Polo del Conocimiento

Pol. Con. (Edición núm. 45) Vol. 5, No 05
Mayo 2020, pp. 275-295
ISSN: 2550 - 682X
DOI: 10.23857/pc.v5i5.1417

Per capita income as a determinant of meat consumption in three cities in China

El ingreso per cápita como determinante del consumo de carne en tres ciudades de China

Renda como determinante do consumo de carne em três cidades da China

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Ciencias económicas y empresariales
Artículo de investigación

*Recibido: 19 de enero de 2020 *Aceptado: 30 de abril de 2020 * Publicado: 31 de mayo de 2020

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Resumen

El ingreso per cápita de los ciudadanos de China ha aumentado desde la introducción de las reformas económicas y políticas en la década de 1980; y al mismo tiempo, se ha producido una transición en los patrones dietéticos, de una dieta basada principalmente en granos alimenticios y vegetales hacia mayor cantidad de productos cárnicos. Hay varias causas que se atribuyen a este cambio, incluida la urbanización, modernización, disponibilidad e ingresos. Sin embargo, no está claro si únicamente los cambios en los ingresos han contribuido a un mayor consumo de carne. Por lo tanto, este estudio investiga si los ingresos son determinantes del consumo de carne en tres ciudades heterogéneas de China, y los diferentes patrones de consumo de carne en los estratos de ingresos bajos, medios y altos. Basándose en los datos recopilados de 358 consumidores y no consumidores de carne de Shanghai, Xi'an y Yichang, los resultados del estudio sugieren que los ingresos tienen una influencia directa sobre el consumo de carne, y que el cerdo se consume más que la carne de res.

Palabras claves: Carne; consumo; ingresos; China.

Abstract

The per capita income of Chinese people has been increasing since the introduction of the economic and political Reforms in the 1980s; and at the same time, a transition in the dietary patterns has been occurring, from a diet mainly based on food grains and vegetables to more meat products. There are several causes attributed to this change including urbanisation, modernisation, availability, and income. However, it is unclear whether solely changes in income have contributed to more meat consumption. Therefore, this study investigates whether income is a determinant of meat consumption in three heterogeneous cities of China and the different meat consumption patterns across low, middle and high income strata. Drawing on the data collected by surveying 358 meat and non-meat consumers from Shanghai, Xi'an and Yichang, findings of the study suggest that income has a direct influence over meat consumption; pork is more consumed than beef.

Keywords: meat; consumption; income; China.

Resumo

A renda per capita dos cidadãos da China aumentou desde a introdução de reformas econômicas e políticas nos anos 80; e, ao mesmo tempo, houve uma transição nos padrões alimentares, de uma dieta baseada principalmente em grãos e vegetais para mais produtos à base de carne. Existem várias causas atribuídas a essa mudança, incluindo urbanização, modernização, disponibilidade e renda. No entanto, não está claro se apenas mudanças na renda contribuíram para o aumento do consumo de carne. Portanto, este estudo investiga se a renda é determinante do consumo de carne em três cidades heterogêneas da China e os diferentes padrões de consumo de carne nos estratos de baixa, média e alta renda. Com base nos dados coletados de 358 consumidores de carne e não carne em Xangai, Xi'an e Yichang, os resultados do estudo sugerem que a renda influencia diretamente o consumo de carne e que a carne de porco é consumida mais que a carne. carne.

Palavras-chave: Carne; consumo; renda; China.

Introducción

The historical Chinese diet was considered one of the healthiest in the Asian region since it was marked by cereals and vegetables, with low amounts of animal products (Du, Lu, Zhai and Popkin, 2002, p. 169; Popkin and Shufa, 2003, pp. 3898). Nonetheless, in the years following the introduction of the political and economic reforms in China in 1980, the Chinese diet reduced the amount of food grains (Wang, Zhou and Cox, 2005), and vegetables (Du et al., 2002, p.171). Food grain reductions were compensated by an increase in meat and edible oils products (Du et al., 2002, p.173). After 1985, food grain consumption decrease even more while animal consumption grew at a steady rate (Wang, Chen, Zheng, and Si, 2014, pp. 453). In fact, the total production of meat consumption has increased from 9.4 kilograms (kg) in 1981, to 17.7 kg in 2002 (Du et al., 2002, p.174; National Bureau of Statistics of China, 2015).

However, this food transition is not isolated to China; it is a worldwide dietary shift in most developing countries called the “nutrition transition” (Hawkes, Blouin, Henson, Drager and Dube, 2010). The “nutrition transition” refers to the consumption substitution in the traditional products, mainly cereals and carbohydrates, towards a diet marked by high consumption of refined carbohydrates (Hawkes et al., 2010), as well as meat, dairy, and other animal products (Popkin, 2002, p.207). This dietary shift has several causes, such as changes in lifestyle patterns (Hubacek, Guan and Barua, 2007, p.1084), economic progress, changes in culture, improvements

in education (Du et al., 2002, p 171), and urbanization (Delgado, Rosegrant, Steinfeld, Ehui and Courbouis, 2001, p. 27-29; Food and Agriculture Organization of The United Nations [FAO], 2006; von Braun, 2007). Another cause for this dietary transition is related with food availability (Swinburn, Egger and Raza, 1999, p. 564), price of products and marketing (Hawkes, 2010).

Furthermore, it is important to state that the relationship between food consumption and income growth is not linear (Rask and Rask, 2011, p.186). As Rask and Rask (2011) mention, "Poor countries typically commit a considerable percentage of income as well as a major share of the active work force to the procurement of food" (p.187). Hence, any growth in income will be spend largely on food consumption (Rask and Rask, 2011, p.188). In the same way, studies suggest that people with higher incomes are eating away from their homes, and have increased the demand for more processed food regardless of the price (Hawkes et al., 2010).

On the other hand, other studies suggest that there is a direct relationship between the increase of food consumption and the type of goods consumed - whether it is a luxury product, or one of necessity (Andreyeva, Long and Brownell, 2010, p. 217). Unsurprisingly, a study developed by Burggraf et al., (2015, p. 1010), comparing meat consumption between China and Russia, found that in China, lamb and beef are considered luxury goods, while pork is considered a necessity good.

There are several investigations focused on meat consumption by household (Shi, Jun-fei, Seale and Wahl, 2015, p. 1000; Wang et al., 2014, p. 453); whereas others have concentrated specifically on pork (Jingjing, Yongfu, Zhihao and Wi, 2014, pp. 452), beef (Liu, Parton and Cox, 2006), and even fish (Zhou et al., 2015, p.1273), all of them trying to identify consumers attitudes to meat and causes that increases their consumption. However, there are no studies focused on luxury beef, or one that has addressed meat consumption by individuals, or one comparing meat consumption according to the income of a particular city. In fact, Zhou and collegaues (2015) mention that "frequency of per capita consumption is a factor that has received little attention" (p.1273).

This study focuses on the analysis of one of the nutrition transition causes in China, income. To do so, the paper utilizes data of meat consumption surveys that includes household incomes and meat consumption patterns. The information was collected in three heterogeneous cities in China, in July 2015. The rest of the paper is organized as follows: Section 2 describes the methods used

to obtain the data and how it was analysed, Section 3 presents the results of the data, and finally, Section 4 concludes and discusses further studies.

Methods

This cross-sectional study investigates the relationship between income and meat consumption based on an initial and a final year, 2005 and 2015, respectively. It was developed in Shanghai, Yichang and Xi'an, cities in China. The data is based on urban household surveys conducted in July 2015. Places surveyed were located in a radius of approximately 5 kilometres from the main streets in each city. The main street surveyed in Shanghai was Nanjing Road; in Yichang, Jiefang Road was the principal axis, and finally, in Xi'an, the South Street, close to the Bell Tower, was considered to be the main one. In all of these places, meat and non-meat consumers of different ages, gender and income categories were asked to answer some questions. This process was developed to ensure a random sample of people with different incomes and meat consumption patterns. For the purpose of this study, the term luxury beef refers to imported beef, while meat refers to three types of meat: pork, beef and luxury beef.

Materials and procedures

A semi-structured questionnaire was used to gather the data, and the questions were designed to test three hypothesis based on the existing literature:

Hypothesis 1: The higher the income levels, the more meat consumed in a more frequent rate;

Hypothesis 2: Pork is more frequently consumed than beef.

Hypothesis 3: Pork is more consumed at home rather that away from home options.

Initially, the questionnaire was designed in English; then it was translated to Chinese by a native Chinese speaker, and tested in Shanghai. After the pilot test, feedback from the respondents was added to the questionnaire. The final document had 8 questions referring to meat consumption patterns in 2005 and 2015, household numbers, employment status, average household income, consumption frequency of pork, beef and luxury beef, and places where meat is eaten. The questionnaire had a final open question about the possible factors that contribute to meat consumption patterns. Qualitative data gathered was then translated back into English by the native Chinese speaker.

In total, 373 people were surveyed; however, surveys that had incomplete information were deleted. Surveys that lacked income values, meat consumption patterns, and number of employed

people in the house were also excluded since these questions provide valuable information for the analysis. Hence, only 356 surveys were considered in this study: 111 surveys from Shanghai, 137 from Yichang and finally 108 from Xi'an.

In specific cases, further calculations were made. To obtain the per capita income for 2005 and 2015, it was necessary to divide the household income by the number of people over 18 years working in the house, for each of these years. These results were then divided into three categories (low, medium and high income) in accordance to the average wage of employed people in rural areas, which was 18,200 yuans in 2005 and 56,339 yuans in 2014 (National Bureau of Statistics of China, 2015). Results below these values were considered low income; within these categories -middle income- and above were considered as high income.

Additionally, to better understand the relationship between income and consumption of pork and beef, the buyer's capacity for these types of meat, per each category, in 2005 and 2015 was calculated. The average per capita income of each of the categories (low, medium and high income), in those years, was then divided for the corresponding prices of pork and beef in 2005 and 2015. In 2005, the price of beef was ¥17.89 and pork ¥7.91 for a kilogram (Dong, Li and Cui, 2014, pp.87-88; Zhang, Tao y Liu, 2015, p.30). In 2015, the average price for a kilogram of beef was ¥86 yuans and ¥34 yuans for a kilogram of pork. Beef and pork 2015´prices were established according to the price information collected on the local supermarkets, in the field trip.

Results

General results

General economic indicators of our sample are found in Appendix 1. The results of the survey show the amount of people who do and do not eat meat (Figure 1). From the 356 surveys obtained, the vast majority eat meat. There was only a 3.65% that do not eat meat, where religion appears to be the main reason to avoid meat consumption. In fact, from the qualitative data gathered from the surveys, a thirty-two years old men in Shanghai mentioned that he does not eat meat due to religion beliefs. Others respondents argued that the price of meat was too expensive, while some said that they did not like the taste of it.

The increase in the average per capita income of the meat consumers surveyed, between 2005 and 2015, was also tested. Figure 2 shows that the average per capita income has increased in all three income categories established. For low income people, the income has almost tripled the 2005' value, changing from ¥8,965.09 in 2005 to ¥25,597.77 in 2015. Likewise, middle and high income categories have increased in this period. For these categories, the average per capita income has almost doubled the values of the past decade.

Figure 1. Meat consumption in China, 2015

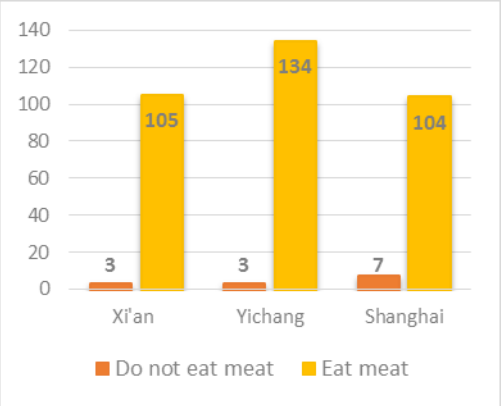


Figure 2. Average income per capita in 2005 and 2015

Results for hypothesis 1

The relationship between income and meat consumption is shown in Table 1. The total number of beef eaters in 2005 in the different consumption frequencies was 75, but, this number decreased almost four times by 2015. In the three income categories, between 2005 and 2015, the number of people that did not previously eat meat was significantly reduced. The most notable change

appears in the low income category, where a decrease of 257% of non-meat eaters occurred between 2005 and 2015.

Referring to beef eaters, the results demonstrate that low income beef eaters have shifted their consumption from a monthly frequency -approximately 12 times per year- in 2005, to a weekly consumption -approximately 52 times per year- in 2015. On the contrary, for high income eaters, the most notable change refers to the number of consumers. Indeed, the frequency of consumption in 2015 is the same as the previous ten years; but the number of beef consumers has increased in 92% in this period of time. For middle income people, the frequency of beef consumption in 2005 is the same as in 2015. Nonetheless, the number of beef consumers has been drastically reduced as it can be seen in Table 1.

Likewise, the results show that pork consumption has followed a similar trend to beef. While the number of consumers has increased in low and high incomes, the number of pork eaters has decreased in the middle income category. Furthermore, the frequency of pork consumption has grown from 52 times per year (weekly) to 365 times per year (daily) in both low and high income categories. As you can see in Table 1, an 80% decrease in pork consumption occurred during 2005 and 2015.

Table 1. Meat consumption patterns in the three cities surveyed

2005 beef eaters							
Frequency (Times/year)							
Income category	**N**	**Yr**	**S**	**M**	**W**	**D**	**L**
3	6	4	6	16	26	2	2
2	5	7	12	24	24	8	0
1	25	37	31	64	32	11	1

2015 beef eaters							
Frequency (Times/year)							
Income category	**N**	**Yr**	**S**	**M**	**W**	**D**	**L**
3	1	4	5	19	50	16	3
2	1	0	0	8	7	4	1
1	7	14	30	67	82	21	3

2005 pork eaters							
Frequency (Times/year)							
Income category	**N**	**Yr**	**S**	**M**	**W**	**D**	**L**

2015 pork eaters							
Frequency (Times/year)							
Income category	**N**	**Yr**	**S**	**M**	**W**	**D**	**L**

3	2	2	0	6	21	21	7
2	2	0	0	10	30	34	4
1	12	7	9	41	67	55	13

3	1	1	1	3	31	48	13
2	0	0	0	1	8	10	2
1	11	3	5	18	66	97	24

2005 luxury beef eaters							
Frequency (Times/year)							
Income category	**N**	**Yr**	**S**	**M**	**W**	**D**	**L**
3	37	7	5	7	6	0	0
2	66	6	2	3	2	1	0
1	164	16	6	12	2	1	0

2015 luxury beef eaters							
Frequency (Times/year)							
Income category	**N**	**Yr**	**S**	**M**	**W**	**D**	**L**
3	42	14	16	8	16	1	1
2	9	2	1	6	2	1	0
1	136	33	7	36	8	4	0

Abbreviations: N: Never. Yr: Yearly. S: Seasonally. M: Monthly. W: Weekly. D: Daily. L: Less than 1 per day.

In the case of luxury beef, on one hand, both the number of eaters and the frequency of consumption increased between 2005 and 2015, except for middle income eaters. For low income eaters, the frequency of luxury beef consumption rise from approximately one time per year to twelve times per year, and the number of consumers increased by 125% in this specific transition, as Table 1 shows. In the case of high income consumers, the consumption frequency shifted from yearly -1 time- and monthly -12 times- in 2005, to seasonally -4 times- and weekly -52 times-, respectively.

On the other hand, the number of people that do not eat luxury beef in the high income category increased in 13% between 2005 and 2015, while in the other two income categories, this number decreased. In the middle income category, whereas the number of non-luxury beef eaters has decreased by 73% between 2005 and 2015, the frequency of consumption changed from yearly to monthly. In general, this illustrates that between 2005 and 2015, as people increased their incomes, frequency of meat consumption and the number of meat eaters also increased; thus, Hypothesis 1 is supported by these findings.

Results for hypothesis 2

Next, whether the price of meat has a positive relationship with meat consumption is examined in accordance with Hypothesis 2. Table 1 shows that in 2005 and 2015, pork consumption has the highest frequency of consumption with the higher number of meat eaters, for all the income categories; and where pork is followed by beef and luxury beef consumption. In fact, Figure 3 indicates that the total number of pork consumers in 2005 was 327, beef consumers were 307 and luxury beef consumers were 76. Ten years later, the number of consumers for these three types of meat also increased while having the same order of meat consumption: pork 340, beef 334, and luxury beef 156 consumers. More importantly, this has occurred even though the capacity of people to purchase pork and beef, expressed in kilograms, has declined between 2005 and 2015, as Figure 4 illustrates. In 2015, people are not able to afford a larger quantity of pork and beef than they were able to afford 10 years ago. Nonetheless, in both years, a larger quantity of pork is more affordable compared to beef.

Figure 3. Number of meat consumers

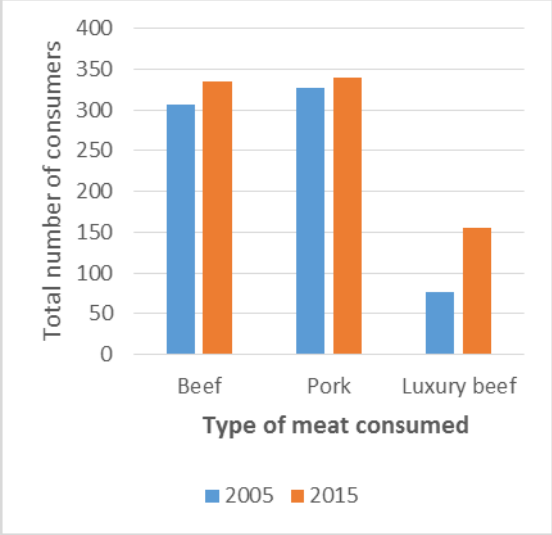
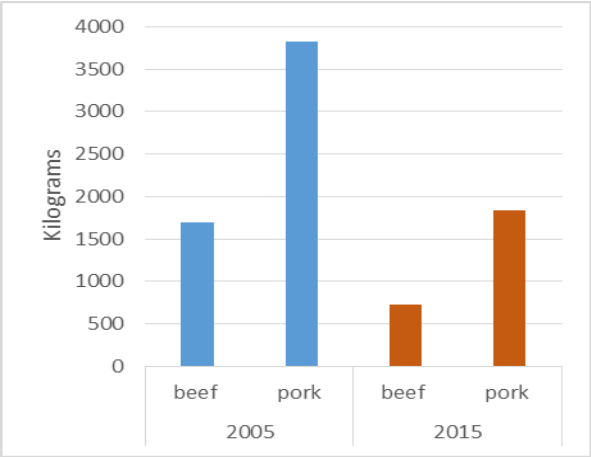


Figure 4. Capacity to purchase beef and pork

Pol. Con. (Edición núm. 45) Vol. 5, No 05, mayo 2020, pp. 275-295, ISSN: 2550 - 682X



Results for hypothesis 3

Third hypothesis assumes that home consumption is higher that away from home options, hence, place of pork and beef consumption was another variable tested. Results of the study suggest that the majority of people surveyed eat pork and beef at home, as we can see in Table 2. Nonetheless, there is an increasing number of people that eat beef, and in less quantity pork, away from home. If we compare the number of beef and pork eaters in 2005 and 2015, Table 2 shows that in both cases, the number of people that previously ate beef or pork at home was reduced during that timeframe. In fact, in 2015, there were 16% more beef consumers and 82% more consumers eating in restaurants than in the 10 previous years.

Table 2. Place of meat consumption

	Home	Restaurants	Home/ Restaurants	Other options	No answer
Beef 2005	146	80	41	22	54
Pork 2005	244	17	37	17	28
Beef 2015	140	93	59	16	35
Pork 2015	222	31	55	15	20

Discussion

Explanation of results

Results found in this study support the three hypotheses proposed: 1) the higher the income, the higher meat consumption; 2) pork consumption is higher than beef consumption, and 3) pork is

more consumed at home rather that away from home options. Certainly, from 2005 to 2015, Gross Domestic Product (GDP) and per capita income has increased as Appendix 1 shows. Likewise, low and high income categories have increased their meat consumption in this period of time, as seen in Table 1.

Further, findings support Rask and Rask's argument (2011): "any growth in income will be spent largely on food" (p.188), where this increase has no a linear relationship between these two variables. Indeed, results on Table 1 show that between 2005 and 2015, changes of consumption in each income categories shift from monthly to weekly consumption, or from weekly to daily consumption. This change represents a significant increase of meat consumption from 12 times per year to 52 times per years, and from 52 times per year to 365 times per year, respectively. One possible explanation for this is that Chinese people believe that meat has a higher nutritional values than other types of food being "good for health" (Liu et al., 2006). Indeed, one female 66 years old of the low income category (Survey 355) told us that: "I eat pork at Chinese New Year. I eat beef at canteen at my work place and beef has more nutritious". We found this woman's idea to be supportive with the general assumption that meat is more nutritious (Liu et al., 2006), and therefore consumption has increased.

In contrast, results obtained for the middle income category do not reflect the general trend. Studies suggest that people in low income categories are more worried about food price, hence cheaper foods options such as "starchy staples' (Delgado et al., 2001, pp. 27-29) with low levels of nutrient and less calcium, are mostly consumed (Yang et al., 1997). Surprisingly, this is not true for this case study. Comparing 2005 and 2015, the middle income category has reduced the amount of meat consumed instead of the low income category (Delgado et al., 2001, pp. 27-29; Yang et al., 1997).

One possible explanation for the decrease in meat consumption is that this income category could be worried in the quality of meat, since higher incomes can afford to pay higher prices for a better meat quality, and people of lower incomes are just starting to buy more meat. For example, a middle income male of 78 years old surveyed in Shanghai (Survey 97), mentioned that: "I eat less pork now because I'm older now, and I eat less meat because of my health. I eat more vegetables though. I'm also worried about the cleanliness of pork/beef because the grain might be of bad quality. But I actually love beef". In addition to meat quality issues, Verbeke, Perez-Cueto, Barcellos, Krystallis, and Grunert, (2010, p. 285) indicate that concerns of people towards

meat consumption is starting to be related with health issues, such as obesity (Swinburn et al., 1999, p.569).

Pork has a higher consumption than beef, supporting Hypothesis 2. This means that pork is the most consumed type of meat in China (Liu and Deblitz, 2007), where its price seems to influence consumers decisions to purchase meat (Burggraf et al., 2015, p. 1018). The price of beef is much higher than the price of pork in 2005 and 2015, hence the willingness of people to purchase meat is lower for beef, and luxury beef than for pork. This was confirmed by a Shanganiese male of 58 years old:

It is so expensive to eat imported beef ten years ago! (He gives an example): I went to a 4 star restaurant in Shandong ten years ago and one Australian steak is 280 RMB at that time! In my city, people don't eat much beef, not to say imported (Weihai) ones. In provinces like Shandong, Henan or Hubei, people are not keen on. They prefer lamb and pork instead. My family is very rich because I have my own business now… (Survey 64. Male, 58-years old from Shanghai).

In addition, one important finding of this study shows that even when the capacity of people to purchase meat in 2015 decreased, in comparison to the 2005' capacity, pork and beef consumption has increased. Results show that pork has become a necessity good, while beef is still a luxury type of meat (Burggraf et al., 2015, p. 1008). Consequently, if a price increase occurs in these products, meat consumers will still buy a larger quantity of pork, and possible a less quantity of beef. However, if the increase of price is too high, consumers will purchase a substitute kind of meat such as poultry or fish (Wang et al, 2005; Jingjing et al., 2014).

Another important point is that even when the vast majority of meat consumers are eating pork and beef at home, there is an increasing number of people eating away from home (Burggraf et al., 2015, p.1015; Hawkes et al.,2010), see Table 2. Certainly, consumers decisions on the location of where to eat meat is directed related to meat price because, generally, eating at home will be cheaper than eating away-from home (Liu and Deblitz, 2007).

This study illustrates a positive relationship between income and meat consumption, proving the three hypothesis. Approximately 25 years after the introduction of the political and economic reforms in China, the Chinese people are still increasing their incomes, and being part of a dietary change which is mainly called the "nutrition transition" towards the consumption of more animal products (Hawkes et al., 2010; Popkin y Shufa, 2003).

Limitations

Due to time limitations, it was not possible to obtain the number of kilograms eaten by people in each income strata and ascertain the different prices that consumers pay for that quantity of meat. As a tractable alternative, prices were got from supermarkets.

Even when the sampling strategy used was random, a major limitation of this study is its sample size. Incomes categories are not well represented. For example, people for the middle income category were difficult to find. We found more people in the low level or high income categories (see Table 1). This could be caused by the fact that the main streets in each city are marked by expensive shopping malls and restaurants, while the secondary streets generally have low income people with small business and street food sellers.

Finally, the language barrier has to be acknowledged. The questionnaire was prepared in English and then translated to Chinese. If qualitative data was gathered in the questionnaire, it was translated back to English. Despite the effort and caution in translation, some information cannot retain its original meaning.

Conclusions

This paper analyses the relationship between income and meat consumption patterns in three cities of China. The analysis, based on data from urban household's surveys conducted reveals that income has a positive relationship with meat consumption. The results also indicate a non-linear relationship between income and meat consumption, and show an inverse relationship between price and meat consumption.

The empirical results suggest important points in accordance with our three hypothesis. First, as people become more affluent, frequency of meat consumption increases in low and high income strata. Possible economic and non-economic factors associated with the reduction of meat consumption for middle income people should be studied. Second, pork is the primarily type of meat consumed in three cities, followed by beef and luxury beef, as a result of price. Third, pork and beef are mainly consumed at home, but there is an increasing tendency to consume both types of meat away from home. We believe that studies are needed to understand changes in food consumption patterns.

Although this study focuses on consumption pattern in three cities in China, the study was developed on the downtowns of the cities; hence, an investigation of the meat consumption patterns in rural areas would certainly be interesting (Wang et al, 2005), and the shift of urban people towards for more processed type of meat may be advisable are for suture study (Burggraf et al., 2015, p.1022).

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