacts of knowledge level on consumer choice

To test my working hypotheses on consumer knowledge level on deforestation, waste production, waste treatment, health issues and government efforts relating to disposable chopstick use, I compared the results for each question. To analyze the relationship between consumer choice and knowledge levels, I coded the response to different knowledge level factors (deforestation, waste production a treatment, health issues and three of the government efforts) into a scale of 0-7 with 0 indicating no selection and 7 meaning all the factors were selected. Because there might have been differences between campus dining halls and off-campus restaurants, I used ANOVA Tests to obtain the association between consumer choice and knowledge levels in both dining areas.

Impacts of demographics on behavior, knowledge, and attitude

To determine the relationship between demographic background and consumer choices of different types of chopsticks, I used both ANOVA tests and Chi-Squared Tests. I used Chi-Squared tests to test the relationship of gender, and academic levels to the choice behaviors. Then I used ANOVA Tests to determine the relationship of family income level and their actual choice behaviors. To do this I coded the income level into a scale of 1-3, with 1 indicating low income level and 3 meaning high income levels.

After obtaining the key answer for each factor field (attitude, knowledge level, and demography), and their relationships to choice behaviors, I used ANOVA tests to obtain the relationship between demographic factors to both knowledge level and attitudes. Then, after a series of comparisons, I obtained the associations between different categories considered and also obtained the most related factor that affect consumer choices on different types of chopsticks when dining out.

RESULTS

Data Collection

Demography

I collected 165 responses from the online survey, of which 8 responses had to be discarded due to incompleteness. The demographic profile of the respondents showed little difference in terms of gender, but other categories, such as academic level, income level, and college major varied among respondents (Table 2).

Table 2. Demographic Results for Participants.

Demographic Profile		**% of Total Respondents**
Gender	Male	49.37%
	Female	50.63%
Age	Average	25
Academic Status	Undergraduate	85.44%
	Graduate	14.56%
Family Income Level	Low Income Level	32.28%
	Middle Class	54.43%
	High Income Level	13.29%
Major	Environmental	6.96%
	Other	93.04%

Behavior

In both dining halls and restaurants, the majority of participants (68% in dining halls and 58% in restaurants) chose to use reusable chopsticks rather than disposable chopsticks. Of the group who chose to use disposable chopsticks, there were more respondents (53% in dining halls and 41% in restaurants) who recycled the used disposable chopsticks in dining halls than in restaurants (Table 3).

Table 3. Choice Behaviors and Recycling Behaviors as Self-reported by Survey Participants.

Dining Area	Choice Behavior	% of total respondents	Recycle Behavior	% of respondents who chose disposable chopsticks
Dining Hall	Disposable Chopsticks	32.28%	Recycled	52.94%
			Not Recycled	47.06%
	Reusable Chopsticks	67.72%		
	Total Percentage	100%		100%
Restaurant	Disposable Chopsticks	41.72%	Recycled	40.91%
			Not Recycled	59.09%
	Reusable Chopsticks	58.28%		
	Total Percentage	100%		100%

Attitudes and preferences

The majority of respondents (78%) cared about the impacts of using disposable chopsticks and agreed that the government should try to reduce disposable chopstick use (Figure 4).

Certain dining halls provided both disposable and reusable chopsticks. In these dining halls most respondents (72%) preferred to either bring their own chopsticks or use reusable chopsticks provided by the dining halls. In the dining halls that provided only disposable chopsticks, more respondents preferred to bring their own chopsticks (59%) than use the disposable chopsticks provided. In restaurants that provided both disposable and reusable chopsticks, 56% of respondents preferred to either bring their own chopsticks or use reusable chopsticks. In restaurants that only provided disposable chopsticks, the majority of respondents (61%) preferred to use the disposable ones (Table 4).

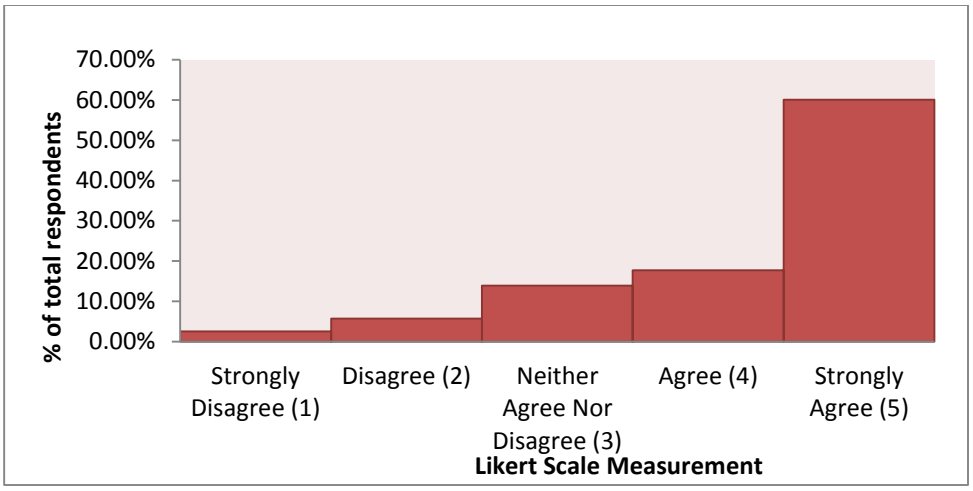

Figure 4. Results of Likert Scale Rankings Showing Attitude toward Government Efforts to Reduce Disposable Chopstick Use.

Table 4. Personal Preference on Different Types of Chopsticks under Different Provision Conditions

		Dining Hall	Restaurant
Supply Situation	**Personal Preference**	**% of total respondents**	**% of total respondents**
Both types of chopsticks were provided	Disposable chopsticks	27.85%	43.67%
	Reusable chopsticks	49.37%	50.00%
	Bring their own chopsticks	22.78%	6.33%
	Total Percentage	100%	100%
If only provided disposable chopsticks	Use the one provided	40.51%	60.76%
	Bring their own chopsticks	59.49%	39.24%
	Total Percentage	100%	100%

Students who preferred disposable chopsticks cited safety, convenience, and cleanliness as the most popular reasons for this choice. However, their reasons differed depending on whether they were eating in dining halls or restaurants. In dining halls, the majority of respondents who preferred disposable chopsticks due to convenience (41%), while the majority of participants who preferred reusable chopsticks due to cleanliness (57%). In restaurants, 38% of respondents

preferred disposable chopsticks due to safety, while 53% of respondents preferred reusable chopsticks due to safety (Figure 5, Figure 6).

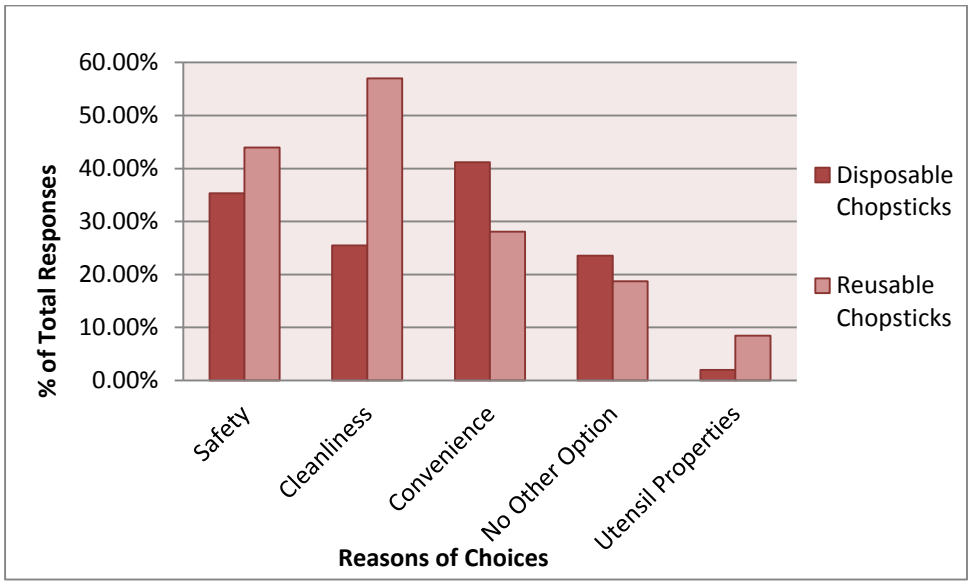

Figure 5. Rationale for Chopstick selection in Dining Hall.

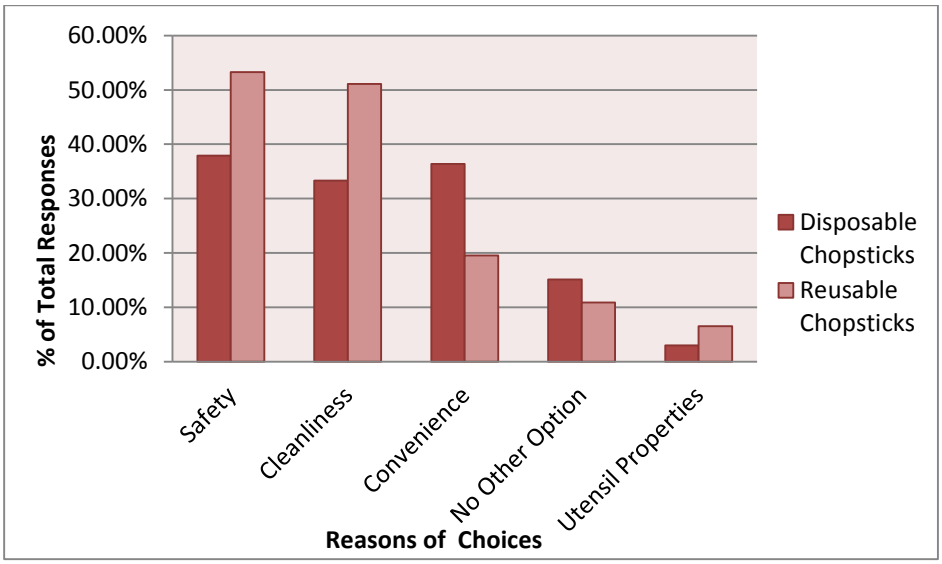

Figure 6. Rationale for Chopstick Selection in Restaurants.

Knowledge level

The majority of respondents (86%) had some knowledge of the impacts of using disposable chopsticks. There was an evidence of high knowledge levels of deforestation. Consumers were less aware of the impacts on waste production, waste treatment, and health issue (Figure 7).

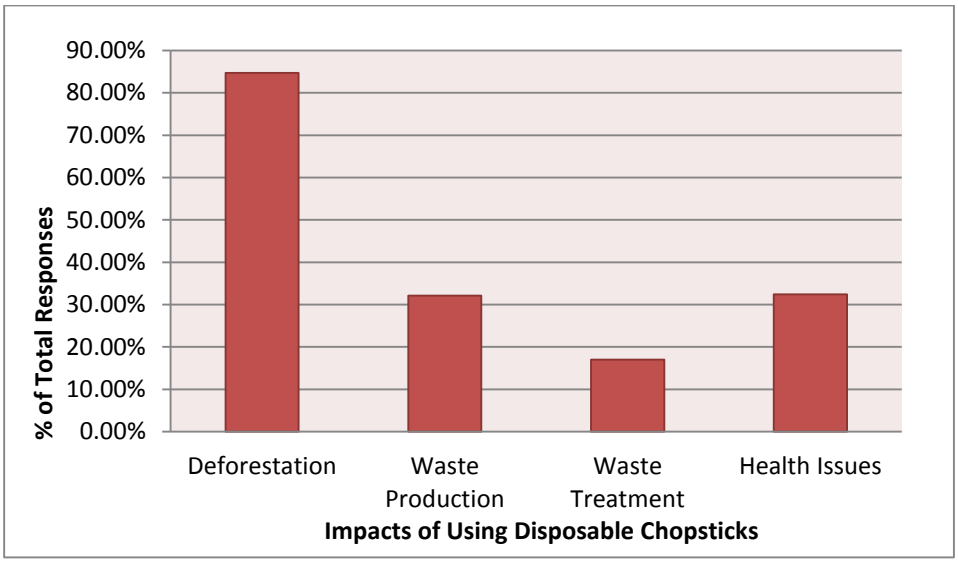

Figure 7. Respondent's Knowledge Level in Knowing Different Impacts of Using Disposable Chopsticks.

Statistical analysis

Demography vs. choices

I found no significant relationships between gender, academic level, or family monthly income level and chopstick use choice in either dining areas. The Chi-squared test indicated no significant correlations between choice behaviors and either gender or academic level factors (Table 5). Also the ANOVA test indicated no significant relationship between income level and choice behaviors (Table 6).

Table 5. Gender and Academic Level Association with Choice Behavior Using Chi-squared Test Results.

Factors Tested	$\chi 2$	df	p-value
Gender vs. Choice in *Dining Hall*	3.72	1	0.054
Gender vs. Choice in *Restaurants*	1.85	1	0.17
Academic Level vs. Choice in *Dining Hall*	1.49	1	0.22
Academic Level vs. Choice in *Restaurants*	0.37	1	0.54

Table 6. Family Monthly Income Level Association with Choice Behavior Using ANOVA Test Results.

Factors Tested	F-value	P-value
Income Level vs. Choice in Dining Hall	0.81	0.37
Income Level vs. Choice in Restaurant	0.63	0.43

Knowledge level vs. choice

I found a significant association between knowledge level and choice behaviors in both dining areas. The ANOVA test showed significant correlation between knowledge level in different impacts of using disposable chopsticks and choice behavior in both dining halls ($P<0.05$) and restaurants ($P<0.05$) (Table 7).

Attitudes vs. choice

I found significant relationships between attitude on reducing disposable chopstick use and choice behaviors in both dining areas. The ANOVA test showed significant correlation between attitude factors and choice behaviors in both dining halls ($P<0.005$) and restaurants ($P<0.000005$) (Table 7).

Table 7. Knowledge Level and Attitude Association with Choice Behavior Using ANOVA Test Results.

Factors Tested	F-value	P-value
Knowledge Level vs. Choice in Dining Hall	4.23	0.041
Knowledge Level vs. Choice in Restaurant	4.85	0.029
Attitude Likert Scale vs. Choice in Dining Hall	11.67	0.00081
Attitude Likert Scale vs. Choice in Restaurant	23.17	3.49×10-6

Demography vs. knowledge level

I found no significant relationship between knowledge level and either gender, academic level, or income level factors. There was no significant correlation between knowledge level and family income level (r_{155} = -0.145238, p = 0.06954). Also, the ANOVA test indicated no significant relationship between knowledge and either gender (P>0.05) or academic level (P>0.05) (Table 8).

Demography vs. attitudes

I found no significance between attitude and either gender, academic level, or income level factors. There is no significant correlation between attitudes and family income level (r_{155} = 0.08130373, p = 0.3114). Also the ANOVA test indicated no significant relationship between attitude and either gender (P>0.05) or academic level (P>0.05) (Table 8).

Table 8. Gender, and Academic Level Association with both Knowledge Level and Attitude Using ANOVA Test Results.

Factor Tested	F-value	P-value
Gender vs. Knowledge Level	0	0.995
Gender vs. Attitude	1.395	0.239
Academic Level vs. Knowledge Level	0.003	0.957
Academic Level vs. Attitude	0.774	0.38

DISCUSSION

My results suggest that consumer attitudes and knowledge level are important factors in consumer behavior, whereas demographic factors are less important. First, the results suggest that the attitudes toward products will directly affect consumer consumption behavior, so it is important to improve reusable chopsticks manufacturing and supply chains to meet the satisfaction of consumers. Also, the results show that the higher the environmental knowledge level of the consumer, the more likely the consumer was to purchase green products such as reusable chopsticks, which indicates the importance of education. Although my results did not show strong relationship between demographic factors and consumer behavior, based on many previous studies it is still important to take demographic profile into account when making certain policies. Overall, the study results suggest that policy makers need to take a wide range of factors into account, and apply this knowledge to construct effective policies or programs to promote green consumption in the future.

Consumer demography and choice

Consumer gender and behaviors

The results showed no significant associations between choice behavior and gender, academic level, major, or family income level, but these may still be important factors that the policy makers should consider. While there was no statistically significant association between gender and choice behavior, a previous study on green consumption showed that women had more favorable opinions and scored higher on an attitude scale than men (Mainieri et. al. 1997). This difference in results may be due to cultural differences, because most of the relevant studies focused on western countries. Also, my study focused on a well-educated portion of the population (i.e., college students) whereas previous studies focused on populations of varying ages, in which each gender might not have had equal access to formal education and knowledge. Together with previous studies, my results suggest that the policy makers might want to focus more on men than women when developing future programs, but that gender differences might not play as significant of a role among the college-educated population. Similarly my results showed no significant association between academic level and choice behavior, which could be attributed to the lack of

variation in academic level within my population sample. Because nearly 90% of the respondents were undergraduates, it was difficult to detect differences between academic levels.

Consumer education and behaviors

The results showed no significant relationship between majors and choice behavior. However, majors still could be an important factor to consider when evaluating the impact of formal education. A close examination of the 10 respondents with environmentally oriented majors shows that they all chose using reusable chopsticks. Although there were too few respondents in environmental majors to find statistical significance, my results, along with results from other studies focusing on impacts of major selection, show that college major could still play a critical role in green behavior. Schools with environmentally related majors may have students more likely to get involved in environmental activism on campus (Lounsbury 2001). Thus, the importance of college education and activity points to the need for the creation of environmental courses and research projects as an integral part of non-science major curricula, in which undergraduates can promote informed environmental action and also gain leadership skills on campus (Shachter and Edgerly 1999).

Consumer family income level and behaviors

The results also indicate that family income is not relevant to the choice behavior, which can be explained by the characteristics of my population sample. From previous studies, income is generally thought to be positively related to environmental sensitivity, which means individuals with higher income levels can bear the marginal increase in costs associated with supporting green causes and favoring green product offerings (Straughan and Roberts 1999). However, my sample consists of college students, many of whom are not working for a living. Therefore they might not have good sense of how to manage the money they have. Their choices about different types of chopsticks are, perhaps, more restricted by the chopstick availability in dining areas, which is not under their control. Based on these findings, future actions geared toward university students should focus on the supply of chopsticks in dining areas. Generally, although my results showed no significant association between choice behavior and demographic profile of the surveyed

consumers, knowing the demographic characteristics of the target population could be helpful in choosing appropriate intervention strategies for a less educated population.

Consumer attitudes and choice

The varieties of responses to my questions about consumer attitudes suggest that consumer choices and attitudes are correlated, which the government should focus on specific consumer preferences when reducing disposable chopstick use in dining halls. Attitudes are defined as beliefs about the predicted outcomes of a behavior and the evaluations of the pleasantness of each of these outcomes; in my study the consumer attitudes are important when working on strategies for different dining areas (Parker 2011). In dining halls, for example, the majority of respondents chose reusable chopsticks because they thought reusable chopsticks were clean and safe to use. Similarly, respondents who used disposable chopsticks thought disposable chopsticks were safe. For those who believe using disposable chopsticks are safer than reusable ones, it is helpful to provide education about the possible health impacts of using disposable chopsticks (which contain harmful chemicals) because ecological or environmental knowledge might act as a mediating variable for ecological or environmental attitudes and behavior (Chan 2001). Another reason consumer still use disposable chopstick is that they believe using disposable chopsticks is more convenient, suggesting the importance of increasing the availability of reusable chopsticks and replacing disposable ones in dining halls.

The variety of responses to my questions about consumer attitudes suggest that consumer choices and attitudes are correlated, which policy makers should focus on specific consumer preference focuses when reducing disposable chopstick use in restaurants. Respondents who use disposable chopsticks often thought that chopstick safety and cleanliness were higher in dining halls, which reflected the distrust in the washing process in restaurants. this suggests the need to introduce disinfection machines in restaurants to increase the cleanliness of reusable utensils, and to create policy focusing on replacing disposable chopsticks with reusable ones in restaurants. My results suggest that we can promote positive consumer attitudes toward green consumption by education, since an individual's ecological or environmental knowledge and affect were postulated as affecting his/her attitudes toward green purchases (Chan 2001).

Consumer knowledge and choice

The results indicate that the knowledge level of consumers is highly connected with their choice behaviors, as having more knowledge concerning the impacts of using disposable chopsticks correlates with less usage. My results reflect the notion that knowledge can impact the way buyers understand and arrange acquired information, the way this guidance is used in process of making decision, and the way buyers appraise goods that they are going to consume (Bridget and Antonis 1995). More specifically, my results showed that the most well-known impacts of using disposable chopsticks are deforestation and public health issues (i.e. harmful chemicals), which support that the previous government attempts on advertising and educating consumers about these two issues worked well. Together with the major factor in demographic profile, the results support my expectation about promoting behaviors of green consumption through education, especially in college, because environmental or ecological knowledge is positively associated with intention of sustainable purchase behavior (Behjati and Kumar 2012). Similar studies on recycling behavior also showed the same results that environmental knowledge level is positively affect recycling (Cheung et. al. 1999, Vining and Ebreo 1990). Besides education within campus, the policy making and broadcasting is also important as a way to show people how positive the government is when dealing with environmental issues, which will then make people pay more attention to the issue too. Overall, my results suggest that the knowledge level is the basic and important factor that the government and policy makers should focus on, which could make more significant effects in the future implications.

Practical implications

Results from short answer questions that were proposed by respondents present some practical policy implications. First, when asking why those who did not recycle used disposable chopsticks, many respondents said that no recycling bins were available or they do not trust in recycling treatment, which suggest that the universities and restaurants should set up more organized recycling bins both in dining halls and off campus restaurants. The results of questions on how to increase reusable chopstick use suggest that dining areas should stop providing disposable chopsticks and should improve the disinfection process of reusable chopsticks by

introducing disinfection machines. For the future of disposable chopsticks, there were many interesting suggestions proposed by respondents, for example, developing new materials to replace original wooden materials, government restrictions on disposable chopstick production and use, and advocacy programs to encourage consumers to use their own reusable utensils.

Limitations

Certain limitations arose from the design of my study. First, I only focused on college students in Beijing, which means that these results cannot be applied to larger populations like other Chinese urban college populations or non-Chinese populations. Also, the online survey approach was biased, because it restricted access to a limited population. An important problem with survey designs in general is that reported behavior might not be the same as actual behavior. There could also be additional factors important to chopstick selection that may not have been addressed here.

Future directions

My study suggests that identifying linkages between consumer choices and influencing factors is very complicated. Together with other similar studies, my study supports the idea that additional research is needed to understand and modify consumer behavior with respect to the selection of green alternatives. To improve my study, it would be important to expand the target population, to do additional research on the factors that need to be addressed in this problem, and to incorporate these factors into survey or interview questions. To avoid the problem of difference between survey responses and actual behaviors, actual observations in restaurants and other dining areas are needed. Also it would be useful to compare chopstick consumption patterns with other consumer behaviors in the same population. Generally, my study is a good starting point for analyzing college student behavior, but more in depth studies on the broad range of consumers in China are needed in the future.

Conclusions

My findings have implications for understanding associations between consumer choice and influential factors, and concerning the development of future public policies. In order to address the issue of using disposable chopsticks, focusing on consumers is very important. Policy makers proposing to reduce disposable chopstick use should consider consumer factors (e.g. education and product improvements) to meet consumer preferences. Rather than focusing solely on government interventions, policy makers should focus on consumer attitudes and behavior, because individual consumers drive product demand. Thus, my study results point to the need for promoting green consumption through education, for example setting up classes or workshops addressing the issue, and by promoting government policies that restrict disposable chopstick use or developing new technologies for manufacturing and waste treatment processes.

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APPENDIX A: Survey Questions

Demography:

1. Gender:
   - ☐ Male
   - ☐ Female
   - ☐ Other

2. Age: _____

3. Year of enrollment:
   - ☐ Freshman
   - ☐ Sophomore
   - ☐ Junior
   - ☐ Senior
   - ☐ Graduate

4. Major: _____

5. Where is your home town: _____

6. Family monthly income level:
   - ☐ < 12000 RMB
   - ☐ 12000 ~ 24000 RMB
   - ☐ > 24000 RMB

Dining Hall:

1. How often do you dine out in campus dining hall: _____times/month (rough number)

2. If dining halls provide both types of chopsticks, which one would you choose? Why?
   - ☐ Disposable chopsticks _____
   - ☐ Reusable chopsticks _____
   - ☐ Bring my own reusable chopsticks _____

3. When dining halls only provide disposable chopsticks, do you bring your own reusable chopsticks to use? Why?
   - ☐ Yes _____
   - ☐ No _____

4. When using disposable chopsticks in a dining hall, do you recycle?
   - ☐ Yes

☐ No (if choosing No, then answer Q5)

5. Why not?
   ☐ No bin available
   ☐ Lack of time
   ☐ Not necessary
   ☐ No trust in waste treatment
   ☐ Other: _____

6. Which type of chopsticks do you use more often when eating out in campus dining halls?
   ☐ One-time use disposable chopsticks (jump to Q7)
   ☐ Reusable chopsticks (jump to Q11)

[Disposable Chopsticks:]

7. Do you think using disposable chopsticks has impact on the environment and people?
   ☐ Yes (if yes, then answer Q8)
   ☐ No

8. In my opinion, disposable chopsticks have impact on (check all that apply and give specific concerns for each choice):
   ☐ Deforestation _____
   ☐ Waste production _____
   ☐ Waste treatment _____
   ☐ Health issues _____
   ☐ Other _____

9. Why do you use disposable chopsticks (check all that apply and give specific reasons for each choice):
   ☐ Safety _____
   ☐ Cleanliness _____
   ☐ Convenience _____
   ☐ Utensil properties _____
   ☐ Reusable chopsticks are not offered _____
   ☐ Other _____

10. What would motivate you to choose reusable chopsticks?
    _____

[Reusable chopsticks:]

11. Do you think using disposable chopsticks has impact on the environment and people?
    ☐ Yes (if yes, then answer Q12)
    ☐ No

12. In my opinion, disposable chopsticks have impact on (check all that apply and give specific concerns for each choice):
    ☐ Deforestation _____

- ☐ Waste production _____
- ☐ Waste treatment _____
- ☐ Health issues _____
- ☐ Other _____

13. Why do you use reusable chopsticks (check all that apply and give specific reasons for each choice):
    - ☐ Safety _____
    - ☐ Cleanliness _____
    - ☐ Convenience _____
    - ☐ Utensil properties _____
    - ☐ Reusable chopsticks are not offered _____
    - ☐ Other _____

Restaurants:

1. How often do you dine out in off-campus restaurants: _____times/month (rough number)

2. If restaurants provide both types of chopsticks, which one would you choose? Why?
    - ☐ Disposable chopsticks _____
    - ☐ Reusable chopsticks _____
    - ☐ Bring my own reusable chopsticks _____

3. When restaurants only provide disposable chopsticks, do you bring your own reusable chopsticks to use? Why?
    - ☐ Yes _____
    - ☐ No _____

4. When using disposable chopsticks in an off-campus restaurant, do you recycle?
    - ☐ Yes
    - ☐ No (if choosing No, then answer Q5)

5. Why not?
    - ☐ No bin available
    - ☐ Lack of time
    - ☐ Not necessary
    - ☐ No trust in waste treatment
    - ☐ Other: _____

6. Which type of chopsticks do you use more often when eating out in off-campus restaurants?
    - ☐ One-time use disposable chopsticks (jump to Q7)
    - ☐ Reusable chopsticks (jump to Q11)

[Disposable Chopsticks:]

7. Do you think using disposable chopsticks has impact on the environment and people?
   - ☐ Yes (if yes, then answer Q8)
   - ☐ No

8. In my opinion, disposable chopsticks have impact on (check all that apply and give specific concerns for each choice):
   - ☐ Deforestation _____
   - ☐ Waste production _____
   - ☐ Waste treatment _____
   - ☐ Health issues _____
   - ☐ Other _____

9. Why do you use disposable chopsticks (check all that apply and give specific reasons for each choice):
   - ☐ Safety _____
   - ☐ Cleanliness _____
   - ☐ Convenience _____
   - ☐ Utensil properties _____
   - ☐ Reusable chopsticks are not offered _____
   - ☐ Other _____

10. What would motivate you to choose reusable chopsticks?
    _____

[Reusable chopsticks:]

11. Do you think using disposable chopsticks has impact on the environment and people?
    - ☐ Yes (if yes, then answer Q12)
    - ☐ No

12. In my opinion, disposable chopsticks have impact on (check all that apply and give specific concerns for each choice):
    - ☐ Deforestation _____
    - ☐ Waste production _____
    - ☐ Waste treatment _____
    - ☐ Health issues _____
    - ☐ Other _____

13. Why do you use reusable chopsticks (check all that apply and give specific reasons for each choice):
    - ☐ Safety _____
    - ☐ Cleanliness _____
    - ☐ Convenience _____
    - ☐ Utensil properties _____
    - ☐ Reusable chopsticks are not offered _____
    - ☐ Other _____

General:

1. I'm aware of government attempts to reduce disposable chopsticks use:
   - ☐ Increasing tax on disposable chopsticks
   - ☐ Recycling
   - ☐ Investigating new waste treatments
   - ☐ Unaware

2. The government should reduce disposable chopstick use (rank from 1 to 5, 1= strongly disagree, 5= strongly agree):
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4
   - ☐ 5

3. Do you have any suggestion/comments on how can we reduce use or make production more sustainable?

   _____

4. Do you have anything that want to add or any comment on this survey?

   _____