Migration and Food Security in Urban China: A Case Study in Megacity Shanghai from the Perspective of Food Consumption

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Table of Contents

List of Tables

List of Figures

Abstract

This thesis looks at the food security of migrants from the perspective of food consumption. Rapid urbanisation particularly with massive inflows of migrants from rural areas into large cities has been a significant phenomenon in China and many other developing countries. This is concomitant with changes in lifestyles and food consumption patterns known as the "nutrition transition" that has significantly influenced not only food security through both the supply and demand sides but also public health. Existing studies on food security and urbanisation tend to focus primarily on the macro level, such as examining reduced agricultural production resulting from land loss. Health problems particularly obesity caused by changing food consumption patterns in the process of urbanisation have also received increasing attention.

Different groups of population have different patterns of food consumption, which in turn influence their own as well as national food security. The food security of migrants in developing countries like China deserves serious attention not only for promoting human wellbeing but also to achieve food security for the whole population. With the long-standing focus on rural food security in studies linking food security, urbanisation and migration, little attention has been paid to the linkage between migration and urban food security. Although recent research has started to shift the focus from the influences of migration on rural food security to the changes in the patterns of food consumption of the migrants themselves, which have been found to differ by study area. This research attempts to fill this gap in the context of China, the world's most populous country, and therefore plays a significant role in achieving the food security goal of the international community.

This thesis enriches the understanding of the interaction between migration and food security by using a case study approach, which involves primary survey data collected from 395 rural migrants in Shanghai – the most urbanised city in China. It has the following findings: 1) The increased consumption of sugar and beverages found in some studies on the food consumption of African migrants has not been the case in China. This research found that migrants in Shanghai had more nutritious and diverse diets after migration, with increased consumption of poultry meat, fungus, milk products and aquatic products; 2) Staple foods, vegetables, animal meat, fish, fruit and poultry meat were regularly consumed food groups in migrants' diets, and milk products, alcohol, soft drinks, snacks, other aquatic products, animal organs, processed

food and fast food were irregularly consumed, with staple foods and animal meat the top two contributors to the daily dietary energy intake of surveyed migrants; 3) Consistent with findings from studies in other nations, the sending of remittances was an important determinant of the food consumption pattern of migrants, as those who did not send remittances back to their rural hometown tended to consume more foods particularly nutritious food groups; 4) Socio-demographic characteristics were important in shaping migrants' food consumption patterns, with age, gender and occupational industry playing the dominant roles, with females and those in the business and services industries more likely to consume more nutritious food groups while aged migrants showed a generally lower consumption of food except alcohol; 5) The food preferences and awareness of food security of migrants particularly their attention to healthy diets led to substantial variations in their food consumption, especially for the less popular food groups, and 6) urbanisation did improve food security in terms of the improved food access of migrants in Shanghai including more food choices for migrants, which were also related to better income, better transportation and market distribution.

The survey contributes to the knowledge of migrants' food consumption patterns in China which has been found to differ from other developing countries. The determinants of their food consumption patterns offer useful information to policy makers on how to promote healthy diets and thus ensure the food security and wellbeing of all the population. At the same time, the food consumption patterns found among the migrants as whole, and within different socio –demographic groups, also reflect their general demands on the food market, which would in turn affect food supply in the urban food market, given the increasing rural to urban migration that is fuelling the process of urbanisation in China. This would also offer entitlements on the requirements on resources needed for food production to meet future food demand to ensure food security in the urban areas. Moreover, food consumption trends found among aged migrants would also have an important influence on future food demand in China, with the aging of the population.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Lingling Liao

16th February 2018

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Abbreviations and Acronyms

ASF	Animal Sourced food
BMI	Body Mass Index
CHNS	China Health and Nutrition Surveys
DDS	Dietary Diversity Score
FAO	The Food and Agriculture Organisation of the United Nations
FCS	Food consumption score
GEC	Global Environmental Change
GECAFS	Global Environmental Change and Food System
INSTAT	Institute of Statistics (Albania)
IPC	The Integrated Food Security Phase Classification
NBS	National Bureau Statistics of China
OECD	The Organisation for Economic Co-operation and Development
SPSS	Statistical Package for Social Sciences
UN	United Nations
WFP	World Food Programme
WHO	World Health Organisation

Chapter 1 Introduction

1.1 Background to study

There has been a massive flow of rural to urban migration in the process of urbanisation, as more and more people in China move away from their rural hometowns to urban areas. By the end of 2015, there were 247 million rural migrants in urban China, accounting for almost one third (32.1 percent) of the total urban population (NBS 2016). Migrants have become an important part of China's urban population, and therefore, the diets of rural migrants now living in cities not only play a significant role in shaping their wellbeing, but also influence urban food demand and thus food security.

Urbanisation, migration and food security are major development issues that face developing countries all over the world. Most importantly, urbanisation and migration are inevitable contexts for research about food security in developing countries like China. Although a lot of research has been done in the fields of urbanisation, migration and food security, the relationship between those three is understudied. Existing research has paid attention to the environmental and ecological impacts of urbanisation on agriculture and food security, and there have also been studies that show the demographic consequences of urbanisation, but research that links urbanisation, migration and food security, namely migration and urban food security is limited (Crush 2013). Research into the linkage between migration and food security is also quite minimal, with a major focus on the effect of migration on rural food security (Crush 2013; Lacroix 2011). This study focuses on rural migrants living in Shanghai. It questions whether they are food secure by investigating their food consumption patterns, and links them to their economic and socio-demographic characteristics, the sending of remittances, food preferences and their awareness of healthy diets.

This chapter provides an outline of the research. It starts with some background to the research, including the global and Chinese context of food security. The thesis seeks to fill current research gaps in the literature within the nexus of food security, urbanisation and migration linkages.

Food security which used to be considered a "developing world" issue has drawn worldwide concerns since the food price 'spike' in 2007-2008 (Ingram 2011:417). According to the Food and Agriculture Organisation of the United Nations (FAO), 795 million people in the world were still suffering from hunger and malnutrition by the year 2015, and 780 million of them were from the developing regions (FAO et al. 2015).

Ingram (2011) and Misselhorn et al. (2012) argued that food security is becoming a much more complex issue, given that there are increasing supply and demand pressures. Demand pressures mainly include population growth and changing food consumption patterns induced by urbanisation and globalisation (Chopra and Shetty 2004; Godfray et al. 2010; Kennedy et al. 2004; Misselhorn et al. 2012). There is projected to be 9 billion people in the world by the year 2050, with an increase of about 2.3 billion from now, and almost all of this increase is expected in developing countries (FAO 2009b). During the same time period, the world's urban population will increase to 70 percent of its total population, leading to a further decline in rural population (FAO 2009b). The growing population directly pushes up the global demand on food. It is projected by Hanjra and Qureshi (2010) that the world needs an increase of 557 million metric tons of cereal grain production to meet the food demand of a growing population by the year 2020. Asia would need sixty two percent and China specifically twenty six percent of that increase (Hanjra and Qureshi 2010:367). Of most importance, urbanisation changes the demand for food through changing preferences and food consumption patterns (Beddington 2011; Chopra and Shetty 2004; Godfray et al. 2010; Misselhorn et al. 2012).

The supply pressures come from ecological and environmental consequences such as agricultural land loss due to the expansion of urban built-up areas during the process of urbanisation (Fazal 2000; Hasse and Lathrop 2003; Heimlich and Anderson 2001; Imhoff et al. 2004; Livanis et al. 2006; Tan et al. 2005), water pollution (Hubacek et al. 2009; Varis and Somlyódy 1997; Wang et al. 2008), soil degradation (Chen 2007; Jie et al. 2002), increased greenhouse gas emissions (Dhakal 2009; Zhang and Lin 2012) and related climate change (Cline 2007; Ericksen et al. 2011; Fischer et al. 2005; Misselhorn et al. 2012). Climate change can cause weather conditions including average temperatures, rainfall amounts and patterns which will affect agricultural productivity (Misselhorn et al. 2012). These pressures are particularly obvious in developing countries, which impede people from accessing sufficient and nutritious food by affecting livelihoods, income and food prices (Misselhorn et al. 2012).

The annual growth rate of the world's total crop yield has slowed down from 1.7 percent per annum during the period 1961-2007 to 1.3 percent during 1997 and 2007 (Bruinsma 2009:23). This trend is expected to continue in the coming decades. It is projected that, the crop yield will only grow at a rate of 0.8 percent per annum during 2007-2050 (Bruinsma 2009:23). According to Tweeten and Thompson (2009) who made projections of food supply and food demand by 2050 based on United Nations' population projections, globe food supply would hardly meet food demand which is expected to increase faster than food supply in the next few

decades. Specifically, global food demand is forecast to be 79 percent higher than in 2000 by the year 2050, but the food supply is expected to be only 57 percent higher than in the 2000. The excess of food demand over supply would further lead to food price increases, which would further weaken people's ability to access food, adding another layer of pressure to food security at individual, household and also national levels.

Food consumption is not only an important measurement for household and individual level food security (Jones et al. 2013), but it is also a significant influential factor for food security in terms of national food production and the nutrition intake by individuals (Moomaw et al. 2012). Food consumption patterns reflect food demand from different population groups in a country and form the country's total food demand, and they also imply issues for food production. In 2014, 54 percent of the world's population were living in urban areas, which is expected to be over two thirds by 2050, with nearly 90 percent of the increase absorbed by Asia and Africa. China and India are expected to contribute to more than one third of this increase (United Nations 2014). Moreover, it is argued by Popkin (1999) that the diets of urban residents are distinctly different from those of people living in rural areas, as the former are exposed to more diverse food choices (Moomaw et al. 2012). Therefore, accompanying continuous urbanisation is the "nutrition transition" as more and more people become urbanised. This nutrition transition is characterised by a shift in the pattern of food consumption from traditional diets high in cereal and fibre to more nutrition-dense diets including finer grains (such as rice and wheat rather than millet and corn), more animal-based foods (e.g. meat and dairy products) and foods higher in sugar and fat (Kearney 2010; Moomaw et al. 2012; Popkin 1999). For instance, the world's consumption of meat and dairy products doubled between 1950 and 2009 (Moomaw et al. 2012:26) .

Four factors make food security an important issue for the coming decades: (i) the growth of the world population, (ii) changes in agriculture, particularly those related to land degradation, (iii) a shift from local self-sufficiency towards a global commodity market, and (iv) changes in food consumption patterns (Gerbens-Leenes and Nonhebel 2005:24). It is now common to see changing dietary patterns related to globe economic growth, and high quality food is becoming increasingly popular. The changes triggered a response at the first Asia-and Pacific-wide Investment Forum on Food Security, where it was stated that more attention should be paid to changing patterns of food consumption when considering emerging issues of food security (Asian Development Bank 2011).

One significant difference between urban dwellers and rural residents is that the former group depend much more on food purchases while the latter can generally produce their own food (Armar-Klemesu 2000). Pendleton et al. (2014) argued that the definition of food security in urban settings needs to shift its focus from production and supply to food access, nutrition quality and dietary diversity. In other words, the accessibility and utilisation of food, and the key dimensions of food security in the urban context include 1) food purchasing; and 2) more dependence on the market and on commercially processed food. Therefore, macroeconomic policies, employment and cash income, markets and food prices and urban agriculture would become the main determinants of urban food security (Armar-Klemesu 2000: 100), rather than levels of production. Nevertheless, an overwhelming consensus remains that food insecurity is primarily a rural issue that can be solved by increasing agricultural production (Crush and Frayne 2011:527). As a result, studies on food security have been mainly focused on rural areas, with little attention paid to urban food security (Atkinson 1995; Crush 2013).

Although China has achieved high achievements in reducing hunger among nations and regions in Eastern Asia, it is still home to an estimated 134 million people facing hunger, and it is also the country with the highest number of undernourished people (FAO 2015). Accommodating 20 percent of the world's population with only 7 percent of global land and 6.6 percent of global fresh water (Bruins and Bu 2006), China has to pay careful attention to its food security, particularly in the context of the rapid rate of urbanisation that has occurred since the 1970s.

In examining food consumption, urbanisation is a very important context for research in developing countries that have been experiencing rapid urbanisation. This not only results in rising income but also changes in the lifestyles and food consumption patterns of people living there. The most significant contributor to urbanisation in China is rural to urban migration which leads to a direct increase in urban population.

According to the National Bureau of Statistics of China, the rate of urbanisation in China increased from 17.9 percent in 1972 to 56 percent in 2015 (NBS 2016), an annual increase of about one percent per year during this period. More than half of the growth in urban population (about 85.6 million in the 2000s) came from rural-urban migration (Chen and Song 2014). This migration of rural workers has become a major component of the industrial workforce in the major cities (Gu et al. 2007). At the same time, this transition has tended to deprive rural households of agricultural labour, while providing them with remittances to enable them to purchase agricultural inputs and food (Crush 2013). The rapid urbanisation process in China

has generated unfavourable environmental and ecological consequences, including the loss of cultivated land, water and air pollution, soil degradation, increased greenhouse gas emissions and related climate change (Chen 2007; Dhakal 2009; Lal 2009; Zhang and Lin 2012; Zhao et al. 2006). Land, water and labour are key inputs to agriculture production, and the declining land and water resources, along with the decreasing supply of quality labour, have had a significant influence on food supply. In addition, urbanisation causes changes in people's demand for agricultural products through socio-economic and demographic changes and changes in their diets (Satterthwaite et al. 2010). It has been found (Kearney 2010; Popkin 1999) that people are shifting their consumption patterns to higher-fat and more animal-based diets, this has caused unfavourable nutrition-related health outcomes (Mendez and Popkin 2004), such as obesity and diabetes (Popkin 2003). The changes not only impact on food security through food supply, demand and nutrition, but also threaten the sustainability of urbanisation, and Chinese development in general.

As a member of the international community, food security in China is facing the same pressures as global food security. However, the focus on food security in China is gradually shifting from national level availability to household and individual level access and utilisation. Due to economic reforms since 1978, food availability has been significantly improved and food access is no longer a problem for the majority of people in China (Zhou 2010). China has achieved great success in feeding its people without disturbing the global food market (Tao et al. 2011). However, food security was, is and will continue to be of great concern to China (Zan and Li 2010), because of anthropogenic, social, economic, political, environmental and policy challenges within the country (Khan et al. 2009), as well as changes to global energy and food markets (Heilig 1997; Khan et al. 2009). For example, China suffers from the world's most serious land degradation problems with more than 40 percent of its land affected by various environmental issues such as soil erosion, salinisation and desertification (Chen 2007). Water shortages are seen to be another great threat to livelihoods and food security in China (Fan et al. 2012; Li 2012; Peng 2011).

Despite resource limitations on food production, one emerging issue in China's food security is the imbalanced nutrition intake of people from different income groups. This is why the focus on food security in China is transiting from having enough to eat to nutritional balance (Zhou 2010). As a country which is experiencing rapid urbanisation, the nutrition transition has also been evident in China, as people have shifted from a traditional diet to a western one, with a considerable decrease in the consumption of cereals and an increase in the consumption

of fat and animal products (Popkin 2003; Zhai et al. 2009). Such an increase was found to be higher among Chinese urban residents than their rural counterparts (Zhai et al. 2009:58), and therefore needs increasing research attention.

1.2 Aims/Objectives of the research

The main objective of this study is to explore the food security of rural migrants in urban China under the context of urbanisation, specifically that relating to rural to urban migration. It seeks to find out the food security status of rural migrants from the perspective of their food consumption patterns. This will be achieved by examining the food consumption patterns of rural migrants in Shanghai, a megacity/autonomous city with the highest percentage of migrants (Liao and Wong 2014:110), and the highest population density in China (Cui and Shi 2012:2).

The specific objectives are:

1) To examine the changes migrants have experienced in their food consumption patterns and food access after migration.
2) To explore whether rural migrants in Shanghai are food secure based on the foods included in their diets.
3) To examine the determinants of their food consumption patterns in Shanghai.

To achieve these objectives, the research addresses the following questions:

1) What are the food preferences and food consumption patterns of rural migrants in Shanghai and their determinants?
2) What are the changes in the food consumption patterns among rural migrants after their migration to urban Shanghai?
3) What are the dietary energy outcomes of their changing food consumption patterns and their determinants?
4) Are their food consumption patterns influenced by the sending of remittances home?
5) Are their food consumption patterns influenced by their awareness of healthy diets?

The research seeks to increase understanding of food security by targeting rural to urban migrants rather than their rural families. It will draw attention to migrants' food security under the context of urbanisation. The research is expected to add new evidence of rural-urban migrants' food security, and to provide enlightening information for policy makers to improve food security in the context of urbanisation processes in China. In addition, given that urbanisation and migration are related to both the supply and demand sides of food security,

examining food consumption patterns and the nutritional adequacy of migrants' diets will contribute towards planning for sustainable urbanisation. By developing knowledge on the interrelationships between migration, food security and urbanisation, this research will go a small way in achieving food security in the context of sustainable development in China.

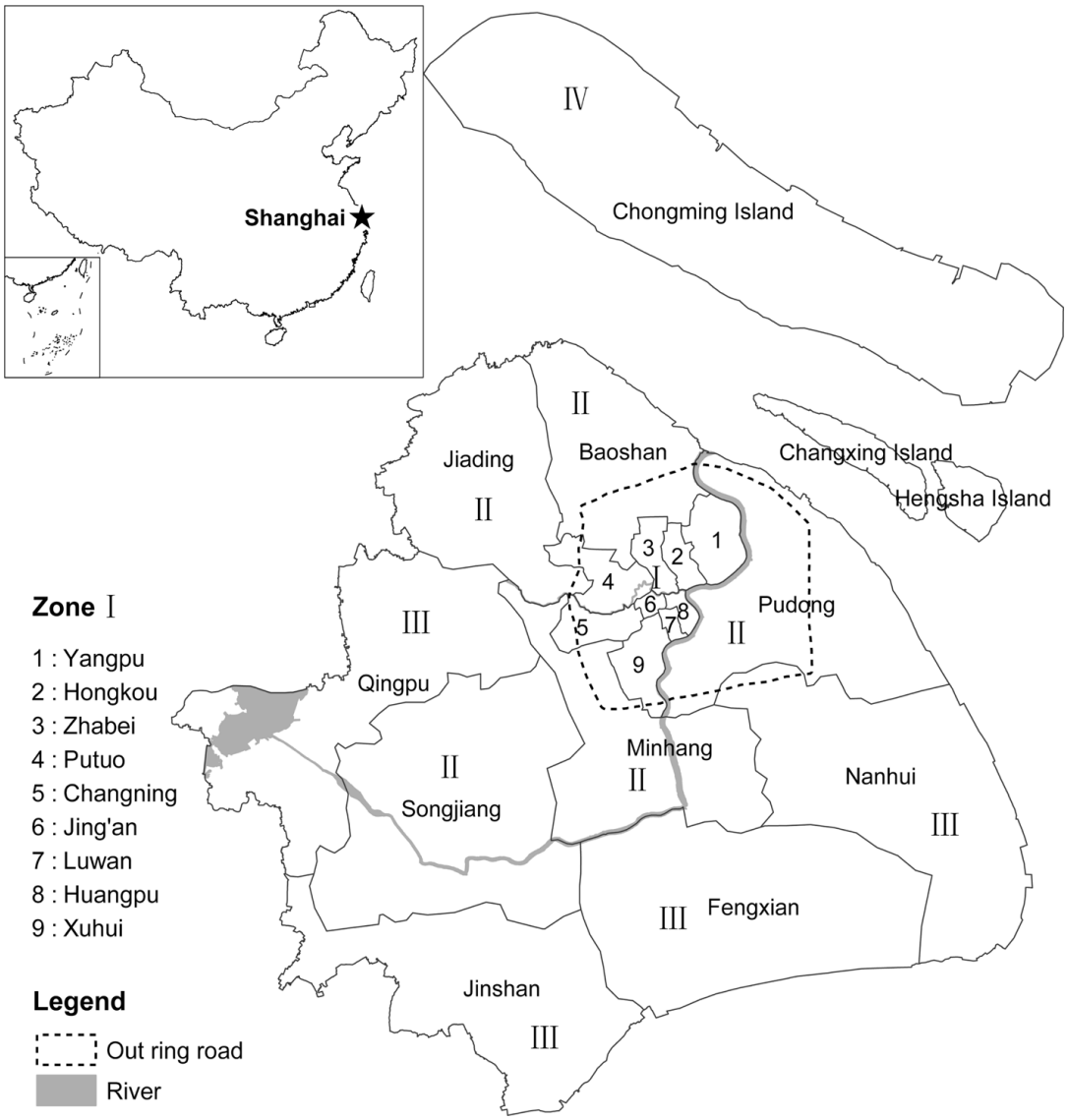
1.3 Study area: the megacity Shanghai

Shanghai is the most important city in the Yangtze River Delta Economic Zone. It is located in the east coast of China at latitude 31° 14' and longitude 121° 29'(Yue et al. 2014:768), at the tip of the Lower Yangtze River Delta, as shown in Figure 1.1. It boarders Zhejiang province to the southwest, JiangSu province to the northwest, and East China Sea to the east. Accommodating more than 24 million residents with the total area of 6340.5 km^2, Shanghai has the highest population density in China. The advantageous geographical location makes Shanghai the most important economic centre in China. Particularly, under the Master Urban Planning of Shanghai, 1999-2020 of China's central government since the early 1990s, Shanghai has developed to be an international centre for the economy, finance and trade (Li et al. 2013). The gross domestic product (GDP) of Shanghai in 2014 was 2,356 billion Chinese Yuan (Shanghai Municipal Statistics Bureau, 2014), accounting for 3.7 percent of China's total GDP. Shanghai consisted of 19 administrative areas (18 districts and 1 county) before 2009. Since then, the administrative division of Shanghai has changed a little, with Nanhui merged into Pudong New Area in 2009, Luwan merged into Huangpu in 2011 and Zhabei merged into Jing'an in 2015.

Yue et al. (2014) classified the administrative areas of Shanghai into four zones (as shown in Figure 1.1) to describe the economic development and urban expansion. Zone I is the inner city of Shanghai, which is 100 percent urban built-up areas. The districts in Zone I together with Nanshi (now belongs to Huangpu district), Wusong (currently Baoshan) and Minhang, were the original urban area of Shanghai in the 1980s. Zones II and III are suburban areas of Shanghai. Each district in Zone II has a small area of agricultural or open land. Zone III is classified as the far suburban area of Shanghai, consisting of four districts which were converted from counties to urban districts successively between 1993 and 2001. As an ecological and environmental reserve, Chongming Island is designated as Zone IV (Yue et al. 2014:787). Although Songjiang is classified into Zone II as near the inner city, most research about Shanghai has considered it to be a far-suburban district (e.g. He and Ning 2015; Tan and Ren 2015). The inner city of Shanghai accommodates 30 percent of Shanghai's total population

in only 4.6 percent of Shanghai's total area, resulting in the highest population density. Nearly half of Shanghai's population congregate in the near suburbs which cover 36.5 percent of Shanghai's total area. Therefore the far suburban areas accommodate less than one fourth of Shanghai's total population in about 60 percent of the city's total area. The population density there is only 40 percent of the average level of the whole city (Yang and Yang 2014).

Figure 1. 1 Location and administrative divisions of Shanghai



Source: (Yue et al. 2014:787)

Most of Shanghai's urban development and economic activities have previously concentrated in the west of the Huangpu River (Puxi area) until the reform and opening-up in 1978. Since then, Shanghai has experienced unprecedented economic growth and urbanisation, particularly since the establishment of the Pudong New Area in 1992 east of the Huangpu River. The level

of urbanisation in Shanghai has increased from 59.0 percent in 1978 to 88.6 percent in 2008 (Yue et al. 2014), which now has the highest level of urbanisation in China since 2008. One reflection of this is the constant and dramatic increases in non-hukou migrants since 1980s, the 2010 population census of China reported that two out of five residents in Shanghai have a non-local hukou (Lan 2014:248). The period from 2000 to 2010 witnessed the peak of population growth in Shanghai (He and Ning 2015:229), during which the total population increased from 16.41 million to 23.02 million. Some 90.2 percent of this growth was attributable to the surge of migrants which increased from about 3.06 million in 2000 to 8.96 million in 2010 (Liao and Wong 2014:113-114).

As Shanghai plays an important role in China's economic development, it enjoys huge policy support from the central government and an accompanying huge amount of resources. The development of the services industry has created numerous job opportunities, attracting migrants from 30 other provinces, municipalities and autonomous regions. However, the origins of migrants in Shanghai are mainly from the central China provinces, sending 50 percent of migrants between 2005 and 2010, with Anhui province sending the largest share (29 percent) of migrants to Shanghai from 2005 to 2010 according to the sixth national census of China. The two major origin provinces in eastern China are Jiangsu and Zhejiang, sending 16.7 percent and 5 percent of migrants respectively to Shanghai between 2005 and 2010. These three provinces, which contribute half of Shanghai's migrants, are quite close to Shanghai, and they all belong to the Yangtze River Delta economic zone. This indicates that migration to Shanghai tends to be mainly short-distance, from provinces in close proximity.

The distribution of rural migrants is similar to the distribution of the whole population in Shanghai. This is because the industrial enterprises are moving from the inner city to the near suburbs and the far suburbs due to the shift in Shanghai's investment-growth centre from inner city to the near suburbs. The percentage of migrants in the inner city has decreased from 22.2 percent in 2005 to 19.3 percent in 2010. The majority of the migrants in Shanghai live and work in near suburban areas, but the share of migrants in near suburbs has been declining gradually (Yang and Yang 2014).

Migrants are playing an increasingly significant role in many aspects of Shanghai's development, particularly urbanisation. Research indicates that rural migrants contribute to 30 percent of the growth of Shanghai's GDP (Yang and Yang 2014). However, their non-hukou status has negatively influenced their life in Shanghai as they are denied access to many social

benefits, services and housing welfare (Kam and Buckingham 2008:176). All of these issues make Shanghai the most suitable setting for the proposed research.

1.4 Outline of the thesis

The thesis is organised into eight chapters. The first has provided the global and Chinese background to the study. Chapter two provides a literature review to address related concepts and the academic background related to the study. It starts with reviewing the concepts and definitions of food security and its indicators and measurements, and the role played by food consumption in food security is also illustrated in the first section of this chapter. Then the second section reviews the concepts of urbanisation and the background of Chinese urbanisation and migration to contextualise the study. The last section reviews current studies in the nexus of the food security, urbanisation and migration linkages. It demonstrates the need to explore the connection between migration and food security in the urban context, which has had limited research and this justifies the significance of the study.

Chapter three illustrates the methodology applied in the research. It provides an introduction to the sampled sites – Putuo district in the inner city, Pudong district in the near suburb and Songjiang district in the far suburbs, and the town sampled in each district. Next is the methodological basis for, and the design of, the research. Existing methods for collecting quantitative data on food consumption are also reviewed in this chapter. Based on this, the strategic and statistical design of the survey is then presented, including the specific steps of the selection of the sample and the methods used to collect data on the amount of food consumed by the surveyed migrants. Following on this the chapter illustrates tools used for data collection and analysis, including indicators and important definitions for the analysis. The last section presents the challenges and limitations of the survey.

A profile of the surveyed migrants is presented in chapter four. This profile consists of information on the differences among the surveyed migrants that are assumed to have an impact on their food consumption, which provides a good basis for the following analytical chapters. It first presents the basic information of the participants, including their socio-demographic characteristics, living conditions and employment in Shanghai. Then the interactions between the socio-demographic characteristics including age, gender, income, education, occupational industry, time of residence in Shanghai, and their hometown. Finally, the last section presents respondents' awareness of healthy diets, including perceptions on what constitutes a healthy

diet, perceptions of the importance of having healthy diets and the degree of attention they give to information about healthy diets.

Chapter five addresses the general food consumption patterns of the surveyed migrants and the outcome of their food consumption. The food consumption patterns of participants are described in three aspects: 1) meal patterns; 2) diet patterns including snack habits; and 3) food sources. A comparison of meal patterns and diet patterns before and after migration is presented, and respondents' perceptions of changes in their food consumption and access to food are also examined. The second major part of this chapter focuses upon migrants' food consumption according to their seven-day recall. This part first presents quality of the respondents' diets using a food consumption score and a dietary diversity score, then the average daily energy intake of the diets is presented. Differences by major socio-demographic characteristics of respondents in diet quality and dietary energy intake are also presented.

Chapter six discusses the socio-demographic determinants of respondents' consumption patterns of regularly consumed food groups including animal meat, fruit, fish and poultry meat. It first looks at the association between food preferences and food consumption frequencies, and then differences in the frequency of consumption were presented by different socio-demographic characteristics. The impact of the sending of remittances home by respondents on their frequency of consuming each food group was then addressed. The last section demonstrates the effects of respondents' awareness of healthy diets on the consumption of regularly consumed food groups.

Chapter seven looks at the drivers of the consumption of irregularly consumed food groups to include milk and milk products, alcohol, soft drinks, snacks, other aquatic products, animal organs, processed food and fast food. The effects of the same factors in chapter six are also examined in this chapter.

Chapter eight brings together the major findings of the study and provides some policy and research implications in the nexus of the food security and migration linkage in the context of urbanisation, and also illustrates the limitations of the study and recommendations for future research.

Chapter 2 Literature Review

2.1 Introduction

This chapter reviews literature related to food security, urbanisation and migration to provide the appropriate context for the study. It consists of three major parts: concepts and definitions of food security and urbanisation, and identifies the research gaps. It begins with the concepts and theoretical framework of food security, as well as the role food consumption plays in food security. Then it reviews the concepts related to urbanisation and the background of urbanisation and migration in China is presented. The last section demonstrates the gaps in research about the linkages between food security, urbanisation and migration.

2.2 Food Security

2.2.1 An evolving definition of food security: from availability to access and utilisation

Food security is of great importance at individual, national and global levels. At the micro level, food security has close links with nutritional outcomes and thus the health status of individuals, particularly children. It has already been indicated that food insecurity is directly related to obesity in developed nations and malnutrition in developing countries (Renzaho and Mellor 2010). Being food secure is the prerequisite for the health of human beings and thus the need to also secure labour productivity and societal development. Article 25 of the Universal Declaration of Human Rights has announced it as one of the basic human rights:

> "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care" (United Nations 1948:4).

At the macro level, regional or national food insecurity can undermine a country's economy and may even cause social turmoil, which may also lead to international conflicts. Ensuring food security of different populations in a country, therefore, should be one of the priorities of government. Hence, whether a group of people or the whole nation is food secure would have an important influence on the policies of many sectors of government.

Unfortunately, priorities ensuring food security "wax and wane" (Maxwell 1990), as a result of competition with other development concerns. There are so far three waves of food security. The first one dates back to the world food crisis in 1972-4, due mainly to a series of unsatisfactory food production initiatives in Africa. The second one catalysed due to the African famines in the second half of the 1980s (Maxwell 1990), and the third one was

stimulated by the recent world food price crisis which started in late 2006 and peaked in 2008 (McDonald 2010:60).

Based on this concern, countries in the world began to collect data on food security during post World War II to help make decisions on food allocation in war-affected regions. This was prior to the recognition of the term "food security" which did not get formal recognition until 1970s as the concept of "food supply". The definition of food security has been developed and substantiated over time with the enrichment of researchers' studies on food security (Jones et al. 2013). The definition of food security has been evolving, with changes in the emphasis from food availability to food access and then to utilisation, also from global and national levels to household and individual levels. Just as Maxwell (1996) characterises the evolution of the definition of food security as a process from "simple beginning to cornucopia". He summarised that such evolution was reflected in the three major overlapping paradigm shifts: 1) from the global and the national to the household and the individual, 2) from a food first perspective to a livelihood perspective, and 3) from objective indicators to subjective perception (Maxwell 1996:156). Such evolution is also reflected in the analytical literature of food security. The following is about the evolved versions of the definition of food security.

The first official definition of food security can be traced back to the world food summit at Rome in 1974:

> Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices. (United Nations 1975:10,15)

This definition, which focuses on "steady" availability and supply, reflects the fact that food security was regarded as a macro phenomenon at that time.

In the definitions of food security by FAO 1983 and the World Bank 1986, the demand side concerns were reflected by stressing the necessity of people's access to available food need:

> Ensuring that all people at all times have both physical and economic access to the basic food that they need. (FAO 1983:4)
>
> Access by all people at all times to enough food for an active, healthy life. (World Bank 1986:1)

Food security received more attention in the 1990s due to widespread undernourishment, and the definition of food security continued to evolve. It was further developed into a more complete and thus more complex one in the 1996 world food summit:

> Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to

> sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. (FAO 1996, World Food Summit Plan of Action, para. 1)

It is clear, from this definition, that food security is not only restricted to a specific level. Instead, it is a multi-level issue ranging from global and national levels to household and individual levels. This definition continues to express the concerns about food security from the demand side rather than the supply side, by introducing perspectives from its ultimate subject namely the individual, expressed as "all people". It implies that the ultimate objective of food security is to meet people's "*dietary needs and food preferences for an active and healthy life*". It also illustrates more comprehensive and more clear-cut indicators of food security: "food preferences" was added to this definition as a new subjective perception indicator; the term "food" was further defined as "safe and nutritious food". The 1996 version is the most commonly cited definition in food security studies. It is also recognised as a "working definition" by the Food and Agriculture Organisation of the United Nations in its summary of the concepts and measurements of food security (FAO 2003). According to this summary, food security is considered to be a phenomenon with the individual as the ultimate subject of focus:

> Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern. (FAO 2003:29)

2.2.2 A brief review of the framework of the concept of food security – the four pillars

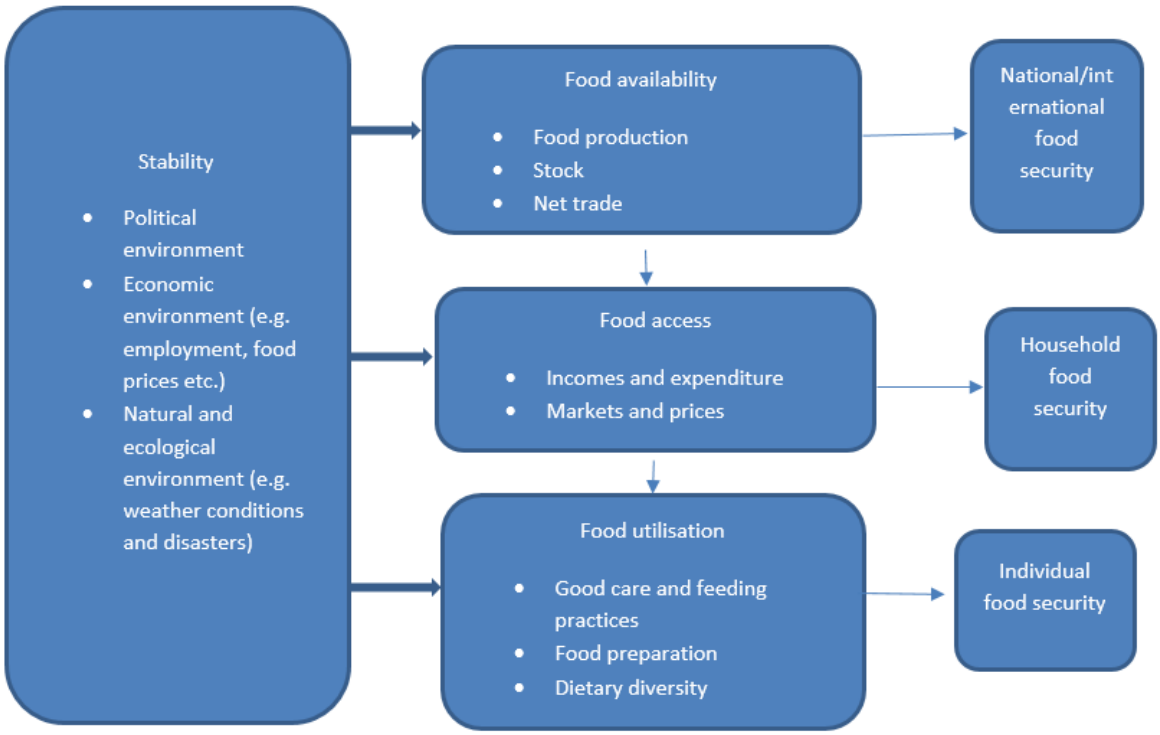
The Food and Agriculture Organisation of the United Nations summarised the four dimensions of the concept of food security: food availability, food access, food utilisation and the stability of those three factors. It further defined that food availability refers to the physical dimension, while food access included both physical and economic dimensions (FAO 2008). A year later, those four dimensions were officially declared as the "four pillars" of food security in the declaration of the world summit on food security, and the nutritional dimension is considered to be integral to the concept of food security (FAO 2009a:1).

The definition of each pillar of food security is provided by FAO. Food availability is the "supply side" of food security, it is the sum of food production, stock and net trade. Nevertheless, enough food supply cannot ensure food security at the household level in terms of food access. Incomes, expenditure, markets, prices all have an influence on economic and physical access to the food needed for the household to achieve food security goals. Still, even

when the household has access to sufficient safe and nutritious food, food security for each member within a household can also be affected by their food utilisation. This can be influenced by food preparation, dietary diversity, and intra-household food distribution. On top of that, the stability of food availability, access and utilisation is imperative for ensuring long-term food security (FAO 2008).

According to the detailed definition of food security by FAO, food security is actually the outcome of the interaction of the four pillars. Figure 2.1 presents an outline of food security based on the definition by FAO in 2008. Food availability can be considered as food security at the macro level, which is the prerequisite for food security at the micro level – food access and food utilisation. If there were not enough food available for all the people, then food access and utilisation would be meaningless for those economically or environmentally vulnerable populations. Some may claim that food availability can also be a micro issue, as farmers are the food producers themselves. However, farmers usually only grow specific types of food products that can only contribute to part of their diets and therefore cannot completely ensure the substantial nutrition intake necessary to meet basic health and nutrition needs. When the major focus is on a household's ability to achieve food security goals, food access can be considered to be micro level food security at the household level. By contrast, food utilisation, which focuses on individual food intake, is micro level food security at the individual level. The "stability" pillar actually stresses the important role of the macro economic, political and ecological environment, such as fluctuations in food prices and water scarcity, as well as pollution, can either increase or reduce the vulnerability to food security of the disadvantaged population groups through the influences on the other three pillars.

Figure 2. 1 A simplified diagram of conceptual framework of food security



Source: adapted from FAO (2008:1)

The framework of food security developed by Ericksen (2008), who proposed the "global environmental change and food system (GECAFS)" approach, includes Food System Activities and Food System Outcomes, to study the interactions between global environmental change (GEC) and food security. Food security is seen to consist of three components – food availability, food access and food utilisation. According to this approach, food security is regarded as one of the outcomes of food system activities which are affected by global environmental change. He offered a definition of the three dimensions of food security from the perspective of consumption:

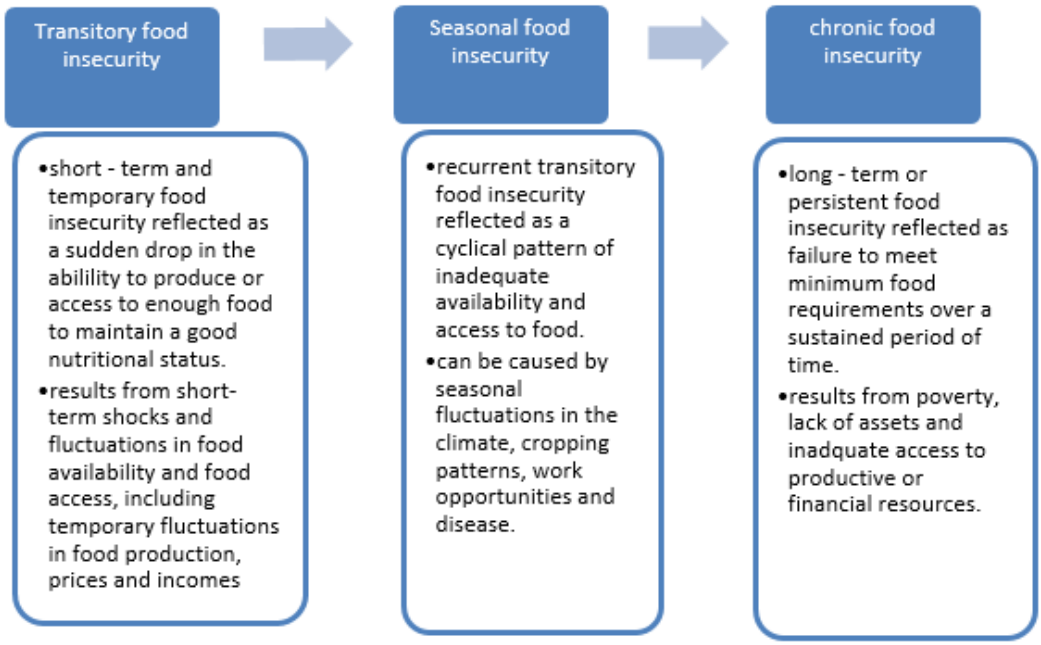
> Food availability refers to the amount, type and quality of food a unit has at its disposal to consume. Access to food refers to the ability of a unit to obtain access to the type, quality, and quantity of food it requires. Food utilisation refers to individual or household capacity to consume and benefit from food. (Ericksen 2008:238)

Due to the multi-layered definition and multi-disciplinary characteristic of food security, and therefore, complexity of measurement, it is impractical and difficult to look at food security at all the three levels. Most studies of food security focus on national/global levels or the household level and on one or two dimensions of food security.

2.2.3 Measuring food security: determinants and indicators

Given the multi-level and multi-dimension characteristics of food security, the failure to meet the conditions of any dimension of food security can cause food insecurity. Figure 2.2 outlines three types of food insecurity according to the time frames of occurrence: chronic food insecurity, seasonal food insecurity and transitory food insecurity (FAO 2008).

Figure 2. 2 Classification of food insecurity



Source: adapted from FAO (2008:1)

The Integrated Food Security Phase Classification (IPC) classifies food security into five phases according to the severity of food insecurity: famine/humanitarian catastrophe; humanitarian emergency; acute food and livelihood crisis; chronically food insecure and generally food secure. Indicators used to measure the food security phase include: crude mortality rate; malnutrition prevalence; food access/availability; dietary diversity; water access/availability; coping strategies and livelihood assets (FAO 2008:2). In addition to malnutrition, the most severe consequence of food insecurity is hunger, "an uncomfortable or painful sensation" caused by food deprivation. It is measured by undernourishment, the proportion of the population whose dietary energy intake is under a pre-determined requirement that is country specific (FAO 2008:2). Nevertheless, measurements of food security at different levels are different due to variations in the focus on specific aspects.

The measure of macro or national level food security focuses on availability, whereas access and utilisation are the focus of more micro, or household and individual level food security. In addition to the food balance sheet used by FAO to estimate the prevalence of undernourishment, the *global hunger index* and *global food security index* are the two major tools used to estimate country-level food security. Undernourishment, underweight and child mortality are the three indicators used in the global hunger index, ranking the status of a country's food security from "low" to "extremely alarming" hunger on a 100 point scale. Indicators applied in the global food security index are totally different: affordability, availability and quality, and safety. There are also some other tools used to monitor and predict high risk areas of food insecurity, such as the famine early warning systems network, vulnerability analysis and mapping (Jones et al. 2013).

The estimate of household level food security relies on data based on household consumption and expenditure surveys, which is a summary of a series of different surveys such as Household Budget Surveys (HBS), Household Food Consumption Surveys, Individual Dietary Surveys, Household Income and Expenditure Surveys (HIES), Living Standard Measurement Studies (LSMS). These surveys have different purposes, including measuring consumer price indices and collecting comprehensive information on expenditures on food and other goods (Fiedler et al. 2012). The FAO approach adopts four indicators to collect household food consumption and expenditure data: average per person per day food consumption, dietary energy unit cost, share of food consumption expenditure in total consumption expenditure and share of food consumption by sources (Sibrián et al. 2007:8-10).

Ericksen (2008) further divided the three components of food security into three subcomponents. Specifically, food availability includes production, distribution and exchange; while affordability, allocation and preference are the three variables representing food access. Nutritional value, social value and food safety are defined as the components of food utilisation. He further offered a detailed list of the determinants of each subcomponent of food security. Availability can be determined by factors such as agricultural productivity, public facilities for food storage and allocation, international trade, subsidies, demographic structure and economic capacity. Food access is determined by household incomes, food prices, distribution of food in the market and within the household, religion, media, human capital, level of physical activity and so on. While the utilisation of food is determined by individual related factors including living conditions for food preparation, eating habits, cultural customs, standards and regulations on food production, processing and packaging (Ericksen 2008).

Misselhorn et al. (2012) illustrated a series of factors which influence the dynamic of food security, including population pressure, climate change, constraints to food access, changing food supply and demand in the process of urbanisation and globalisation, and gender equality. Nevertheless, incomes and food prices are generally considered to be two main determinants of food security (Armar-Klemesu 2000; Atkinson 1995; Corral et al. 2000; Ericksen 2008; Ingram 2011; Misselhorn et al. 2012; Pendleton et al. 2014).

2.2.4 Food consumption pattern: an important factor influencing food security and public health

McDonald (2010:59) claims that

> A key component of efforts to ensure food security must involve discussions about the sorts of diet that people will consume" (McDonald 2010).

As has been illustrated above, food consumption data is important for estimating whether the outcome of consumption achieves the goal of food security. The consumption patterns of people also reflect demand for food, which would have direct impacts on an individual's ability to access food through food price fluctuations caused by the interaction between food demand and supply (Moomaw et al. 2012). More importantly, trends in food consumption can influence future food availability according to available resources such as land, water and agricultural resources for food production (Clay 2004; Gerbens-Leenes and Nonhebel 2002; Gerbens-Leenes et al. 2002; Liu and Savenije 2008; Moomaw et al. 2012; Smil 2000).

For instance, the production of 100 kg of pork requires 400 kg of barley, while only 28 kg of barley are required to produce 100 litres of beer (Gerbens-Leenes and Nonhebel 2002). In a study in China (Liu and Savenije 2008), it was found that water required for animal products was around 250 m^3 per capita per day in 1961, increasing to 850 m^3 per capita per day in 2003, due to increased consumption of animal products. Smil (2000) provided empirical evidence that in many developed countries a diet dominated by meat and dairy products needs 4000 square metres per person of land, whereas a vegetarian diet requires around 800 square metres per person of land. Furthermore, land requirements vary significantly by the primary types of meat. Land required to produce a diet with chicken and pig (1500 m^2/capita) as the primary meat source is only half that in which meat comes from large amounts of beef (3000 m^2/capita). This adds evidence to the point made by Gerbens-Leenes and Nonhebel (2002) that high land requirements does not necessarily mean high energy intake, which is instead caused by the differences in the specific foods consumed. According to their findings, Greece needed only 1 percent more land than Belgium, while its citizens' energy intakes were 5 percent higher.

Intensive production, in response to increased demand for resource-intensive foods, undermines the productivity of the agro-ecological resource base. In addition, the disposal of wasted food is a significant contributor to methane emissions (Moomaw et al. 2012).

Apart from the influences on food security, food consumption trends have significant health, economic and environmental implications. There is a tendency towards overconsumption both in developed and developing countries, resulting in the number of overweight individuals exceeding those who are underweight. Such a trend can lead to severe health problems such as cardiovascular disease, diabetes and certain forms of cancers (e.g. Beaglehole 1992; Bowen et al. 2011; Ebrahim et al. 2010; Moomaw et al. 2012; Zimmet et al. 1997). On the other hand, under-consumption can cause undernourishment and malnutrition which affects skeletal and muscular growth and even results in shortened life expectancy (Moomaw et al. 2012).

Food consumption patterns are "*repeated arrangements that can be observed in the consumption of food by a population group*", which is reflected in the types and quantities of foods and their composition in diets (Gerbens-Leenes et al. 2002:48). In this thesis, the consumption frequency of a specific food group is also regarded as an important indicator of food consumption patterns. Food consumption patterns can be determined by many factors such as food preference, habit, availability, traditions, religions, income and socio-demographic characteristics including age and gender (A Karim et al. 2008; Gerbens-Leenes et al. 2002; Hulshof et al. 2003; Martikainen et al. 2003; Von Braun 1988; Widdowson 1936).

2.3 Urbanisation

2.3.1 Definition of "urban"

It is traditionally considered that "urban" embodies a different way of life and a higher standard of living, which distinguishes it from "rural" (INSTAT 2014:11). There is, by far, no universal and clear-cut descriptive definition of "urban" and "rural". Instead of giving a precise definition, researchers try to define the concept "urban" by listing characteristics or restrictions, most of which are demographic and economic. For instance, Hussain (2003:2) puts forward two characteristics of an urban place: 1) a high population density; 2) dominant contribution of industry and services to the local income. Further, the "urban" or "rural" feature of a locality usually determines the type of its population (Hussain 2003:2). Northam (1975:6-7) defined the term "urban" as "a place of occupancy" and he puts 3 restrictions on this definition: 1) the density settlement is considerably higher than that of the general population; 2) the people in that setting are mainly engaged in non-agricultural activities, not in economic activities

normally placed in the primary economic sector; 3) the locational setting serves as a cultural, administrative, and economic centre for a region peripheral to the centre in question. He pointed out that the boundaries of an urban settlement often goes beyond the legal limits of the central city, people who live in places just beyond the boundaries of large cities are often adjacent and share the common problems with the central city. Bureau of the Census in the United States officially defined this as being the "urban fringe" (Northam 1975:9), which is also used in China to classify urban settlements.

An operational definition of urban is different from country to country due to the different combination of criteria: size of population, population density, distance between built-up areas, predominant type of economic activity, conformity to legal or administrative status and urban characteristics such as specific services and facilities (United Nations 2005:Table 6). Population density threshold is a commonly used criterion in the operational definition of "urban" and "rural", although the specific number varies from country to country due to different population bases (Northam 1975:8; OECD 1994:22; Pizzoli and Gong 2007:3). For instance, places with a population of 2500 are considered as urban in America, whereas an urban settlement in Denmark is an agglomeration of 250 people or more (Northam 1975:8). The OECD (1994) created a framework for defining rural within its member countries at national, regional and local levels. In Japan local areas are grouped into urban and rural communities by using the density threshold of 500 inhabitants per square kilometre and it is only 150 inhabitants per square kilometre in other member countries. Regions are classified into three types according to the share of regional population living in rural communities: predominantly rural regions (over 50%), significantly rural regions (15%-50%), and predominantly urbanised regions (below 15%) (OECD 1994:23).

In contrast to Hussain's statement (Hussain 2003:2) that "the spatial division 'urban-rural' coincides with the demographic division of the population in urban and rural", in China the spatial and demographic divisions are paralleled. Due to the restriction of the household registration system, population in China cannot be simply divided into urban and rural according to the urban or rural feature of the place in which they reside. First of all, in China the demographic division of urban and rural is based on the personal household registration (*Hukou*) status that classifies the Chinses population into "agricultural (nongye)" and "non-agricultural (fei nongye)", which respectively refers to the official definition of rural and urban population. Secondly, the primary criteria of spatial definition of urban in China are the minimum population size and the share of non-agricultural workforce (Goldstein 1990:677),

many places were redefined from rural to urban due to the liberalisation of those two standards (Goldstein 1990:677; Park 2008:49). However, this has been changed by the National Bureau Statistics (NBS) of China, as it now uses a population density of 1500 people per square kilometre as the primary criterion to define urban places. Specifically, urban places include those who are officially designated as cities (jianzhi *shi*) and towns (jianzhi *zhen*), while townships (*xiang*) and villages (*cun*) are classified as rural places (Liu et al. 2003:7; Martin 1992). Those who move from their usual place of residence to an urban area and live there for more than six months are also counted into the urban population in the national population census.

2.3.2 The mechanism of urbanisation

In the literature of urbanisation theories, the interpretation of the concept of "urbanisation" has been widely connected to "economic development", "industrialisation" and "modernisation". Traditionally, urbanisation has been perceived as a concomitant or phenomenon of economic development, industrialisation and modernisation (Chan 2012; Davis 1965; Fox 2012; Henderson et al. 2009; Lu and Wan 2014; Poumanyvong and Kaneko 2010). During the process of economic development, urban economic expansion "pulls" rural underemployed farmers to migrate to cities for higher productivity and thus higher income (Chan 2012:65; Davis 1965:45). This rural-to-urban migration stimulated by economy development has resulted in urbanisation (Fox 2012:285), which is reflected in the urban demographic and spatial expansion (Chan 2012; Henderson et al. 2009; Pivo 1996). Whereas Davis (1966) compared the relationships between urbanisation and economic development in industrial and nonindustrial nations. He found that urbanisation in industrial countries is attributable to economic development, while total population growth plays a more important part in nonindustrial nations (Davis 1965:47). In addition, given the economic stagnation observed in Africa's urban transition process in the late twentieth century, Fox (2012) proposed a historically grounded theory of urbanisation to explain such phenomenon. He argued that urbanisation is a global historical process driven by population dynamics in the context of technological and institutional change. Through a review of existing research on China's urbanisation, Friedmann (2006:440) pointed out that urbanisation is naturally a "multi-dimensional socio-spatial process". In his opinion, urbanisation can be specifically decomposed into at least 7 different but interacting dimensions: demographic, social, cultural, economic, ecological, physical and governmental aspects. Therefore, urbanisation should be studied from trans-disciplinary perspectives. He also argued that urbanisation sets up new rural-

urban relations, rural and urban issues are actually reciprocally related rather than separate, independent categories (Friedmann 2006). Therefore an urban perspective has to take priority in our future exploration of urbanisation.

Although scholars' understanding and interpretation of urbanisation vary to some extent, demographic change and physical expansion are commonly included in the characteristics of the process of urbanisation (Davis 1965:42-43; Henderson et al. 2009; Mulligan 2013:S59; Pivo 1996; Tisdale 1942:311). For instance, Pivo (1996) claimed that urbanisation is accompanied by a growing share of urban land and urban population and, at the same time, a declining share of rural land and rural population. Friedmann and Wolff (1982) proposed a comprehensive analytical method, which argues that urbanisation actually reflects the entire society and is a multi-dimensional reflection of physical, spatial, institutional, economic, population, and social characteristics.

2.3.3 Indicators of urbanisation: urban population growth as the key index

Although current research into urbanisation has not put forward an explicit illustration of urbanisation indicators, it is not difficult to conclude from the definitions and explanations of urbanisation in related literature that the share of urban population is a key indicator.

Tisdale (1942:311) explictly defines urbanisation as a process of population concentration that is embodied in the "multiplication"of population agglomerations and the expansion of each individual agglomeration. Davis (1965) described urbanisation as a finite process during which nations experience the transition from agricultural societies to industrial societies. He emphasised that urbanisation is associated with, but not equal to, the growth of city, it refers more to the increase in the proportion of population settled down in urban areas. Therefore, the process of urbanisation will finally come to an end but the growth of cities will have no limit. He (Davis 1965:44) listed three possible sources of urbanites: 1) reclassification of rural settlements into urban ones; 2) greater excess of births over deaths in urban areas than in rural areas; 3) population migration from rural settlements to urban settlements. He analyses and compares the potential contribution of those three factors to the increases in urban population, and concludes that rural to urban migration is overwhelmingly the key contributor (Davis 1965).

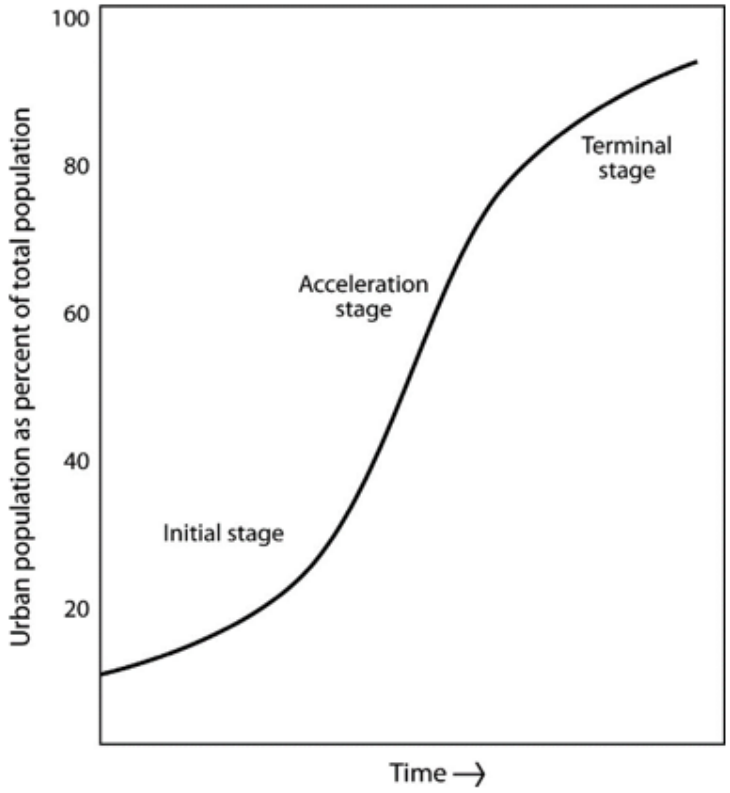
Mendez et al. (2004) argued that traditional measures of urbanisation, including the urban-rural dichotomies and changes in the share of urban population, exclude the heterogeneity in infrastructure and resources within and between urban as well as rural areas. Hence, they used

ten indices of urbanisation in their case study on the impacts of urbanisation on diets and nutrition in China's urban and rural populations. These ten indices are summed up from the data of China Health and Nutrition Surveys (CHNS) as: population size, population density, access to markets, transportation, communications/media, economic factors, environment/sanitation, health, education and housing quality (Mendez et al. 2004:172).

2.3.4 The stages of urbanisation: the urbanisation curve

Some scholars use urbanisation curves to describe the changes in growth rates during the whole process of urbanisation. The concept of the urbanisation curve was first put forward by Davis (1966), who used an attenuated S-shaped curve to summarise the typical process of urbanisation in industrial nations like the United Kingdom and America. He claimed that the speed of urbanisation varies in different stages, which can be specifically described as a slow-rapid-slow process (Davis 1965:44). Northam (1975:53) illustrated the stylised S-shape curve, as shown in Figure 2.3 in a rather detailed way. He claimed, that the S-shaped curve represents three stages of the typical urbanisation cycle which can be termed as: the initial stage, the accelerating stage and the terminal stage. At the initial stage, the share of urban population is less than 25 percent and society at this stage of urbanisation is characterised by an agrarian economy. The demographic reflection of such a society is the quite dispersed distribution of population. From the point around 25 percent of urban population onwards, people living in urban areas increases at a steep rate until they account for 60-70 percent of the total population. The distinctive feature of this stage is the restructuring and concentration of population as well as economic activities into the urban areas. This is accompanied by the inevitable fact of the increasing importance of the secondary and tertiary economic sectors and the gradual shift of economic focus away from the primary sector. Once more than a half a society's population are urban residents, the urbanisation process comes to the terminal stage where the increase in urban population slows down gradually until it reaches the upper limit (Northam 1975:54).

Figure 2. 3 The urbanisation curve



Source: (Northam 1975:53)

Northam (1975), however, claimed that the shape of the urbanisation curve is changeable over time. Two possible changes may happen to it in the future. One is an earlier end of the acceleration stage where the share of population counted as urban is 40-50 percent, while the other is a possible reversal of the urbanisation curve due to outmigration from cities (Northam 1975:54). A classical application of the S-shaped urbanisation curve by Northam himself is classifying the different stages of urbanisation of different nations according to the United Nation's Demographic Yearbook in 1969. The developed countries like the United Kingdom, American, Canada, Japan and France were by then considered as being in the terminal stage. Developing nations were somewhere in the acceleration stage, although some (e.g. U.S.S.R.[1]) were at the upper part of the stage whilst some (e.g. Iran) were at the lower part (Northam 1975:55-56).

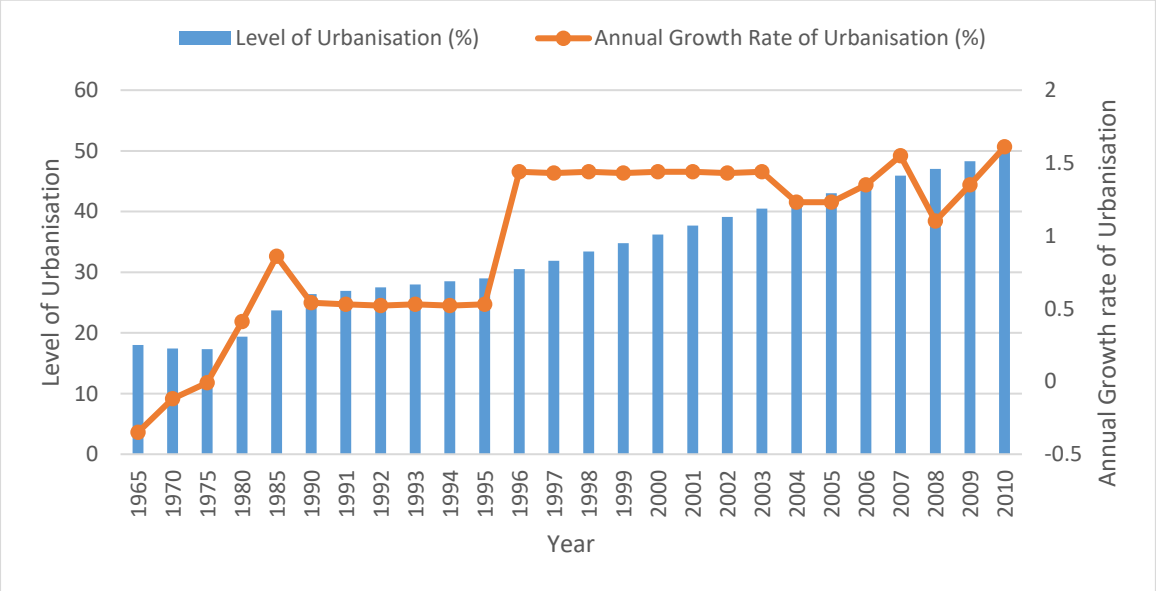
China is now situated at the acceleration stage, and located on the upper part of the urbanisation curve. The rate of urbanisation in China has increased from 17.9 percent in 1978 to 52.6 percent in 2012 (Lu and Wan 2014:671), with close to an annual increase of one percent per year during

[1] the Union of Soviet Socialist Republics

this period. More than half of the growth in urbanised population (about 85.6 million in the 2000s) was from rural-urban migration (Chen and Song 2014:485). This migration of rural workers has become a major component of the industrial workforce (Gu et al. 2007:1).

China's urbanisation is considered by Friedmann (2006) as a recent phenomenon given that for a long time it had stayed rather low before it suddenly started to speed up in the late 1970s. The proportion of China's urban population increased very slowly from 10 percent to around 17 percent in the Maoist era (Friedmann 2006:442). Then the urbanisation rate soared from 17.9 percent in 1978 to 52.6 percent in 2012, with an annual rate of urbanisation of 1.4 percentage points (Lu and Wan 2014:671). The "take-off" of China's urbanisation has been fuelled by the massive flow of rural migrants into urban areas (Chen and Song 2014:485; Friedmann 2006:442; Qin and Zhang 2014:501; Zhang 2008:455). Chen et al. (2013) indicated that there were two remarkable turning points in China's urbanisation process between 1960 and 2010. One around the year 1975 when China's urbanisation stopped negative growth due to the implementation of the "anti-urbanisation" policy. The second is in 1985 when the urban growth rate dropped from just over 1 percentage point to about 0.7 by 1990 and stayed at this level for the following five years. The third is in 1995 when China's urbanisation started to accelerate, jumping to a growth rate of 1.4 percentage points by 1996 and flattening out at this level until 2003, when it started to fluctuate between 1 and 1.5 percentage points (see Figure 2.4).

Figure 2. 4 Progress of China's Urbanisation



Source: adapted from (Chen et al. 2013:28)

Urbanisation in China, especially along the eastern coastal areas, has received much attention from both western and Chinese scholars, their studies mainly focus on the diverse phenomena

that happened in the process of urbanisation in coastal regions (Friedmann 2006:440). Based on a reading of the empirical evidence of China's urbanisation during the last two decades of the 20th century, Friedmann (2006) argued that China's rapid urbanisation was essentially motivated by endogenous forces rather than globalising ones, which are considered by social scientists as the prime mover of China's urbanisation. This leads to unique Chinese characteristics of modernity. One of those characteristics is the co-existence of tradition and modernity in the process of urbanisation, which Friedmann indicates to be the dual aspects of Chinese urbanisation (Friedmann 2006).

The increase in China's urbanisation is primarily driven by three factors: migration, natural growth and urban reclassification, with migration seen to be the first and most important driver of the process (Qin and Zhang 2014:500). However, due to the household registration or *Hukou* system, the massive and sustained flux of rural-urban migration has resulted in many urban migrants without urban citizenship. They are known as urban "temporary", "floating" or non-hukou population, and these people have become a significant segment of the urban population (Zhang 2008:455). This *Hukou*/*non-Hukou* segmentation has even given rise to the emergence of the 'dual society' in Chinese cities, where many recent migrants are segregated from 'native' urban residents (Lu and Wan 2014:672). Such segregation is reflected in numerous social aspects, including job opportunities, income gaps, educational returns and access to basic public services (Lu and Wan 2014:672). Specifically, it is revealed that migrants are excluded from many urban jobs (Kam and Buckingham 2008:583), and migrants' incomes have increased less than their urban counterparts (Knight et al. 2011; Meng and Bai 2007). Zhang and Meng (2007) revealed that the increasing wage gap between rural migrants and urban residents is primarily due to the declining rate of educational returns among migrants. Migrants in China have difficulties in establishing a life in cities due to the lack of access to urban credit markets (Henderson et al. 2009:10), and most of them have restricted access to urban welfare entitlements and basic public services (Zhu 2003; Zhu 2004). All of these elements limit livelihood opportunities for rural migrants in cities, which fundamentally affects their food security situation.

2.4 Urbanisation, migration and food security

The linkage between urbanisation and food security is implicit or indirect, as existing literature tends to focus on the impacts of urbanisation on agriculture/farming and food production from the perspective of demand and supply. On the supply side, as mentioned earlier, most of the

research has been done to examine the ecological and environmental consequences of urbanisation. On the demand side, there is considerable descriptive literature which associates urbanisation with changing food consumption patterns in developing countries, which is reflected in the shift to more diversified and affluent diets and multiple eating patterns (Asian Development Bank 2011; Ericksen 2008; Guo et al. 2000; Moomaw et al. 2012:17; Popkin 1999; Satterthwaite et al. 2010).

A cross-country regression model analysis of urbanisation and diet structure by Popkin (1999) indicates that rapid urbanisation in developing countries has independent effects on diet structure, and this effect is much more significant at lower income levels. This model also confirms that there is an urban-rural difference in the composition of food consumption, in which urban residency is highly linked with a superior diet structure: more refined grains, higher-fat food and more animal products. Kearney (2010:2803) argued that the major effects of urbanisation on food consumption are a deep shift to higher energy food, more fats and oils, more animal-based foods (meat and dairy products) and more processed foods.

Such a structural shift in diets is called the "nutrition transition" (Drewnowski and Popkin 1997). Mendez and Popkin (2004) provided a comprehensive understanding of the transition, which is characterised by the increased consumption of edible oil, animal sourced foods (ASF)[2], added caloric sweeteners, fruits and vegetables, as well as energy sufficiency. The pace of transition varies by regions of the world. The consumption of animal sourced foods as well as fruits and vegetables, have all experienced a marked increase in China during the last decade of the 20th century, while the rate of change in other regions of the globe was relatively mild. Kearney (2010) pointed out that developing countries have experienced the biggest increase in meat consumption, with a threefold increase since 1963. A considerable amount of this growth is contributed by Asia, particularly China, which has seen a dramatic ninefold increase in total meat consumption. He further reveals that the increase in animal product consumption was higher for urban dwellers in comparison to rural residents (Kearney 2010:2796).

There is evidence that links nutrition transition with changes in a variety of factors relating to the urban residence effect: socio-economic status (SES) and physical activity patterns, enhanced food access throughout the year and better facilities including transportation and refrigeration systems (Mendez and Popkin 2004; Popkin 1999). Popkin (1999) found that urbanisation is accompanied by a shift in physical activity to a more sedentary pattern among

[2] Foods including eggs, meats, poultry dairy and fish

the urbanised population, as the economy becomes more dominated by the processing and services industries that are characterised by capital-intensive production. This is also applicable to the case of urban residents in China.

Concomitant with globalisation, the process of urbanisation in developing countries brings about changes in the socio-cultural environment such as mass media marketing and ubiquitous less traditional foods, particularly fast food and soft drinks, which play important roles in shaping people's tastes and preferences (Chopra et al. 2002; Evans et al. 2001). Although income is considered to be an important explanatory variable for changing consumption patterns (Guo et al. 2000:737-738; Nguyen and Winters 2011:71; Popkin 1999:1908; 2003:592), data from a wide range of countries at different income and consumption levels reveal that the correlation between them is not very strong (Reusswig et al. 2003:6).

Research into the linkage between migration and food security is quite limited, with a major focus on the effect of migration on rural food security (Crush 2013; Lacroix 2011). On the one hand, the losses to the rural labour force caused by migration may undermine agricultural production, whereas on the other hand, migration provides remittance in-flows to rural households, which can help improve rural household food security as well as agricultural inputs (Crush 2013; Lacroix 2011:2,7). Case studies on the impacts of migration on food consumption patterns are also starting to emerge. Studies of international migration demonstrate post-migration dietary changes among migrants (Himmelgreen et al. 2007; Kruseman et al. 2005; Renzaho and Burns 2006). For instance, the study of food habits among sub-Saharan African migrants in Victoria, Australia by Renzaho and Burns (2006), reveals post-migration dietary acculturation. Specifically, this acculturation involved three processes: substitution, supplementation and modification of the regular use of certain recipes. Literature about internal migration mainly focuses on changes in expenditure and structure of food consumption. A study in Vietnam by Nguyen and Winters (2011) indicated that short-term migration increases food expenditure, calorie intake and food diversity of the sending households, and that long-term migration can also have positive effects on consumption, but not as significantly as short-term migration. Whereas the case study in Ghana by Karamba et al. (2011), suggests that influences of migration on per capita food expenditure and food expenditure patterns are limited, and that only in high migration regions migration did increase overall food expenditure, resulting in the consumption of less nutritious food such as sugar and beverages. The study also revealed that in addition to increasing income flow, there are other mechanisms like human capital accumulation from migration that can influence food consumption. These

studies tend to focus on migrant sending households rather than the migrants themselves, which motivates this study to concentrate on the food consumption of individual migrants.

2.5 Conclusion

Clay et al. (1981) claimed that food security is actually an issue of "welfare vulnerability of distinct categories of people within the population", and that case studies are important in pinpointing the sources of vulnerability of these groups. Given the rapid urbanisation occurring in developing countries like China, the issue of food security must be discussed in the context of urbanisation. Moreover, as migrants are an important proportion of the urban population, particularly in China, their food security needs to be examined for the sake of their well-being as well as promoting the food security of the whole population. However, little attention has been paid to this area in the literature within the nexus of food security, urbanisation and migration linkages, with a major focus on the rural population. This, therefore, provides the opportunity for the study to cover such a gap.

Chapter 3 Methodology

3.1 Introduction

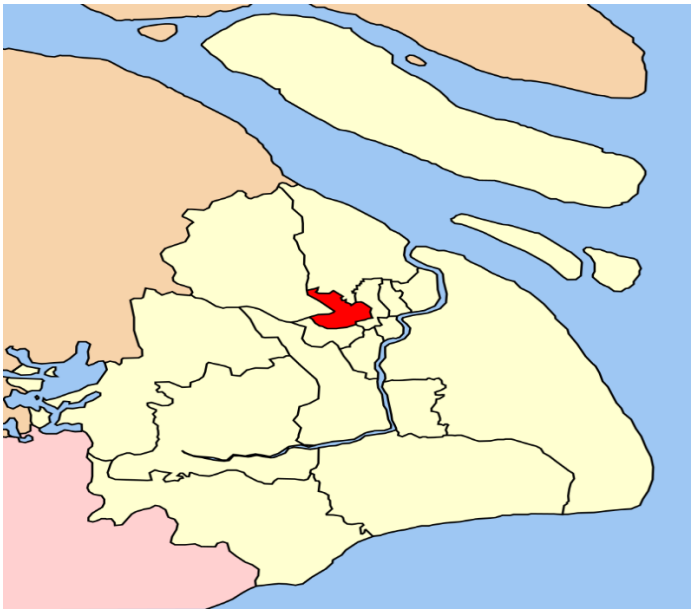
This chapter discusses the theoretical basis of the methodology applied in this research and the detailed processes involved in the survey. It starts with the description of each sampled district and sampled town. A total number of 400 migrants from Putuo, Pudong New Area and Songjiang respectively were sampled based on statistical principles. Following a review of current methods for collecting data on food consumption, it also indicates a detailed outline of the survey, sampling design and the steps involved in the conduct of the survey. A brief explanation of the data collection tool, the food consumption questionnaire, and data analysis are presented. The last section identifies the challenges and limitations related to the methods of the research.

3.2 A brief introduction of sampling locations

The survey was conducted in construction sites, factories and shops/restaurants in three sampled towns in the three sampling districts of Shanghai (Putuo, Pudong New Area and Songjiang). The justification for the selection of these sampled towns and districts is detailed later in the survey design section of this Chapter.

Sampling location I– Taopu in Putuo District. Figure 3.1 shows the location of Putuo in Shanghai, which is highlighted in red. Putuo is a north-western district which is located in the inner city of Shanghai. It boarders Jing'an, Changning, Jiading and Baoshan, with a total area of 55.53 km^2, it administers 6 streets and 3 towns namely Zhenru, Changzheng and Taopu. By the end of 2014, the total population in the Putuo district was 1.296 million, including 27 percent (347,500) migrants (Bureau of Statistics of Shanghai 2015). The gross domestic product of Putuo in 2014 was 72.192 billion Chinese Yuan, accounting for only 3 percent of Shanghai's total GDP in that year. As a town located in the northwest of Putuo district, Taopu has the highest percentage of rural migrants. About (77,200) 45.5 percent of the total population (169,800) were rural migrants without household registration (District Government of Putuo 2014), which is why it was chosen as a Sampling site in the Putuo district.

Figure 3. 1 Location of Putuo District within Shanghai



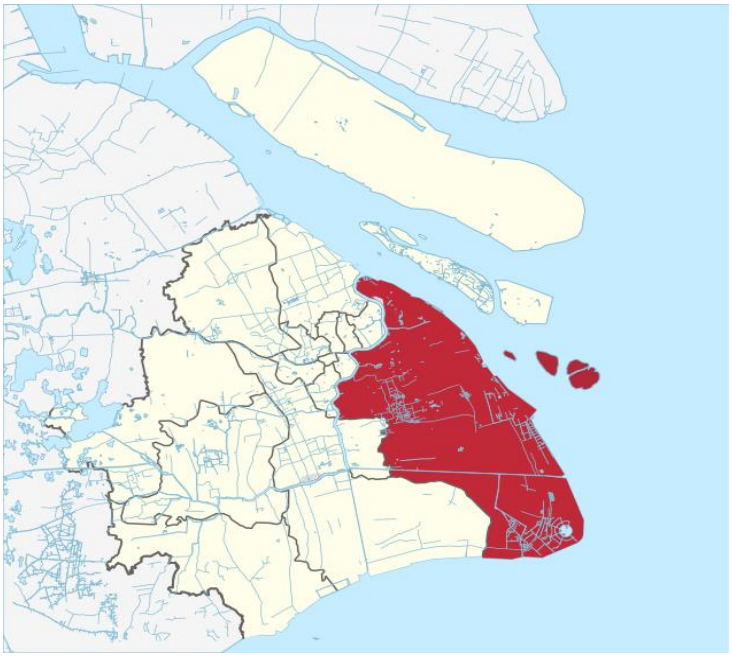
Source : https://en.wikipedia.org/wiki/Putuo_District,_Shanghai

Sampling site II – Sanlin in Pudong District. Figure 3.2 shows the location of Pudong New Area, as highlighted. Pudong is a new district in Shanghai, which was established in 1993 in response to the decision of the State Council. It is honoured as the symbol of China's "reform and opening up", and also recognised as the miniature of Shanghai. The name of Pudong New Area refers to its geographical position, as it is located at the east side of the Huangpu River, which flows through central Shanghai. Pudong is a state-level new area which is home to various globally well-known financial buildings such as the Shanghai World Financial Centre, Lujiazui Finance and Trade Zone and the Shanghai Stock Exchange. The landmark of Shanghai – the Oriental Pearl Tower – is also located in Pudong.

Pudong has the largest population among the districts in Shanghai, it accommodates 5,474,900 residents with a total area of 1,210 Km^2, it administrates 12 streets and 24 towns. Migrants in Pudong has increased from 1,287,900 in 2009 to 2,356,500 in 2014, an increase of 83 percent within those five years. The share of migrants in Pudong's total population also increased from 31 percent in 2009 to 43 percent in 2014 (Bureau of Statistics of Shanghai 2015). It was found that 80 percent of the migrants move to Pudong to work or to open businesses. The top three industries of migrants' employment in Pudong are processing and manufacturing, wholesale and retail, and construction. Processing and manufacturing industries absorb the highest percentage (47.6 percent) of migrants in Pudong, and they mainly work and live in industrial areas. Generally, the northern part of Pudong has a higher share of migrants than the southern

part. The three development zones – Waigaoqiao Free Trade Zone, Jinqiao export processing zone and Zhangjiang Hi-tech Park – have the highest share of migrants (96.3 percent, 95.5 percent and 74.6 percent respectively). But in terms of the absolute number of migrants, Sanlin town accommodates the largest number of migrants, with a total population of 187,288 (District Government of Pudong 2011). Therefore, it was chosen as the sampling site in Pudong.

Figure 3. 2 Location of Pudong District within Shanghai

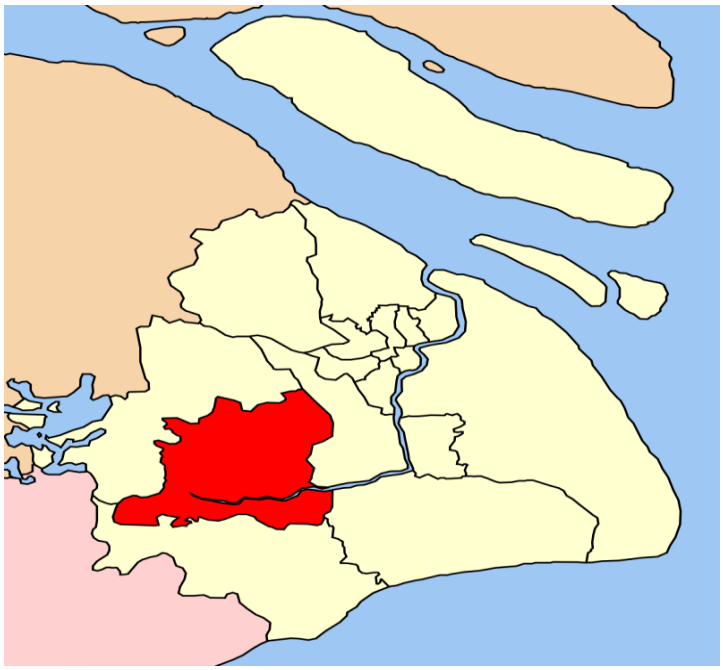


Source: https://en.wikipedia.org/wiki/Pudong

Sampling site III – Jiuting in Songjiang district. Songjiang is a south-western district (see Figure 3.3) of Shanghai with a total area of 604.64km^2. It administers 11 towns and 6 streets. By the end of 2014, there were 1.76 million permanent residents in Songjiang district (Bureau of Statistics of Shanghai 2015). The economy in Songjiang district relies predominantly on the secondary and tertiary industries, with secondary industry contributing the largest share to the district's economy (District Government of Songjiang 2017). Among the districts in the far suburban area of Shanghai, Songjiang accommodates far more migrants than other districts, with 1.0858 million of them migrants, accounting for nearly 61.7 percent of the total population in Songjiang (District Government of Songjiang 2015). Located in the northeast of the Songjiang District, Jiuting Town contributes to the highest share of the total industrial output value in Songjiang District. Among all the towns and streets in the Songjiang District, Jiuting accommodates the largest rural-urban migrant population, as they tend to concentrate in

industrial zones (Xue 2013:117). Therefore, Jiuting Town was chosen as a suitable sampling site in Songjiang District.

Figure 3. 3 location of Song'jiang District within Shanghai



Source: https://en.wikipedia.org/wiki/Songjiang_District

3.3 Methodological basis for research design

3.3.1 Mixed methods approach

Mixed methods research started with the practice of researchers in the social sciences in the early 20th century, when they applied both quantitative and qualitative methods to conduct their research (Johnson et al. 2007:113). The term "mixed methods research" came into being many years later in the methodological movement in response to the polarisation or the paradigm wars between quantitative research and qualitative research (Johnson et al. 2007:117). Through analysing 19 detailed and in-depth definitions provided by leading mixed methods research methodologists, Johnson et al. (2007) refined a brief definition of the concept of mixed methods research:

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration. (Johnson et al. 2007:123)

Dzurec and Abraham (1993:73, 76-78) contended that the use of mixed methods research can be justified by the synthetic nature of research which consists of six pursuits: 1) the pursuit of mastery over self and the world; 2) the pursuit of understanding through recomposition; 3) the pursuit of complexity reduction to enhance understanding; 4) the pursuit of innovation; 5) the pursuit of meaningfulness and 6) the pursuit of truthfulness. The philosophical rationale of mixed methods research is pragmatism, which enables research to produce a more complete, reliable and unbiased outcome by synthesising quantitative and qualitative approaches (Denscombe 2008:272-273). Therefore, Johnson et al. (2007) argued that mixed methods research is positioned as a bridge and later on a middle solution between quantitative research and qualitative research (Johnson et al. 2007:113).

3.3.2 Research design: a concurrent approach

The choice of research design of mixed methods researchers are various, and different typologies are developed from them. However, it is summarised (Onwuegbuzie and Collins 2007:290) that most mixed methods research designs are based on the "time orientation dimension", which refers to the occurrence order of quantitative phase and qualitative phase (either concurrent or sequential).

In this research study, primary data were collected through a questionnaire survey, and both open-ended and close-ended questions were included in the questionnaire. During the undertaking of the questionnaire survey, considerable amounts of qualitative data related to migrants' food consumption were also obtained through talking with the participants. Many of the surveyed migrants were willing to explain why they adopted current food consumption patterns, such as the different life and work styles before and after migration. Moreover, the researcher also did participant observation, by examining their living and working environments, as well as their diets. These data were applied in the following result chapters to offer a better understanding of migrants' food consumption patterns.

3.3.3 Current methods to collect data on food consumption

The quantitative calculation of human food intake is as old as we can imagine, as such data reflects human requirements for food to maintain health, thus offering important information for many other assessments such as the health condition of an individual. Earlier calculations of diet intake mainly relied on recording methods. Widdowson (1936:269,271) teased out three major methods used by then in diet assessments from early studies:

1) Account-book method. This method relies on the documentation of the housewife on all the foods purchased over a certain period of time, usually one year. It generates very rough data as food waste was not checked.
2) Family method. This method shortened the recording period from one year to one week. Food intakes were calculated by weighing foods entering the household during one week and the unconsumed foods at the end of the week. Food waste was also calculated.
3) Individual method. This method directly calculated the quantities of foods consumed by an individual rather than the household during a period of 7 to 10 days. Widdowson (1936) himself adopt this approach in his studies. Average weight loss of foods during the process of cooking was calculated.

Recalling methods started to be used by follow-up studies. For instance, Wiehl (1942) used both quantitative and qualitative methods of recall to ask industrial workers that were surveyed to report their diet histories over the past 7 days. An estimated 2-day recall of the quantities of all foods consumed was used to calculate nutrition intake, and food models were used to help the respondents with the estimation. This two-day recall and a rough recall of the food types chosen in the remaining five days of the week was used to analyse workers' diet patterns. In his later study with Reed, the frequency in which the foods were eaten was suggested as a reliable method to indicate food preferences and dietary patterns (Wiehl and Reed 1960:827).

Nutritional status is widely accepted as an applicable indicator of food security (Maxwell et al. 2008:534), and surveys of food consumption are a common way to generate the nutritional data of participants. No matter what specific methods are used to collect food consumption data, either by recall or recording methods, food consumption surveys have become commonly used. A food frequency questionnaire and the 24-hour recall are the two most commonly used methods to obtain subjects' food consumption patterns. Specifically, researchers usually use the 24-hour dietary recall on consecutive days (eg.Qin et al. 2014), or non-consecutive days (eg.Van Rossum et al. 2011), to collect dietary intake information. Food consumption patterns can also be drawn from subjects' dietary data collected over the past year by using a food frequency questionnaire if time permits (eg.A Karim et al. 2008; Qin et al. 2014). This research applied a 7-day recall method to ask respondents to report their dietary histories over the previous 7 days. The logic to determine 7 days as the recall period was to cover short-term dieting variations as well as to ensure the reliability of a respondents' memory.

3.4 Survey design

The survey was finished in three major steps: preparation and design of the survey, sampling and then questionnaire survey. Each step consists of several sub steps described as follow:

Design and draft of questionnaire: design and frame the questionnaire with meaningful survey questions using plain language based on research objectives and the specific research questions.

Pre-survey preparation: translate the language of the questionnaire from English to mandarin; preparing ethical documents; pilot survey – questionnaire development and revision; collect information of the metric weights of foods in unit of measurement.

Sampling steps: select sampling districts; select sampling towns; select migrant respondents

Survey: collect information of current factories and construction sites in each sampling town; distribute questionnaire to each respondent and finish the survey

3.4.1 Ethical considerations

This research has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number H-2015-180). A participant information sheet and consent form were provided to the respondents. The participant information sheet informs the potential respondents of the following information: a brief introduction of the researcher and this research study and the objective of the survey; what questions they would be asked if they participated in the survey; that they are free to pull out from the survey at any time; and the usage and storage of data collected in the survey; how to complain about the survey if they feel uncomfortable or unhappy with the survey; and contact details of the researcher and supervisor. The consent form was originally designed to seek for the agreement of the respondent to participate in the survey, but as people in China are usually sensitive to offering their signatures to strangers, the researcher adopted an alternative method to obtain the consent of respondents, and ask them to tick on the first page of the questionnaire if they were willing to participate in the survey.

3.4.2 Pilot survey

Prior to the initiation of the survey in Shanghai, the language of the questionnaire was translated into mandarin and a pilot questionnaire survey was conducted. The pilot survey served two major purposes. The first one was to test the questionnaire in terms of the expression and wording of questions to uncover possible flaws that can lead to any misunderstandings by respondents and thus resulting in invalid responses. Another purpose was to identify the most commonly consumed foods by rural migrants, thus helping to decide which foods need to be

collected in local markets for calculating metric weights on food intake. Fifteen questionnaires in total were tested by friends as well as migrants who were selected randomly in the pilot survey. Specifically, the pilot survey was conducted in three sequential stages:

Step one: revise and develop questions

Questionnaires were distributed to five friends and colleagues in Adelaide before the researcher went to Shanghai. The researcher introduced the objective of this research and what data were expected from the survey in Shanghai. They offered useful comments and feedback on the questions and their expression, helping revise the questionnaire.

Step two: questionnaire testing

This step was undertaken in Shanghai. Ten questionnaires in total were distributed to rural migrants in Shanghai. The selection of those migrants was based on the principle of convenience. Some of them were those who worked in the hotel in which the researcher stayed in Shanghai, and some of them were those who had a restaurant near the hotel or people who were hired by them, and some were the vendors in the nearest farmer's market. During this stage, the researcher found that respondents in pilot survey felt unsecure and would not sign the consent form, which made the researcher consider alternative ways to acquire their consent to participate. This step helped form the final version of the questionnaire (see Appendix 1).

Step three: analysis of the pilot survey

A general frequency analysis of the pilot survey was conducted, the researcher thus obtained an initial impression of the possible results of the questionnaire survey. This trial analysis ensured that valid and reliable data could be obtained from the survey, and thus the objective of this survey would be fulfilled.

After the pilot survey, several changes were made to the original questionnaire. Five questions were deleted from the questionnaire, expression of most questions were refined and the whole layout of the questionnaire was also adjusted. Finally, the number of pages in the questionnaire were reduced from 25 to 19. Specifically, the questionnaire originally included questions asking respondents about the quantities of their intake of snacks, drinks (including both alcoholic and sugared drinks), oil and other sources used in their foods. Respondents in the pilot survey, however, pointed out that they seldom eat snacks outside of the three daily meals except fruits. This turned out to be the case in the formal survey that followed, with the majority

of respondents (276 of the respondents) had fruits as snacks, and other snacks were seldom mentioned, with the exception of nuts, puffed food and sweets, with 72 of the participants having nuts at night, 30 of them had puffed food and 13 of them had sweets.

In addition, even female respondents who prepared the daily meals in the household could hardly report the amount of oil, salt and other sources they used in preparation of the meal, let alone male respondents who usually do not cook meals in the household. Therefore, after the pilot survey, fruit was added as a food group and quantities of consumption were collected through the 7-day food consumption recall. Data collection of the weight of drinks, oil, salt and sources was excluded in the formal questionnaire survey.

3.4.3 Market data collection for calculating metric food quantities

Prior to starting data collection, practical and reliable methods, particularly relating to gathering data on food quantities consumed by respondents had to be decided. Smith and Subandoro (2007) offered an in-depth and detailed guidance for collecting food data and converting raw data collected from households into metric food quantities.

As this research needs to examine the structure and quality of food consumption by respondents, an accurate amount of each food item consumed over the reference period of the survey was a prerequisite for any further calculation and analysis of food security indicators. Kitchen scales are quite uncommon among households in China. People seldom weigh their food items that they eat every day, let alone rural migrants who are too busy with their careers in a new environment to care about the details of their food consumption. In addition, this research collected food data through recall rather than the recording of the respondents' food consumption; it was not possible to get an accurate weight of each food item the respondents consumed in the reference period of the survey. Therefore, alternative methods were used to convert the very primary food intake data collected from respondents from raw forms (e.g. servings) into standard metric weights. The researcher visited local markets to collect the unit weights of different food items.

As the food items consumed by respondents varied in size, it is easy to get accurate or reasonably estimated weights of some food items which have standard serving sizes (for example, food sold in cans or other containers that label the specific metric weight of them). Even though the food may be only partly consumed, the weight of the consumed part can still be obtained by only knowing how much share of the food is consumed and the metric weight demarcated on the container. For instance, when a respondent reported that he/she only

consumed about one third of a bottle of milk, then the metric weight of the consumed milk can be obtained by dividing the total weight by 3. It is even more consumer-friendly for some food items in which the label showed the weight per serving size.

Most food items in daily consumption such as fresh vegetables and fruits, however, are sold in non-standard sizes (for example, bunches, unities and bowls). Specifically, some green-leaf vegetables are normally sold in the form of bunches, and the price is charged according to how many bunches a customer buys rather than by the weight of the vegetable. In addition, it is particularly difficult to estimate the share of the prepared food consumed by an individual member of a household. As for fruits, although the price of fruit is normally charged according to their weight, people more often than not buy fruit in units which include more than one piece or single item, and they usually just consume one or several pieces or items of the food, rather than all the items at one time. In this situation, a method of counting the number of pieces or items of fruits consumed is preferable to obtain a reliable estimation of the weights of fruit consumed by a respondent (Smith and Subandoro 2007). Therefore, the metric weights of a sample of those foods in the units of measure need to be obtained in order to reduce the inaccuracy in estimating the total possible weight of foods consumed. Although the variation in the size of each fruit item is normally only small, it was necessary to acquire the specific weight of a fruit item in “small”, “medium” and “large” sizes. Therefore, higher accuracy can be achieved when the respondent was asked to specify the size of the fruit item he/she consumed in the reference period.

Another tricky part of collecting food quantities related to dishes consumed outside the home, for instance, meals eaten in restaurants. A meal prepared in a restaurant normally contains more than one food, therefore the quantity of each ingredient needs to be estimated in order to reduce the inaccuracy of food intake data. Smith and Subandoro (2007) suggest that the researcher should obtain the total expenditure of meals consumed in the restaurant from respondents rather than estimating quantities of each food item, and the energy content in those meals can then be calculated by dividing the expenditure by the price per calorie of food consumed at home. However, in this way, there would be a high level of inaccuracy. The information on diet diversity, which is an important indicator of food security, would be lost. In this research, therefore, the researcher asked the respondents to recall and estimate the quantities of all the food ingredients in their three daily meals in the reference period. What needs to be declared here is that data on snack intake was not included in the data collection. That is because, for one thing, snack consumption is quite rare among rural migrants and the amount consumed is

usually negligible; for another, specifying the quantities of snacks consumed is a rather complex task for respondents who usually do not remember the amount of pieces they consumed. In addition, as the consumption of drinks are changeable from time to time, the survey also excluded the data collection of the metric weights of each sample of sugared beverages and alcoholic drinks.

Therefore, the calculation of metric weights of foods consumed by respondents in this research is based on a combination of market data collection and the rough estimation of respondents. To calculate the metric weights of food for home consumption, the researcher visited both a local supermarket and a local farmers' market. Above all, information of commonly consumed foods among rural migrants was collected during the pilot survey. It turned out that they normally consumed fresh foods and foods in their original condition. Foods in containers such as canned meat, which are almost processed foods, were not popular among rural migrants. Milk and yoghurt were the only exceptions. This helps rule out foods that were not commonly consumed by rural migrants, thus saving work for the researcher. Therefore, the researcher first visited a local supermarket to record the metric weights of milk and yoghurt in different sizes of container that are of known weight. Some milk containers usually only label the volume rather than the metric weight, to make it simple to calculate, this research makes one millilitre of milk equal to one gram.

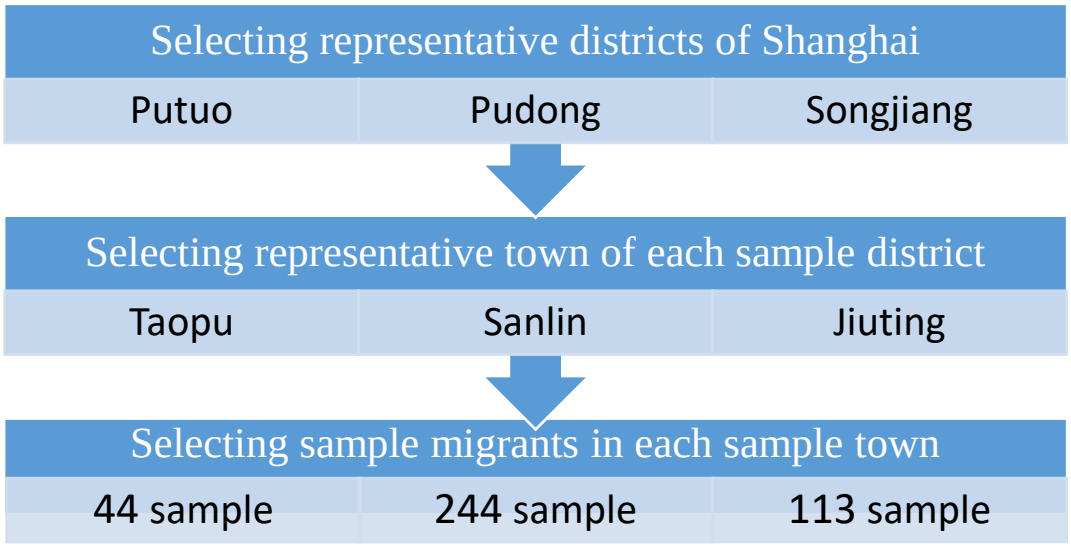
For solid foods, the researcher visited a local farmers' market which offered a wide range of fresh products. Due to cheaper prices and the fact that they can be reached within walking distance, the farmers' market is usually the first choice for most people to buy fresh food ingredients to prepare their daily meals. Given the great variety of food types in the markets, it would be highly time-consuming for the researcher to conduct a thorough data collection for every food sold in the market. Thus, reference-food method (Smith and Subandoro 2007) was applied given limited time and resources for the project. The researcher visited three vendors in the market who sold vegetables, fruits and eggs respectively. They were given a brief introduction to the research and then asked for their help to weigh a sample of each food item they sold and then the weights were recorded. To collect data on fruits, the weight of each single piece was recorded by the researcher. For fruits with little variation in their sizes, the unit weight of a normal-sized sample was recorded. Weights of samples for different sizes of various-sized fruits were taken down. For instance, the unit weight of a single grape, and an apple in small, medium and large sizes respectively. Data for eggs were collected in the similar way as that of fruit, and metric weights of standard-sized eggs were noted. There are too many

types of vegetables in the market, and the unit weight of some vegetable samples (for instance, vegetables sold in the form of separate leaves) was two light to weigh. More importantly, people can seldom remember how many leaves they consumed. As a result, bok choy was chosen as a reference food as it is easy to measure the sample weight. The researcher noted the weight of a sample of bok choy in both normal and small sizes, and this information was applied to help the respondents to estimate the intake of other types of leaf vegetable weighed based on the size and the corresponding weight. Similarly, as a normal size chicken egg weighs 50 grams, the researcher used the sample weight of an egg to remind the respondents and to help them reason about the quantities of other solid foods they had consumed in the past 7 days from when surveyed.

3.5 Sampling

Given that all the resources available for this PhD research are limited and given the large number of rural migrants in Shanghai (8,977,000 by 2010), it was impractical for the research to cover the entire population. Therefore, a three-stage sampling procedure was applied to select a sample of migrants as Shown in Figure 3.4.

Figure 3. 4 Procedures to obtain rural migrants for survey



According to the statistics sample size calculator tool, 384 sample units provided a valid result accepting the 5 percent of confidence interval, given the migrant population of 8,977,000 in Shanghai. In using traditional measurements of urbanisation to distinguish urban areas from rural areas, the inner heterogeneity of urbanisation within a city has to be considered, as infrastructure and resources may vary across a city (Mendez et al. 2004). To ensure the representativeness of the sample, a total number of 400 rural migrants were finally selected

from the inner city, suburban area and far suburban area. The selection procedure was a multi-stage sampling process where the final sample was selected through three stages. A representative sample was selected using the probability proportional to size sampling (PPS) method which was applied in stages one and two, then a systematic sampling method was adopted in the third stage to select the final sample unit of migrant respondents.

Selection of sampling districts. In the first stage, the purpose of sampling was to narrow down the geographic focus to specific districts which are respectively from the inner city, suburban area and far suburban area rather than the whole city of Shanghai. The logic of selection was that these districts had the highest density of rural migrants in shanghai. Therefore, sample units are the representative administrative districts of Shanghai. In this stage, 3 districts were selected, Putuo from the inner city, Pudong New Area from the suburban area and far suburban area represented by Songjiang. According to the Sixth National Census of Shanghai, those districts absorbed more than one third of Shanghai's migrants from other provinces (0.363 million in Putuo, 2.0243 million in Pudong New Area and 0.937 million in Songjiang) (Shanghai 2011). They are respectively the largest migrant residence districts of the inner city, near suburbs and far suburbs of Shanghai (Shanghai 2011).

Selection of sampling towns. Given the large number of rural migrants in these three districts and the complicated transportation system, surveying a specific number of migrant respondents from each town in these districts was too much for the researcher. The purpose of the second stage was thus to narrow down the survey area to a representative town within the district. In this stage, therefore, sample units are the representative town in each sample district. Towns that have the largest migrant population were selected as the sample town. As the report of the Sixth National Census of Shanghai only offers district level population data, the literature review and interviews with local officials were applied to find the largest migrants receiving towns in the three sample districts.

Selection of sample migrants. In the third stage, sample units were selected to form the final sample of individual migrant respondents. The number of sample units in each sample district (SD) was decided before selecting sample migrants, and 400 sample units were allocated proportionally to each representative town in the sample district. The number in each sample town (Qf) is defined according to the proportion of each sample district's migrant population (Md) to the total migrant population (Mt) of the 3 sample districts. That is to say, the amount of sample migrants in each sample district was calculated by using the equation: Qf=sample

size*$\frac{Md}{Mt}$. Accordingly, final sample to be defined in the 3 sample districts are respectively: Qf Putuo= 400* $\frac{0.363}{0.363+2.0243+0.937}$; Qf Pudong=400* $\frac{2.0243}{0.363+2.0243+0.937}$; Qf Songjiang= 400*$\frac{0.937}{0.363+2.0243+0.937}$. Therefore, as shown in Figure 3.4, some 44, 244 and 113 sample units were selected from Putuo, Pudong and Songjiang respectively.

According to the literature review of the industrial distribution of rural migrants in Shanhai, the top 3 industries in Shanghai receiving rural migrants were manufacturing and processing, business and services and the construction industry (Kang-qiang 2010:67). According to Kang-qiang (2010), the first major industry attracting the largest share of rural migrants (43.4 percent) in Shanghai was the processing and manufacturing industries, the second major one was the construction industry, absorbing 18.5 percent of rural migrants in Shanghai. The remainder of rural migrants work in business and services industries, with wholesaling and retailing accounting for the largest proportion (13.8 percent). Hence, the number of sample migrants were allocated into different industries in each sampling district using the following calculations: $Q_{m\&p}$ = Qf* 43.4%; Q_c= Qf* 18.5%; $Q_{b\&s}$ = Qf* (100% -43.4%-18.5%) = Qf* 38.1%. The number of sampled migrants from different industries within each sampling district is presented in Table 3.1:

Table 3. 1 Sample allocation by districts and industries

	Number of sample from factories	**Number of sample from Construction sites**	**Number of sample from shops/restaurants**
Putuo	43.4%*44=19.096≈19	18.5%*44=8.14≈8	38.1%*44=16.764≈17
Pudong	43.4%*243.55=105.699≈106	18.5%*243.55=45	38.1%*243.55=92.79≈93
Songjiang	43.4%*113=49.042≈49	18.5%*113=20.905≈21	38.1%*113=43.053≈43

Based on this background, the sample in each sampling site were grouped and selected by industry (manufacturing and processing, construction, business and services) according to the proportion of migrant population in those three industries. Sample migrants were finally identified in their workplace by using systematic random sampling. Workplace here refers specifically to factories, construction sites and shops/stores or restaurants run by migrants, they were identified by an online map and then selected through equal interval sampling. As large factories normally run a canteen to offer food for their workers, diets among workers in those factories often had little diversity. More importantly, it is usually difficult to get permission to interview persons in large-size factories for security reasons. Therefore, this research chose

small and medium-sized factories which have open access to the public as sampling and survey sites.

Selection of survey sites and the conduct of survey. All of the survey sites (construction sites, factories and stores/restaurants) were selected based on the principle of convenience. They were selected along the main roads of transportation which have a relatively dense distribution of bus stops so that they could be easily reached by the researcher. The first sampling site was usually the construction site/factory/store that was nearest to the bus stop where the researcher got off. Given the fact of the dispersed distribution of sampling sites (many small- and medium-sized factories are usually mixed with shops and restaurants), the researcher selected every third factory and shops/restaurants as the sampling site. Therefore, after the first site was identified, the second sampling site would be (1+3)th factory along the street, the third sampling site would be the (1+3+3)th factory on the same street, the fourth sampling site would be the (1+3+3+3)th factory... The selection of sampling stores/restaurants applied the same procedure.

The selection of construction sites within a sampling town was determined according to the sample size allocated to the construction industry within each sampling district. First of all, the number of sampling construction sites was generated by dividing the total number of sample units from the construction industry in each district by ten. Take Pudong district for example, the sample allocated to the construction industry were 45 migrant workers. Therefore, five construction sites were needed to conduct surveys for the construction industry. After the calculation of the number of sampling construction sites, the physical location of them was then defined. This was done by online research and site visits as the information online was not always up-to-date. The construction sites were then selected randomly after the site visit. Upon arrival at each construction site, the researcher talked to the project manager at first to seek their permission to conduct the survey, once they were in agreement, the construction site was chosen as a sample survey site.

The survey was conducted by visiting the participants in person in their workplaces. When visiting factories, the researcher first introduced the research project to the principals at the site by providing the information sheet and asked for their permission to conduct the survey. Once permitted, the researcher asked for an on-duty staff list (only contains staff ID and date), then the researcher selected the participants randomly from the list with specified intervals (the interval varied by the number of on-duty staff which were different from factory to factory).

They were also provided with information about the research and asked their willingness to participate, once they agreed to start the survey they were asked to tick on the first page of the questionnaire. When visiting shops or stores, the researcher provided the information sheet to the storekeeper/business owner and asked if they were willing to participate in the survey. Construction workers told the researcher that they usually do not work on Sundays or bad-weather days and they were happy to participate in the survey when they were free. Survey at construction sites therefore, was concentrated on weekends and rainy days. It is lucky for the researcher that a few workers at several construction sites promised they would contact the researcher by mobile phone when they and their colleagues took a day-off, which helped save a lot of time.

3.6 Data collection and analysis. Tools and instruments applied in the research

This section illustrates data sources and tools applied to collect the primary data and the indicators used in data analysis.

3.6.1 Data sources

The research uses both primary and secondary data. Primary data was collected through the questionnaire survey conducted in Shanghai from October 2015 to March 2016. Secondary data from multiple sources were collected before and after the survey. Before the survey, contextual information about China and Shanghai, such as data about urbanisation and migration were collected from the 2010 population census report, and demographic data about Shanghai were collected from the local government website or the official website of the statistical bureau of the sample district to help define the sample frame. After the survey, the official food nutrition database on the website of China's Institute of Nutrition and Food Safety was applied to calculate the basic nutritional outcome (dietary intake) of respondents' food consumption. Furthermore, official nutrition requirements by the Food and Agriculture Organisation of the United Nations were collected to determine the outcome of respondents' food consumption and dietary energy adequacy. At the same time, secondary data about yearly oil consumption of the national population was applied from the official website of the National Bureau of Statistics of China to calculate respondents' daily oil intake, which contributed to part of their daily energy intake presented in Chapter 5.

3.6.2 Primary data collection: a face to face questionnaire survey

Due to the limitation of time and manpower, this research applied recall rather than the recording method to collect food consumption data. The food consumption questionnaire

survey was adopted to collect the primary data of migrants' food consumption in Shanghai. The respondents were asked to recall their three daily meals and fruit intake information in the past 7 consecutive days. The questionnaire (Appendix 1) consists of two sections, the first section – part I in the questionnaire – was designed to collect information on demographic, economic, employment and living conditions of the migrants, and their dietary habits including the preference and frequency of consumption of each food group. Respondents' awareness of healthy diets including their perceptions on what constitutes a healthy diet, and the importance to have healthy diets and how much attention they paid to information about them were also collected to establish any impact on the respondents' food consumption patterns. In addition, participants were asked to provide their weight and height to calculate their Body Mass Index (BMI), which can indicate whether their food consumption patterns were healthy or not. The second section – part II in the questionnaire – is actually made up of a series of forms that ask the respondents to recall their food consumption (including eating frequency and quantity) of several major food groups during the previous 7 days. Data from this section is used to calculate the respondents' nutrition intake and diet quality.

3.6.3 Data processing and analysis

Each question in the first part of the questionnaire was coded as a variable and the answers were entered directly into the statistical analysis program SPSS. Data collected from the second part of the questionnaire were entered into an Excel spreadsheet, as the primary data were not ready for analysis until necessary calculations had been done to generate key variables representing indicators needed for the analysis. After that, data for those composite variables were imported into SPSS for advanced analysis. Frequency and cross tabulation analysis were conducted to obtain information about the characteristics and structure of migrants' diets. Information about diet quality such as nutrition intake was generated from descriptive analysis.

3.6.4 Major indicators applied to analyse food consumption data

Wiesmann et al. (2009) argued that there are four dimensions of food security in practice: diet quantity; diet quality; psychological dimensions and social and cultural dimensions. These four dimensions are used to measure food security at the household or individual level. Food consumption frequency and dietary diversity are the two commonly used proxy indicators for dietary energy intake and calorie availability in measuring dietary quantity and quality (Wiesmann et al. 2009:2). Based on food consumption frequency and dietary diversity, the

World Food Program (WFP) established another indicator – food consumption score to classify status of food security based on this score.

The food consumption score is a composite score calculated on the basis of dietary diversity, food consumption frequency (days of consumption of corresponding food group) and nutritional weights of each food group (WFP 2008). The equation of the calculation of food consumption score is dietary diversity by consumption frequency by nutritional weights. Specific nutritional weights of different food groups and principles for the weighting are listed in Table 3.2.

Table 3. 2 Weights of different food groups and justification of the weight allocation

Food groups	Weight	Justification
Main staples	2	Energy dense/usually eaten in larger quantities, protein content lower and poorer quality (PER17 less) than legumes, micro-nutrients (bound by phytates).
Pulses	3	Energy dense, high amounts of protein but of lower quality (PER less) than meats, micro-nutrients (inhibited by phytates), low fat.
Vegetables	1	Low energy, low protein, no fat, micro-nutrients
Fruit	1	Low energy, low protein, no fat, micro-nutrients
Meat and fish	4	Highest quality protein, easily absorbable micronutrients (no phytates), energy dense, fat. Even when consumed in small quantities, improvements to the quality of diet are large.
Milk	4	Highest quality protein, micro-nutrients, vitamin A, energy. However, milk could be consumed only in very small amounts and should then be treated as condiment and therefore re-classification in such cases is needed.
Sugar	0.5	Empty calories. Usually consumed in small quantities
Oil	0.5	Energy dense but usually no other micro-nutrients. Usually consumed in small quantities

Source:WFP (2008)

Therefore, indicators used in this research include dietary diversity, food consumption frequency, food consumption score and dietary energy intake. The first three indicators were used to analyse respondents' diet quality, and the last one is calculated based on respondents' recall of food consumption during a seven-day period to present respondents' vulnerability to food insecurity. In addition, habitual consumption frequencies of different food groups collected in the first section of the questionnaire were used to describe the food consumption patterns of respondents.

Important definitions that need to be illustrated include:

Dietary diversity refers to the number of food groups and counts of food items consumed during a seven-day period (WFP 2008).

Food consumption frequency refers to the specific times of consumption of a food item. These raw data were classified into five frequency levels to describe respondents' consumption patterns in following chapters: daily, weekly, monthly, yearly and never.

Food group is a group of food items that have similar caloric and nutrient content (WFP 2008).

Food item cannot be further split into separate foods.

3.7 Challenges and limitations

Previous research experience in undertaking surveys while doing the masters programme in China helped the researcher to adopt an appropriate way to talk with the respondents and to ask questions. The majority of respondents in the survey were very friendly and cooperative, thus each individual survey proceeded smoothly. There were, however, still challenges during the course of the survey which are worth mentioning.

One major challenge was the shortage of manpower and limited budget. The researcher went to Shanghai alone and planned to hire some students studying in the local universities to conduct the survey. The researcher posted both recruitment notices on campus billboards and online on university websites, and also contacted teachers and friends (including postgraduate students) in the East China Normal University and Shanghai University to ask their friends, who may have had time to participate as an interviewer. One major reason was the high cost of time and energy required by the survey. As most of the survey sites were outside the inner city and far away from most universities or colleges, long journeys were needed for those students to reach the survey site. In addition, most postgraduate students were already participating in the projects of their supervisors, and undergraduate students had to attend classes and to prepare for exams. Therefore, the researcher did the survey alone. A second challenge was obtaining permission to conduct the survey. Although many factory directors were friendly and offered their generous permission and help for conducting the survey, the researcher was still turned down several times by a few migrants, which prolonged the time needed for the survey. Thanks to the cooperation of the respondents that the survey could be finished within 6 months – the maximum field work period permitted given limited resources.

The most complicated and thus challenging part of the research was how to get accurate quantities of food intake from respondents. As was mentioned earlier, food consumption data was collected through respondents' recall rather than recording of their food consumption. This resulted in the fact that estimation was unavoidable as detailed 7-day recall is rather difficult for the respondents, causing some inaccuracy in data. In addition, as the recall period was the

past 7 days from the day the respondent was surveyed, the consumption data could not cover seasonal variation. Therefore, results of data analysis would inevitably imply some bias about the long-term condition of respondents' energy intake.

3.8 Conclusion

This chapter has discussed the methodological rationale of the study and specific steps taken to conduct the research. It illustrates the conduct of the survey from preparation, sampling to questionnaire design. A comprehensive description of the whole procedure of sample selection, including the selection of sampling districts within Shanghai, the selection of a sampling town within each sampling district, the selection of survey sites (factories, construction sites and shops/restaurants) within each sampling town, and the selection of the individual sample of migrants is also presented in this chapter.

Although the main data collection tool in this research is the questionnaire survey, the overall methodology applied in this research included a combination of both quantitative and qualitative approaches. Data collected from the questionnaire survey generated both qualitative and quantitative information about respondents' diet characteristics, structures and qualities and descriptions about nutrition supply from migrants' diets. Secondary data on food nutrition composition and food consumption of the general population were also collected from official statistical websites to be utilised in the calculation of respondents' energy intake. At the same time, the questionnaire surveys for many participants were actually like informal interviews, as the participants did more than just answer the questions in the questionnaire. When asked their consumption frequencies of different food groups, they also explained why they consumed them frequently or infrequently.

The chapter also discusses the main challenges faced by the researcher and declares some of the possible limitations of the survey. Based on this, the next chapter provides a profile of the migrants interviewed in the survey, including their socio-demographic characteristics and awareness of healthy diets, which lays the foundation for the analysis of their patterns of food consumption and their determinants.

Chapter 4 Characteristics of Respondents and their Awareness of Healthy Diets

4.1 Introduction

Studies on the food consumption patterns in other nations (e.g.A Karim et al. 2008; Hulshof et al. 2003; Martikainen et al. 2003; Widdowson 1936) have found that socio-demographic characteristics such as age, gender and socio-economic status can result in different food consumption patterns. This is also the case in China (e.g.Du et al. 2004; Guo et al. 2000). Therefore, this chapter presents a profile of the respondents who undertook the survey, which provides the foundation for the analysis reported in the following chapters. There are four sections in this chapter. The first presents a socio-demographic profile of the respondents including age and gender composition, education, income, province of origin and the like, which may directly or indirectly be associated with their food consumption. The second describes the employment related characteristics such as the occupational industries they were engaged in and working hours per week. The association between the basic characteristics of respondents in different industries such as gender, age, education, income, and hometown are considered to help explain different patterns of food consumption. The last section of this chapter examines respondents' awareness of a healthy diet which is assumed to influence their food consumption behaviour.

4.2 Background information on surveyed migrants

4.2.1 Socio-demographic characteristics

Table 4.1 shows the socio-demographic characteristics of the rural migrants in the survey. Although 400 rural migrants were surveyed, five of them failed to complete the questionnaire. Therefore 395 surveyed migrants were considered to be valid respondents. They were made up of 31.6 percent of females and 68.4 percent of males. Married migrants made up 89.9 percent of the respondents. The average age of the respondents was 37, with the majority of them aged under 40 years (59.5 percent), and 21.3 percent younger than 30 and those aged 50 and over made up only 8.1 percent of respondents. Migrants from middle provinces accounted for 58 percent of surveyed migrants, with those from the Anhui province making up the largest share (27.3 percent) of respondents. This is because migration to Shanghai is mainly short-distance, with migrants moving from rural areas relatively close to Shanghai.

Table 4. 1 Socio-demographic characteristics of survey respondents

Characteristics		Percentage (N=395)
Gender	Male (N=270)	68.4
	Female(N=125)	31.6
Age	<30 (N=84)	21.3
	30-39 (N=151)	38.2
	40-49 (N=128)	32.4
	50+ (N=32)	8.1
Marital status	Married (N=355)	89.9
	Unmarried (N=40)	10.1
Hometown	Eastern provinces (N=111)	28.1
	Middle provinces (N=229)	58
	Western provinces (N=55)	13.9
Education	Never been to school (N=11)	2.8
	Primary school or none (N=97)	24.6
	Middle school (N=172)	43.5
	High school (N=77)	19.5
	Post school (N=115)	9.6
Income	≤3000 (N=17)	4.3
	3001-5000 (N=198)	50.1
	5001-10000 (N=170)	43.0
	>10000 (N=10)	2.5
Residence	< 1 year (N=66)	16.7
	1-5 years(N=92)	23.3
	6-10 years (N=168)	42.5
	More than 10 years (N=69)	17.5
Accommodation ownership	Own a house	1.3
	Tenant	63.0
	Provided by employer for free	35.2
	Provided by relatives/friends for free	0.5
Living companion	Live alone	19.5
	Live with family member(s)	55.9
	Live with friends/colleagues	24.6
Accommodation facilities	Tap water (N=395)	100.0
	Private kitchen (N=219)	55.4
	Shared kitchen(N=43)	10.9
	Television (N=245)	62.0
	Fridge (N=207)	52.5
Migration type	Permanent (N=4)	1.0
	Temporary (N=301)	76.2
	Cyclical (N=49)	12.4
	Not sure (N=41)	10.4
Body Mass Index	Underweight(N=5)	1.3
	Normal Range(N=293)	74.2
	Overweight _ pre-obese(N=94)	23.8
	Obese (N=3)	0.8

Source: Shanghai food consumption survey, 2015-2016

The majority of respondents were educated, with only 2.8 percent of them reporting that they had never been to school. Almost two thirds of respondents had finished secondary education, while 43.5 percent of them had only finished middle school. Respondents with only primary school or no education made up a quarter (27.4 percent), with those who finished high school or higher education levels making up 29.1 percent. That was less than the average education levels of the general population in Shanghai, with 44.6 percent of residents having at least finished high school, and only 17.3 percent with only primary school or less (Shanghai 2011). The majority of the respondents had a monthly income between 3000-10,000 yuan, with 50.1 percent of them earning a low 3000-5000 yuan per month. Nearly half (43.0 percent) of the respondents earned more than 5000 but less than 10,000 yuan per month, those who were above this level made up only a minimal share.

The survey found that the majority (82.3 percent) of the respondents claimed that they had never migrated to other cities before migrating to Shanghai. Temporary migrants accounted for 76.2 percent of respondents, while permanent migrants made up only 1 percent, and 12.4 percent were cyclical migrants, with 77.6 percent of them working in the construction industry. The majority (60 percent) of respondents had been living in Shanghai for more than 5 years, while new migrants (been in Shanghai less than a year) made up 16.7 percent of respondents. Most of the respondents were living with others in Shanghai, with more than half (55.9 percent) living with at least one of their family members. Nearly 99 percent of migrants in the survey did not own their house in Shanghai, with just over 60 percent living in apartments rented by themselves, and 35 percent of them living in accommodation provided by their employers.

Respondents were often not living in an ideal accommodation, as just over one third of them did not have a kitchen, and one in ten shared a kitchen with other tenants. This is because apartments with private kitchens are more expensive compared to those with no kitchen or shared ones. Respondents without access to a kitchen reported that they just use induction cooktops and automatic rice cookers to prepare some basic dishes. Moreover, it should be mentioned here, that although half of the respondents reported that they did have a private kitchen in their accommodation, the kitchen was usually very small and poorly equipped. This was especially the case for respondents working in the processing and manufacturing industries and living in accommodation provided by their employers. There was no exhaust fan in their private kitchen, only an induction cooktop, rice cooker and a couple of pans were found in the kitchen, almost the same as for those living in accommodation without kitchens. This may undermine their health not only because they have to breathe in the cooking fumes but also due

to the limitations on preparing healthy diets. Similarly, just over 50 percent of them had a fridge in their accommodation, while the rest had no fridge, which may reduce their likelihood of consuming foods that need to be kept fresh such as milk, meat, and fish. Alternatively, their consumption of these foods would be reduced, unless they can buy them anytime when they want to consume them. More than a third of respondents lived in accommodation with no television, which reduced their opportunities to acquire information, particularly TV programs about healthy diets. Fortunately, all of the respondents had access to clean tap water, which is crucial for food safety and utilisation and thus food security.

According to the WHO standards of adults being underweight, overweight and obese based on Body Mass Index (BMI), the BMI of the majority of the respondents was within the normal range. However, there was still a considerable proportion (24.6 percent) of respondents who were overweight. Fortunately the majority of them were in a pre-obese stage, with only 3 respondents classified as obese.

4.2.2 Socio-demographic composition of respondents from different sample districts

Table 4.2 shows differences in socio-demographic characteristics between respondents from different sample districts, which were assumed would show differences in food consumption patterns.

Respondents from all the three sample districts consisted of more males than females, with each district having around two thirds of male respondents, with the Putuo district having the largest share of males (some 70 percent). The Putuo district also had the highest percentage of both the youngest and oldest respondents, while the Songjiang district had the lowest percentage of respondents from those groups, with 52.3 percent aged 30-39 years. The share of respondents aged younger than 30 in the Putuo district was 36.4 percent, more than twice that in the Songjiang district. At the same time, the Putuo district was by far the oldest district, with almost one fifth aged 50 years or more.

Table 4. 2 Socio-demographic characteristics of respondents from each sample district

Socio-demographic characteristics	Sample districts		
	Putuo	Pudong	Songjiang
Gender			
Male	70.5	68.3	67.6
Female	29.5	31.7	32.4
Age			
<30	36.4	21.3	15.3
30-39	25.0	34.2	52.3
40-49	20.5	35.0	31.5
≥50	18.2	9.6	0.9
Occupation			
P&M	43.2	42.9	56.8
C	18.2	18.8	5.4
B&S	38.6	38.3	37.8
Income			
≤5000	68.2	60.4	36.0
>5000	31.8	39.6	64.0
Education			
Primary school or none	22.7	29.6	24.3
Middle school	47.7	39.6	50.5
High school or above	29.5	30.8	25.2

Note: P&M refers to Processing &Manufacturing industry; C refers to construction industry; B&S refers to Business & services industry

Source: Shanghai food consumption survey, 2015-2016

Respondents in the three sample districts were all most likely to work in the processing and manufacturing industries, and least likely to work in the construction industry. This trend is consistent with the employment trend of rural migrants in Shanghai. Respondents from the Songjiang district showed the highest likelihood of working in the processing and manufacturing industries, with 56.8 percent of them working in these industries, while the share of respondents in the other two districts was just over 40 percent. However, only 5.4 percent of respondents in the Songjiang district worked in the construction industry, while just over 18 percent of respondents in the other two districts were in this industry. Nevertheless, respondents in all the three districts had almost the same likelihood of working in the business and services industries, at 38 percent or so.

It was interesting that the farther away one moved from the inner city, the higher the income level, as incomes increased from respondents in Putuo (the inner city) to those living in Songjiang (the far suburb). Over 60 percent of respondents in the Putuo and Pudong districts earned no more than 5000 yuan per month, while almost the same percentage of participants in the Songjiang district had a monthly income higher than 5000 yuan. This can be related to

the age distribution within each district. As the Putuo district had the highest percentage of young respondents who were most likely to earn a lower income, while the Songjiang district had the largest proportion of respondents aged 30-39 who were most likely to earn more than 5000 yuan per month.

Most respondents from the three sample districts had achieved an education of middle school, although it was found that respondents working in the inner city and near suburbs were more likely to be better educated compared to those who worked in the outer suburbs. There was a slightly higher percentage of respondents having finished high school or higher education in Putuo (29.5 percent) and Pudong (30.8 percent) compared to Songjiang (25.2 percent).

4.3 Employment profile

The two major employers of respondents were private companies and self-owned businesses. More than half (58 percent) of the respondents worked for private companies, 33.9 percent were self-employed in their own business which they had opened in Shanghai, and 7.6 percent were employed by individually owned businesses. Only a small share of respondents worked for state-owned enterprises (0.3 percent), or foreign-funded enterprises (0.3 percent).

As was mentioned earlier in the methodology chapter, respondents were sampled from the top three major industrial groups that absorb the majority of rural migrants in Shanghai: the processing and manufacturing industries, business and services industries and the construction industry. As a result, 46.8 percent of respondents worked in the processing and manufacturing industries, and 14.9 percent were from the construction industry. The rest of the respondents were from the business and services industries, with those who working in the wholesale and retail industry accounting for the highest percentage (22.5 percent), with 10 percent working in the catering industry.

Table 4.3 shows gender differences in the respective occupational industries. Male respondents were primarily engaged in physical work, and two thirds of them were in the construction industry and the processing and manufacturing industries. Nevertheless, the share of male respondents working in the business and services industries was nearly twice that working in the construction industry (30.3 percent and 18.5 percent respectively). Males working in the wholesale and retail industries accounted for the largest share of male respondents working in the business and services industries, and for the second largest share of total male respondents.

In contrast, female respondents were more likely to work in the business and services industries (55.2 percent), with 26.4 percent and 24 percent of female respondents working in the

wholesale and retail industry, and catering industry respectively. Nevertheless, those who worked in the processing and manufacturing industries made up the second largest share (37.6 percent) of female respondents, while only 7.2 percent of female respondents worked in the construction industry.

Table 4. 3 Male and female respondents by type of occupation industry

Occupation types	Gender		Total
	Male (N=270)	Female (N=125)	
Processing and manufacturing industry	51.1	37.6	46.8
Construction industry	18.5	7.2	14.9
Wholesale and retail industry	20.7	26.4	22.5
Catering industry	3.0	24.0	9.6
Hotel industry	0.0	0.8	0.3
Information and consulting service industry	0.7	0.0	0.5
Other social services industry	5.9	4.0	5.3

Source: Shanghai food consumption survey, 2015-2016

It was found that most respondents had to work long hours each week, as almost 80 percent of them worked 50 hours or longer per week. Furthermore, more than one third (36.2 percent) worked 70 hours or more a week, and only 21.2 percent worked less than 50 hours a week.

Table 4.4 compares the difference in weekly working hours by gender and age, a statistically significant difference was found between males and females (Chi-square=13.438, df=4, $p=0.009<0.01$, $\phi=0.184$). Females worked longer hours per week in comparison with male respondents, as 42.4 percent of females and 33.3 percent of males worked 70 hours or longer a week. This is because females were more likely to work in the business and services industries, which usually require long opening hours. Nevertheless, this does not mean that they have a higher level of physical activity, as workload is largely dependent on the flow of customers. Respondents aged in their 30s showed a higher likelihood of working longer hours per week in comparison with younger respondents, as they were most likely to work in the business and services industries compared to their younger and older counterparts. The largest share (43.7 percent) of respondents aged 30-39 worked 70 hours or more per week, which was followed by the oldest participants.

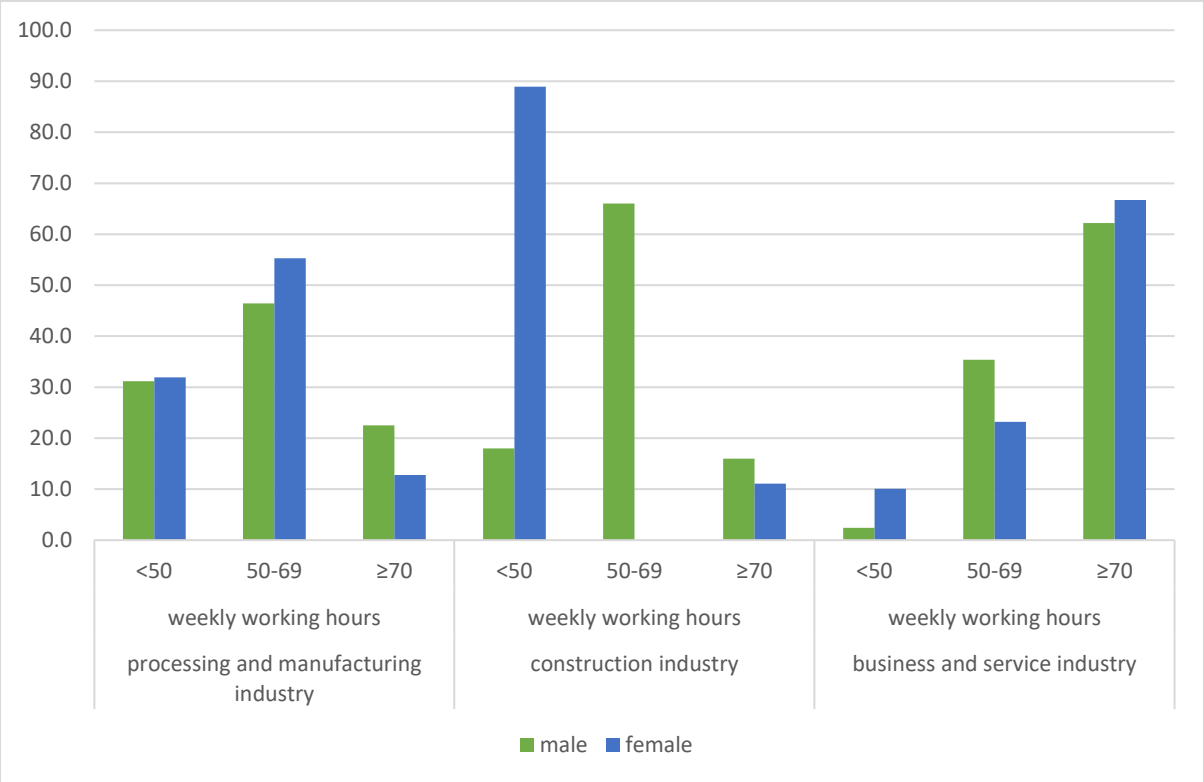
Table 4. 4 Hours worked per week by age and gender of respondents

Characteristics	<50 hours (%)	50-69 hours (%)	≥70 hours (%)
Gender			
Male	20.0	46.7	33.3
Female	24.0	33.6	42.4
Age			
<30	23.8	45.2	31.0
30-39	13.9	42.4	43.7
40-49	28.9	39.8	31.3
≥50	18.8	46.9	34.4

Source: Shanghai food consumption survey, 2015-2016

The Chi-square test shows that there were significant differences in the working hours by industry when controlled by gender (Chi-square=192.286, df=8, p=0.00< .01, ϕ=0.698). Figure 4.1 shows that in the business and services industries, the majority (more than 60 percent) of both male and female respondents worked for 70 hours or more per week. In the processing and manufacturing industries, male respondents tended to work longer hours compared to females, as 12.8 percent of female respondents and 22.5 percent of male respondents worked 70 hours or longer per week. This is also the case in the construction industry, with 88.9 percent of female respondents working less than 50 hours a week, while 66 percent of male respondents worked 50-69 hours per week, and similarly the number of males working at least 70 hours a week was higher than for females. This is understandable as both processing and manufacturing industries, as well as the construction industry, require much more physical activity compared to work in the business and services industries.

Figure 4. 1 Hours worked per week by industry for male and female respondents



Source: Shanghai food consumption survey, 2015-2016

4.4 Relationship between occupation type and selected characteristics

The characteristics of respondents in each occupational industry is shown in Table 4.5, indicating that respondents from the eastern provinces were most likely to work in the business and services industries and least likely to be found in the construction industry. However, those from the middle provinces were most likely to work in the construction industry, and the least likely to work in the business and services industries, which was the similar case for those from the western provinces. Gender difference by occupational industry was significant (Chi-square=24.438, df=2, p=0.00< .01, ϕ=0.249). Male respondents dominated, largely in the construction industry while the business and services industries had the lowest proportional share. Respondents aged younger than 40 dominated in the processing, manufacturing, business and services industries, whereas the construction industry primarily had respondents aged 40 and over, with those in their 40s accounting for the largest proportion (32.2 percent). Such a difference was found to be statistically significant (Chi-square=133.770, df=78, p=0.00< .01, ϕ=0.582). This is understandable as most of the older respondents had relatively low educational levels, which reduced their likelihood of working in the other industries in which non-manual work forms a larger part.

Table 4. 5 Characteristics of respondents by industry

Characteristics	P& M (N=185)	C (N=59)	B& S (N=151)
Gender			
Male (N=270)	74.6	84.7	54.3
Female (N=125)	25.4	15.3	45.7
Age			
<30 (N=84)	21.6	22.0	20.5
30-39 (N=151)	34.6	23.7	48.3
40-49(N=128)	36.8	32.2	27.2
≥50(N=32)	7.0	22.0	4.0
Education			
Primary school or none (N=108)	32.4	39.0	16.6
Middle School (N=172)	41.6	45.8	45.0
High School or above (N=115)	25.9	15.3	38.4
Income			
≤5000 (N=215)	61.6	49.2	47.7
>5000 (N=180)	38.4	50.8	52.3
Residence			
<5 year (N=120)	31.9	74.6	11.3
5-9 years (N=146)	38.9	10.2	45.0
≥10 years (N=129)	29.2	15.3	43.7
Weekly working hours			
<50 (N=84)	31.4	28.8	6.0
50-69 (N=168)	48.6	55.9	29.8
≥70 (N=143)	20.0	15.3	64.2
Hometown			
Eastern provinces (N=111)	24.9	18.6	35.8
Middle provinces (N=229)	58.4	62.7	55.6
Western provinces (N=55)	16.8	18.6	8.6

Note: P&M refers to the Processing &Manufacturing industry; C refers to the construction industry; B&S refers to the Business & services industry

Source: Shanghai food consumption survey, 2015-2016

Respondents working in the business and services industries were most likely to be better educated compared to their counterparts working in the other two industries. They had the highest percentage (38.4 percent) of respondents who had finished high school or higher education. While those who worked in the construction industry were most likely to have little education.

Respondents working in the business and services industries were most likely to have lived in Shanghai the longest (10 years or longer), whereas construction workers were most likely to

have been there a short time (less than 5 years). This can be explained by the fluidity of the construction industry, where job opportunities depend totally on construction projects and the hiring of contract or temporary labour. More importantly, those differences were statistically significant (Chi-square=182.148, df=4, p=0.00< .01, ϕ=0.679).

It was found that 90 percent of respondents working in the business and services industries had been in Shanghai for more than 5 years, and tended to have higher incomes compared to those in the other industries. Those in the processing and manufacturing industries were mainly earning 5000 yuan or less per month, whereas in the construction industry and the business and services industries, respondents having a monthly income higher than 5000 yuan was slightly greater.

There were significant differences in working hours by industry (Chi-square=192.286, df=8, p=0.00< .01, ϕ=0.689). Respondents in the business and services industries were much more likely to work longer hours than those in the other industries. Some 64.2 percent of respondents reported working more than 70 hours a week, while the reporting rate from the construction industry and the processing and manufacturing industries were 15.3 percent and 20 percent respectively. In addition, almost one third of respondents in the processing and manufacturing industries, as well as the construction industry, worked less than 50 hours a week, whereas only 6 percent in the business and services industries did so.

4.5 Relationship between income and other characteristics

As income is a direct reflection of a person's paying power, it may result in differences in expenditure on food among different groups of people. Therefore, the composition of respondents with different income levels by gender, age, education and residence is shown in Table 4.6. Male respondents were found to be more likely to earn more compared to females, as just over 50 percent of them claimed to earn more than 5000 yuan per month, whereas females primarily earnt no more than 5000 yuan per month.

Table 4. 6 Income of respondents by selected characteristics

Characteristics	Income (yuan)	
	≤5000 (%)	**>5000 (%)**
Age		
<30	72.6	27.4
30-39	41.1	58.9
40-49	54.7	45.3
≥50	68.8	31.3
Education		
Primary school or none	66.7	33.3
Middle school	55.2	44.8
High school and above	41.7	58.3
Residence		
< 5 years	65.8	34.2
5-9 years	51.4	48.6
≥ 10 years	47.3	52.7

Source: Shanghai food consumption survey, 2015-2016

Income varied significantly by the age of surveyed migrants (Chi-square=59.440, df=39, p=0.01< .05, ϕ=0.388). It was found that respondents aged under 30 and those aged 40 or over were more likely to earn 5000 or less per month, while those aged between 30 and 39 were more likely to earn more than 5000 yuan per month. The youngest respondents were most likely to earn lower incomes. Such age differences in income levels may be explained by lower levels of human capital for those aged 40 or over and lack of employment experience for those younger than 30 years.

Similarly, a significant statistical difference was found between income and education (Chi-square=25.622, df=6, p=0.00<0.01, ϕ=0.255). It was found that respondents with a middle school or lower education level were more likely to earn no more than 5000 yuan per month, whereas those with an education at high school or above were more likely to be the higher income earners. Therefore, this can explain why respondents aged 40 and over were more likely to have lower incomes, given that they were more likely to have lower education (as is presented in section 4.6), which reduces their likelihood of earning a higher income. At the same time, there are studies (e.g.Corcoran and Duncan 1979; Light and Ureta 1995) which found that years of work experience is positively associated with wages, although the significance of such a relationship varies among different population groups. Although younger respondents were more likely to have higher education levels, they were in their early stages of career, and usually had a shorter working period and experience in the labour force compared to their older counterparts. This would help explain why they were the least likely to earn higher

incomes, while respondents aged in their 30s, who had both a better work experience and high likelihood of having attained higher education, were most likely to earn higher incomes.

It was found that the longer the migrants had lived in Shanghai, they were more likely to earn a higher income. There was a definite decrease in the share of respondents earning 5000 yuan or less per month as the length of stay in Shanghai increased, moreover, those who had stayed for 10 years or longer tended to earn more than 5000 yuan per month.

It was assumed that males and females at different ages would have different income levels, which in turn would influence their food consumption patterns. Table 4.7 shows that male and female respondents aged younger than 30 and those aged 50 and over were more likely to earn no more than 5000 yuan per month. Actually, female respondents tended to have a lower monthly income regardless of their age, as there was greater proportion of respondents earning low incomes, with all of them from the oldest age group earning no more than 5000 yuan per month.

Table 4. 7 Income of male and female respondents by age

Gender	Income	Age			
		<30 (%)	**30-39 (%)**	**40-49 (%)**	**≥50 (%)**
Male	≤5000	72.1	34.7	42.9	58.3
	>5000	27.9	65.3	57.1	41.7
Female	≤5000	73.9	54.0	77.3	100.0
	>5000	26.1	46.0	22.7	0.0

Source: Shanghai food consumption survey, 2015-2016

Different levels of education can result in different human capital, which further influences one's capacity to earn income. Therefore, the occupation in respective industries for both income groups at each education level is shown in Table 4.8. It is clear that income differences of respondents working in different industries were the most significant at middle school level, and the least at high school and higher level. Both lower and higher income respondents were most likely to work in the processing and manufacturing industries when they had the least education. As education levels increased, higher income respondents were most likely to work in the business and services industries. Moreover, construction workers made up a higher percentage of higher income respondents at higher educational levels.

Table 4. 8 Relationship between income and industry of occupation by education

Education	Occupation industry	Income	
		≤5000 (%)	>5000 (%)
Primary school or none	Processing and manufacturing	54.2	58.3
	Construction	23.6	16.7
	Business and services	22.2	25.0
Middle school	Processing and manufacturing	53.7	33.8
	Construction	9.5	23.4
	Business and services	36.8	42.9
High school or above	Processing and manufacturing	50.0	35.8
	Construction	6.3	9.0
	Business and services	43.8	55.2

Source: Shanghai food consumption survey, 2015-2016

As has been illustrated earlier in this chapter, workers in the business and services industries were the best paid, and most respondents working in these industries came from the eastern provinces, and showed the highest likelihood of earning more than 5000 yuan per month, while those from the western provinces were most likely to be the low income earners. When taking occupational industry as the control variable, this trend is still applicable in the processing and manufacturing industries and the business and services industries (Chi-square=45.970, df=32, p=0.05) as shown in Table 4.9.

Table 4. 9 Income of respondents by origin provinces controlled by industry

Occupation industry	Income (Yuan)	Hometown groups			Total (%)
		Eastern provinces (%)	Middle provinces (%)	Western provinces (%)	
P&M	≤5000	54.3	63.0	67.7	61.6
	>5000	45.7	37.0	32.3	38.4
C	≤5000	45.5	43.2	72.7	49.2
	>5000	54.5	56.8	27.3	50.8
B&S	≤5000	44.4	46.4	69.2	47.7
	>5000	55.6	53.6	30.8	52.3

Note: P&M refers to the Processing &Manufacturing industry; C refers to the construction industry; B&S refers to the Business & services industry

Source: Shanghai food consumption survey, 2015-2016

However, in the construction industry, respondents from the middle provinces were most likely to earn more than 5000 yuan per month. In other words, eastern-province respondents were most likely to earn higher incomes when they work in the processing, manufacturing, business and services industries, while those from the western provinces were the most likely to earn a lower income regardless of their occupational industry. This is related to much lower

investment in western China in human capital development which has resulted from slower economic growth compared to the eastern region (Demurger 2001:114; Fleisher et al. 2010:219; Shenggen and Zhang 2004:208). Therefore, migrants from those poorer regions are most likely to have poor economic returns after migration.

4.6 Relationship between education and other characteristics

Education contributes to one's human capital and thus is usually positively related to their occupation and income. Table 4.10 shows that older respondents were more likely to have less educational experience, with more than half of those aged 50 and over either had no education or only finished primary school. The youngest respondents were most likely to have a higher education, with more than half of them having at least finished high school. This is related to the widespread socio-economic development in China which has occurred over the last three decades since the "reform and opening-up" in 1978. The older respondents were born in an age when their family had more children to raise on much lower incomes, it was economically difficult for them to receive anything above a basic education or none at all, especially in rural areas.

Male respondents showed a higher likelihood of receiving higher levels of education in comparison with their female counterparts, and the difference was statistically significant (Chi-square=24.671, df=6, $p=0.00<0.01$, $\phi=0.250$). Male respondents at least completing high school was more than double that of females. Moreover, respondents from the western provinces were most likely to have a low level of education. They actually showed a tendency of having an education of primary school or none at all, whereas those from the eastern and middle provinces tended to at least have finished middle school, which helps to explain why western province respondents were most likely to have low incomes.

Such regional disparity in education is one of the consequences of China's reform and opening-up policy since 1978 and the economic transformation from a planned economy to a market economy since the 1990s, during which economic growth in China's western region has lagged far behind that in the eastern and interior areas. Geographical disadvantage of the inland areas (including western and middle provinces) compared to coastal areas in the east, reduces their potential to attract both domestic and foreign investment. As education is funded by local government, backward economic growth has further resulted in poor investment in education in the inland provinces. Such a situation may have been improved by the ongoing "Grand Western Development" project launched by the Chinese central government in 2000 to reduce

the imbalance in regional development. Respondents in this research do not reflect that possible improvement in education investment, as they were over 18 years old when surveyed.

Table 4. 10 Relationship between the education of respondents and other characteristics

Selected characteristics	Primary school or none (%)	Middle school (%)	High school and above (%)
Age			
<30	3.6	45.2	51.2
30-39	10.6	49.0	40.4
40-49	50.0	43.8	6.3
≥50	78.1	12.5	9.4
Gender			
Male	21.1	43.7	35.2
Female	40.8	43.2	16.0
Hometown			
Eastern provinces	18.0	50.5	31.5
Middle provinces	27.9	43.2	28.8
Western provinces	43.6	30.9	25.5

Source: Shanghai food consumption survey, 2015-2016

4.7 Respondents' awareness of healthy diet

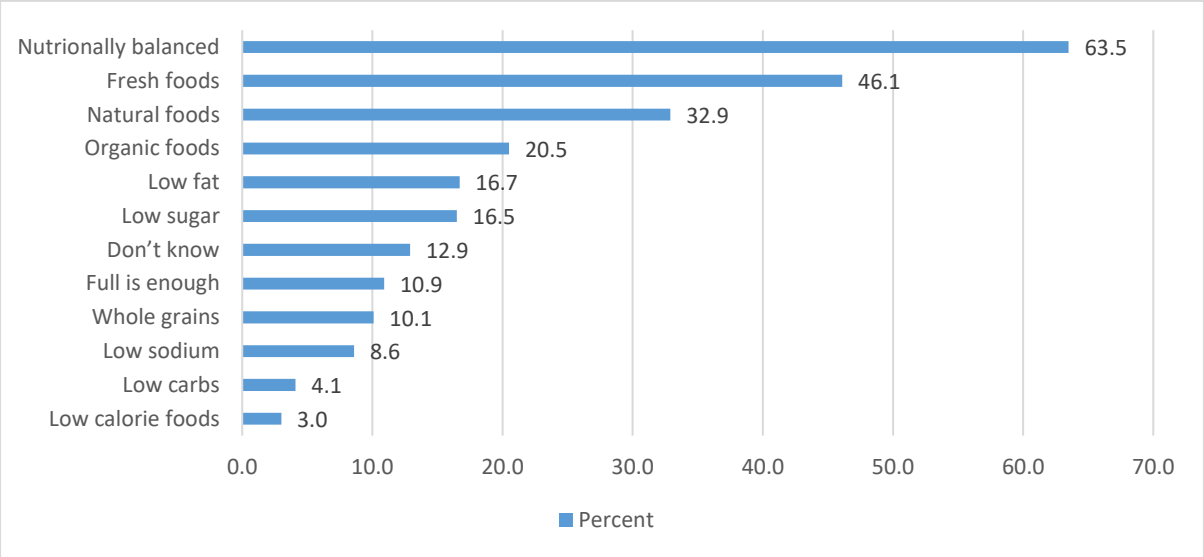
People's attitudes can partly determine their behaviour. Similarly, migrants' attitude to food security can influence their food consumption. In this research, the attitude of migrants to food security was examined by their awareness of healthy diets. Further, three indicators were created to examine this awareness: perceptions of the characteristics of a healthy diet; perceptions of the importance of having a healthy diet; degree of attention to information about a healthy diet. The majority of respondents could name at least one characteristic of a healthy diet, and perceived having a healthy diet to be of high importance. The practical awareness of healthy diet, however, is rather low. Generally, there was little attention paid to information about healthy diets.

4.7.1 Perceptions of healthy diets related to socio-demographic characteristics

To examine migrants' perceptions of a healthy diet, respondents were asked to choose from a list of characteristics indicating a healthy diet which was provided by the researcher, they were also allowed to provide their own understanding of other characteristics that were not included in the list. Figure 4.2 presents the broad indicators of a healthy diet mentioned by rural migrants in the survey. The top three most frequently mentioned characteristics were diets having "*nutritionally balanced*" foods (63.5 percent), "*fresh*" foods (46.1 percent) or "*natural*" foods (32.9 percent). However, a considerable share (12.9 percent) of respondents reported "*don't*

know" when asked their perceptions of a healthy diet, followed by 10.9 percent who considered that a diet that made them feel full constituted a healthy diet. However, the general perception of a healthy diet was acceptable among the respondents, as the majority of them could name at least one feature of a healthy diet. To achieve an in-depth understanding of rural migrants' perceptions, the socio-demographic differences in perceptions among respondents were examined.

Figure 4. 2 Perceptions of respondents on healthy diets (multi response)



Source: Shanghai food consumption survey, 2015-2016

Table 4.11 shows that female respondents tended to have a better perception of a healthy diet compared to males, given that they were more likely to report most of the characteristics except for "*low carbs*" and "*full is enough*". Females were more likely to mention the top three characteristics (particularly "*fresh*") of healthy diets than males, 56.8 percent compared to 41 percent of males. However, more males (14.1percent) did not know what contributed to a healthy diet compared to females (10.4 percent).

Table 4. 11 Perceptions of healthy diets among male and female respondents (percentage of "yes")

Perceptions of healthy diets	Male (N=270)	Female (N=125)	Total
Nutritionally balanced	61.9	67.2	63.5
Fresh	41.1	56.8	46.1
Natural	29.6	40.0	32.9
Organic	18.9	24.0	20.5
Low fat	15.2	20.0	16.7
Low sugar	15.2	19.2	16.5
Don't know	14.1	10.4	12.9
Full is enough	10.7	11.2	10.9
Whole grains	7.8	15.2	10.1
Low sodium	7.4	11.2	8.6
Low carbs	4.4	3.2	4.1
Low calorie	1.5	6.4	3.0

Source: Shanghai food consumption survey, 2015-2016

Table 4.12 shows the perceptions of a healthy diet by age, with marked differences found between young and old, and indicating a statistically significant relationship (Chi-square=160.023, df=78, $p=0.00<0.01$, $\phi=0.636$). Young respondents frequently mentioned "*nutritionally balanced*", "*fresh food*" and "*natural food*, and showed a tendency towards having better knowledge about healthy diets, stressing "*low fat*" and "*low sugar*" in a healthy diet compared to older respondents. One reasonable explanation is that young respondents were more likely to be exposed to media and educational campaigns promoting healthy diets. However, respondents in their 30s were most likely to stress the nutrition balance of a healthy diet, with 85 percent of them saying it must be "*nutritionally balanced*". They also put more emphasis on "*natural*" and "*fresh*" foods than respondents in other age groups.

The survey found that respondents aged 50 and over tended to have less knowledge about healthy diets compared to their younger counterparts, as they had the lowest reporting rate for most of the indicators of healthy diets, and they were more likely to claim that they did not know and nearly half of them perceived that a healthy diet was one that made them feel full. In addition, their reporting of the three most frequently mentioned characteristics was significantly lower than among younger respondents. This is related to the socio-economic environment of the age when they were born, as they were the generation who were born in a time when household income was much lower than the current level due to the less developed economy of China, and they had to share very limited food with their many siblings during their childhood. Therefore, having enough food to eat was perceived to be of very high

importance to them. Moreover, those respondents were also less likely to access media about healthy diets.

Table 4. 12 Perceptions of healthy diets by age of respondents (percentage of "yes")

Perceptions of healthy diets	<30 (N=84)	30-39 (N=151)	40-49 (N=128)	≥50 (N=32)	Total
Nutritionally balanced	60.7	84.8	50.8	21.9	63.5
Fresh	47.6	62.3	33.6	15.6	46.1
Natural	39.3	43.7	21.9	9.4	32.9
Organic	27.4	27.8	10.2	9.4	20.5
Low fat	26.2	17.2	10.9	12.4	16.7
Low sugar	22.6	17.9	10.9	15.6	16.5
Don't know	14.3	6.0	18.0	21.9	12.9
Full is enough	3.6	0.7	19.5	43.8	10.9
Whole grains	13.1	12.6	6.3	6.3	10.1
Low sodium	9.5	8.6	7.8	9.4	8.6
Low carbs	6.0	4.6	3.1	0.0	4.1
Low calorie	7.1	3.3	0.8	0.0	3.0

Source: Shanghai food consumption survey, 2015-2016

Table 4.13 shows the perceptions of healthy diets between high and low income earners, and respondents with higher incomes showed a better understanding of healthy diets. They had a higher reporting rate of all the listed characteristics and were not as likely to indicate "*don't know*" and "*full is enough*". The share of respondents with low incomes who said "*don't know*" and "*full is enough*" was twice as high as for higher income earners. Moreover, the percentage of the three most frequently mentioned characteristics (particularly "*fresh*" and "*natural*") was much lower for the lower income respondents, with one half of the higher income respondents mentioning them, compared to one third of those on lower incomes.

Table 4. 13 Perceptions of healthy diets by income of respondents (percentage of "yes")

Perceptions of healthy diets	≤5000 (N=215)	> 5000 (N=180)	Total
Nutritionally balanced	54.0	75.0	63.5
Fresh	37.7	56.1	46.1
Natural	26.0	41.1	32.9
Organic	16.3	25.6	20.5
Low fat	14.0	20.0	16.7
Low sugar	13.0	20.6	16.5
Don't know	16.7	8.3	12.9
Full is enough	14.4	6.7	10.9
Whole grains	7.4	13.3	10.1
Low sodium	4.7	13.3	8.6
Low carbs	3.7	4.4	4.1
Low calorie	2.8	3.3	3.0

Source: Shanghai food consumption survey, 2015-2016

As is shown in Table 4.14, it was not surprising to find that those with higher levels of education were more likely to have better perceptions of a healthy diet. More than a quarter of respondents

with low education considered eating full enough meant a healthy diet, whereas only 0.9 percent of those who had higher education did so. The reporting rate of the top three most frequently mentioned characteristics among respondents with the lowest education level was just half that of those with higher education.

Table 4. 14 Perceptions of healthy diets by education of respondents (percentage of "yes")

Perceptions of healthy diets	Primary school or none(N=108)	Middle school (N=172)	High school or above (N=115)	Total
Nutritionally balanced	42.6	70.3	73.0	63.5
Fresh	26.9	52.3	54.8	46.1
Natural	16.7	35.5	44.3	32.9
Organic	4.6	24.4	29.6	20.5
Low fat	7.4	14.5	28.7	16.7
Low sugar	4.6	18.0	25.2	16.5
Don't know	19.4	11.0	9.6	12.9
Full is enough	28.7	6.4	0.9	10.9
Whole grains	3.7	9.9	16.5	10.1
Low sodium	2.8	10.5	11.3	8.6
Low carbs	0.9	5.2	5.2	4.1
Low calorie	0.0	2.3	7.0	3.0

Source: Shanghai food consumption survey, 2015-2016

Table 4.15 indicates that workers in the construction industry had the lowest perceptions of a healthy diet, as they had the highest reporting rate of "*don't know*" and "*full is enough*". On the contrary, respondents working in the business and services industries showed the best knowledge of a healthy diet compared to respondents working in the other industries. This reflects the association between age and gender distribution within each industry and perceptions of healthy diets. As the construction industry had the largest share of males and older respondents, whereas the business and services industries had the highest percentage of females and younger respondents.

Table 4. 15 Perceptions of healthy diets by occupation of respondents (percentage of "yes")

Perceptions of healthy diets	P&M (N=185)	C (N=59)	B&S (N=151)	Total
Nutritionally balanced	62.7	49.2	70.2	63.5
Fresh	44.9	30.5	53.6	46.1
Natural	32.4	28.8	35.1	32.9
Organic	21.6	11.9	22.5	20.5
Low fat	14.6	15.3	19.9	16.7
Low sugar	14.6	11.9	20.5	16.5
Don't know	13.5	16.9	10.6	12.9
Full is enough	10.8	18.6	7.9	10.9
Whole grains	8.6	6.8	13.2	10.1
Low sodium	6.5	6.8	11.9	8.6
Low carbs	3.2	6.8	4.0	4.1
Low calorie	2.7	1.7	4.0	3.0

Note: P&M refers to Processing &Manufacturing industry; C refers to construction industry; B&S refers to Business & services industry

Source: Shanghai food consumption survey, 2015-2016

Table 4.16 presents the perceptions of healthy diets by respondents from different regions. Respondents from the eastern provinces showed a better perception of healthy diets compared to those from the other areas. They had a higher reporting rate of most of the characteristics of a healthy diet, although respondents from the western provinces were most likely to say "*low calorie*", "*low fat*", "*organic*" and "*full is enough*" and those from the middle provinces tended to say "*don't know*". Nonetheless, given the lowest reporting rate of most of the mentioned indicators, respondents from western provinces were most likely to have low perceptions of healthy diets, due to their lower education levels.

Table 4. 16 Perceptions of healthy diets by hometown of respondents (percentage of "yes")

Perceptions of healthy diets	Eastern provinces (N=111)	Middle provinces (N=229)	Western provinces (N=55)	Total
Nutritionally balanced	74.8	60.7	52.7	63.5
Fresh	55.9	43.7	36.4	46.1
Natural	39.6	28.4	38.2	32.9
Organic	23.4	17.9	25.5	20.5
Low fat	19.8	14.4	20	16.7
Low sugar	22.5	14.4	12.7	16.5
Don't know	9.9	14.4	12.7	12.9
Full is enough	5.4	12.2	16.4	10.9
Whole grains	14.4	8.3	9.1	10.1
Low sodium	11.7	7.9	5.5	8.6
Low carbs	4.5	3.9	3.6	4.1
Low calorie	2.7	3.1	3.6	3

Source: Shanghai food consumption survey, 2015-2016

4.7.2 Perceptions of the importance of healthy diets

Respondents were asked to score from 1(not important at all) to 5 (extremely important) to express their perceptions of the importance to have a healthy diet. To simplify the analysis, the perceived importance was grouped into two groups: low and moderate importance (importance scored as 1 to 3) and high importance (importance scored as 4 and 5). The majority (81 percent) of the participants indicated that having a healthy diet is of high importance. Perceptions of the importance by socio-demographic characteristics are further examined and presented in Table 4.17. It was found that variation in perceptions was only slight among different socio-demographic groups. Nonetheless, respondents from the following groups tended to be more likely to give high importance to healthy diets: females; high income group; higher education group; worked in business and services industries; long-term residents and those from eastern provinces.

Table 4. 17 Perceptions of respondents on the importance of healthy diets by socio-demographic characteristics

Socio-demographic characteristics	Perceptions of importance	
	Moderate or low	High
Gender		
Male	20.7	79.3
Female	15.2	84.8
Age		
<30	25.0	75.0
30-39	10.6	89.4
40-49	18.8	81.3
≥50	43.8	56.3
Income		
≤ 5000	23.7	76.3
>5000	13.3	86.7
Education		
Primary school or none	26.9	73.1
Middle school	19.2	80.8
High school or above	11.3	88.7
Occupation		
Processing and manufacturing industry	20.0	80.0
Construction industry	20.3	79.7
Business and services industry	17.2	82.8
Residence		
< 5 years	25.0	75.0
5-9 years	16.4	83.6
≥10 years	16.3	83.7
Hometown		
Eastern provinces	14.4	85.6
Middle provinces	21.4	78.6
Western provinces	18.2	81.8

Source: Shanghai food consumption survey, 2015-2016

4.7.3 Degree of attention of respondents to healthy diet by socio-demographic characteristics

To examine migrants' degree of attention to information about healthy diets, respondents were asked to answer the question "*how often do you pay attention to information about healthy diets*". The degrees of attention to healthy diets are grouped into three categories: no attention, low attention and high attention. This is determined according to the frequency of paying attention to information about healthy diets. Respondents who reported paying attention to information about a healthy diet on a frequent basis were classified into the "high attention" group. Only a small share (10.4 percent) of respondents showed a high degree of attention to information about healthy diets, claiming that they often paid attention to information about healthy diets. More importantly, more than one fifth (21.3 percent) of the respondents gave no attention to information about healthy diets. The rest of the respondents, which accounted for the majority of the migrants surveyed, paid only a low degree of attention.

Table 4. 18 Attention of respondents to healthy diet by socio-demographic characteristics

Socio-demographic characteristics	Degree of attention		
	None attention	Low attention	High attention
Gender			
Male	21.1	70.4	8.5
Female	21.6	64.0	14.4
Age			
< 30	15.5	70.2	14.3
30-39	4.6	86.1	9.3
40-49	34.4	57.0	8.6
≥ 50	62.5	25.0	12.5
Income			
≤ 5000	29.3	63.7	7.0
>5000	11.7	73.9	14.4
Occupation industry			
Processing and manufacturing industry	20.5	71.4	8.1
Construction industry	37.3	54.2	8.5
Business and services industry	15.9	70.2	13.9
Education			
Primary school or none	46.3	50.0	3.7
Middle school	15.1	73.3	11.6
High school or above	7.0	78.3	14.8
Residence			
< 5 years	26.7	62.5	10.8
5-9 years	13.0	78.1	8.9
10 years or longer	25.6	62.8	11.6
Hometown			
Eastern provinces	13.5	73.0	13.5
Middle provinces	24.0	67.7	8.3
Western provinces	25.5	61.8	12.7

Source: Shanghai food consumption survey, 2015-2016

Differences in attention to healthy diets by socio-demographic characteristics are shown in Table 4.18. It was found that attention to healthy diets varied most significantly by age, with respondents aged 40 and over much more likely not to pay any attention to healthy diet, and some 62.5 percent of those aged 50 or more claimed to pay "no attention" to healthy diet. Nonetheless, respondents with the following characteristics were more likely to pay a high degree of attention to healthy diets: females; aged younger than 30; earning higher than 5000 yuan per month; worked in the business and services industries; at least finished high school; had spent at least 10 years in Shanghai; came from the eastern provinces.

4.8 Body Mass Index and characteristics of respondents

Table 4.19 shows variations in the Body Mass Index of respondents by their characteristics. It was found that female respondents were more likely to be overweight compared to their male counterparts, with 28.8 percent of females being overweight compared to 22.6 percent of males, although 1.1 percent of males were classified as obese while no females were at this level. However, females also showed a slightly higher likelihood of being underweight, although the share of underweight males and females was minimal.

Substantial age differences in BMI were found. There was a trend that age was negatively related to Body Mass Index. A high 75 percent of the oldest respondents were overweight, compared to only 9.5 percent of the youngest ones. However, 6 percent of respondents aged under 30 were found to be most likely to be underweight, with 6 percent of them were underweight, and no one at older ages.

It was observed that BMI also varied substantially by industry, with respondents working in the construction industry most likely to be overweight and least likely to be underweight, whereas an opposite trend was found among those in the processing and manufacturing industries. Nearly half (47.5 percent) of respondents in construction were found to be overweight, compared to only 16.2 percent of respondents in the processing and manufacturing and 23.8 percent in the business and services industries.

Table 4. 19 Body Mass Index by characteristics of respondents

Characteristics	Body mass index			
	Under weight (%)	Normal rang (%)	Over weight (pre-obese) (%)	Obese (%)
Gender				
Male	0.7	76.7	21.5	1.1
Female	2.4	68.8	28.8	0.0
Age				
<30	6.0	84.5	9.5	0.0
30-39	0.0	87.4	11.9	0.7
40-49	0.0	64.1	35.2	0.8
≥50	0.0	25.0	71.9	3.1
Occupation				
P&M	2.2	81.1	16.2	0.5
C	0.0	50.8	47.5	1.7
B&S	0.7	74.8	23.8	0.7
Income				
≤5000	1.9	67.0	30.2	0.9
>5000	0.6	82.8	16.1	0.6
Education				
Primary school or none	0.9	57.4	40.7	0.9
Middle school	0.6	77.9	20.9	0.6
High school or above	2.6	84.3	12.2	0.9
Perceptions of the importance of healthy diets				
Moderate or low importance	1.3	64.0	33.3	1.3
High importance	1.3	76.6	21.6	0.6
Degree of attention to healthy diets				
None attention	1.2	50.0	47.6	1.2
Low attention	1.5	81.1	17.0	0.4
High attention	0.0	78.0	19.5	2.4

Source: Shanghai food consumption survey, 2015-2016

Income differences in the BMI were slight, with lower income respondents more likely to have an unhealthy BMI. Some 31 percent of lower income respondents were overweight, which was almost twice that of their higher income counterparts. At the same time, respondents with a lower income also had a slightly higher likelihood of being underweight compared to their higher income counterparts. However, it was found that BMI varied substantially by education, with respondents having the lowest education most likely to be overweight. Specifically, a high 41.6 percent of them were underweight, compared to only 13 percent of respondents who had finished high school or higher education, although they showed the same likelihood of being obese.

It was clear that lower awareness of healthy diets tended to relate to unhealthy BMI. Those respondents who indicated low importance to healthy diets were more likely to be overweight, with just over a third (34.6 percent) of them being overweight compared to 22.2 percent of those who perceived healthy diets to be of high importance. The former also showed a slightly higher likelihood of being obese, although they had the same likelihood of being underweight. Similarly, respondents paying no attention to healthy diets were most likely to be overweight. A high 48.8 of those who paid no attention to healthy diets were overweight, compared to only 17.4 percent of those paying low attention and 21.9 percent who paid high attention.

4.9 Conclusion

This chapter addressed basic characteristics of respondents and the associations between them. Hometown, gender, age, education and length of residence were associated with the types of jobs in which respondents were engaged. Males, younger respondents, and respondents from the eastern provinces were more likely to have higher education levels, which increased their likelihood of working in better paid industries such as the business and services, or the construction industry, thus earning a higher income. Those who had lived in Shanghai for a longer period were also more likely to have higher incomes compared to respondents who moved to Shanghai more recently, as they were more likely to work in the business and services industries. Respondents' awareness of healthy diets, examined here, also represents the interrelations between the socio-demographic characteristics. Those who had a higher awareness of healthy diets tended to be females at younger ages, with higher incomes and higher education levels, worked in better paid industries, originated from eastern provinces, and lived the longest in Shanghai. In addition, differences in Body Mass Index tended to follow similar characteristics of respondents, which are assumed to have an impact on respondents' food consumption.

Moreover, the interactions between different characteristics of respondents appear to contribute to the differences in their food consumption patterns. Those different characteristics and relationships between them will be applied in the following chapters to form a complete understanding of respondents' food consumption patterns.

Chapter 5 Patterns of Food Consumption of Rural Migrants in Shanghai

5.1 Introduction

Patterns of food consumption of an individual not only helps shape their status of food security, but also can influence their health condition. Uncovering the contributing factors behind a specific pattern of food consumption can partly explain the food security of a population. This chapter presents a general picture of food consumption patterns of rural migrants according to data collected from a questionnaire survey in Shanghai from October 2015 to March 2016. The chapter consists of five sections, the first section begins with the patterns of three daily meals of participants before and after migration, and then examines the general food consumption patterns of their diets by identifying the commonly consumed food groups at breakfast, lunch and supper. This is followed by identifying the average consumption frequencies of each food group estimated by the participants, and the consumption of each food group is classified into four patterns ("daily", "weekly", "irregularly" or "never") according to the respective consumption frequencies. The third part illustrates respondents' perceptions of the changes in the consumption of each food group after their migration. Following this the analysis explores how the respondents access food sources for daily consumption. The last section shows the calculation of the outcome of food consumption according to a seven-day recall of foods consumed in the diets of respondents, including dietary energy intake, food groups that provided the major daily dietary energy, and the quality of their diets reflected in a food consumption score and (FCS) a dietary diversity score (DDS).

5.2 Consumption patterns of three daily meals before and after migration

This section starts with looking at respondents' consumption patterns before and after migration of three daily meals – their frequencies of having breakfast, lunch and supper. It was found that there was little change in the consumption frequency of the three daily meals, as all respondents claimed to have lunch and supper every day, with only a slight increase found in the everyday consumption of breakfast after migration. There were slight variations in the frequency of having breakfast both before and after migration by socio-demographic characteristics, particular by age.

It is not unusual in China for some people to customarily only have breakfast and supper, and some (particularly young people) are used to having only lunch and supper, as they prefer to sleep rather than to have breakfast and then have some snacks later. Therefore, examining whether the migrants eat three daily meals is necessary for understanding a person's food

consumption pattern. According to the seven-day recall of food consumption by rural migrants, there was no significant change in the frequency of daily meals, with the majority of respondents eating three main meals every day before and after migration. Specifically, 373 respondents (94.4 percent) reported that they had breakfast every day before migrating to Shanghai. This number increased slightly after migration, with 383 rural migrants (96.7 percent) reporting that they had breakfast every day in Shanghai. The number of rural migrants who did not have breakfast before migration was only 10, which reduced to 6 after migration.

Although there was little difference in the frequency of breakfast both before and after migration, there was some variation among age groups. Young migrants (aged 30 and under) were more likely to have breakfast on an irregular basis compared to older participants. All the older respondents claimed to have breakfast every day, only 82.1 percent of the younger respondents did so. After migration, this variation was even more slight with a small increase in the share of young respondents having breakfast every day.

All respondents reported that they had lunch everyday both before and after migration. Many respondents from the construction industry as well as the processing and manufacturing industries, claimed that lunch is the most important meal of the day for them, as they need enough energy to support their work. By contrast, most respondents from the business and services industries claimed that dinner was usually the biggest meal of the day. Although all respondents reported that they had supper every day before migrating, there was only one respondent who claimed to have no supper after migration, and another who had supper only twice per week.

5.2.1 Breakfast before and after migration

In general, the survey found that rural migrants have more substantial lunches and suppers in comparison to their breakfasts both before and after migration. Table 5.1 shows a comparison of major changes in food consumption at breakfast before and after migration. Although it appears that respondents had a lighter breakfast after migration, some 20 percent of respondents claimed that they used to have a relatively rich breakfast before migrating which often included the consumption of eggs, meat and vegetables, which was not as substantial as their lunch and supper. However, after migration, most of the respondents claimed that they just had a light breakfast and a substantial lunch and supper. The major reason for this change, according to the respondents, was that '*they now just do the same as urban residents*'. In other words, they actually follow the urban pattern of breakfast, by purchasing foods for breakfast instead of

home preparation, a major shift from the rural pattern of breakfast before their migration. In the early morning, people queue in front of a breakfast bar to buy their breakfast (usually Baozi /Chinese cruller with porridge/soy milk or noodles), and then either take it away or eat there, which is a characteristic of breakfast in most Chinese cities. Another reason reported was the lack of time for cooking breakfast themselves. They used to be able to enjoy breakfast prepared by their wives, the person who usually prepared three meals a day for them. However, after migration, some of them lived alone in Shanghai as their wives were left behind in their hometown. Although 38 percent of respondents did live with their spouses or partners in Shanghai at the time of survey, they were all working full-time, and thus choose to purchase breakfast outside for the sake of convenience. Therefore, it was found that there was a decrease in the respondents eating rice, meat, eggs, vegetables and legumes at breakfast after migration.

Table 5. 1 Comparison between breakfast before and after migration

Food items	% of cases after migration	% of cases before migration
Porridge	75.6	67.6
Steamed bun	68.4	49.6
Eggs	14.9	23.0
Vegetables	3.1	21.0
Rice	1.3	18.2
Noodle	18.0	18.2
Baozi	43.2	18.2
Pickles	10.8	15.2
Chinese cruller	30.3	13.4
Pork	0.5	11.9
Legumes	0.5	11.6
Soy milk	30.8	9.6
Fungus	0.5	9.6
Fish	0.5	7.6
Seaweeds	0.0	5.8
Pasty	18.8	5.3
Milk	11.6	4.3
Poultry	0.3	4.3
Sweet potato	3.6	4.1
Corn	2.6	3.9

Source: Shanghai food consumption survey, 2015-2016

Another reason for such a change in the pattern of breakfast is the shift in work patterns away from a labour intensive work style in the rural area to a capital intensive one in the urban area. This is a common phenomenon concomitant with urbanisation as it occurs throughout the world (Popkin 1999). Many migrants in the survey claimed that they used to do a lot of farm work in

the field at dawn, so they needed to have a rich breakfast to replenish their energy to keep active until lunch. However, their work pattern changed to a more sedentary one when they migrated to the city, given that most of them worked in machine assisted jobs or service jobs that require lower physical activity, therefore a lighter breakfast is enough to cover their energy expenditure.

As more respondents chose to buy their breakfast from nearby stalls or restaurants rather than prepare it themselves, the proportion of respondents who consumed Chinese cruller and Baozi more than doubled after migration, increasing from 13.4 to 30.3 percent in respect to Chinese cruller and from 18.2 to 43.2 percent for Baozi. This was similar for other foods including soy milk, and pasty and the like, as the consumption of these foods more than tripled after migration. The preparation of all those foods is time consuming, and they are much easier to be accessed by consumers in cities owing to the well-developed transportation system and ubiquitous markets and shops. Whereas in rural areas, food markets are quite dispersed and often far from dispersed households. It is not practical for most remote rural residents to buy their breakfast from markets which usually takes them at least one hour to travel there by bus or longer if walking. Therefore, consumption of soy milk was much more popular among rural migrants after migration, soaring from 9.6 percent to 30.8 percent. Another food item worth mentioning here is pasty, one of the food items commonly consumed in urban breakfasts in China, which shows a nearly fourfold increase in consumption among the rural migrants (from 5.3 percent to 18.8 percent after migration). Although less respondents consumed eggs at breakfast after migration, dropping from 23 percent to 14.9 percent. By contrast, porridge and steamed bun were the two most popular foods eaten by migrants at breakfast both before and after migration, 75.6 percent and 68.4 percent of respondents respectively reported the consumption of those two food groups. As they are easier to prepare compared to other food items such as Chinese cruller and Baozi.

5.2.2 Lunch before and after migration

A comparison of food consumed at lunch before and after migration is presented in Table 5.2. Food groups consumed by 80 percent or more of rural migrants were considered to be the commonly consumed food groups. It must be noted that food groups consumed by less than one percent of the respondents are not indicated here.

Before migration, it was found that the commonly consumed food groups at lunch included vegetables, pork, eggs, fish, legumes, which were consumed by at least 85 percent of

respondents. However, the consumption of all those food groups after migration was even higher, with the greatest increase in fish consumption, increasing from 85.1 percent before migration to 98.7 percent after migration. However, rice was the primary staple food for lunch both before and after migration for the majority of migrants in the survey. Vegetables remained the most popular food consumed by all of the migrants, a very marginal increase from 99.7 percent before migration.

Table 5. 2 Comparison between lunch before and after migration

Food items	% of cases after migration	% of cases before migration
Vegetables	100.0	99.7
Pork	99.2	97.5
Rice	98.7	86.1
Fish	98.7	85.1
Eggs	95.2	93.4
Legumes	93.2	92.2
Fungus	92.2	79.2
Poultry	91.6	55.9
Other aquatic products	55.9	33.7
Beef	45.3	17.2
Seaweeds	39.5	35.2
Mutton	5.1	2.5
Noodle	2.0	18.5

Source: Shanghai food consumption survey, 2015-2016

There was also an increase in the reported consumption of foods such as beef, poultry meat, other aquatic products and fungus. The largest increase was in the consumption of poultry meat, which became a new popular food group for lunch after migration, with consumption increasing from 55.9 percent to 91.6 percent after migration, an increase of over one third. According to respondents, they had raised a herd of chicken or ducks (most often chickens) at their rural homes for their own consumption and for entertaining guests at important festivals. That is probably why just over one third of them often consumed poultry meat before migration. However, after migration, it was easier for them to consume poultry meat which is more readily available and affordable for them with higher incomes, as 87.6 percent of the respondents claimed that they earned more after migration. Moreover, respondents who worked in the construction, processing and manufacturing industries were highly likely to consume poultry meat, as they bought lunch every day from the canteen run by their employer, and poultry meat was common in these canteen meals.

The second greatest increase was found in beef consumption, increasing from 17.2 percent before migration to 45.3 percent after migration. Although nearly a thirty-percent increase in consumption, beef was still not a common food at lunch, as it was consumed by less than half of the rural migrants in the survey. Meanwhile, the share of respondents reporting consumption of other aquatic products excluding fish such as shrimp, crabs and shellfish, most often shrimp, increased from just over one third (33.7 percent) to 55.9 percent. Although the increase in the consumption of fungus increased by just 13 percent (from 79.2 percent before migration to 92.2 percent after migration), it was another new popular food group at lunch after migration. A general increase in incomes can account for much of the increased popularity of these foods. It should be noted that respondents consuming mutton remained small both before and after migration, due largely to its high price. At lunch, noodle was the only food in which consumption decreased after migration, this may be due to the fact that most respondents had to buy lunch from the canteen of their workplaces where noodle was not that common.

To sum up, therefore, rural migrants in the survey have more diverse diets at lunch after migration, as the major food groups consumed at lunch increased for rice, vegetables, pork, eggs, fish, and legumes before migration with the addition of poultry meat and fungus after migration. Although beef and other aquatic products were not that popular at lunch in comparison to the top seven most commonly consumed food groups, the reporting rate of their consumption increased substantially among the respondents after migration. Actually other aquatic products was a commonly consumed food group at lunch for over 50 percent of surveyed rural migrants.

5.2.3 Supper before and after migration

Table 5.3 compares food consumption patterns at supper before and after migration, which were similar to those as described for lunch. This is because most rural migrants in the survey reported that they ate the same foods at supper as they had eaten at lunch both before and after migration. Therefore, diets at supper before migration tended to be a combination of rice, vegetables, pork, eggs, legumes and fish, while after migration, the majority of respondents added poultry meat and fungus into their diets. Vegetables were also most popular, although the share of respondents reporting regular consumption at supper was slightly lower than at lunch.

Table 5. 3 Comparison between supper before and after migration

Food items	Percent of cases after migration	Percent of cases before migration
Vegetables	99.7	99.2
Pork	99.2	97.0
Rice	98.7	86.1
Fish	98.5	84.3
Eggs	94.9	92.4
Legumes	92.9	91.1
Poultry	91.9	55.9
Fungus	91.6	79.2
Other aquatic products	57.0	32.2
Beef	44.6	17.2
Seaweeds	39.0	34.2
Mutton	5.1	2.5
Noodle	2.3	17.0

Source: Shanghai food consumption survey, 2015-2016

5.3 Snacking habits

The survey found that all the participants reported that they had snacking habits. The majority of them (73.9 percent) claimed to snack at night, followed by just 23.8 percent in the afternoon and 18.2 percent in the morning. Only one percent of respondents claimed that they snacked after 10 pm. Specific snacks consumed by respondents at different times of the day are presented in Table 5.4.

The top four most popular snacks among respondents were fresh fruits, puffed foods (foods processed by high temperature and high pressure, such as popcorn), nuts and candies. Fresh fruit enjoys predominantly high popularity in different snacking times of the day, with the reporting rates of consumption in the morning, afternoon and at night 80.6 percent, 71.3 percent and 94.5 percent respectively. These are followed by rather low reporting rates of consumption of other snacks, with no more than one third of the respondents mentioning the second most popular snacks in different times of the day (candies in the morning, puffed foods in the afternoon and nuts at night).

Table 5. 4 Foods snacked at different times of the day (multi responses)

Food groups	Morning (%)	Afternoon (%)	Night (%)	Late night (%)
Candies	18.1	1.1	0.7	0.0
Nuts	1.4	13.8	24.7	0.0
Puffed food	8.3	29.8	7.9	0.3
Desserts	0.0	6.4	0.3	0.5
Preserved fruits	1.4	3.2	0.7	0.0
Fresh fruits	80.6	71.3	94.5	0.5

Note: foods consumed by less than 1 percent of the respondents were not presented, including bean products, squid and chocolate.

Source: Shanghai food consumption survey, 2015-2016

5.4 Frequency of consumption of major food groups and drinks

How frequently foods are consumed is an important indicator of food consumption pattern, as it indicates which food groups are popular in a person's diets. This also reflects the food security status by dietary energy availability, food diversity and the like. Rural migrants in the survey were asked to estimate their frequency of consumption of foods in Shanghai and the specific times of consumption according to the specified categories (every day/every week/ every month/every year)[3]. For instance, if the respondents claimed that they consumed a specific food group every day, they were asked to report the specific times of consumption. Respondents' responses of their consumption frequencies of each food group were grouped into five consumption patterns: daily [4] consumption; weekly [5] consumption; monthly [6] consumption; yearly[7] consumption; and never[8] consumed.

A food group consumed at least once per week is considered as an "essential" food group in the respondents' diets given its high popularity. An earlier study about Chinese diet by Wu (2004) pointed out that cereals, meats, aquatic products, fruits and vegetables make up a typical Chinese diet. Consistent with this finding, the survey found that there were five essential food groups in respondents' diets: vegetables, animal meat, fruits, fish and poultry meat. The first three were the most frequently consumed food groups, as they had the highest percentage of

[3] Note: consumption frequency of staple foods was not examined in the survey, as people in China eat staple foods every day.

[4] Respondents in the "daily" consumption group consume a food group every day and at least once per day.

[5] Respondents in the "weekly" consumption group consume a food group at least once per week but less frequently than once per day.

[6] Respondents in the "monthly" consumption group consume a food group at least once per month but less frequently than once per week.

[7] Respondents in the "yearly" consumption group consume a food group at least once per year but less frequently than once per month.

[8] Respondents in the "never" group reported to have never consumed the food group.

respondents reporting consumption every day. The specific consumption frequencies of different food groups are presented in Table 5.5. All the respondents reported that they consumed vegetables on a daily basis, and 99.5 percent of them consumed them twice per day. This is perfectly understandable, as vegetables are generally cheaper than other foods. The second most frequently consumed food group, animal meat, was consumed every day by 82.5 percent of the respondents, while all of the rest tended to eat animal meat at least once per week, accounting for 16.5 percent of the respondents. Nearly half (45.3 percent) of the respondents indicated that they consumed animal meat twice per day. Fruit was consumed less frequently in comparison with vegetables and animal meat, as just 51.9 percent of respondents consumed fruit every day, with only 5.9 percent consuming fruits twice per day, while the rest (46.6 percent) reported weekly consumption of fruits.

Fish and poultry meat were mainly consumed weekly, with only 1.3 percent of the surveyed migrants consuming fish once per day, while the majority (92.9 percent) consumed fish on a weekly basis. A high 63.5 percent of the respondents consumed it 2-4 times per week, with those consuming it twice a week accounting for 37.2 percent. Another weekly consumed food group was poultry meat, with 62 percent of the respondents consuming it on a weekly basis, and 39 percent indicating that they eat it once a week.

Other aquatic products were consumed much less frequently, and nobody reported that they consumed it daily, with only a small percentage (17 percent) of participants reporting that they did so weekly. However, it was more likely to be consumed monthly, with a reporting rate of 40.3 percent. Nevertheless, the share of respondents consuming other aquatic products on a yearly basis was high at 40.8 percent, almost the same as those who reported “monthly” consumption. Milk and milk products were less frequently consumed by respondents in comparison with other aquatic products. Although one in ten respondents consumed milk and milk products every day, more than half (55.7 percent) of them consumed them less frequently than once a month.

Table 5. 5 Percentage distribution of consumption frequencies for different food groups

Food items	Consumption frequencies (%)				
	Daily	Weekly	Monthly	Yearly	Never
vegetables[9]	100.0	0.0	0.0	0.0	0.0
Animal meat[10]	82.5	16.5	0.8	0.3	0.0
Fruits	51.9	46.6	1.0	0.5	0.0
Milk and products	11.6	24.1	8.6	34.4	21.3
Alcohol	3.5	21.3	18.0	26.3	30.9
Soft drinks	2.5	17.7	15.9	42.8	21.0
Poultry meat[11]	2.0	62.0	27.8	8.1	0.0
Fish	1.3	92.9	5.1	0.5	0.3
Puffed food	1.0	17.0	11.6	40.0	30.4
Animal organs[12]	0.8	14.2	19.7	23.3	42.0
Sweets	0.3	7.3	29.4	52.2	10.9
Other aquatic products[13]	0.0	17.0	40.3	40.8	2.0
Fast food	0.0	0.8	3.0	45.8	50.4
Processed food	0.0	2.0	6.6	47.8	43.5

Source: Shanghai food consumption survey, 2015-2016

Food groups that are considered to be not that healthy, particularly fast food, processed food, soft drinks and alcohol, were all consumed on an irregular basis, as more than sixty percent of respondents reported consuming them less frequently than once a month. Fast food was the least frequently consumed food group, with 50.4 percent of respondents indicating that they had never consumed it, while 45.8 percent had done so once or twice a year. This is not just because fast foods are high-fat products as they are usually deep fried, more importantly, they are more expensive than meals in ordinary restaurants. Similarly, nearly half (43.5 percent) of

[9] This food group includes all non – meat food items such legumes and fungus.
[10] Animal meat mainly refers to pork meat, as according to respondents' report, it is the most commonly consumed animal meat. Beef and mutton are not common in their diets due to their much more expensive prices.
[11] Poultry meat mainly refers to chicken and duck meat which are the most commonly consumed poultry meat in China.
[12] Organs of animals that can be consumed as food by humans, such as liver, kidneys, heart, brain etc.
[13] Other aquatic products include shrimps, shellfish and crabs etc.

the respondents reported that they had never consumed processed food, while 47.8 percent consumed it only on a yearly basis. However, alcohol was more likely to be consumed at higher frequencies compared to fast food and processed food. Although only 30 percent of respondents said they had never drank alcohol, more than 40 percent of them had done so at least once a month, with 21.3 percent drinking it every week. Soft drinks were even less frequently consumed compared to alcohol, although only 21 percent of the respondents reported that they had never consumed it, while the share of respondents reporting yearly consumption was as high as 42.8 percent in comparison with 26.3 percent for alcohol. Moreover, reporting rates of consumption at other frequency levels were all lower than that of alcohol. This was similar for sweets, with as many as 52 percent of respondents consuming them on a yearly basis, and only 7.3 percent of the participants eating them every week, which was much lower than for alcohol and soft drinks.

Although many animal organs are rich in micronutrients, they were irregularly consumed by the respondents, with 42 percent of them having never eaten them. Nearly a quarter of the respondents claimed to have eaten animal organs only on a yearly basis (usually 3-5 times a year), and only 14 percent of them consumed them every week, with less than one percent every day.

It must be noted that, in addition to staples, vegetables, animal meat and fruits were consumed daily, while fish and poultry meat were consumed weekly, and other aquatic products were consumed at least once a month by over half of the respondents. Milk and milk products, as well as alcohol were even less popular than other aquatic products, with less than half of the respondents reporting that they consumed them at least once a month, and even less reporting "daily" and "weekly" consumption. Fast food and processed food were not popular among rural migrants in the survey, and played a very small part in their diets.

Table 5.6 indicates that the general consumption pattern of the respective food groups shows the impact of food prices. Information of the prices of commonly consumed food items were collected by visiting some local farmer's food markets and supermarkets in Shanghai, therefore slight variations from unvisited markets may exist. Nonetheless, those variations would not influence the general price ranking of food groups in Shanghai. There was generally a positive association between price and consumption frequency of a food group. Those food groups consumed daily were generally cheaper than other food groups that were less frequently consumed. Vegetables were the cheapest food group, which explains why they were most

frequently consumed. Beef and mutton are much more expensive than pork, as was the case with other aquatic products compared to fish. Therefore, pork was the most commonly consumed variety of animal meat, and fish was more frequently consumed than other aquatic products. Although poultry meat was almost the same price as pork, it was less frequently consumed by participants in the survey, indicating a lower preference for poultry meat.

Table 5. 6 Range of prices of commonly consumed food items/food groups

Food items	Range of prices (Yuan)
Vegetables	2-20 /kg
Pork	28-45 /kg
Beef	50-120 /kg
Mutton (domestic)	160-200/ Kg
Chicken meat	28-45/kg
Duck meat	10-30 /Kg
Milk (ordinary)	10-20/litre
Yoghurt (ordinary)	2-5/ cup (100-250 ml)
Fish	8-80 /kg
Other aquatic products	50-200 /kg
Soft drinks (ordinary)	4-10/ bottle (500-600 ml)
Beer (domestic)	4-10/ bottle (500 ml)
Beer (imported)	12-26/ bottle (300 ml)
Liquor (ordinary)	10-40 /bottle (500-700 ml)
McMeal at McDonalds (or Equivalent Combo Meal)	20-40/person
Restaurant meal (ordinary)	15-30/ person
Common fruits	5-30/Kg

Source: Shanghai food consumption survey, 2015-2016

5.5 Perceptions of changes in the consumption of food groups before and after migration

Rural migrants in the survey were asked to make a comparison between how frequently they consumed specific food groups before and after migration. They were asked to answer the question "*Has your consumption of the following foods increased/reduced/stayed the same*

since your migration?" It was found that the frequency of consumption of all the food groups stayed generally the same. More than 90 percent of them consumed the following food groups as frequently as they did before migration: staple foods, sweets, vegetables, soft drinks, puffed foods, fruits and alcohol. Meanwhile, more than 75 percent of respondents reported that they had not changed how frequently they consumed animal organs, fast food and milk and milk products had not changed since their migration. Moreover, the majority (50-70 percent) of surveyed rural migrants claimed to have not changed how frequently they consumed fish, animal meat and other aquatic products.

Most importantly, around half (49.4 percent) of the respondents reported an increase in their consumption of fish and poultry meat, while just over one third reported consuming animal meat and other aquatic products more frequently after migration. For milk and milk products, 22.8 percent of respondents reported an increased frequency after migration. This was similar to the consumption of fast food and animal organs, with 16.2 percent and 13.2 percent of respondents respectively reporting that they had consumed them more often. For food groups including fruits, alcohol, soft drinks, puffed foods, vegetables, processed food, sweets and staple foods, the reporting rates of increased consumption frequencies were all lower than ten percent.

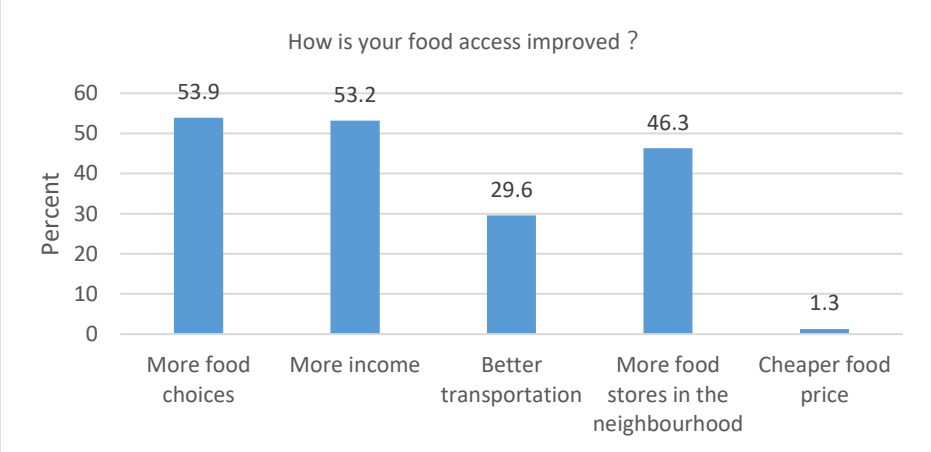
There were still some respondents who reported that their consumption had decreased in respect to several food groups: processed food, alcohol, animal meat, vegetables, fish, puffed food, milk and milk products, poultry meat and staple foods. Nevertheless, the reporting rates for all those food groups are under one percent except for processed food, with 2.5 percent of respondents reporting a reduced frequency of consumption.

5.6 Generally perceived improvement in food access after migration

Respondents were asked to describe their perceptions on the differences in their food access before and after migration to Shanghai. Almost two-thirds (63 percent) of respondents reported improved food access after migration to Shanghai, the remainder claimed that their access to food was the same as before. Those who perceived an improvement in their food access were asked to answer the question "*How do you think your food access is improved?*". Figure 5.1 shows the reasons for their improved food access, "*more food choices*", "*more income*", "*more food stores in the neighbourhood*", "*better transportation*" and "*cheaper food prices*". The first three were regarded as the top three aspects of improvement in their food access, some 53.9 percent, 53.2 percent and 46.3 percent respectively mentioned them. Better transportation was

reported by 29.6 percent of respondents as the fourth reason for improved access to food, and only 1.3 percent perceived "cheaper food price" as contributing to their improved food access. This implies the trend of improvement in both physical and economic food access of respondents after migration to Shanghai.

Figure 5. 1 Reasons for the improvement of food access perceived by the respondents



Source: Shanghai food consumption survey, 2015-2016

5.7 Food sources: nearby farmer's market is the predominant food source

The top three sources of food consumed by respondents were nearby farmer's market, supermarket and informal market (street stalls or hawkers). More than half the respondents bought food from those three sources. Table 5.7 shows the sources of food mentioned by the respondents and the specific percentage that each source covered for their daily consumption. Specifically, 90.6 percent of the surveyed rural migrants bought food from a nearby farmers' market, with 69.9 percent buying food from them to cover at least 50 percent of their daily food requirements. Among them, almost one third of respondents bought food from a nearby farmer's market to cover 80 percent or more of their daily food consumption. Respondents buying food from supermarkets accounted for 83 percent of respondents, but over half of them did so to cover 20 percent or less of their daily consumption. However, foods bought from supermarkets covered at least 50 percent of daily consumption for only 3.7 percent of the participants. Almost half (46.8 percent) of the migrants in the survey said that they had bought food from street stalls or hawkers, but that had only covered no more than 20 percent of the daily food consumption for 44.5 percent of the respondents, with most of them covering only five to ten percent.

Table 5. 7 Sources of food for the daily consumption of rural migrants in Shanghai

Food sources	Percentage covering daily food consumption			
	None	1-20	21-50	≥50
Bought from farmer's market	9.4	17.7	3.0	69.9
Bought from super market	17.0	57.7	21.6	3.7
Bought from informal market	53.2	44.5	1.8	0.5
Bought from restaurants	69.6	24.8	3.6	2.0
Bought from canteen at workplace	79.0	0.8	2.5	17.7
Food from rural family	99.7	0.3	0.0	0.0

Source: Shanghai food consumption survey, 2015-2016

It was also found that 21 percent of respondents bought food from the canteen in their workplace, this was a major source for daily food consumption for 17.7 percent of them. Similarly, almost one third of respondents bought food from restaurants, but that covered just a small proportion of their daily food consumption, and 24.8 percent of them claimed that restaurant food covered no more than 20 percent of their daily consumption. Case studies in Africa (Frayne 2004, 2007, 2010; Pendleton et al. 2014) revealed that rural to urban food transfers play an important role in offsetting vulnerability to food insecurity in the urban context through the migration system. Food obtained from rural families and relatives contributed to a considerable part of rural-urban migrants' food consumption, with cereals playing the most dominant role. However, this is basically not the case for the migrants in this study. Only 0.3 percent of the respondents reported that they did receive or bring food from their rural family before Chinese New Year festival (usually preserved meat), but this only covered 5 percent of their yearly consumption.

5.8 Outcome of food consumption: results based on a 7-day recall

5.8.1 Food consumption profile: food consumption score (FCS) and dietary diversity score (DDS)

Respondents were asked to recall their food consumption over the 7 days prior to the survey, which was interpreted as a specific food consumption score[14]. According to the guidelines of WFP, respondents were grouped into three different consumption levels according to their food consumption scores: "Poor" (0-21); "Borderline" (21.5-35); "Acceptable" (>35). Table 5.8 shows that according to the 7-day recall of respondents, 87.8 percent of them were at an

[14] Food Consumption Score (FCS) is developed by World Food Programme (WFP) based on dietary diversity and food frequency. It is calculated by multiplying the consumption frequency of a food group (number of days consumed) with the weight of this food group based on its nutrition density (WFP 2008). For detailed introduction about FCS and DDS, please refer to Methodology chapter.

"acceptable" consumption level, with none having poor diets and just 12.2 percent of them being "borderline".

Table 5. 8 Food consumption score for respondents

Food consumption score	Frequency	Percent
Borderline	48	12.2
Acceptable	347	87.8
Total	395	100.0

Source: Shanghai food consumption survey, 2015-2016

The dietary diversity score for each respondent is calculated by summing all the food groups consumed during the reference week. Food groups used for the calculation are listed in Table 5.9. The average dietary diversity for the respondents was 8.4 ±1.2, and the maximum score was 11. Therefore, respondents with a dietary diversity score of 7-8 were considered as having medium dietary diversity, a diversity score of 9-11 was considered as having good dietary diversity, and those respondents who had consumed less than 7 food groups during the reference period were defined as having poor dietary diversity.

Table 5. 9 Food groups used from the questionnaire to create dietary diversity score

	Food groups		
1	Staples (cereals & grains)	7	Vegetables
2	Animal meat	8	Fruit
3	Poultry meat	9	Legumes
4	Fish	10	Eggs
5	Other aquatic products	11	Milk & milk products
6	Fungus		

Note: dietary diversity score is the sum of the number of food groups consumed by respondents over a 7-day period.
Source: Shanghai food consumption survey, 2015-2016

Table 5.10 shows that the majority of respondents had medium to good dietary diversity, with 94.9 percent of them consuming at least 7 food groups over the week prior to the survey. The share of respondents consuming at least 8 food groups was high at 76.4 percent. Nearly half (48.9 percent) of the respondents were concentrated at the medium level of dietary diversity, while the share of respondents having good dietary diversity was also high at 46 percent, with 26.3 percent of them consuming 9 food groups over the 7 day period. Some 3.8 percent of the respondents had diets that covered all the food groups during the reference week.

Table 5. 10 Dietary Diversity Score of respondents

Dietary diversity score	Frequency	Percent
5.00	2	0.5
6.00	18	4.6
7.00	73	18.5
8.00	120	30.4
9.00	104	26.3
10.00	63	15.9
11.00	15	3.8
Total	395	100.0

Note: the dietary diversity score is the sum of the number of food groups consumed by respondents over a 7-day period.

Source: Shanghai food consumption survey, 2015-2016

Food diversity by the number of types of food consumed within each food group is shown in Table 5.11. The majority of respondents consumed no more than 3 types of foods within each food group, except for vegetables. Almost three quarters (74.4 percent) of respondents consumed at least 6 types of vegetables during the period. More than half (51.4 percent) of them consumed more than 7 types of vegetables, with a high 41.8 percent consuming at least 9 types of vegetables such as Bok choy, wax gourd, lettuce, bitter melon, cucumber, carrots, tomatoes, lotus root, and Chinese cabbage that are in high demand Shanghai.

Table 5. 11 Food diversity within each food group

Food groups	None	1 type	2 types	3 types	4 types	≥5 types
Staple food	0.0	19.0	69.9	10.1	1.0	0.0
Animal meat	0.5	56.7	35.7	6.3	0.8	0.0
Poultry meat	36.7	50.4	12.9	0.0	0.0	0.0
Fish	4.3	58.2	27.3	9.4	0.8	0.0
Other aquatic	85.6	14.4	0.0	0.0	0.0	0.0
Fungus	25.8	32.4	21.0	13.4	4.8	2.5
Fruits	5.8	25.6	47.8	14.7	5.1	1.0
Legumes	7.1	17.0	24.6	27.3	13.9	10.1
Vegetable	0.0	0.0	2.8	6.1	8.1	83.0

Source: Shanghai food consumption survey, 2015-2016

Dietary diversity varied by socio-demographic characteristics, and those differences are shown in Table 5.12. Substantial variations were found by age, occupation and education, whereas only slight variations were observed by income and gender. Just as expected, it was found that the diversity in diets was positively associated with education and income, while negatively with age. Females and those who worked in the business and services industries also tended to have more diverse diets compared to males and respondents working in other industries.

Table 5. 12 Dietary diversity by major demographic characteristics

Socio-demographic characteristics	Number of food groups consumed						
	5	6	7	8	9	10	11
Occupation							
P &M (N=185)	0.5	5.9	21.1	36.8	21.6	11.9	2.2
C (N=59)	0.0	6.8	15.3	15.3	37.3	22.0	3.4
B & S (N=151)	0.7	2.0	16.6	28.5	27.8	18.5	6.0
Education							
Primary school or none	0.9	11.1	32.4	30.6	18.5	4.6	1.9
Middle school	0.6	2.3	16.9	30.2	28.5	17.4	4.1
High school or above	0.0	1.7	7.8	30.4	30.4	24.3	5.2
Income							
≤5000	0.9	7.4	21.4	30.7	26.5	10.2	2.8
>5000	0.0	1.1	15.0	30.0	26.1	22.8	5.0
Gender							
Male (N=270)	0.7	4.4	17.4	33.7	24.4	14.8	4.4
Female (N=125)	0.0	4.8	20.8	23.2	30.4	18.4	2.4
Age							
<30 (N=84)	0.0	0.0	8.3	22.6	38.1	23.8	7.1
30-39 (N=151)	0.0	5.3	14.6	33.1	27.2	17.2	2.6
40-49 (N=128)	0.8	5.5	27.3	32.8	19.5	11.7	2.3
≥50 (N=32)	3.1	9.4	28.1	28.1	18.8	6.3	6.3

Note: P&M refers to Processing &Manufacturing industry; C refers to construction industry; B&S refers to Business & services industry

Source: Shanghai food consumption survey, 2015-2016

Dietary diversity by age. There was a significantly negative correlation between age and dietary diversity (r (393) = -0.256, p=0.00<0.01). There was a decrease in the share of respondents with high diversity levels (9 and 10) as age increased. Specifically, the youngest respondents had higher diversity in their diets, while their older counterparts, particularly those who were aged 40 and over tended to have medium dietary diversity. The share of the youngest respondents who had consumed at least 9 food groups during the week was high at 69 percent, which was more than twice that of the older respondents. Furthermore, almost a third (30.9 percent) of the youngest respondents consumed 10-11 food groups, whereas only 12.6 percent of the oldest respondents did so.

Dietary diversity by industry of occupation. Dietary diversity varied significantly by industry (r_s (393) = 166, p=0.001<0.01). It was found that participants in the processing and manufacturing industries had diets that were less diverse compared to their counterparts working in the construction industry, as well as the business and services industries. More than half of those in the processing and manufacturing industries had no more than 8 food groups

in the past 7 days when they were surveyed, while more than half of those in other industries had at least 9 food groups in the reference period. Construction workers had the highest likelihood of high dietary diversity, with 62.7 percent of them consuming at least 9 food groups during the past 7 days. That was followed by 52.3 percent from the business and services industries sharing the same level of dietary diversity, while only 35.7 percent of those from the processing and manufacturing industries did so. Moreover, around a quarter of those who worked in the construction industry and the business and services industries claimed to have consumed 10-11 food groups, which was more than twice that of those in the processing and manufacturing industries. Income distribution within each industry group helps to explain this dietary diversity trend, as respondents in the construction industry and business and services industries were more likely to earn more than 5000 yuan per month, and therefore more likely to afford more diverse diets.

Dietary diversity by education. There was a trend that respondents with higher education levels were more likely to have more diverse diets, with better-educated migrants tending to have diets with high dietary diversity. Such a trend was statistically significant (r_s (393) = 0.219, p=0.00<0.01). A substantial percentage (75 percent) of respondents with a low education level consumed less than 9 food groups, while more than half of those with an education of middle school or above consumed at least 9 food groups in the reference period. Furthermore, there were still 12 percent of the respondents with the least education that had diets with poor diversity, which was four times that of their counterparts with higher education levels. This is because less educated respondents were less likely to earn higher incomes, which would reduce their ability to afford good diversity in their diets.

Dietary diversity by income. It is not surprising that respondents with a higher income level had a higher likelihood of having greater diversity in their diets compared to those with lower incomes (r_s (393) = 0.231, p=0.00<0.01). Although more than half of the higher income respondents consumed at least 9 food groups during the week, only 39.5 percent of lower income respondents did so. The two income groups had almost the same share (just over a quarter) of respondents consuming 9 food groups, however, the disparity increased when the number of consumed food groups increased. As the share of higher-income respondents consuming 10-11 food groups during the week was more than twice that of lower-income respondents. However, a significantly negative relationship was found between the amount of remittances and dietary diversity (r (393) = -0.256, p=0.00<0.01).

Dietary diversity by gender. Female respondents showed a slightly higher likelihood of having more diverse diets during the past week, as more than half of them consumed at least 9 food groups, compared to 43.6 percent of males. However, a slightly higher percentage of males consumed 11 food groups compared to females, although the reporting rate was very small.

5.8.2 Dietary energy intake

Energy provided by the diets of each respondent was calculated based on their recall of the amount and frequency of each food item consumed over the 7 days prior to the survey, plus secondary data on energy provided by each food item applied from the food composition database of China Food Nutrition Network. As it is difficult for the respondents to recall the specific weight of oil they consumed during the period, this research used the average yearly oil consumption weight of the national population from NBS (National Bureau of Statistics of China) to calculate respondents' daily oil consumption and energy provided. Although data on snacks, except fruits, were not collected for the calculation, the resulting energy loss is negligible given the small share of respondents consuming other snacks. According to FAO, the "Minimum Dietary Energy Requirement" (MDER) for Chinese adults during the period 2014-2016 is 1901 kcal/caput/day, and the "Average Dietary Energy Requirement"(ADER) is 2445 kcal/caput/day (FAO 2015). However, according to the recall of respondents about their food intakes in the past seven days, almost half (49.6 percent) of them had diets supplying energy lower than 1901 kcal per day (Table 5.13). In other words, there are 49.6 percent of respondents who could be classified as undernourished[15] or vulnerable to food insecurity. What is more alarming is that only 10.4 percent of respondents meet the Average Dietary Energy Requirement.

Table 5. 13 Daily dietary energy intake of respondents

Levels of energy supply	Percent
< Minimum Dietary Energy Requirement	49.6
Minimum Dietary Energy Requirement - Average Dietary Energy Requirement	40.0
≥Average Dietary Energy Requirement	10.4
Total	100.0

Source: Shanghai food consumption survey, 2015-2016

[15]According to the definition by FAO, undernourished people refers to "the population whose dietary energy consumption is less than a pre-determined threshold. This threshold is country specific and is measured in terms of the number of kilocalories required to conduct sedentary or light activities. The undernourished are also referred to as suffering from food deprivation." (FAO 2008)

Differences in dietary energy supply between respondents by their demographic characteristics including their body mass index were further examined, and presented in Table 5.14. It was found that dietary energy intake varied greatly by gender, income and occupation, with the greatest variation found between males and females, while only moderate age differences were observed.

Table 5. 14 Daily energy intake by major demographic characteristics

Socio-demographic characteristics	Levels of daily energy intake		
	<MDER	MDER-ADER	≥ADER
Gender			
Male (N=270)	36.3	48.9	14.8
Female (N=125)	78.4	20.8	0.8
Age			
<30 (N=84)	57.1	31.0	11.9
30-39 (N=151)	43.0	47.7	9.3
40-49 (N=128)	53.1	35.9	10.9
≥50 (N=32)	46.9	43.8	9.4
Income			
≤5000	61.4	34.4	4.2
>5000	35.6	46.7	17.8
Education			
Primary school or none (N=108)	55.6	37.0	7.4
Middle school (N=172)	49.4	38.4	12.2
High school or above (N=115)	44.3	45.2	10.4
Occupation			
P &M (N=185)	45.4	43.2	11.4
C (N=59)	37.3	40.7	22.0
B & S (N=151)	59.6	35.8	4.6
BMI			
Under weight	1.5	1.3	0.0
Normal range	72.4	77.2	70.0
Overweight (pre-obese)	25.0	20.9	29.3
Obese	1.0	0.6	0.0

Note: P&M refers to Processing &Manufacturing industry; C refers to construction industry; B&S refers to Business & service industry. MDER refers to "Minimum Dietary Energy Requirement"; ADER refers to "Average Dietary Energy Requirement". BMI refers to Body Mass Index.

Source: Shanghai food consumption survey, 2015-2016

Gender differences of daily energy intake. The spearman correlation indicated that gender and daily energy intake was significantly correlated (r_s (393) = -0.472, p=0.00<0.01). Male respondents were more likely to have higher dietary energy intake compared to females. Nearly 80 percent of females had diets supplying energy that were under the minimum dietary energy requirement by FAO, compared to just over one third of males. Nearly half of the male participants had diets that met the minimum dietary energy requirement, which was more than twice that of females. Moreover, almost 15 percent of dietary energy intake for males reached,

or was over the average dietary energy requirement, while for females it was under 1 percent. Such variation is related to the occupational industry in which males and females were likely to work. As male migrants were more likely to work in the construction industry that involved heavy activities. Differences in energy intake may also help explain why females showed a slightly higher likelihood of being overweight compared to males.

Age differences of daily energy intake. The youngest respondents showed the highest likelihood of having diets that could not supply the minimum amount of energy required for an individual. They actually showed a tendency of having dietary energy intake under the minimum requirement, with 57.1 percent of the youngest respondents at this level. Those who were aged in their 30s were most likely to have energy intake meeting the Minimum Dietary Energy Requirement but under the average requirement. The four age groups had almost the same share (about 10 percent) of respondents whose dietary energy intake was at the average energy requirement or more.

Income differences of daily energy intake. Daily dietary energy varied significantly between the income groups (r_s (393) = 0.366, p=0.00<0.01), it was apparent that respondents having higher incomes were more likely to have diets with higher energy intake. The share of respondents under the minimum dietary energy level decreased as income increased. Lower income respondents actually showed a trend of having diets with daily energy intake under the minimum requirement for individual adults. The share of lower income respondents whose daily dietary energy intake under the minimum requirement was high at 61.4 percent, which was nearly twice that of those on higher incomes. Nearly half of the higher income respondents had a daily energy intake that was between the minimum requirement and the average. The reason for this is obvious, as a higher income provides the affordability of a greater range of foods.

Educational differences of daily energy intake. It was observed that respondents with lower education levels were more likely to have diets whose daily energy intake was under the minimum dietary energy requirement (r_s (393) = 0.131, p=0.009<0.01). There was a decrease in the share of respondents under the minimum requirement as education increased. The share of respondents whose energy intake level was between the minimum and average requirement increased gradually as education increased. Respondents with the lowest educational level also had the lowest likelihood of meeting the average dietary energy requirement, although it was

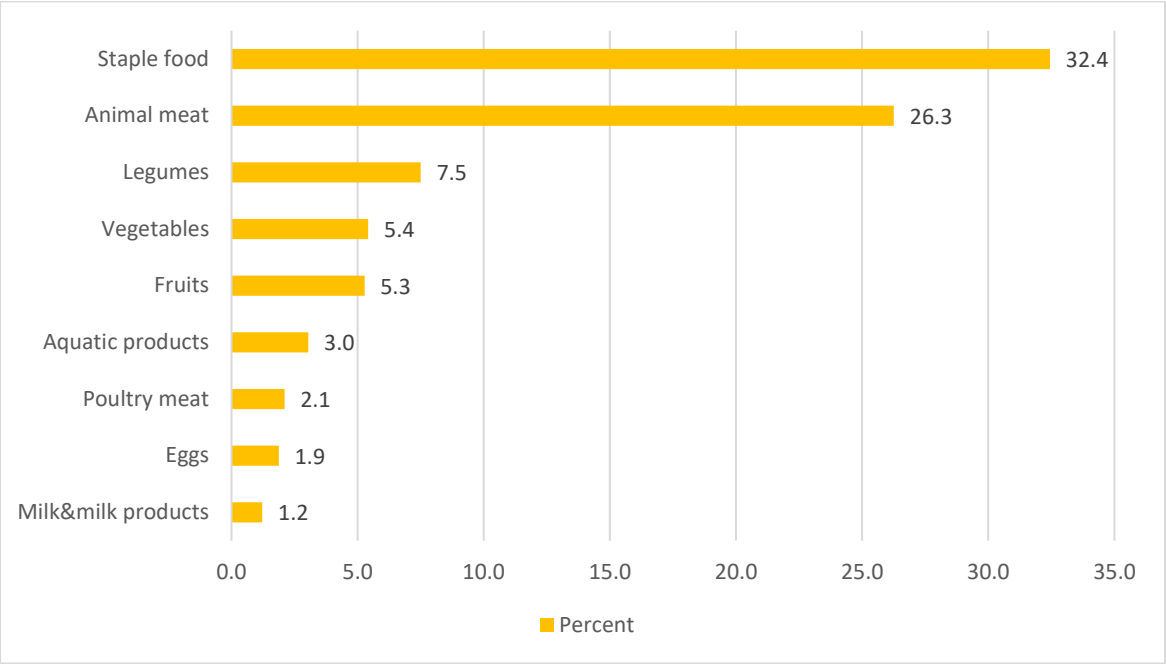
only slightly lower than that of better-educated respondents. This would result from the positive association between education and income.

Difference of daily energy intake by industry of occupation. There was also significant association between the dietary energy intake and industry (r_s (393) = -0.143, p=0.004<0.01). Business and services respondents showed the highest likelihood of having low dietary energy intake, as more than half (59.6 percent) of them had daily energy intake under the minimum requirement. At the same time, they had the lowest share of respondents at higher energy intake levels. Respondents from the processing and manufacturing industries showed the highest likelihood of having diets offering energy intakes between the minimum and average level, while those in the construction industry showed the highest meeting the average energy intake requirement. This is understandable, as construction workers engage in more physical activities, and need more energy to conduct their work. Whereas workers in the business and services industries had lower physical activities in comparison with those in the other industries. In addition, this may also be related to the gender composition within the occupational industries, as male respondents who showed the higher daily energy intake accounted for the largest number in the construction industry, whereas females were mainly business and services workers.

Difference of daily energy intake by Body Mass Index. It was found that variations in the dietary energy intake were minimal among respondents with a different body mass index. Nonetheless, energy intake tended to positively relate with body mass index. The share of underweight respondents decreased when energy intake increased, and those with the highest level of energy intake were most likely to be overweight.

Figure 5.2 shows the average percentage of energy from each food group, with staple foods and animal meat the two major energy sources for the diets of respondents, providing 32.4 percent and 26.3 percent of daily energy respectively. This is due to the frequent consumption and high-calorie characteristic of these two food groups. All other food groups provided less than 10 percent of daily energy intake each, as they were less frequently consumed (except for vegetables) and contain lower calories. Among them, aquatic products, poultry meat, eggs and milk products contributed to no more than 3 percent of the average energy intake.

Figure 5. 2 Average Percentage of daily energy from each food group reported by respondents



Source: Shanghai food consumption survey, 2015-2016

Table 5.15 shows the percentage of respondents indicating different energy contribution rates of each food group. Staple foods accounted for more than 30 percent of the dietary energy for 62.2 percent of the respondents. This food group even offered more than 50 percent of daily energy for 1.3 percent of the respondents. More than one third (34.9 percent) of respondents had diets in which more than 30 percent of energy was contributed from animal meat. Legumes provided more than 10 percent of daily dietary energy for nearly one third (32.6 percent) of the respondents. All the other food groups each supplied no more than 10 percent of daily energy for the majority of respondents.

Table 5. 15 Reporting rates of energy contribution from each food group

Food groups	Energy contribution rates (% of total energy intake)					
	≤10	**10.1-20**	**20.1-30**	**30.1-40**	**40.1-50**	**>50**
Staple	0.0	2.3	35.5	48.7	12.2	1.3
Animal meat	4.3	20.6	40.2	30.3	4.3	0.3
Poultry meat	97.7	2.0	0.3	0.0	0.0	0.0
Aquatic products	99.5	0.5	0.0	0.0	0.0	0.0
Milk & milk products	99.5	0.5	0.0	0.0	0.0	0.0
Eggs	99.5	0.5	0.0	0.0	0.0	0.0
Legumes	67.4	30.5	1.8	0.3	0.0	0.0
Vegetables	95.4	4.6	0.0	0.0	0.0	0.0
Fruits	92.1	7.4	0.5	0.0	0.0	0.0

Source: Shanghai food consumption survey, 2015-2016

Nevertheless, there were obvious differences in energy supply from staple foods and animal meat by gender, age, income and occupation, with the greatest variations found by age.

Table 5.16 shows that male respondents were more likely to have diets in which energy from staple foods accounted for a higher share in comparison with female respondents. Staple foods supplied more than 30 percent of daily energy for 68.5 percent of male respondents and 48.8 percent of females. Those respondents enjoying higher energy contribution rates (over 40 percent) were also more likely to be male. Similarly, male respondents showed a higher likelihood of taking in more energy from animal meat in comparison to females. Nonetheless, animal meat contributed to no more than 30 percent of daily energy for just over half male and female respondents. Specifically, two in five females consumed animal meat that supplied less than 20 percent of their average daily energy intake. However, the majority (75.5 percent) of males took in 20-40 percent of average daily energy from animal meat, with a high 35.9 percent of males with diets in which animal meat contributed to 30-40 percent of daily energy, which was twice that of females. Moreover, animal meat even provided for more than 40 percent of daily energy for 6.7 percent of males, compared to only 0.8 percent for females.

Table 5. 16 Energy contribution from staple foods and animal meat by gender

Energy contribution rate (%)	Staple foods		Animal meat	
	Male	Female	Male	Female
<20	1.1	4.8	17.8	40.0
20-30	30.4	46.4	39.6	41.6
30-40	53.7	37.6	35.9	17.6
>40	14.8	11.2	6.7	0.8

Source: Shanghai food consumption survey, 2015-2016

Age differences in energy supply from staple foods and animal meat is shown in Table 5.17. It was found that older respondents were more likely to consume more staple foods, consumption covered more than 30 percent of their average daily dietary energy as age increased. However, when it comes to the consumption of animal meat, the youngest and oldest respondents showed a lower likelihood of enjoying high energy contribution rates from it compared to those in the middle-age groups. More specifically, respondents aged in their 30s were most likely to consume animal meat that contributed to more than 30 percent of their daily dietary energy, whereas respondents aged 50 and over the lowest. Moreover, for 37.7 percent of respondents aged 30-39 animal meat supplied 30 to 40 percent of their daily energy intake, compared to only 15.6 percent for those aged 50 and over.

Table 5. 17 Energy contribution from staple foods and animal meat by age

Energy contribution rate (%)	Staple foods				Animal meat			
	<30	30-39	40-49	≥50	<30	30-39	40-49	≥50
<20	4.8	34.5	42.9	17.9	34.5	39.3	23.8	2.4
20-30	2.0	39.1	51.7	7.3	15.2	41.1	37.7	6.0
30-40	1.6	33.6	50.0	14.8	25.8	40.6	28.9	4.7
>40	0.0	28.1	43.8	28.1	40.6	37.5	15.6	6.3

Source: Shanghai food consumption survey, 2015-2016

It was found that energy intake from staple foods was negatively related to the level of income (r_s (393) = -0.167, p=0.001<0.01) while that from animal meat was positively related to income (r_s (393) =286, p=0.00<0.01). As is shown in Table 5.18, respondents from the higher income group showed a higher likelihood of having diets where staple foods had a lower energy contribution rate (no more than 30 percent) in comparison with those on lower incomes. These higher income respondents were more likely to have a higher energy intake from animal meat

in comparison with the lower ones. There was an increase in the share of respondents at higher energy contribution rates (30-40 percent and over 40 percent) as income level increased. For example, 44.4 percent of higher income respondents consumed staple foods that supplied 20-30 percent of their average daily energy intake, only 27.9 percent of lower income respondents enjoyed the same energy contribution rate from animal meat. However, the share of higher income respondents consuming animal meat that supplied 30-40 percent of average daily energy was almost twice that of lower income respondents.

Table 5. 18 Energy contribution from staple foods and animal meat by income

Energy contribution rate (%)	Staple foods		Animal meat	
	≤5000	>5000	≤5000	>5000
<20	2.8	1.7	32.6	15.6
20-30	27.9	44.4	43.7	36.1
30-40	50.2	46.7	21.4	40.6
>40	19.1	7.2	2.3	7.8

Source: Shanghai food consumption survey, 2015-2016

Table 5.19 shows that respondents in the construction industry had a much higher likelihood of enjoying the highest energy contribution rate from staple foods, while the lowest from animal meat compared to those in the other industries. Specifically, nearly 70 percent of construction workers had staple foods that contributed to over 30 percent of their average daily energy, compared to just over 50 percent of those in the business and services industries. However, over one third of respondents in the processing and manufacturing industries and business and services industries consumed animal meat that covered over 30 percent of their average daily energy supply. By comparison, only 22 percent of construction workers did so, and none of them consumed animal meat that made up more than 40 percent of their average daily energy.

Table 5. 19 Energy contribution from staple foods and animal meat by occupation

Energy contribution rate (%)	Staple foods			Animal meat		
	P&M	C	B&S	P&M	C	B&S
<20	2.2	0.0	3.3	24.3	27.1	24.5
20-30	29.7	30.5	44.4	38.4	50.8	38.4
30-40	55.1	49.2	40.4	33.5	22.0	29.1
>40	13.0	20.3	11.9	3.8	0.0	7.9

Note: P&M refers to Processing &Manufacturing industry; C refers to construction industry; B&S refers to Business & service industry.

Source: Shanghai food consumption survey, 2015-2016

Table 5.20 indicates that overweight respondents were most likely to have the highest daily energy from staples and lowest from animal meat. However, underweight respondents had the lowest daily energy intake from staples, while they were least likely to have highest daily energy intake from animal meat. Although more than half of the respondents in all the three BMI groups consumed staple foods which made up more than 30 percent of their average daily energy intake, the share of respondents having more than 40 percent of daily energy from staple foods for overweight respondents was 18.6, compared to not any underweight respondents and 12.3 percent of those whose weight was at the normal range. At the same time, a third of overweight respondents consumed animal meat that covered less than 20 percent of their daily energy intake, whereas about 20 percent of underweight and normal weight respondents did so. Nevertheless, only 20 percent of underweight respondents enjoyed an energy contribution rate of 30 percent or more from animal meat, compared to 37 percent of normal weight respondents and 29 percent of overweight respondents.

Table 5. 20 Energy contribution from staple foods and animal meat by Body Mass Index

Energy contribution rate (%)	Staple foods			Animal meat		
	Under weight	Normal	Over weight	Under weight	Normal	Over weight
<20	20.0	2.0	2.1	20.0	21.8	34.0
20-30	20.0	34.5	39.2	60.0	41.0	37.1
30-40	60.0	51.2	40.2	20.0	31.4	26.8
>40	0.0	12.3	18.6	0.0	5.8	2.1

Source: Shanghai food consumption survey, 2015-2016

5.9 Conclusion

This chapter has examined the food consumption patterns of rural migrants in Shanghai and the outcome of their food consumption according to their seven-day recall. The majority of respondents had three meals per day, with only a small number (primarily young migrants) who did not have breakfast. It was found that the breakfast reported by respondents tended to be urbanised after migration, as they claimed that they usually had a lighter breakfast bought from outside home due to the influences of urban work and life styles, while they previously ate a substantial breakfast prepared at home before migration. All of the respondents did eat snacks, with most migrants snacking at night, with fresh fruits being the most popular snack for them. Moreover, respondents had more diverse diets at lunch and supper after moving to Shanghai, as the number of food groups commonly consumed increased from 6 to 8, with poultry meat and fungus the two new commonly consumed food groups among the

respondents. Vegetables and animal meat dominated food groups consumed at lunch and supper both before and after migration. Consumption of beef experienced a significant increase among migrants after migration, although it was still not commonly consumed due mainly to its high price. The majority of respondents bought food from a farmers' market to cover 70 percent of their daily food consumption, with many of them living very close (within 10 minutes' walk) to the fresh food market. The increased dietary diversity reflected the improvement in food access and availability after migration, with many respondents claiming that they had more food choices, more income and there were more food stores in their communities after moving to Shanghai.

Among the rare existing studies of migration and nutrition/food security in other nations, a study of the linkage between rural-urban migration and health by Bowen et al. (2011) also reveals the increased consumption of vegetables and animal meat among the rural migrants in India. Similar findings were observed in the case of international migration. Sithole and Dinbabo (2016) found that youth migrants from Zimbabwe experienced improved food security after moving to Cape Town, South Africa, and meat and vegetables were also the commonly consumed food groups. The only difference is the relatively high prevalence of food insecurity among the respondents in this study, with just over a third (36.7 percent) indicating that they were food secure, and almost 40 percent had suffered moderate or severe food insecurity due mainly to low earnings.

It was found that there were more diverse diets among female respondents, younger respondents, and those better educated with higher incomes, particularly in the construction industry. The types of industry in which they were engaged also contributed to differences in dietary energy intake, as construction workers were most likely to have diets providing energy meeting the Average Dietary Energy Requirement by FAO. Staple foods and animal meat were the two food groups that supplied the majority of the average daily energy for the surveyed rural migrants. It was found that overweight respondents were most likely to have staple foods to cover a high percentage of their daily energy intake, and take in the lowest percentage of energy from animal meat. However, underweight respondents were most likely to take in lower energy from both staple foods and animal meat. Males and those in their 30s and 40s were more likely to have diets which supplied a larger part of energy from animal meat and staple foods, this is strongly related to the higher level of physical activities involved in their work. Higher income respondents were more likely to take in less energy from staple foods and more from animal meat compared to those on a lower income. Interestingly, construction workers

consumed the largest proportion of energy from staple foods while the lowest from animal meat. Differences in the energy intakes from different food groups are largely due to the regularity of the consumption of respective food groups. In addition to socio-demographic characteristics of respondents, such differences in consumption regularity may also be related to food preferences, the sending of remittances and the awareness of healthy diet, which will be further examined in the following two chapters.

Chapter 6 Influential Factors of the High Popularity of the Essential Food Groups

6.1 Introduction

This chapter analyses the factors relating to the consumption of the four essential food groups: animal meat, fruit, fish and poultry meat (as all the respondents claimed to consume vegetables daily, it is not included in the analysis). Firstly, this chapter justifies the popularity of food groups among the survey participants. This focuses upon respondents' preference for each food group and the association between food preference and the consumption frequency of them. Then it examines the impact of key socio-demographic characteristics on the consumption of the essential food groups. As a frequently mentioned factor in studies on the relationship between migration and food consumption/food security in many other countries, the impact of sending remittances on the food consumption of participants is also examined here. The last section looks at the influence of the awareness of healthy diets on consumption patterns.

Food groups which were consumed daily or weekly by at least 50 percent of the respondents from a specific socio-demographic group were identified as "regularly" consumed food groups among them, while those consumed monthly or yearly were identified as "irregularly" consumed ones. As the essential food groups were consumed daily or weekly, responses of monthly and yearly consumption were combined into a broader group as being "irregular" consumption in this chapter. As for the less popular food groups, responses of their consumption frequencies were simplified into three groups: "regular", "irregular" and "never" and are discussed in the next chapter.

6.2 Food preferences and food consumption: the higher the preference the higher the popularity

Consumers are identified as people who have perceptions of factors that affect their decision about food consumption. In order to obtain a better understanding of possible contributors to rural migrants' food consumption patterns in Shanghai, the survey collected data on respondents' perceptions of what influenced their patterns of food consumption. They were asked to score the influence of a list of factors from 1 (not influential at all) to 5 (extremely influential). The answers were grouped into three groups: low; moderate and high.

Food price and income are the two factors that are frequently mentioned in many studies on food security and food consumption. Researchers (e.g.Armar-Klemesu 2000; Misselhorn et al. 2012; Schmidhuber and Tubiello 2007) consider them to be a direct influence on individuals'

households' economic access[16] to food, thus affecting their food consumption and food security. Table 6.1 shows that there is some consistency in this study with these research findings. The top three contributors to their food consumption decisions were food preference, income and food price. Some two thirds of respondents mentioned "food preference", followed by 58.2 percent who mentioned "income". As for the third influencer – food price, respondents seemed to be less sensitive to its impact on their food consumption. The share of respondents who perceived that "food price" highly influenced their food consumption was just over one fifth, while more than half reported that it had only a "moderate influence". More than 90 percent of respondents perceived that factors such as living conditions, transportation, market location, food availability in the market, education and dietary habits had only a low influence on their food consumption. In addition, all surveyed migrants considered their health condition did not influence their food consumption.

Table 6. 1 Respondents' perceptions on the influence of factors on their decision of food consumption

Influential factors	Low influence	Moderate influence	High influence
Food preference	2.8	31.6	65.6
Income	12.9	28.9	58.2
Food price	26.3	52.4	21.3
Job	88.6	7.3	4.1
Knowledge about healthy diets	87.8	8.6	3.5
Food availability in market	93.7	4.6	1.8
Education	98.0	0.3	1.8
Transportation	97.2	1.3	1.5
Market location	97.0	1.5	1.5
Living condition	95.4	3.5	1.1
Dietary habits	99.5	0.0	0.5
Health condition	100.0	0.0	0.0

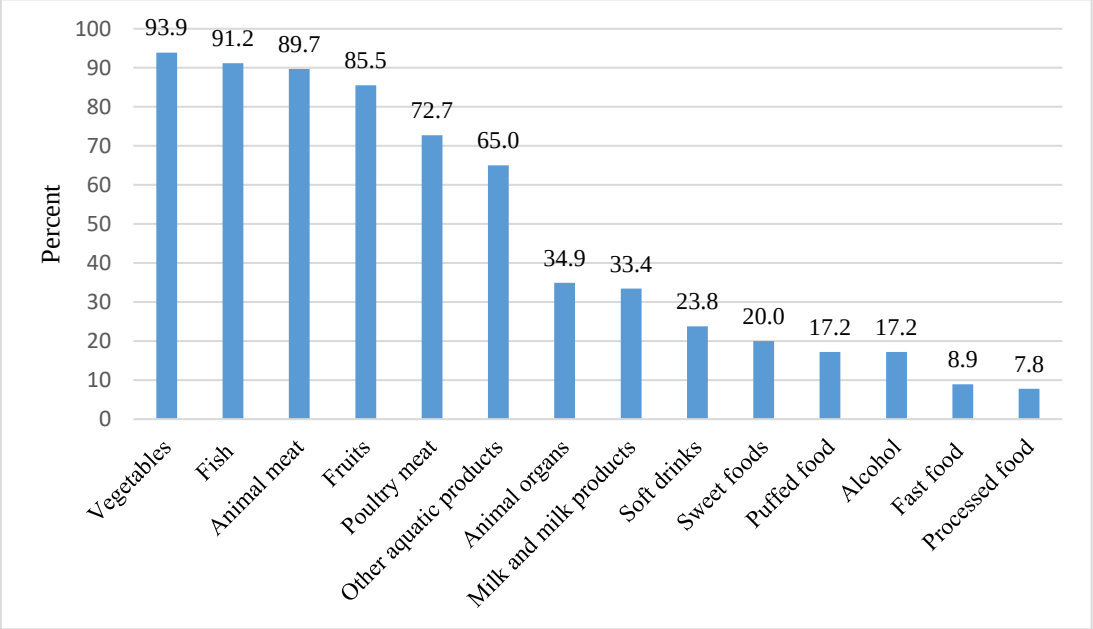
Source: Shanghai food consumption survey, 2015-2016

As respondents perceived food preference to be the primary influential factor in their food consumption, their preference for each food group was examined together with consumption frequency to see whether the foods they preferred were more frequently consumed. Participants in the survey were asked to score their preferences for different food groups from 1 to 5 (1 means did not like at all, 5 means did extremely like). According to respondents' answers, their preferences for different food groups were grouped into three categories: "dislike", "neutral" and "like". The reporting rate of "like" for each food group is presented in Figure 6.1.

[16] The definition of food security by the Food and Agriculture Organisation of the United Nations identifies that food access includes economic and physical dimensions (FAO 1983).

Respondents ranked the top 5 most popular food groups as vegetables, fish, animal meat, fruit and poultry meat, which were also the five most frequently consumed food groups. Although fish was the second mostly preferred food group, it was primarily consumed on a weekly basis rather than daily, with most of the respondents claiming to consume it twice per week. Income and price of fish are influential factors in this case, as some varieties of fish are more expensive than pork. Some respondents may prefer consuming highly priced fish, particularly marine fish, but could not afford frequent consumption. For instance, the average price for salmon is around 80 yuan per kg, which is definitely too expensive for most rural migrant to consume it daily. The top three food groups that were least popular among respondents were "processed food", "fast food" and "alcohol", only 7.8 percent, 8.9 percent and 17.2 percent respectively reporting a like for them. They were also the least frequently consumed food groups, and a high percentage of respondents stated that they had never consumed these foods, and others indicated "yearly" consumption which ranged from 26.3 to 45.8 percent.

Figure 6. 1 Respondents' preferences for different food groups



Source: Shanghai food consumption survey, 2015-2016

Table 6.2 presents the association between the consumption frequency of each food group and the corresponding preference, and shows that there is a positive association between them, a high preference tended to increase the likelihood of frequent consumption. As for the three daily consumed food groups, the reporting rate of daily consumption increased markedly whereas weekly consumption decreased as the degree of preference increased from "dislike" to "like". Moreover, more than half the respondents claimed that the three foods they liked

were consumed daily, however holding different degrees of preference for vegetables all reported daily consumption. This is clearly related to cheap prices and common sense of the health benefits from having vegetables in their diets. This is the similar case for weekly consumed food groups and other least frequently consumed ones, as generally the reporting rate of consumption at a higher frequency increased as the degree of preference increased from “dislike” to “like”.

Table 6. 2 Food consumption frequency by food preferences of respondents

Food groups	Preferences	Consumption frequency (%)				
		Daily	Weekly	Monthly	Yearly	Never
vegetable	neutral	100	0.0	0.0	0.0	0.0
	like	100	0.0	0.0	0.0	0.0
	dislike	100	0.0	0.0	0.0	0.0
animal meat	neutral	71.4	28.6	0.0	0.0	0.0
	like	84.2	15	0.6	0.3	0.0
	dislike	11.1	77.8	0.0	11.1	0.0
fruit	neutral	35.4	62.5	2.1	0.0	0.0
	like	55.3	43.5	0.9	0.3	0.0
	dislike	0.0	57.1	28.6	14.3	0.0
fish	neutral	3.6	75	14.3	3.6	3.6
	like	1.1	95	3.9	0.0	0.0
	dislike	8.3	41.7	25	25	0.0
poultry meat	neutral	3.1	58.3	30.2	8.3	0.0
	like	1.4	64.1	27.2	7.3	0.0
	dislike	0.0	25	6.3	31.3	37.5
other aquatic products	neutral	0.0	4.9	31.1	62.3	1.6
	like	0.0	22.2	46.7	31.1	0.0
	dislike	0.5	1.6	2.1	11.2	84.5
animal organs	neutral	0.0	10	8.6	72.9	8.6
	like	1.4	33.3	49.3	14.5	1.4
	dislike	2	4.9	3.9	25.5	63.7
milk and milk products	neutral	2.5	14.3	13.7	59.6	9.9
	like	30.3	50.8	6.1	10.6	2.3
	dislike	3.9	6.3	2.3	29.7	57.8
soft drinks	neutral	0.6	6.9	20.8	66.5	5.2
	like	4.3	53.2	25.5	17	0.0
	dislike	0.0	2.3	11.4	43.2	43.2
sweets	neutral	0.4	3.9	24.6	70.2	0.9
	like	0.0	22.8	63.3	10.1	3.8
	dislike	0.0	0.9	6.2	38.9	54
puffed food	neutral	1.7	18.1	17.2	59.5	3.4
	like	2.9	64.7	19.1	10.3	2.9
	dislike	0.0	3.2	1.9	25.9	69
alcohol	neutral	1.2	17.8	37.9	37.3	5.9
	like	17.6	72.1	5.9	0.0	4.4
	dislike	0.0	0.0	1.8	14	84.2
fast food	neutral	0.0	1.2	2	58.5	38.2
	like	0.0	0.0	14.3	60	25.7
	dislike	0.0	0.0	1.8	1.4	84.2
processed food	dislike	0.0	0.0	2.5	30.8	66.7
	neutral	0.0	3.1	1.6	85.8	9.4
	like	0.0	12.9	58.1	22.6	6.5

Source: Shanghai food consumption survey, 2015-2016

6.3 Socio-demographic characteristics and the consumption of essential food groups

There were differences in the consumption of animal meat, fruit, fish and poultry meat between respondents grouped by different socio-demographic characteristics. Specific variations by key characteristics are indicated below.

6.3.1 Marked age differences in the consumption of essential food groups

According to the survey, there were substantial variations in the consumption frequencies of fruit and poultry meat between the age groups as shown in Table 6.3, with the most significant variation in the consumption of fruit. Although there were only slight variations in the consumption of animal meat and fish. There was generally a younger trend in the consumption of the essential food groups, as it is quite evident that respondents younger than 40 were generally more likely to consume all the food groups at higher frequencies. More specifically, respondents aged in their 30s showed the highest likelihood of more frequent consumption of animal meat, fruit and fish, while those younger than 30 were most likely to consume poultry meat more frequently. The consumption pattern of essential food groups among respondents aged in their 30s was associated with the higher likelihood of them earning a higher income, thus enabling them better affordability based on the price of a food group. Food preferences may help explain why the oldest respondents were the second most likely consumers of animal meat, fish and poultry meat, while they were least likely to consume fruit regularly. Specifically, they liked animal meat, fish and poultry, but had the second lowest preference for fruit.

Table 6. 3 Consumption frequency of essential food groups by age

Food groups	Age groups	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	<30	79.8	19.0	1.2	0.0
	30-39	86.8	11.9	1.3	0.0
	40-49	78.9	21.1	0.0	0.0
	≥50	84.4	12.5	3.1	0.0
Fruit	<30	57.1	39.3	3.6	0.0
	30-39	57.6	41.1	1.3	0.0
	40-49	47.7	51.6	0.8	0.0
	≥50	28.1	71.9	0.0	0.0
Fish	<30	1.2	94.0	3.6	1.2
	30-39	1.3	95.4	3.3	0.0
	40-49	0.0	89.1	10.9	0.0
	≥50	6.3	93.8	0.0	0.0
Poultry meat	<30	2.4	76.2	21.4	0.0
	30-39	0.7	60.9	38.4	0.0
	40-49	2.3	53.1	44.5	0.0
	≥50	6.3	65.6	28.1	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. There were only slight variations by age in the consumption of animal meat, with the disparity of reporting rate at each frequency level ranging from 0 (for no consumption)-10.2 (weekly consumption) percentage points. Although around 80 percent of

respondents across all age groups reported daily consumption of animal meat, those aged in their 30s and 50s showed a slightly higher likelihood of daily consumption. Although respondents in their 40s all claimed to consume animal meat at least once a week, they had the largest percentage (21.1 percent) of weekly consumers. Therefore, a generally younger trend of daily consumption can be concluded in the consumption of animal meat.

Fruit. Similar to the consumption of animal meat, younger respondents were more likely to consume fruit more often. Those consuming fruit daily decreased as age increased, whereas an opposite trend was found for weekly consumption. Around 57 percent of those aged below 40 consumed fruit on a daily basis, whereas 51.6 percent of respondents in their 40s and 71.9 percent of the oldest participants consumed it weekly.

Fish. Fish consumption only varied slightly by age, with a tendency towards weekly consumption, and again there was generally a younger trend in the pattern of consumption of fish. Respondents younger than 40 were more likely to consume fish weekly compared to their older counterparts, although the variation was minimal. However, it is worth mentioning here that all respondents aged 50 and over claimed to consume fish at least once a week, and they also had the highest reporting rate of daily consumption. This was related to their higher preference for fish than younger respondents. It is interesting that 10.9 percent of respondents in their 40s consumed fish irregularly, compared to only 3 percent of the younger respondents and none of the oldest ones. In addition, those in their 40s tended to earn no more than 5000 yuan per month, although they were more likely to earn a higher income compared to the youngest and oldest respondents.

Poultry meat. Although there was a tendency of weekly consumption of poultry meat across all ages, there was generally a downward trend in the consumption as age increased. However, the youngest and the oldest respondents showed a higher likelihood of more frequent consumption compared to the two middle age groups. The youngest respondents showed the highest likelihood of weekly consumption and the oldest ones were more likely to consume it daily. Those aged in their 40s were most likely to eat poultry irregularly, some 44 percent of them compared to 21 percent of the youngest respondents. The consumption among the youngest respondents was likely to be related to their higher awareness of healthy diets rather than preference for poultry meat, as they had the highest awareness of healthy diets while lowest preference for poultry meat. The lower calorie content of poultry meat may be the reason why they were more likely to consume poultry meat more frequently and less likely to regularly

consume animal meat, while the high consumption among the oldest respondents was associated with their highest preference for poultry meat.

6.3.2 Gender differentials in the consumption of essential food groups

There were differences between males and females in the consumption of animal meat, fruit and poultry meat. The most significant variation was found in fruit consumption, with the disparity between both daily and weekly consumption being higher than 30 percentage points. However, differences in fish consumption were only slight, and males were more likely to consume meat and fish more frequently, while females were much more likely to consume fruit more frequently. In addition to the influence of income and occupational industry, a higher awareness of healthy diets, particularly the perceptions of the characteristics of healthy diets could be another reason for the gender differences in the consumption of essential food groups. As females had a higher awareness of healthy diets and were more likely to emphasise "*fresh*", "*low fat*" and "*low calorie*" of a healthy diet.

Table 6. 4 Consumption of essential food groups by males and females

Food groups	Gender	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	Male (N=270)	87.4	11.9	0.7	0.0
	Female (N=125)	72.0	26.4	1.6	0.0
Fruit	Male (N=270)	42.6	56.3	1.1	0.0
	Female (N=125)	72.0	25.6	2.4	0.0
Fish	Male (N=270)	1.5	94.8	3.3	0.4
	Female (N=125)	0.8	88.8	10.4	0.0
Poultry meat	Male (N=270)	3.0	65.6	31.5	0.0
	Female (N=125)	0.0	54.4	45.6	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. A statistically significant gender difference in the consumption of animal meat was observed. Over 70 percent of males and females consumed animal meat on a daily basis, although it was higher for male respondents. Moreover, the share of weekly consumers (26.4 percent) among females was twice that of males. The more frequent consumption among males can be linked to the finding that they were much more likely to work in the construction as well as processing and manufacturing industries, while females dominated the business and services industries that usually required less energy to conduct their work. In addition, income was another important consideration, as males were much more likely to earn higher incomes compared to females.

Fruit. The consumption of fruit varied significantly between males and females. Females showed a much higher consumption of fruit compared to males, and tended to consume fruit on a daily basis, while males were more inclined to consume fruit on a weekly basis. The share (72 percent) of female respondents reporting daily consumption was almost twice that of males. In contrast, 56.3 percent of males were weekly consumers of fruit compared to only 25.6 percent of females. The more frequent consumption of fruit among females was due to their higher preference for it compared to males. Fruit contains little fat and is rich in fibre and vitamins that are beneficial for health and beauty, which increases the likelihood of fruit being consumed by females who tended to have a slightly higher awareness of healthy diets and beauty.

Fish. Males were more likely to consume fish more frequently, with a slightly higher reporting rate of daily and weekly consumption compared to females. Moreover, a slightly greater share (9.6 percent) of females than males (3 percent) reported irregular consumption. The higher likelihood of males earning a higher income may account for their more frequent consumption of fish.

Poultry meat. There was a slight variation in the consumption of poultry meat between males and females, although they both showed a trend of weekly consumption rather than daily. Male respondents showed a slightly higher likelihood of consuming poultry meat more frequently than females, which was similar to that for animal meat and fish, therefore, income and occupational industry rather than food preference can be seen as the likely explanation. Although males showed a lower likelihood of preference for poultry meat compared to females, they were more likely to consume it at a higher frequency.

6.3.3 Differences in the consumption of essential food groups by occupational industry

The survey showed occupational differences by industry in the consumption of animal meat, fruit, and poultry meat, with the greatest variation in the consumption of poultry meat. Only a slight difference was found in the consumption of fish. However, construction workers showed the highest daily consumption of meat (animal meat and poultry meat). A higher level of physical activity and also a higher preference for those foods among these workers can account for this. Respondents in the business and services industries were most likely to consume fruit and fish more frequently, which is likely to be related to a larger share of respondents aged in their 30s had the same consumption patterns of fruit and fish. A higher awareness of healthy diets can also account for this.

Table 6. 5 Consumption of the five essential food groups by occupation industry

Food groups	Occupation industry	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	P &M	82.2	16.8	1.1	0.0
	C	91.5	8.5	0.0	0.0
	B & S	79.5	19.2	1.3	0.0
Fruit	P &M	45.9	51.9	2.2	0.0
	C	45.8	54.2	0.0	0.0
	B & S	61.6	37.1	1.3	0.0
Fish	P &M	1.6	89.7	8.1	0.5
	C	1.7	93.2	5.1	0.0
	B & S	0.7	96.7	2.6	0.0
Poultry meat	P &M	2.7	54.6	42.7	0.0
	C	3.4	88.1	8.5	0.0
	B & S	0.7	60.9	38.4	0.0

Note: "P&M" refers to Processing &Manufacturing industry; "C" refers to construction industry; "B&S" refers to Business & service industry

Source: Shanghai food consumption survey, 2015-2016

Animal meat. There was a moderate variation by industry of occupation in the consumption of animal meat, with almost all the respondents in each industry eating animal meat at least once a week, although it was more common in diets of construction workers compared to workers in the other industries. The majority (91.5 percent) of construction workers claimed to consume animal meat on a daily basis. However, as is shown in Figure 6.2, the meat consumed by construction workers was usually way too fatty and therefore not healthy. The photo shows a male construction worker's lunch who said that this greasy meat was sold as a dish in their canteen. However, in other dishes shown in Figure 6.3, rice and vegetable rather than meat was the primary ingredient. This helps explain why they reported frequent consumption of animal meat while their energy intake from it was lower than their counterparts in other industries as presented in chapter five.

The reporting rate of daily consumption of animal meat by respondents in the processing and manufacturing industries and business and services industries was about 80 percent. Moreover, those in the business and services industries showed the lowest likelihood of daily consumption and highest weekly consumption. This is again because construction, and processing and manufacturing workers are male oriented with more energy required in their daily work than workers in the business and service industries. This increases the likelihood of consuming animal meat high in fat that provides a great amount of energy.

Figure 6. 2 Lunch of a male construction worker

Source: photographed by the author at a construction site in Shanghai in November 2015

Figure 6. 3 Lunch of another construction worker

Source: photographed by the author at a construction site in Shanghai in November 2015

Fruit. Over 60 percent of respondents from the business and services industries consumed fruit on a daily basis, while around 50 percent of those in the processing, manufacturing and

construction industries did so weekly. A higher likelihood of fruit consumption in the business and services industries can be related to a higher percentage of female respondents in this group, as they were much more likely to consume fruit at higher frequencies compared to males. At the same time, this was also associated with a larger proportion of younger respondents in these industries, as younger respondents were also more likely to consume fruit on a daily basis.

Fish. The majority of respondents in each industry reported weekly consumption. Nonetheless, those who worked in the business and services industries did have a slightly higher weekly consumption of fish compared to respondents in the other industries, and workers in the processing and manufacturing industries were the least likely to consume fish, although the reporting rate was quite small.

Poultry meat. Although respondents in each industry consumed poultry meat on a weekly basis, the frequency levels varied markedly between them. Construction workers showed a much higher likelihood of consuming poultry meat on a regular basis, with all of them consuming poultry meat at least once a month, and 91.5 percent of them consuming it at least once a week, compared to 57.3 percent in the processing and manufacturing industries and 61.6 percent in business and services industries. This may be largely related to the higher energy requirements needed for workers in the construction industry. Food preference may be another factor, as respondents in this industry showed the highest likelihood of liking poultry meat compared to those in the other industries. In addition, construction workers had the largest share of the youngest respondents who were more likely to consume poultry meat regularly.

6.3.4 Educational differences in the consumption of essential food groups

Educational differences were found in the consumption of fruit and poultry meat, with the greatest disparity between the respondents from the highest and lowest educational levels, being nearly 20 percentage points. Variation in the consumption of fish was slight, and animal meat was also quite weak. In spite of this, the level of education tended to have a positive relationship with consumption of the essential food groups. This trend also reflects the positive association between education and income levels. Food preference seemed to have little influence on the consumption trends across educational levels, as respondents with little education showed the highest likelihood of liking the essential food groups, with the exception of fish. The effect of the awareness of heathy diets was not clear either, although the better educated respondents had a higher awareness of healthy diets and more frequent consumption

of fruit and fish, they were also more likely to consume animal meat and poultry meat that contain higher calories and fats.

Table 6. 6 The consumption of the five essential food groups by education

Food groups	Education	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	Primary school	79.6	19.4	0.9	0.0
	Middle school	83.1	15.7	1.2	0.0
	High school or above	84.3	14.8	0.9	0.0
Fruit	Primary school	41.7	56.5	1.9	0.0
	Middle school	53.5	45.3	1.2	0.0
	High school or above	59.1	39.1	1.7	0.0
Fish	Primary school	0.9	87.0	12.0	0.0
	Middle school	1.2	94.2	4.7	0.0
	High school or above	1.7	96.5	0.9	0.9
Poultry meat	Primary school	2.8	51.9	45.4	0.0
	Middle school	1.2	62.8	36.0	0.0
	High school or above	2.6	70.4	27.0	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. Only weak differences were observed in the consumption of animal meat between different education groups, as each group had almost the same reporting rate at each frequency level. Nonetheless, respondents with higher education were more likely to consume animal meat at a higher frequency. There was a definite increase in the daily consumption as educational levels increased.

Fruit. Better educated respondents were more likely to consume fruit more frequently. Over 50 percent of those with an education of middle school or higher education consumed fruit daily, while 56.5 of those who only finished primary school did so on a weekly basis.

Fish. Although there was only a small difference in fish consumption by education, respondents with higher educational levels consumed fish more frequently. The share of respondents reporting daily and weekly consumption generally increased as education level increased, while irregular consumption decreased. The most evident variation was in weekly and irregular consumption, with the disparity between the highest and lowest reporting rate of around 10 percentage points.

Poultry meat. Respondents from all the three education groups tended to show similar levels of daily consumption, although it was slightly higher in the low educational group, the disparities between the three groups were negligible. However, there was a general tendency that respondents with higher levels of education consumed poultry meat at higher frequencies.

Respondents who only completed primary school were nearly twice as likely to eat poultry meat irregularly as those with an education of high school or above.

6.3.5 Income differentials in the consumption of essential food groups

The consumption of animal meat, fruit and other aquatic products was related to respondents' income, with the greatest income variation observed in the consumption of fruit, and only slight differences in the consumption of fish and poultry meat. Income had a generally positive association with the consumption of the essential food groups. This is understandable, as higher income increases people's purchasing power, thus increasing their likelihood of consuming more diverse food groups and more frequently. A similar association between dietary intake and income was found in the Dutch national survey, which reveals the link of higher intake of fruit and fish among participants with higher socio-economic status (Hulshof et al. 2003). However, it needs to be pointed out here that respondents on lower incomes were more likely to consume poultry meat more frequently. Food preference can account for this, as the higher income respondents were more likely to prefer animal meat, fruit and fish, while the lower income participants tended to prefer poultry meat.

Table 6. 7 The consumption of the five essential food groups by income

Food groups	Income	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	≤5000 (N=215)	75.8	23.3	0.9	0.0
	>5000 (N=180)	90.6	8.3	1.1	0.0
Fruit	≤5000 (N=215)	44.7	53.5	1.9	0.0
	>5000 (N=180)	60.6	38.3	1.1	0.0
Fish	≤5000 (N=215)	1.4	88.8	9.3	0.0
	>5000 (N=180)	1.1	97.8	1.1	0.0
Poultry meat	≤5000 (N=215)	1.9	63.7	34.4	0.0
	>5000 (N=180)	2.2	60.0	37.8	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. Higher income tended to increase respondents' consumption of animal meat, with daily consumption increasing as income increased. A high 90.6 percent of higher income respondents consumed animal meat daily, while 75.8 percent of lower income respondents did so. Moreover, the former were three times as likely to consume it on a weekly basis as the latter.

Fruit. Respondents with a higher income level were more likely to consume fruit more frequently compared to those with a lower income. Those with higher incomes showed a

tendency of consuming fruit on a daily basis, 60.6 percent compared to 44.7 percent of those on lower incomes, being more likely to be weekly consumers.

Fish. Respondents in both income groups showed a tendency of weekly consumption of fish, and the reporting rate of daily consumption in both income groups was negligible. Nevertheless, a high 97.8 percent of respondents on higher incomes consumed fish weekly, whereas only 88.8 percent of their lower income counterparts did so.

Poultry meat. There was only weak income difference in the consumption of poultry meat. Both higher and lower income respondents showed a trend of weekly consumption, and only a few reported daily consumption. However, the consumption of poultry meat between the income groups was opposite to that of the previous food groups, as 63.7 percent of lower income respondents consumed poultry meat weekly, compared to 60 percent of higher income respondents. Moreover, the latter also showed a slightly higher likelihood of irregular consumption.

6.3.6 Differentials by migrants' length of residence in Shanghai

The consumption of essential food groups did vary by the length of residence in Shanghai. However, marked variations were found only in the consumption of fruit and, in particular, poultry meat. The consumption of animal meat varied only slightly, and the differences in the consumption of fish were also quite weak. It was found that consumption of animal and poultry meat had a negative association with the length of residence, while the consumption of fruit and fish was generally positively associated.

Respondents who had lived in Shanghai 10 years or longer were most likely to consume animal meat and fish more frequently, and the least likely to consume poultry meat regularly. An opposite trend was observed among those who had newly migrated to Shanghai, who were most likely to consume poultry meat regularly, and were the least likely to regularly consume the other food groups, except animal meat. Food preference is a good explanation, as respondents with the lengthiest residence showed the highest preference for animal meat, fruit and fish, and the lowest for poultry meat, whereas the recent migrants were least likely to prefer the first three food groups and most likely to prefer poultry meat. In addition, age also accounts for the consumption patterns among these two residence groups. As recent migrants were largely made up of the youngest respondents as well as being lower income respondents, while those with the lengthiest residence in Shanghai had the largest share of oldest respondents.

Table 6. 8 The consumption of the five essential food groups by length of residence

Food groups	Residence	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	<5year	83.3	16.7	0.0	0.0
	5-9 years	78.1	19.9	2.1	0.0
	≥ 10 years	86.8	12.4	0.8	0.4
Fruit	<5year	46.7	50.8	2.5	0.0
	5-9 years	57.5	41.1	1.4	0.0
	≥ 10 years	50.4	48.8	0.8	0.0
Fish	<5year	2.5	90.8	6.7	0.0
	5-9 years	0.0	93.2	6.2	0.7
	≥ 10 years	1.6	94.6	3.9	0.0
Poultry meat	<5year	1.7	72.5	25.8	0.0
	5-9 years	1.4	60.3	38.4	0.0
	≥ 10 years	3.1	54.3	42.6	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. Consumption of animal meat varied slightly by the length of residence, and the predominance of daily consumption was observed in all the three residence periods. However, respondents living 10 years or longer in Shanghai showed a slightly higher likelihood of daily consumption of animal meat. However, as all of the respondents who were recent migrants claimed to consume animal meat at least once a week.

Fruit. Respondents who were long-term migrants in Shanghai showed a higher likelihood of daily consumption of fruit, while those who had more recently migrated to Shanghai tended to consume fruit weekly. There was generally an upward trend in the regular consumption of fruit as the length of residence increased. This directly reflects the positive relationship between residence and income level. As respondents with lengthier residence were more likely to have higher incomes, thus increasing their purchasing power and likelihood of more frequent consumption. In addition, respondents living longer in Shanghai also showed a higher likelihood of preference for fruit as females made up a larger part among them than males did.

Fish. Variation in fish consumption was negligible, with more than 90 percent of respondents indicating weekly consumption. Yet it is still worth mentioning here, that there was a general pattern that respondents with longer length of residence showed a slightly higher likelihood of weekly consumption, given that weekly consumption increased slightly as length of residence increased. In addition to the direct impact of the positive association between length of residence and income level, another explanation for this could be that long-term respondents were older and more likely to work in the business and services industries and were most likely to consume fish weekly. Food preference may be another contributor of the trend, as

respondents who had lived there10 years or more showed the highest likelihood of preference for fish, while more recent migrants showed the lowest.

Poultry meat. A marked difference was found in the consumption of poultry between more recent and long-term migrants, with weekly consumption decreasing markedly (from 72.5 to 54.3 percent) as the length of residence increased. At the same time, long-term respondents were nearly twice as likely to consume poultry meat "irregularly" as the more recent ones. Age and occupation were the major explanations.

6.3.7 Area of origin

It was assumed that origin or hometown area of respondents may influence their food taste and preference due to cultural reasons or the local food availability. For instance, northern and southern areas of China are the primary producer of wheat and rice respectively, therefore people from northern provinces consume more wheat whereas those from southern China were more likely to consume rice. Similarly, people in western China may be less likely to consume aquatic products, as the majority of water areas in China are located in the eastern and middle regions.

Table 6.9 shows that the consumption of poultry meat differed markedly between hometown groups. There were only small differences found in the consumption of fruit and fish, and variations in the consumption of animal meat were minimal.

Table 6. 9 Hometown and the consumption of essential food groups

Food groups	Hometown	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	Eastern provinces	85.6	14.4	0.0	0.0
	Middle provinces	80.8	17.5	1.7	0.0
	Western provinces	83.6	16.4	0.0	0.0
Fruit	Eastern provinces	56.8	41.4	1.8	0.0
	Middle provinces	48.5	50.2	1.3	0.0
	Western provinces	56.4	41.8	1.8	0.0
Fish	Eastern provinces	1.8	93.7	4.5	0.0
	Middle provinces	0.9	94.3	4.4	0.4
	Western provinces	1.8	85.5	12.7	0.0
Poultry meat	Eastern provinces	1.8	55.0	43.2	0.0
	Middle provinces	2.2	62.0	35.8	0.0
	Western provinces	1.8	76.4	21.8	0.0

Source: Shanghai food consumption survey, 2015-2016

Respondents from the eastern provinces showed a slightly higher likelihood of consuming animal meat, fruit and fish at a higher frequency compared to those from the other two

hometown groups. Specifically, over 80 percent of respondents in each group consumed fruit daily, with those from the eastern provinces had the highest reporting rate (85.6 percent). More than half of those from the eastern and western provinces were daily consumers of fruit, while 50 percent of those from the middle provinces were weekly eaters. Fish was consumed weekly by all the three hometown groups. Although respondents from eastern and middle provinces had almost the same reporting rate (93-94 percent) of weekly consumption, the former had a slightly higher likelihood of daily consumption, and those from western China had the lowest reporting rate (85.5 percent) of weekly consumption and highest (12.7 percent) of irregular consumption.

The higher consumption of these foods among the eastern-province respondents is likely to be related to them earning higher incomes. Age distribution may be another explanation for the consumption patterns, as the eastern province respondents were mainly in their 30s who were most likely to consume animal meat, fruit and fish more frequently. They also had the largest share of oldest respondents which may account for their lowest likelihood of daily consumption of fruit. The effects of food preferences and the awareness of healthy diets were not clear on the consumption patterns of essential food groups among respondents originated from different areas.

However, those from the western provinces showed a higher likelihood of consuming poultry meat more frequently. The reporting rate of weekly consumption increased from 55 percent for eastern-province respondents to 76.4 percent for those from western China. At the same time, the latter also had the lowest share of irregular consumers of poultry meat. This higher popularity may be related to the fact that this group has a larger proportion of construction workers who were most likely to consume poultry meat at higher frequencies.

6.3.8 Sample district

The three sample districts were selected respectively from the inner city, near suburbs and far suburbs of Shanghai, which have different levels of urbanicity such as access to market, transportation, accommodation and housing quality that can influence the lifestyle and diets of people living there (Mendez et al. 2004). Therefore, the consumption of the essential food groups among respondents from different sample districts was examined as shown in Table 6.10. Significant differences were found in the consumption of poultry meat and animal meat, with that of poultry meat much greater. Only slight variations were observed in the consumption of fish and fruit. Respondents from the Songjiang district showed the highest

likelihood of more frequent consumption of animal meat, fish and fruit whereas those from the Putuo district showed the lowest.

Such differences reflect the impact of the age and income distribution within each district. As the Songjiang district had the highest percentage of higher income respondents and those in their 30s, they were most likely to consume those food groups more frequently, while the Putuo district had the lowest. Gender composition can also help explain less consumption of fruit in Putuo, given that the area had the smallest share of females who were more likely to consume fruit. In addition, food preference was generally positively related to the consumption patterns among respondents from different sample districts. As respondents who were most likely to have more frequent consumption of the food groups also showed the highest likelihood of preference for them, with the exception of the consumption of poultry meat. As respondents from the Songjiang district were most likely to prefer poultry meat but consumed it much less regularly than those in the other two areas. This was related to the lowest percentage of males and construction workers in that area. The influence of the awareness of healthy diets was not clear, as Putuo participants had the highest awareness of healthy diets, but showed a lower likelihood of frequent consumption of fruit and fish.

Table 6. 10 Differences in the consumption of essential food groups by sample district

Food groups	Sample districts	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	Pudong	80.4	18.8	0.8	0.0
	Songjiang	91.0	8.1	0.9	0.0
	Putuo	72.7	25.0	2.3	0.0
Fruit	Pudong	50.0	47.9	2.1	0.0
	Songjiang	57.7	42.3	0.0	0.0
	Putuo	47.7	50.0	2.3	0.0
Fish	Pudong	1.3	92.9	5.4	0.4
	Songjiang	0.0	94.6	5.4	0.0
	Putuo	4.5	88.6	6.8	0.0
Poultry meat	Pudong	1.7	75.0	23.3	0.0
	Songjiang	0.0	29.7	70.3	0.0
	Putuo	9.1	72.7	18.2	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. Differences in the consumption of animal meat were observed between respondents from the sample districts. There was a tendency of regular consumption of animal meat among respondents in each sample district, with the majority of them consuming it on a daily basis, and the share of irregulars was negligible. A high 91 percent of respondents from the Songjiang district consumed animal meat daily, compared to 72.7 percent of those from

Putuo and 80.4 percent from Pudong. Respondents from the Songjiang district showed the lowest of weekly consumption while those from Putuo showed the highest, by more than three times.

Fruit. Although only a moderate variation was found in fruit consumption, respondents from the suburbs were more likely to consume fruit daily, whereas those from the inner city were predominantly weekly consumers. Those from the far suburb – Songjiang showed the highest daily consumption.

Fish. Although only slight differences were observed between the districts, about 90 percent of them consumed fruit on a weekly basis, only 5 percent or so reported irregular consumption. Nevertheless, respondents from the Songjiang district showed the highest likelihood of weekly consumption and those from the Putuo district showed the lowest, they also showed a slightly higher likelihood of daily and irregular consumption.

Poultry meat. A significant variation was found in the consumption of poultry meat, over 70 percent of respondents from Putuo and Pudong consumed poultry meat weekly, whereas only 29.7 percent of those from Songjiang did so, with 70 percent of them consuming poultry meat irregularly. Nevertheless, regular consumers of poultry meat were more likely to be in Putuo, and 9.1 percent of them consumed it daily compared to only 1.7 percent of those in Pudong.

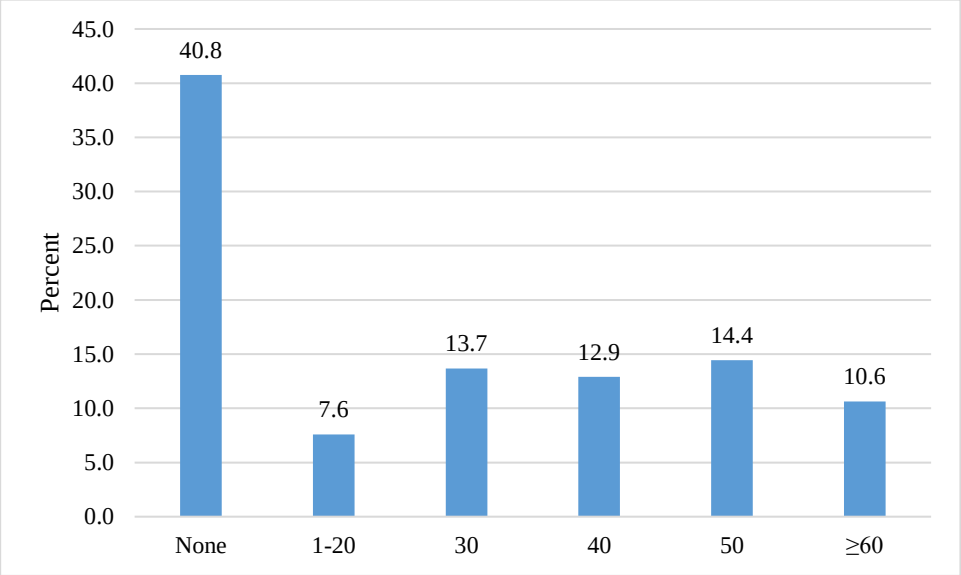
6.4 The role of remitting in migrants' food consumption

Remittances have received much attention in studies in the migration and food security nexus, while a consensus has been achieved that remittances have positive effects on promoting food security for sending households through increased expenditure on food and stabilising food consumption (e.g.Combes et al. 2014; Crush 2013; Karamba et al. 2011; Quartey 2006). Karamba et al. (2011) found that the inflows of remittance can have notable effects on the quantity and quality of household food consumption and thus nutrition. Instead of looking at the impact on expenditure, Combes et al. (2014) found that remittance can mitigate the food price shock in the recipient countries by using econometric model analysis.

However, these studies all focus on the benefits to sending households receiving remittances. Little evidence on the linkage between remittance and migrants' food consumption or security has been found. This research assumes that whether migrants send remittances home and how much they send can influence their own food consumption. Given that their disposable income would be reduced if they send remittances home, thus impacting their economic access to food. Therefore, respondents in this study were asked about the estimated percentage of their income

they sent home every year. Figure 6.4 shows that more than half of the respondents sent more than 30 percent of their yearly income home. Among them, 14.4 percent sent half of their yearly income home, and 10.6 percent sent 60 percent or more every year. On the other hand, a considerable proportion (40.8 percent) of respondents reported that they did not send any remittance back home.

Figure 6. 4 Estimated percentage of remittances sent home every year by respondents



Source: Shanghai food consumption survey, 2015-2016

Table 6.11 presents the distribution of percentage of remittances according to respondents' gender, age and income. High remittance senders were more likely to be male older respondents with lower incomes and those who lived alone in Shanghai. Furthermore, it was found that the positive relationship between living alone and sending remittances was statistically significant, although it was not that strong (Chi-square=64.896, df=4, $p=0.00<0.1$, $\phi=0.405$). The share of males sending more than 30 percent of annual incomes back home was 41.5 percent compared to 30.4 percent of females. A high 64.9 percent of those who lived alone in Shanghai sent the largest share of the incomes home. More importantly, older respondents particularly those who were in their 40s tended to send the largest remittances home while they were mainly on lower incomes. This would definitely reduce their economic access to food and thus food consumption.

Table 6. 11 Percentage of remittance by socio-demographic characteristics

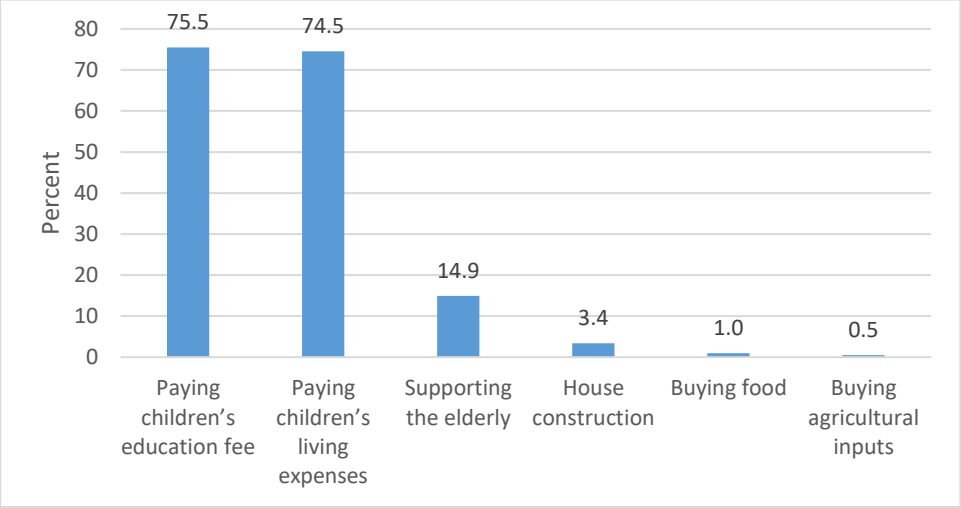
Socio- demographic characteristics	% of Remittance		
	None	1-30	>30
Gender			
Male	40.0	18.5	41.5
Female	42.4	27.2	30.4
Family in Shanghai			
Live alone	12.4	8.3	33.3
Live with families	52.2	86.9	42.7
Live with friends	35.4	4.8	24.0
Age			
<30	69.0	16.7	14.3
30-39	31.1	29.1	39.7
40-49	32.0	18.0	50.0
≥50	46.9	9.4	43.8
Income			
≤5000	43.3	15.3	41.4
>5000	37.8	28.3	33.9

Source: Shanghai food consumption survey, 2015-2016

Research on both inter and intra-national migration has indicated the primary utilisation of remittances on consumption and durable products rather than productive purposes (Burki 1991; Choucri 1985; Cobbe 1982; Karamba et al. 2011; Keyder and Aksu-Koc 1988; Nguyen and Winters 2011; Paine 1974). It has also been found that remittances are mainly used in real estate in the case of Turkish (Keles 1985), Morocco (Lazaar 1987) and Greek migrants (Taylor et al. 1996). Nonetheless, a study on migration from within Africa to South Africa by (Lucas 1987) found that remittances from migrants were invested to improve crop agricultural production.

The situation is different in the Chinese context. Remittances from migrants in Shanghai were mainly used for productive purposes – the development of human capital of their children. Figure 6.5 displays the usages of remittances sent by respondents. For those who sent remittances home (N=234), they mainly served two purposes: supporting children's living expenses and education fees. According to the survey, the primary application of their remittances sent home were supporting their children, including living expenses (39.2 percent) and education fees (39.7 percent). This explains why those with lower incomes sent more remittances home, as they had a larger share of older respondents who were more likely to have school age children. Still, there were 7.8 percent of migrants surveyed claiming that they sent remittances home mainly to support their parents. However, a study in Cagayan also observed that remittances were mainly used to support children's education expenses (Flores et al. 2012).

Figure 6. 5 Major usages of remittances (multiple responses)



Source: Shanghai food consumption survey, 2015-2016

The association between the percentage of remittances sent home and food consumption patterns was further examined, as is shown in Table 6.12. The most significant variations were found in the consumption of poultry meat, while variation in the consumption of fruit and fish was quite weak. Those who did not send remittance home tended to be more likely to consume each food group at a higher frequency. This was because those who sent more than 30 percent of their income as remittances had the lowest incomes. In addition, there was generally a negative association between food preference and consumption frequency. As respondents who sent large remittances showed the highest preference for animal meat, fruit and poultry meat, while they showed the lowest likelihood of frequent consumption. Although those who were not sending remittances home often showed the lowest preference for the essential food groups, they were most likely to consume them more frequently, except for animal meat. This implies that the effect of disposable income played a more important role than food preference in determining their food consumption patterns. Effects of the interactions between demographic characteristics were not clear on the food consumption patterns among the remittance groups. Effects of the awareness of healthy diets was not clear either.

Table 6. 12 The consumption of essential food groups by the percentage of income remitted home

Food groups	Remittance sent home (%)	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	0	85.1	14.3	0.6	0.0
	1-30	85.7	11.9	2.4	0.0
	>30	78.0	21.3	0.7	0.0
Fruit	0	53.4	44.7	1.9	0.0
	1-30	52.4	44.0	3.6	0.0
	>30	50.0	50.0	0.0	0.0
Fish	0	1.9	93.2	4.3	0.0
	1-30	1.2	94.0	4.8	0.0
	>30	0.7	92.0	7.3	0.0
Poultry meat	0	1.9	68.9	29.2	0.0
	1-30	1.2	54.8	44.0	0.0
	>30	2.7	58.7	38.7	0.0

Source: Shanghai food consumption survey, 2015-2016

Animal meat. There was a general downward trend in the daily consumption of animal meat and an upward trend in weekly consumption as remittances increased. Respondents who were not sending remittances showed the highest likelihood of regular consumption, while those sending remittances at the highest level showed the lowest of daily consumption.

Fruit. A similar trend was observed in the consumption of fruit, with respondents sending fewer remittances showed a higher likelihood of more frequent consumption. Daily consumption decreased as the percentage of remittances increased.

Fish. Although over 90 percent of the respondents consumed fish weekly, there was generally a negative association between the share of remittances and the consumption of fish. Respondents sending fewer remittances home tended to be more likely to consume fish daily as well as weekly.

Poultry meat. Respondents sending no remittance home were most likely to consume poultry meat regularly, while those who sent a relatively small share of remittances (1-30 percent) showed the lowest likelihood. However, those who sent the largest remittances were most likely to consume poultry meat daily compared to other respondents, but the variation was minimal.

6.5 Associations with the awareness of "healthy diets" and consumption of the essential food groups

This section addresses the consumption of the most popular food groups by their perceptions of the importance of healthy diets and attention to information about healthy diets. A generally positive association was observed.

Perception of the importance of healthy diets. Table 6.13 presents consumption frequencies of essential food groups according to respondents' perceptions on the importance of having healthy diets. Differences were found mainly in the consumption of fruit. Respondents who gave high importance to healthy diets showed a higher likelihood of consuming animal meat, fruit and fish at higher frequencies. Whereas those who perceived healthy diets of low importance were more likely to consume poultry meat more frequently. Particularly, more than half of the former consumed fruit daily, while almost the same share of the latter did so on a weekly basis. This shows a direct link with food preference, as respondents who consumed particular foods more frequently were more likely to prefer them.

Table 6. 13 Distribution of consumption frequency by perception of the importance of healthy diets

Food groups	Perception of importance	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	Moderate or low importance	81.3	18.7	0.0	0.0
	High importance	82.8	15.9	1.3	0.0
Fruit	Moderate or low importance	44.0	54.7	1.3	0.0
	High importance	53.8	44.7	1.6	0.0
Fish	Moderate or low importance	1.3	89.3	8.0	1.3
	High importance	1.3	93.8	5.0	0.0
Poultry meat	Moderate or low importance	4.0	65.3	30.7	0.0
	High importance	1.6	61.3	37.2	0.0

Source: Shanghai food consumption survey, 2015-2016

Degree of attention to healthy diets. Association between degree of attention to healthy diets and how frequently the four essential food groups were consumed is presented in Table 6.14. Respondents indicating "high attention" were most likely to consume fruit and poultry meat more frequently, while those paid low attention to healthy diets more likely to consume animal meat and fish. The greatest variation was found in the consumption of fruit. There was a definite increase in daily consumption of fruit as the degree of attention to healthy diets increased. Specifically, a high 70.7 percent of the "high attention" respondents were daily consumers of fruits, compared to 53.3 percent of those who only paid low attention and only 38 percent of

those did not pay any attention. Influence of food preference as well as socio-demographic characteristics were not clear here.

Therefore, association between preference and the degree of attention to healthy diets is reflected in the consumption of fruit among the high attention group, who had the highest likelihood of preferring it. However, the effects of food preference on the consumption of other essential food groups among the attention groups was not clear. Nevertheless, the largest share of the youngest respondents and those with high education could account for the highest consumption of poultry meat among the high attention groups.

Table 6. 14 The consumption of essential food groups by attention to healthy diets

Food groups	Degree of attention	Daily (%)	Weekly (%)	Irregular (%)	Never (%)
Animal meat	Zero attention	78.6	21.4	0.0	0.0
	Low attention	84.1	14.4	1.5	0.0
	High attention	80.5	19.5	0.0	0.0
Fruit	Zero attention	38.1	60.7	1.2	0.0
	Low attention	53.3	45.6	1.1	0.0
	High attention	70.7	24.4	4.9	0.0
Fish	Zero attention	1.2	88.1	10.7	0.0
	Low attention	1.1	94.4	4.1	0.4
	High attention	2.4	92.7	4.9	0.0
Poultry meat	Zero attention	1.2	64.3	34.5	0.0
	Low attention	1.5	59.6	38.9	0.0
	High attention	7.3	73.2	19.5	0.0

Source: Shanghai food consumption survey, 2015-2016

6.6 Conclusion

This chapter addressed the factors driving the high consumption of the essential food groups by examining the association between their frequency of consumption and respondents' socio-demographic characteristics as well as their awareness of healthy diets. Generally, it was found that variations in the consumption of animal meat and fish were slight or moderate, while differences for fruit and poultry meat were marked. This implies that animal meat and fish may be more essential compared to fruit and poultry meat, whose consumption were more easily influenced by a combination of factors.

Nevertheless, age, gender and occupation were the major socio-demographic characteristics that led to apparent contrasts in the consumption of essential food groups. Furthermore, the consumption of animal meat varied more markedly by gender, income, occupational industry and sample district than by other characteristics. However, this further reflects the effects of

income, as males, construction workers and those from the Songjiang district who had the highest consumption of animal meat were mainly on higher incomes. The positive effect of income was also reflected in the consumption of fish. The consumption of poultry meat varied substantially by most of the socio-demographic characteristics, with most significant variations found by sample district, and second most by occupational industry. Age and area of origin also played an important role in the consumption of poultry meat. In comparison, age and gender were the two major socio-demographic characteristics in influencing the consumption of fruit. However, it needs to be noted that awareness of healthy diets contributed to much more substantial variations in the consumption of fruit compared to socio-demographic characteristics. Although the consumption of essential food groups varied slightly by the sending of remittances, those who were not sending any remittance were more likely to consume them more frequently.

Moreover, food preference and awareness of healthy diets were respectively found to be positively related to the frequency of consumption of essential food groups among the surveyed migrants, and a generally positive association between awareness of healthy diets (especially perceptions on the importance of healthy diets) and food preference was observed in the consumption patterns of essential food groups. However, the situation was different when looking at different socio-demographic characteristics and introducing the effects of awareness of healthy diets. Generally, the positive association between food preference and food consumption frequencies still apply for respondents from different socio-demographic groups, with the exception of education, the sending of remittances and hometown groups, while the effect of awareness of healthy diets was not clear for most of the socio-demographic groups. Gender and age were exceptions, however, as females who had a higher awareness of healthy diets were less likely to consume poultry meat although they showed a higher preference for it. Similarly, the youngest respondents were more likely to consume fruit and fish more frequently although they showed the lowest likelihood of preferring them.

Moreover, the trends in the consumption of essential food groups by different characteristics also reflect the interactions between the characteristics. Age, gender and occupational industry were interrelated in the consumption patterns of essential food groups. The higher likelihood of the consumption of a specific food group was associated with a higher percentage of the respective gender and age group who also showed a higher likelihood of consumption. For instance, females who were more likely to consume fruit made up a higher percentage of respondents in the business and services industries who shared the same pattern of

consumption. Similar interrelationship between age and industrial occupation was found in the consumption of fruit, fish and poultry meat among construction workers. In addition, positively associated characteristics, such as income and education, resulted in similar consumption patterns of essential food groups. As respondents with a higher education and income level were more likely to have more frequent consumption of essential food groups. This was also the case for income and residence.

Chapter 7 The Drivers of the Consumption of the Less Popular Food Groups

7.1 Introduction

This chapter looks at what drives the consumption of the less popular food groups – those consumed irregularly by the respondents, including milk and milk products, alcohol, soft drinks, snacks, other aquatic products, animal organs, processed food and fast food. The consumption of the less popular food groups are considered in relation to selected socio-demographic characteristics and respondents' awareness of a healthy diet. These relationships are established to explain the linkages between food consumption patterns and the characteristics of respondents. Since the regular consumption of processed food and fast food was very low, the consumption patterns of those two food groups by different characteristics of respondents are presented in a summary table.

7.2 Relationship between socio-demographic characteristics of respondents and their consumption of less popular food groups

As has been illustrated in Chapter 5, food groups that were consumed regularly by 50 percent or more of the respondents were identified as the major food groups. Table 7.1 presents food groups that were classified as less popular ones. The responses of the consumption of sweets and puffed food are combined into the broader group "snacks" to simplify the analysis. The Table shows that under a third of the respondents consumed these foods, with the majority consuming them irregularly. Fast food, processed food and animal organs were the least consumed food groups, with 42-50 percent of respondents indicating that they had never consumed them. Fast food was the least popular, with the majority of consumers only consuming it once or twice a year, as it was too expensive for them to do so on a regular basis. A few respondents who lived with their spouses and children in Shanghai said that they only eat fast food when their children asked, and only consumed it four to five times per year, as they thought it was not good for their health.

Milk consumption has been rising during the process of urbanisation in developing countries such as China and India, although India plays a more significant role in this rise (Delgado 2003). The per capita consumption of milk in China has increased from 0.7 litre in 1970 to 11.9 litre in 2008, an increase of 1700 percent (Wiley 2011). The increase in the consumption of milk in China is also related to policy priority initiated by the central government with the purpose of improving population quality. The Chinese ex-premier Wen Jiabao said that "*I have a dream to provide every Chinese, especially children, sufficient milk each day*" (Wiley

2011:18). This survey found that milk and milk products were the most frequently consumed food compared to the other irregularly consumed ones, with more than one third of the participants reporting regular consumption.

Table 7. 1 Consumption frequency of less popular food groups

Food groups	Regular (%)	Irregular (%)	Never (%)
Milk and milk products	35.7	43.0	21.3
Alcohol	24.8	44.3	30.9
Soft drinks	20.2	58.7	21.0
Snacks	19.5	71.4	9.1
Other aquatic products	17.0	81.1	2.0
Animal organs	15.0	43.0	42.0
Processed food	2.0	54.4	43.5
Fast food	0.8	48.8	50.4

Source: Shanghai food consumption survey, 2015-2016

The lower popularity of the food groups indicated in the table shows that they were less essential in respondents' diets, which was consistent with the typical Chinese diet. Nevertheless, changes in their food access due to migration in part explains the consumption of the less popular food groups. All of the food groups, particularly milk and milk products and soft drinks, cannot be self-produced or at least are more difficult to access in the rural area due to limited food markets and transportation. The exception are processed foods and animal organs, which can be made or accessed from foods and livestock produced by rural residents. Milk and milk products are also an exception for people in northern China such as Inner Mongolia which is one of the major bases for the Chinese dairy industry. It is similar for other aquatic products in the eastern provinces where there are abundant aquatic products due to the rich water areas.

However, better physical accessibility of the less popular food groups in Shanghai may not necessarily lead to their consumption. The consumption of the less popular food groups were assumed to be directly related to respondents' income levels or their food preferences and their awareness of healthy diets. Furthermore, those three factors may vary by different socio-demographic characteristics (e.g. gender, age, education, occupation), thus resulting in differences in their consumption. This section examines the consumption differences in the less popular food groups according to the characteristics of respondents and their respective hometown origins.

7.2.1 Hometown

Table 7.2 shows variations by hometown in the consumption of the less popular food groups, with the most significant difference found in the consumption of alcohol. There was generally a trend of irregular consumption of all the listed food groups in the three hometown groups, with respondents from the western provinces the exception, as they tended to not consume alcohol or animal organs. At the same time, more than half of the respondents from the eastern provinces claimed to not have consumed animal organs.

Table 7. 2 Consumption of less popular food groups by hometown

Food groups	Hometown	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and milk products	Eastern provinces	44.1	38.7	17.1
	Middle provinces	32.8	44.1	23.1
	Western provinces	30.9	47.3	21.8
Alcohol	Eastern provinces	19.8	51.3	28.8
	Middle provinces	30.2	43.6	26.2
	Western provinces	12.7	32.7	54.5
Soft drinks	Eastern provinces	25.2	59.4	15.3
	Middle provinces	19.7	59.8	20.5
	Western provinces	12.7	52.7	34.5
Snacks	Eastern provinces	26.1	68.5	5.4
	Middle provinces	16.6	74.7	8.7
	Western provinces	18.2	63.6	18.2
Other aquatic products	Eastern provinces	29.7	68.4	1.8
	Middle provinces	13.1	85.6	1.3
	Western provinces	7.3	87.3	5.5
Animal organs	Eastern provinces	9.9	38.7	51.4
	Middle provinces	17.9	47.6	34.5
	Western provinces	12.7	32.7	54.5

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. There was a general trend that this food group was most likely to be frequently consumed by respondents from the eastern provinces, and least likely by those from the western provinces. Actually, those from the eastern provinces showed a tendency of regular consumption, while the other two hometown groups consumed them irregularly. At the same time, respondents from the eastern provinces also were the most likely not to consume milk and milk products. Apart from their preference for milk, differences in income can explain such consumption differences between hometown groups. As respondents from the eastern provinces were most likely to earn higher incomes, while those from the western provinces were the most likely to earn lower incomes.

Alcohol. Nearly one third of respondents from the middle provinces consumed alcohol on a regular basis, much higher than respondents from the other two hometown groups. Nonetheless, both respondents from the eastern and middle provinces showed a tendency to irregularly consume alcohol. Most importantly, 54.5 percent of those from the western provinces claimed to have never drunk alcohol, almost twice that of their counterparts in the other two hometown groups.

Soft drinks. More than half of the respondents from each hometown consumed soft drinks irregularly. Nevertheless, respondents from the eastern provinces were most likely to consume soft drinks regularly, while western-province respondents showed the opposite trend. Just over a third of them had never consumed soft drinks, compared to only 15.3 percent of the eastern province respondents.

Snacks. A trend of irregular consumption of snacks was observed among the three hometown groups, with the reporting rate higher than 60 percent in each group. More than a quarter of participants from the eastern provinces reported regular consumption, a slightly higher percentage than in the other two hometown groups. Only 5 percent of respondents from the eastern provinces did not consume snacks, compared to18.2 percent of those from the western provinces and 8.7 percent from the middle provinces.

Other aquatic products. There was a clear tendency of irregular consumption of other aquatic products among respondents, with the reporting rate ranging from 68 percent to 87 percent. In spite of this, respondents from the eastern provinces were more likely to consume them regularly compared to those from the other regions in China. As nearly one third of eastern-province respondents claimed to consume other aquatic products on a regular basis, which was more than twice and three times that of respondents from the middle/western provinces respectively.

Animal organs. Middle-province respondents showed a slightly higher likelihood of more frequent consumption of animal organs compared to their counterparts from the other areas. They were more likely to consume animal organs on a regular basis, some 17.9 percent compared to 9.9 percent from the eastern provinces and 12.7 percent from the western provinces. A high of 51.4 percent of eastern-province respondents and 54.5 percent of western-province ones did not consume animal organs, compared to only a third of their middle-province counterparts.

In summary, respondents from eastern provinces showed the highest likelihood of consuming milk and milk products, soft drinks, snacks and other aquatic products on a regular basis. The respondents from the middle provinces were more likely to consume animal organs and alcohol regularly compared to those from the other two regions. Western-province respondents were less likely to regularly consume most of the less popular food groups, with the exception of snacks and animal organs. At the same time, respondents from the middle provinces were most likely to not consume milk and milk products.

For the western-province respondents, they were more likely to earn lower incomes as well as indicating lower preferences for the less popular food groups, which may explain their less regular consumption. By contrast, the higher regular consumption of milk and milk products, other aquatic products, soft drinks and snacks by eastern-province respondents is more likely to be related to their higher income earnings as well as higher preferences for them. The globalisation of the world food market and higher urbanisation levels in the eastern regions of China are likely to be associated with the high consumption of soft drinks which is not included in traditional Chinese diets. Middle-province respondents had the lowest preference for milk and milk products as well as the lowest awareness of healthy diets, which can account for them consuming them less frequently. However, their highest preference for alcohol and animal organs can also be the reason why they were most likely to be regular consumers of those two food groups.

7.2.2 Age

Table 7.3 shows that there were substantial age differences in the consumption of the less popular food groups among respondents, mostly in the consumption of soft drinks and snacks. Variations in the consumption of other aquatic products and animal organs were much less compared to the other food groups, with the disparity in regular consumption of animal organs only 5.4 percentage points. Respondents in each age group showed a general trend of irregular consumption of most of the food groups, with the exception that the oldest respondents showed a trend towards consuming alcohol regularly while not consuming soft drinks. However, younger respondents were nearly five times as likely to consume soft drinks as older respondents, but they also tended to avoid animal organs.

Table 7. 3 Consumption of less popular food groups by age

Food groups	Age groups	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	<30	22.6	70.2	7.1
	30-39	5.3	88.1	6.6
	40-49	1.6	85.1	13.3
	≥50	3.1	65.7	31.3
Alcohol	<30	13.1	50.0	36.9
	30-39	17.2	59.0	23.8
	40-49	34.3	32.8	32.8
	≥50	53.2	6.2	40.6
Soft drinks	<30	46.4	40.4	13.1
	30-39	15.9	71.5	12.6
	40-49	11.0	64.1	25.0
	≥50	9.4	25.0	65.6
Snacks	<30	39.3	53.6	7.1
	30-39	13.9	80.1	6.0
	40-49	14.1	74.2	11.7
	≥50	15.6	65.6	18.8
Other aquatic products	<30	26.2	69.1	4.8
	30-39	13.9	84.8	1.3
	40-49	15.6	82.9	1.6
	≥50	12.5	87.5	0.0
Animal organs	<30	17.9	28.6	53.6
	30-39	13.2	41.7	45.0
	40-49	15.6	53.1	31.3
	≥50	12.5	46.9	40.6

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. A younger trend was found in the consumption of milk and milk products, although more than 60 percent of respondents in each age group reported irregular consumption. Nearly a quarter of the youngest respondents claimed to consume it on a regular basis, while only 5 percent or less of respondents from the older age groups did so. Respondents aged more than 50 years were more than four times as likely not to consume it as those younger than 30.

Alcohol. Marked age differences were observed in alcohol consumption. Respondents aged 50 and over showed a tendency towards consuming alcohol regularly, while younger participants tended to consume it on an irregular basis. A high 53.2 percent of the oldest respondents reported regular consumption of alcohol, which was four times that of the youngest participants. Nonetheless, there was still around one third of respondents in each age group who claimed that they did not consume alcohol.

Soft drinks. There were significant age differences in the consumption of soft drinks, with a downward trend found in the reporting of regular consumption as age increased. Respondents from the youngest age group showed a tendency to consume soft drinks regularly, while more than 60 percent of respondents who were in their 30s and 40s reported irregular consumption, and two thirds of those aged 50 and over did not consume them. Some 46.4 percent of the youngest respondents were regular consumers of soft drinks, compared to only 9.4 percent for the oldest respondents.

Snacks. There was generally a younger trend in the consumption of snacks, with more than one third of respondents aged younger than 30 claiming to consume them on a regular basis, which was three times that of their older counterparts. Those indicating that they did not eat snacks increased gradually as age increased.

Other aquatic products. A younger trend was observed in the consumption of other aquatic products, although the majority of respondents consumed them irregularly. There was a general decrease in regular consumption as age increased, as 26.2 percent of the youngest respondents consumed other aquatic products regularly, compared to 13 to 16 percent for their older counterparts.

Animal organs. There was generally an older trend in the consumption of animal organs. Respondents aged 40 and over tended to be irregular consumers of animal organs, while those aged younger than 40 tended to not consume them. Although the youngest respondents showed a slightly higher likelihood of regular consumption compared to older respondents, the variation was minimal.

In summary, the older trend of alcohol consumption was related to the marked increase in the preference for alcohol as age increased. However, the younger trend in the regular consumption of most of the less popular food groups, can be seen to be related to different socio-economic environments at the time of their birth. The younger generation, particularly those who were aged younger than 40, were born in the age of the “one child policy”, and their families tended to give them a decent material life as best as they could, given the reduced number of children to feed. Moreover, higher average household incomes enabled them to access a wider variety of foods since their childhood, thus increasing their likelihood to establish more diverse diets compared to their older counterparts. A higher preference would also be another explanation for the higher likelihood of regular consumption of milk, soft drinks, other aquatic products and animal organs. In addition, however, consumption of soft drinks may be further related to

more exposure to the media and the advertisement of western food and the influence of crowd psychology. In contrast, respondents aged 40 and over were born into families that had to share less economic resources with other siblings. Therefore, it was more likely that they establish frugal life styles and thus more economical dietary habits.

7.2.3 Gender

Table 7.4 indicates significant gender differences in the consumption of the less popular food groups, with marked contrasts in the consumption of alcohol, soft drinks, snacks and animal organs. Only slight differences were found in the consumption of other aquatic products, as well as milk and milk products. Although a tendency towards irregular consumption of most of the less popular food groups was observed among both males and females. Females were more likely than males to regularly consume more nutritious food groups – milk and milk products and other aquatic products. At the same time, however, they were nearly five times as likely to become regular consumers of snacks as males. On the other hand, male respondents were much more likely to consume alcohol, soft drinks and animal organs on a regular basis, while females were more likely to not consume alcohol and animal organs.

Table 7. 4 Consumption of less popular food groups by gender

Food groups	Gender	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	Male	35.2	41.4	23.3
	Female	36.8	46.4	16.8
Alcohol	Male	35.5	48.9	15.6
	Female	1.6	34.4	64.0
Soft drinks	Male	24.8	58.2	17.0
	Female	10.4	60.0	29.6
Snacks	Male	8.9	79.3	11.9
	Female	42.4	54.4	3.2
Other aquatic products	Male	16.7	81.5	1.9
	Female	17.6	80.0	2.4
Animal organs	Male	20.3	47.8	31.9
	Female	3.2	32.8	64.0

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. Generally, females were more likely to consume milk and milk products, they were also more likely to become regular consumers of this food group compared to males, although the contrast was minimal. However, almost a quarter (23.3 percent) of male participants claimed to have never consumed milk and milk products, while only 16.8 percent of females did so.

Alcohol. Male respondents showed a much higher likelihood of alcohol consumption, with more than one third of them consuming alcohol on a regular basis, compared to only 1.6 percent of females. Furthermore, two thirds (64 percent) of female respondents did not consume alcohol compared to only 15.6 percent of males.

Soft drinks. Although both male and female participants showed a tendency towards irregular consumption of soft drinks, males were more likely to consume them more often. Nearly a quarter of males were regular consumers of soft drinks, which was more than twice that of their female counterparts. On the other hand, females (29.6 percent) were almost twice as likely to not consume soft drinks as males (17 percent).

Snacks. Females were much more likely to consume snacks and more often than males, although a high percentage of them tended to consume snacks irregularly. Most importantly, 42.4 percent of females were regular consumers of snacks, which was almost five times that of their male counterparts. Moreover, only 3.2 percent of females reported that they did not consume snacks, while one in ten males did so.

Other aquatic products. Minimal gender difference was found in the consumption of other aquatic products. More than 80 percent of both males and females were irregular consumers. However, females were more likely to be regular consumers of other aquatic products compared to males.

Animal organs. Male respondents showed a much higher likelihood of more frequent consumption of animal organs. One in five males consumed animal organs regularly, while only 3.2 percent of females did so. Furthermore, a high 64 percent of females did not consume them at all, which was more than twice that of males.

These consumption trends may be positively related to higher preferences for corresponding food groups in males and females. However, it needs to be pointed out here that consumption patterns among females is further related to their awareness of healthy diets. For instance, although a higher percentage of females reported a higher preference for soft drinks, they had a higher awareness of a healthy diet and were more likely to emphasise “low sugar” in a healthy diet. This may explain why females were less likely to consume soft drinks regularly compared to males.

7.2.4 Occupational industry

Consumption of the less popular food groups varied by occupation as shown in Table 7.5. Substantial variations were found in the consumption of milk and milk products, alcohol and other aquatic products, with the most marked in alcohol consumption. Only slight differences were found in the consumption of soft drinks, snacks and animal organs. Respondents from the business and services industries were more likely to regularly consume milk and milk products, snacks and other aquatic products compared to those in the other industries. Whereas respondents in the construction industry were the most likely to consume alcohol, soft drinks and animal organs on a regular basis.

Table 7. 5 Consumption of less popular food groups by occupational industry

Food groups	Occupation	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	P &M	30.2	44.9	24.9
	C	37.3	44.1	18.6
	B & S	41.7	40.4	17.9
Alcohol	P &M	23.7	49.8	26.5
	C	40.7	30.5	28.8
	B & S	19.8	43	37.1
Soft drinks	P &M	19.5	64.4	16.2
	C	23.7	40.7	35.6
	B & S	19.8	58.9	21.2
Snacks	P &M	17.8	73.0	9.2
	C	18.6	69.5	11.9
	B & S	21.9	70.2	7.9
Other aquatic products	P &M	9.7	87.0	3.2
	C	13.6	84.8	1.7
	B & S	27.2	72.1	0.7
Animal organs	P &M	15.7	41.0	43.2
	C	16.9	40.6	42.4
	B & S	13.3	46.3	40.4

Note: “P&M” refers to Processing &Manufacturing industry; “C” refers to construction industry; “B&S” refers to Business & service industry

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. Respondents from the business and services industries were most likely to consume milk and milk products on a regular basis, the reporting rate was as high as 41.7 percent. By contrast, those in the other industries showed a trend of irregular consumption, and participants in the processing and manufacturing industries were least likely to regularly consume milk and milk products and were most likely not to consume them.

Alcohol. Respondents working in the construction industry were most likely to be regular consumers of alcohol, with 40.7 percent regularly consuming alcohol, compared to only about 23.7 percent in the processing and manufacturing industries and 19.8 percent in the business and services industries. Respondents in the business and services industries had the largest (37.1 percent) share of respondents indicating that they did not consume alcohol.

Soft drinks. Most respondents in the three groups consumed soft drinks irregularly. Nevertheless, respondents in the construction industry showed a slightly higher likelihood of consuming them regularly compared to respondents in the other industries. However, they were also most likely not to consume them, some 35.6 percent compared to 21.2 percent in the business and services industries and 16.2 percent in the processing and manufacturing industries.

Snacks. Although around 70 percent of respondents in the three occupational industry groups reported irregular consumption of snacks, those who worked in the business and services industries were more likely to be regular consumers compared to respondents in the other industries.

Other aquatic products. Respondents in each industry groups showed a marked tendency towards irregular consumption of other aquatic products, with the reporting rate ranging from 72 to 87 percent. However, respondents from the business and services industries were most likely to consume them regularly (27.2 percent), compared to only 13.6 percent in the construction industry and 9.7 percent in the processing and manufacturing industries.

Animal organs. Although only small variations were found in the consumption of animal organs, respondents working in the construction industry were slightly more likely to consume them regularly compared to their counterparts in the other industries. Nevertheless, over 40 percent of respondents in the three groups indicated that they did not consume animal organs, with those in the business and services industries slightly more likely to be irregular consumers.

Consumption trends among the occupational industry groups was similar to those described for gender, showing a direct link between males and females within each occupation industry, as the business and services industries had much higher percentage of females while males were more likely to be found in the construction industry. Females were more aware of healthy diets and had higher preferences for the less consumed foods. Therefore, those from the business and services industries had the highest awareness of healthy diets while respondents from the male dominated construction industry the lowest. In addition, the higher likelihood of more

frequent consumption of milk and milk products, snacks and other aquatic products would also be related to income levels. As respondents working in the business and services industries were more likely to earn higher incomes compared to those working in the other industries, thus enabling them to have better economic access to those food groups.

7.2.5 Education

Table 7.6 shows that respondents who had finished middle school were most likely to become regular consumers of alcohol, snacks and animal organs, whereas those with higher education were most likely to consume milk and milk products, soft drinks and other aquatic products regularly. Furthermore, respondents who had finished high school or higher education tended to consume milk and milk products regularly and did not consume animal organs. Respondents with low education were most likely not to eat the less popular food groups, particularly milk and milk products and alcohol.

Table 7. 6 Consumption of less popular food groups by education

Food groups	Education	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	Primary school or none	12.0	45.4	42.6
	Middle school	40.1	42.5	17.4
	High school or above	51.3	41.8	7.0
Alcohol	Primary school or none	21.3	31.4	47.2
	Middle school	29.1	48.9	22.1
	High school or above	21.8	49.6	28.7
Soft drinks	Primary school or none	6.5	58.3	35.2
	Middle school	22.1	59.3	18.6
	High school or above	30.5	58.2	11.3
Snacks	Primary school or none	19.4	70.4	10.2
	Middle school	23.8	68.0	8.1
	High school or above	13.0	77.4	9.6
Other aquatic products	Primary school or none	5.6	91.6	2.8
	Middle school	16.3	82.5	1.2
	High school or above	28.7	68.6	2.6
Animal organs	Primary school or none	8.3	49.1	42.6
	Middle school	18.0	46.5	35.5
	High school or above	16.5	32.2	51.3

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. There was an apparent trend that the more highly educated were more likely to consume milk and milk products regularly. A high 51.3 percent of those with the highest education regular consumers, compared to 40.1 percent of middle-school respondents and 12 percent of those with the lowest education. However, 42.6 percent of respondents who

had only finished primary school or had no educational experience never consumed milk and milk products, which was six times that of those who finished high school or higher education.

Alcohol. Better-educated participants were more likely to consume alcohol. A high 47.2 percent of low-education respondents reported that they had never drunk alcohol, compared to only 22.1 percent of middle-school respondents and 28.7 percent of those with an education of high school or above.

Soft drinks. The consumption of soft drinks varied slightly by education, with most respondents consuming soft drinks irregularly. Nonetheless, respondents who finished high school or above were most likely to consume soft drinks more frequently, with 30.5 percent of them being regular consumers, which was almost five times those with little education.

Snacks. Respondents completing middle school showed the highest likelihood of consuming snacks, while those with the highest education had the lowest. Some 23.8 percent of respondents who had finished middle school consumed snacks regularly, compared to 19.4 percent of those with low education and 13 percent of those who had completed high school or higher education.

Other aquatic products. Other aquatic products were consumed irregularly. Nevertheless, some 28.7 percent of respondents who had an education of high school or above consumed other aquatic products regularly, this was followed by 16.3 percent who had completed middle school and only 5.6 percent of those with the lowest education. The reporting rate of not having consumed them was negligible in the three education groups, as the majority were irregular consumers.

Animal organs. Respondents with lower education levels were more likely to consume animal organs. Just over a third of middle-school respondents indicated that they did not consume animal organs, compared to a high 51.3 percent of those who had finished high school or had higher education and 42.6 percent of the least educated. Moreover, 18 percent of middle school respondents consumed them regularly, while only 8.3 percent of those with low education did so.

Income disparity within each education group is clearly related to the consumption trends according to education level, particularly the contrast between respondents with low education and those who had obtained higher education levels. Respondents with low education showed the highest preference for the less popular food groups, but were the most likely to consume them irregularly or not at all. In contrast, those with the highest education showed the lowest

preference but a higher likelihood of regular consumption. This is because they were more likely to earn a higher income, resulting in their better economic access to food compared to those with lower education. Nonetheless, the consumption of milk and milk products is an exception here. Respondents with high education were more likely to regularly consume milk and milk products, and they also showed the highest preference for them. This may be further positively related to the awareness of healthy diets between the education groups. As better educated respondents were more likely to have access to media and education programs relating to healthy diets. This can also help explain the lowest likelihood of regular consumption of snacks and the higher consumption of animal organs among respondents who had higher education. Of most importance, those with higher education had a larger share of younger respondents who were more likely to consume most of the food groups, whereas those with lower education were more likely to be older respondents who were more likely to consume alcohol.

7.2.6 Income

Table 7.7 presents income differences in the consumption of the less popular food groups. Variations in regular consumption were moderate for most food groups except for soft drinks, which varied only slightly by income. There was a general tendency of irregular consumption of the less popular food groups by both income groups, however higher income respondents tended to consume milk and milk products regularly. Most of the less popular food groups were more likely to be regularly consumed by higher income respondents, and not by the lower income ones with the exception of snacks which were more likely to be regularly consumed by them.

Table 7. 7 Consumption of less popular food groups by income

Food groups	Income	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	≤5000	29.3	43.8	27
	>5000	43.3	42.2	14.4
Alcohol	≤5000	17.3	38.6	44.2
	>5000	33.9	51.1	15
Soft drinks	≤5000	18.2	53.5	28.4
	>5000	22.7	65	12.2
Snacks	≤5000	27.0	62.3	10.7
	>5000	10.6	82.2	7.2
Other aquatic products	≤5000	9.3	86.9	3.7
	>5000	26.1	73.9	0.0
Animal organs	≤5000	9.8	46.5	43.7
	>5000	21.1	38.9	40

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. It was clear that respondents with a higher income were more likely to consume milk and milk products more regularly, while their lower income counterparts did so irregularly. Moreover, the latter were nearly twice as likely not to consume milk and milk products.

Alcohol. Higher income respondents were more likely to consume alcohol and at higher frequencies. Above all, respondents with higher incomes tended to consume alcohol irregularly (51.1 percent), while those with lower incomes were inclined not to consume it. A third of higher income respondents were regular consumers of alcohol, and only 15 percent of them did not consume alcohol, compared to 44.2 percent of lower income respondents.

Soft drinks. Higher income respondents were much more likely to consume soft drinks compared to their lower income counterparts, although both of them did so irregularly. Almost 30 percent of lower income earners claimed to have never consumed soft drinks, which was more than double that of higher income respondents, who were more likely to be regular consumers.

Snacks. Although the majority of respondents in both income groups reported irregular consumption of snacks, those with lower incomes were more likely to be regular consumers, 27 percent compared to only 10.6 percent of those with higher incomes.

Other aquatic products. Although more than 70 percent of respondents in both income groups claimed to consume other aquatic products irregularly, 26 percent of those with a higher income

consumed this food group regularly, which was nearly three times that of those on lower incomes.

Animal organs. Higher income respondents were more likely to consume animal organs, with 21.1 percent of them consuming them regularly, while only 9.8 percent of lower income earners did so. In spite of this, over 70 percent of respondents in both income groups consumed animal organs irregularly.

It is understandable that higher income respondents showed a higher likelihood of regular consumption, as this meant higher purchasing power, thus endowing people better economic access to food. However, the consumption trend of alcohol and snacks may be more related to the gender composition within each income group, as the lower income group had a greater share of females who were more likely to consume snacks regularly and not to consume alcohol. Food preference could be another explanation for the consumption patterns of the less popular food groups among the income groups. As respondents who were more likely to consume the food groups showed a higher preference for them. The effects of awareness of healthy diets were not clear, as the higher income respondents had a higher awareness of healthy diets, but they were more likely to consume soft drinks, although they were also more likely to consume milk and milk products.

7.2.7 Residence

The consumption of the less popular food groups varied by the length of residence of respondents in Shanghai, although the differences were moderate. The main differences were found in the consumption of snacks and soft drinks, with only slight variations found in the consumption of animal organs and other aquatic products, as shown in Table 7.8.

Table 7. 8 Consumption of less popular food groups by residence

Food groups	Residence	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	<5 year	44.2	35.8	20.0
	5-9 years	32.2	50.7	17.1
	≥ 10 years	31.8	41.1	27.1
Alcohol	<5 year	30.8	36.7	32.5
	5-9 years	15.8	54.8	29.5
	≥ 10 years	29.5	39.5	31.0
Soft drinks	<5 year	28.3	45.8	25.8
	5-9 years	15.8	73.3	11.0
	≥ 10 years	17.8	54.3	27.9
Snacks	<5 year	31.7	56.7	11.7
	5-9 years	13.0	78.8	8.2
	≥ 10 years	15.5	76.7	7.8
Other aquatic products	<5 year	15.8	80.0	4.2
	5-9 years	13.0	84.9	2.1
	≥ 10 years	22.5	77.5	0.0
Animal organs	<5 year	17.5	38.3	44.2
	5-9 years	10.3	46.6	43.2
	≥ 10 years	17.8	43.4	38.8

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. There was a general trend that more recent arrivals in Shanghai were more likely to be regular consumers of milk and milk products. Moreover, 40-50 percent of respondents with longer residency consumed milk and milk products irregularly, and those who had lived in Shanghai the longest were most likely not to consume milk and milk products at all.

Alcohol. A similar trend was found in the consumption of alcohol. Respondents spending less than 5 years in Shanghai showed the highest likelihood (30.8 percent) of regular consumption, which was almost the same as those who had lived there 10 years or longer (29.5 percent), compared to only 15.8 percent of respondents who had lived there for 5 to 9 years. Nonetheless, all of them showed a tendency towards irregular consumption of alcohol.

Soft drinks. It was clear that newly migrated respondents were most likely to consume soft drinks regularly compared to those who had lived in Shanghai for 5 years or longer. Specifically, 28.3 percent of recent migrants were regular consumers of soft drinks, which was nearly twice that of long-term migrants, although the majority of them consumed soft drinks irregularly.

Snacks. Respondents who recently migrated to Shanghai were more likely to consume snacks regularly compared to earlier migrants. Almost one in three respondents who had lived in Shanghai for less than 5 years were regular consumers of snacks, which was twice that of those who had spent a longer period of time there.

Other aquatic products. Again, a trend of irregular consumption of other aquatic products was observed. Nevertheless, longer-term respondents showed a higher likelihood of regular consumption. As there was a general increase in regular consumers as the length of residence increased.

Animal organs. It was observed that respondents who had lived a longer time in Shanghai were more likely to consume animal organs, however, more recent migrants were more likely not to consume them at all.

More recent migrants were most likely to consume milk and milk products, alcohol, soft drinks and snacks on a regular basis compared to respondents with lengthier residence in Shanghai. The consumption of alcohol was associated with the occupation composition within each group, as recent migrants had a much greater proportion of construction workers compared to those who had migrated some time ago. In addition, food preference was also a likely explanation, as recent migrants showed the highest preference for alcohol. However, the more frequent consumption of milk, soft drinks and snacks among them might be related to a much higher percentage of younger respondents who shared the same food consumption patterns.

Those who had lived in Shanghai for 10 years or longer showed the highest likelihood of regular consumption of other aquatic products and animal organs. This may be directly related to their incomes, as they had the highest likelihood of earning a higher income. However, food preference would be a more persuasive explanation for this, as these respondents showed the highest preference for other aquatic products and animal organs while indicating lower preferences for other less popular food groups.

The effect of awareness of healthy diets was not clear on the consumption patterns among recent migrants, as they had the lowest awareness of healthy diets, while they were most likely to consume the unhealthy food groups, although they also showed the highest likelihood of more frequent consumption of milk. It seemed not to be the case for respondents with the lengthiest residence, who had the highest awareness of healthy diets and also highest likelihood of regular consumption of more nutritious food groups.

However, it needs to be pointed out here that respondents who had spent 5 to 9 years in Shanghai were less likely to have regularly consumed soft drinks compared to those who had lived there for 10 years or longer. This may be because the former had a larger share of respondents who sent a high percentage of remittances back home every year, which could result in less disposable income and thus lower paying power.

7.2.8 Sample district

Substantial variations were found in the consumption of the less popular food groups among respondents from different sample districts (Table 7.9), with the most substantial being in other aquatic products and soft drinks. It was found that those who lived in the inner city were most likely to regularly consume the less popular food groups.

Table 7. 9 Consumption of the less popular food groups by sample district

Food groups	Sample district	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	Putuo	40.9	31.8	27.3
	Pudong	36.3	41.7	22.1
	Songjiang	32.4	50.5	17.1
Alcohol	Putuo	27.3	34.1	38.6
	Pudong	27.0	59.5	13.5
	Songjiang	23.3	39.2	37.5
Soft drinks	Putuo	31.8	36.4	31.8
	Pudong	19.2	53.8	27.1
	Songjiang	18.0	78.4	3.6
Snacks	Putuo	29.5	47.7	22.7
	Pudong	19.6	70.0	10.4
	Songjiang	15.3	83.8	0.9
Other aquatic products	Putuo	40.9	56.8	2.3
	Pudong	13.8	83.3	2.9
	Songjiang	14.4	85.6	0.0
Animal organs	Putuo	22.7	34.1	43.2
	Pudong	12.5	40.4	47.1
	Songjiang	17.1	52.3	30.6

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. The consumption frequency of milk and milk products tended to decrease from the inner city district to the outer suburbs, as respondents from Putuo showed the highest likelihood (40.9 percent) of regular consumption, while those from Songjiang showed the lowest (32.4 percent).

Alcohol. The consumption of alcohol decreased from inner city to the outer suburbs, as Putuo had the largest share of regular consumers, while Songjiang had the smallest, although the

variation was slight. Specifically, more than one third of respondents from Putuo and Songjiang claimed to have never consumed alcohol, while only 13.5 percent of those from Pudong did so.

Soft drinks. The consumption of soft drinks decreased markedly from inner city to the suburbs. Nearly one third of respondents from Putuo were regular consumers of soft drinks, while the share in the other two districts was under 20 percent. However, 78.4 percent of respondents from Songjiang consumed soft drinks irregularly, more than twice that of those from Putuo.

Snacks. A similar trend was found in the consumption of snacks, although the differences were moderate. The consumption of snacks decreased from inner city to the suburbs, with 29.5 percent of respondents from Putuo consuming snacks regularly, and only 19.6 percent from Pudong and 15.3 percent of those from Songjiang did so. However, the share of irregular consumers of snacks increased from about 50 percent in Putuo to 83.8 percent in Songjiang.

Other aquatic products. Again, the share of regular consumers decreased markedly from inner city to the suburbs. Specifically, a high 40.9 percent of respondents from the Putuo district consumed other aquatic products regularly, while less than 15 percent of those from the suburbs did so.

Animal organs. Variations in the consumption of animal organs were moderate. Nevertheless, respondents from inner city were more likely to consume animal organs more frequently compared to those from the suburbs. Putuo had the highest percentage (22.7 percent) of regular consumers of animal organs. However, it needs to be mentioned here that respondents from Pudong rather than Songjiang showed the lowest likelihood of regular consumption.

Above all, the highest likelihood of regular consumption of the less popular food groups among inner city respondents was clearly related to the age distribution within each sample district. As Putuo had the highest percentage of the youngest respondents who were most likely to regularly consume milk and milk products, soft drinks, snacks, other aquatic products and animal organs. However, it also had the greatest proportion of oldest participants who were most likely to consume alcohol regularly. The effects of preference and awareness of healthy diets were not clear here, as Putuo respondents had a higher awareness while lower preferences for the food groups that they were most likely to consume frequently.

7.3 The sending of remittances

Substantial differences were observed among the remittance groups in the consumption of most less popular food groups, with the most marked one in the consumption of milk and milk products. Only a slight variation was found in the regular consumption of animal organs, which had most apparent variations in "irregular" and "never" consumed as shown in Table 7.10. Respondents sending no remittance home showed a tendency towards regular consumption of milk and milk products, while those sending 30 percent or less of their incomes back home tended not to consume animal organs.

Table 7. 10 Consumption of less popular food groups by % of remittance

Food groups	% of Remittance	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	None	45.3	38.5	16.1
	1-30	41.7	45.2	13.1
	>30	22	46.7	31.3
Alcohol	None	24.3	39.8	36
	1-30	15.5	52.4	32.1
	>30	30.7	44.7	24.7
Soft drinks	None	29.2	47.8	23
	1-30	19.1	64.3	16.7
	>30	11.3	67.3	21.3
Snacks	None	26.7	60.9	12.4
	1-30	16.7	76.2	7.1
	>30	13.3	80.0	6.7
Other aquatic products	None	21.1	76.4	2.5
	1-30	20.2	77.3	2.4
	>30	10.7	88.0	1.3
Animal organs	None	18	35.4	46.6
	1-30	14.3	36.9	48.8
	>30	12	54.6	33.3

Source: Shanghai food consumption survey, 2015-2016

Milk and milk products. The consumption of milk and milk products tended to be negatively related to the percentage of remittances being sent back home. As a general decrease in regular consumption was observed as the percentage of remittances increased. Respondents sending no remittance home tended to regularly consume milk and milk products, while those sending remittances tended to consume them on an irregular basis. Respondents sending no remittance or remitting 1-30 percent of annual incomes home had almost the same reporting rate of regular consumption, which was about twice that of respondents sending large remittances.

Alcohol. It was interesting to find that respondents sending the highest percentage of income home were most likely to consume alcohol on a regular basis. However, respondents sending 1-30 percent of income home showed the lowest likelihood of regular consumption, which was only half that of those who sent more than 30 percent of remittances home.

Soft drinks. A negative association between the consumption of soft drinks and the percentage of remittances were observed. A downward trend in the reporting rate of regular consumption was observed as the percentage of remittances increased, while nearly one in three of those who did not send remittance consumed soft drinks regularly, and only 11.3 percent of respondents sending the highest percentage of remittances did so.

Snacks. Although more than 60-80 percent of respondents in all the three remittance groups claimed to consume snacks on an irregular basis, those sending less remittances were more likely to consume them regularly, as consumption decreased as the percentage of remittances increased. Specifically, 26.7 percent of respondents who were not sending remittance home consumed snacks on a regular basis, twice that of those who sent remittance at the highest level.

Other aquatic products. Respondents sending remittances at a lower level were more likely to consume other aquatic products on a regular basis. Regular consumption decreased as the percentage of remittances increased, with just over 20 percent of respondents sending no remittance or 1-30 percent of remittances regular consumers, compared to only 10.7 percent of those sending more than 30 percent of income home.

Animal organs. Respondents sending fewer remittances were more likely to consume animal organs more frequently, although the variation was only slight. Some 18 percent of respondents who did not remit consumed animal organs regularly, compared to 14 percent of those sent 1-30 percent of remittances and 12 percent of those who sent remittances at the highest level.

In summary, respondents not sending remittances home were more likely to consume most of the food groups regularly compared to their counterparts who sent remittances. Alcohol consumption was an exception, however, as those who sent the largest remittances showed the highest likelihood of regular consumption. This is clearly related to the gender composition within each remittance group, as males who showed a much higher likelihood of drinking alcohol, made up as high as 74.7 percent of the highest remittance senders, which was much higher than that of lower level remitters. A larger share of females did not send remittance may account for them being regular consumers of other food groups. In addition, another likely explanation is that by not sending remittance migrants were left with more disposable income.

At the same time, a higher preference for the less popular food groups may also account for the higher likelihood of regular consumption among them.

7.4 Awareness of healthy diets

This section looks at the association between participants' awareness of healthy diets and their consumption of the less popular food groups. It was found that respondents' attention to healthy diets seemed to have a significant influence on their consumption of the less popular food groups compared to their perceptions of the importance of healthy diets. As there were more significant variations observed. A higher awareness of healthy diets tended to increase respondents' likelihood of regular consumption of the more nutritious food groups, and decrease the less nutritious ones, with the exception of soft drinks. This trend was related to the higher preference for the corresponding food groups. However, the effect of food preference was not clear in the consumption of soft drinks, snacks and animal organs. On the one hand, respondents with a higher awareness of healthy diets showed the lowest preference for animal organs and soft drinks, while they were also the most likely to consume them regularly. On the other hand, they showed the highest preference for snacks but were least likely to consume them regularly.

7.4.1 Perception of the importance of healthy diets

As shown in Table 7.11, the consumption of less popular food groups varied only slightly by the perception of the importance of healthy diets, with the exception of alcohol consumption. Respondents perceiving healthy diets to be of high importance showed a slightly higher likelihood of regular consumption of the more nutritious food groups – milk and milk products and other aquatic products. Whereas respondents stating that it was of a "moderate or low importance" were more likely to regularly consume other less popular food groups that are less nutritious or even unhealthy. For instance, 36.9 percent of those who gave "high importance" as a response to healthy diets indicated regular consumption of milk and milk products, compared to 30.7 percent of those who reported "moderate or low importance". However, 30.6 percent of the latter consumed soft drinks regularly, only 17.8 percent of the former did so.

This implies that a higher perception of the importance of healthy diets may increase the likelihood of consuming more nutritious food groups. Such a trend may be further related to the association between food preference and perception of importance of healthy diets. As respondents who gave high importance to a healthy diet generally showed a higher preference

for milk and milk products, as well as other aquatic products, whereas they indicated a lower preference for alcohol, soft drinks, snacks and animal organs.

Table 7. 11 Consumption of less popular food groups by the perception of importance of healthy diets

Food groups	Perception	Consumption frequency		
		Regular (%)	Irregular (%)	Never(%)
Milk and products	Moderate or low importance	30.7	38.6	30.7
	High importance	36.9	44.0	19.1
Alcohol	Moderate or low importance	32.0	34.7	33.3
	High importance	23.2	46.5	30.3
Soft drinks	Moderate or low importance	30.6	44.0	25.3
	High importance	17.8	62.2	20.0
Snacks	Moderate or low importance	22.7	60.0	17.3
	High importance	18.8	74.1	7.2
Other aquatic products	Moderate or low importance	13.3	82.7	4.0
	High importance	17.8	80.6	1.6
Animal organs	Moderate or low importance	20.0	49.3	30.7
	High importance	13.7	41.6	44.7

Source: Shanghai food consumption survey, 2015-2016

7.4.2 Attention to information about healthy diets

Table 7.12 shows marked differences in the consumption of less popular food groups by respondents' degree of attention to healthy diets. Generally, respondents paying a higher degree of attention to healthy diets showed a higher likelihood of regular consumption, with the exception of alcohol and snacks. A higher percentage of the youngest respondents could account for this. The most significant variation was found in the consumption of milk and milk products, with a high 75.6 percent of "high attention" respondents being regular consumers, compared to only a third of those who paid low attention or none. Similarly, 43.9 percent of respondents paying high attention to healthy diets consumed other aquatic products, while only 16 percent of the "low attention" respondents and 6 percent of respondents paying no attention did so.

However, respondents not paying any attention to healthy diets showed the highest likelihood of regular consumption of alcohol. This reflects the impact of occupation and age composition within each group. As these respondents had the greatest share of construction workers and oldest respondents who were most likely to consume alcohol regularly. As for the consumption of snacks, income distribution within each group indicated that, respondents giving low

attention to healthy diets were most likely to consume snacks regularly, because they were mainly on lower incomes.

Such consumption trends again imply the importance of the awareness of healthy diets, which may increase the likelihood of regular consumption of nutritious food groups.

Table 7. 12 Degree of attention to healthy diets and the consumption of less popular food groups

Food groups	Degree of attention	Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Milk and products	Zero	17.9	39.3	42.9
	Low	35.2	48.9	15.9
	High	75.6	12.2	12.2
Alcohol	Zero	34.5	28.6	36.9
	Low	21.1	51.5	27.4
	High	29.3	29.3	41.5
Soft drinks	Zero	15.5	46.5	38.1
	Low	21.1	65.2	13.7
	High	24.4	41.5	34.1
Snacks	Zero	20.2	63.1	16.7
	Low	20.4	74.1	5.6
	High	12.2	5.6	17.1
Other aquatic products	Zero	6.0	90.5	3.6
	Low	16.3	82.2	1.5
	High	43.9	52.6	2.4
Animal organs	Zero	11.9	57.2	31.0
	Low	15.1	43.4	41.5
	High	19.5	12.2	68.3

Source: Shanghai food consumption survey, 2015-2016

7.5 Consumption patterns of processed food and fast food

7.5.1 Processed food

Table 7.13 presents variations in the consumption of processed food by socio-demographic characteristics and the awareness of healthy diets. A general trend of irregular consumption of processed food was observed, and the reporting rate of regular consumption in each socio-demographic group was minimal. Respondents showing a higher likelihood of irregular consumption have the following characteristics: they came from middle provinces, were aged younger than 30, male, worked in the construction industry, had an education of middle school, earnt no more than 5000 yuan per month, and had been in Shanghai for 5-9 years, sent no remittance home, perceived healthy diets to be of high importance, while paying no attention to healthy diets.

Table 7. 13 Consumption of processed food by socio-demographic characteristics and awareness of healthy diets

Characteristics		Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Hometown groups	Eastern provinces	0.9	46.8	52.3
	Middle provinces	2.6	58.9	38.4
	Western provinces	1.8	50.9	47.3
Age	<30	3.6	60.7	35.7
	30-39	2.6	48.4	49.0
	40-49	0.0	58.6	41.4
	≥50	3.1	50.0	46.9
Gender	Male	2.6	57.4	40.0
	Female	0.8	48.0	51.2
Occupation	P &M	1.1	51.9	47.0
	C	6.8	62.7	30.5
	B & S	1.3	54.3	44.4
Education	Primary school or none	1.9	52.8	45.4
	Middle school	2.9	55.2	41.9
	High school or above	0.9	54.8	44.3
Income	≤5000	1.9	57.6	40.5
	>5000	2.2	50.6	47.2
Residence	<5 year	4.2	57.5	38.3
	5-9 years	0.7	58.2	41.1
	≥ 10 years	1.6	47.3	51.2
Remittance	None	1.9	55.2	42.9
	1-30	0.0	54.7	45.2
	≥40	3.3	53.3	43.3
Perception of the importance of healthy diets	Moderate or low importance	2.7	53.3	44
	High importance	1.9	54.7	43.4
Attention to healthy diets	Zero attention	1.2	60.7	38.1
	Low attention	1.9	54.1	44.1
	High attention	4.9	43.9	51.2

Source: Shanghai food consumption survey, 2015-2016

Respondents with the following characteristics were most likely not to consume processed food: came from eastern provinces, female, aged in their 30s, had been in Shanghai for 10 years or longer and paid a high degree of attention to healthy diets. This trend also reflects the influences of food preference and the awareness of healthy diets, particularly attention to healthy diets and their interaction with socio-demographic characteristics.

Specifically, females were more likely to have a higher degree of awareness of healthy diets and were more likely to dislike processed food compared to males. Respondents aged 30-39 showed the highest likelihood of disliking processed food and also perceived healthy diets to

be of high importance. Respondents who had lived in Shanghai the longest were most likely to have a high awareness of healthy diets even though they showed the highest likelihood of liking processed food. The eastern-province respondents were more likely to dislike processed food compared to those from the other provinces. They also had the greatest proportion of respondents perceiving healthy diets to be of high importance, although they were less likely to pay a lot of attention to them.

7.5.2 Fast food

As shown in Table 7.14, there were substantial differences in the consumption of fast food among respondents grouped by different socio-demographic characteristics and their awareness of healthy diets. On the one hand, respondents with the following characteristics showed the highest likelihood of "irregular" consumption: those migrating from eastern provinces; the youngest; male; worked in the business and services industries; finished high school or had higher education; earnt more than 5000 yuan per month; had been in Shanghai for 5-9 years; sent some income home per year; had a high degree of awareness of healthy diets.

On the other hand, respondents who were most likely not to consume fast food tended to have the following characteristics: came from western provinces; aged 50 or over; female; worked in the processing and manufacturing industries; had low or no education; earnt 5000 yuan or under per month; recently migrated; sent largest remittances per year; had a lower awareness of healthy diets.

Table 7. 14 Consumption of fast food by socio-demographic characteristics and awareness of healthy diets

Characteristics		Consumption frequency		
		Regular (%)	Irregular (%)	Never (%)
Hometown groups	Eastern provinces	0.0	55.9	44.1
	Middle provinces	1.3	49.8	48.9
	Western provinces	0.0	30.9	69.1
Age	<30	3.6	76.2	20.2
	30-39	0.0	60.3	39.7
	40-49	0.0	28.1	71.9
	≥50	0.0	6.2	93.8
Gender	Male	0.4	53.0	46.7
	Female	1.6	40.0	58.4
Occupation	P &M	1.1	42.2	56.8
	C	0.0	44.1	55.9
	B & S	0.7	58.9	40.4
Education	Primary school or none	0.0	13.9	86.1
	Middle school	0.0	52.4	47.7
	High school or above	2.6	76.5	20.9
Income	≤5000	0.9	38.6	60.5
	>5000	0.6	61.1	38.3
Residence	<5 year	1.7	47.5	50.8
	5-9 years	0.7	54.1	45.2
	≥ 10 years	0.0	44.2	55.8
Remittance	None	0.6	58.4	41.0
	1-30	1.2	60.7	38.1
	≥40	0.7	32.0	67.3
Perception of the importance of healthy diets	Moderate or low importance	1.3	29.4	69.3
	High importance	0.6	53.4	45.9
Degree of attention to healthy diets	Zero attention	0.0	21.5	78.6
	Low attention	1.1	55.2	43.7
	High attention	0.0	63.4	36.6

Source: Shanghai food consumption survey, 2015-2016

Such a trend is related to income and education. As respondents most likely to have irregularly consumed fast food were more likely to have higher levels of education and thus higher incomes. It is understandable that a higher income tends to increase the likelihood of consuming fast food when introducing the impact of price. As fast food in China, particularly KFC and McDonald's restaurants, is normally more expensive compared to ordinary meals in other restaurants. The influence of awareness of healthy diets on the consumption pattern of

fast food is not clear, as respondents in some socio-demographic groups who were more likely to consume fast food showed a higher likelihood of having high awareness of healthy diets.

7.6 Conclusion

This chapter has shown the consumption patterns of the less popular food groups by socio-demographic characteristics and the awareness of a healthy diet. The results indicate that both socio-demographic characteristics and the awareness of healthy diets contribute to significant differences in the consumption of almost all the less popular food groups. Consumption of fast food varied most significantly by all the factors compared to other less popular food groups. Differences in the consumption of the less popular food groups related to socio-demographic characteristics and attention to healthy diets were even greater than those described in the consumption of the essential food groups in the previous chapter. This implies that consumption of the less popular food groups were more easily influenced by factors compared to the commonly consumed ones.

Migrants with a higher income, aged younger than 30 and paying a high degree of attention to healthy diets were the three factors that made respondents more likely to consume the less popular food groups, with the exception of alcohol and snacks, which were more likely to be regularly consumed by the oldest respondents and those on lower incomes. Nonetheless, it seems that attention to healthy diets, gender and age are the three factors that contributed to the most significant consumption variations. For example, the consumption of milk and milk products, other aquatic products, animal organs and processed food varied most substantially by attention to healthy diets. However, the consumption of fast food and soft drinks varied most significantly by age, while alcohol and snacks by gender. Similar to the consumption of essential food groups, the consumption of the less popular food group seemed to be negatively related to the sending of remittance, with the exception of the consumption of alcohol. There was generally a positive association between food preference and the likelihood of consumption, given that respondents with a higher preference for a food group generally showed a higher likelihood of regular consumption. This implies that food preference may be the primary factor that drives the regular consumption of the less popular food groups.

Chapter 8 Conclusion

8.1 Introduction

This thesis adds to the knowledge on the linkages between urbanisation, migration and food security by focusing on the food consumption patterns of rural migrants in urban areas. This has been largely ignored in discussions within the nexus of urbanisation, migration and food security linkage, which had previously focused upon rural areas. The thesis used primary data based on a case study of Shanghai, which is the most urbanised megacity in China, to provide empirical evidence on the relationship between migration and food security in the urban context. The results, based on a survey of 395 rural to urban migrants living in Shanghai, show that generally migrants tended to improve their food security after migration through improved physical and economic access to food, which is reflected in their improved diets in terms of both quality and diversity. At the same time, however, the endogenous factors, such as the socio-demographic characteristics of migrants, their food preference as well as awareness of healthy diets, and the amount of remittances they sent back home, were found to determine how much they benefit from such improvement by influencing their food consumption patterns after migration.

This chapter brings together the key insights of the thesis. It begins with a brief overview of the research, and then presents the main findings of the study, and makes some suggestions for future studies relating to migration and food security.

8.2 An overview of the study

Chapter one provides some background to the research by presenting a brief introduction to the global and Chinese context of food security. The issue of food security for developing countries, particularly China, needs to be examined in the urban context, given that it has been experiencing massive rural to urban migration in the process of rapid urbanisation. Given the multi-dimensional characteristic of food security, the major focus of the thesis is on the food consumption patterns of migrants in the megacity Shanghai, with the objective to explore the changes in their food security after migration and the dietary energy intake as well as the determinants of their food consumption patterns in Shanghai. The specific questions in the study include: 1) What are the food preferences and food consumption patterns of rural migrants in Shanghai and their determinants? 2) What are the changes in the food consumption patterns among rural migrants after their migration to urban Shanghai? 3) What are the dietary energy outcomes of their changing food consumption patterns and their determinants? 4) Are

their food consumption patterns influenced by the sending of remittances home? 5) Are their food consumption patterns influenced by their awareness of healthy diets?

Before answering these questions, chapter two reviews literature relating to the concept and Chinese context of food security and urbanisation, as well as current research about the food security, urbanisation, and migration linkages from the perspective of food consumption. Chapter three provides details of the questionnaire survey that was conducted in Shanghai to collect data about migrants' food consumption patterns to match with their basic socio-demographic and economic backgrounds. Migrant participants in the survey were sampled from Putuo, Pudong and Songjaing – the three sample districts selected according to their high proportion of migrants representing the inner city, near suburbs and far suburbs of Shanghai respectively. The researcher also visited a couple of local farmers' markets and super markets to collect the unit weight of major food items, which is necessary for the calculation of the dietary outcomes of migrants' food consumption. Tools and major indicators used in data analysis are also illustrated in this chapter.

A profile of migrant participants, outlining their basic socio-demographic and economic characteristics and awareness of healthy diets, is the focus of chapter four to provide backgrounds to their food consumption patterns. Chapter five starts with the analysis of the general food consumption patterns of migrants before and after migrating to Shanghai, this is mainly based on the food consumption frequencies estimated by the participants. Then the chapter presents the dietary energy intake of migrants according to a seven-day recall of their current diets in Shanghai. The commonly consumed food groups, as well as the less popular ones, in migrants' diets are discussed in chapter five. The determinants of migrants' consumption patterns of those food groups are examined respectively in chapters six and seven. Specifically, the influences of food preference, socio-demographic characteristics, the sending of remittances and awareness of healthy diets on migrants' consumption were established.

8.3 Answering the research questions: main findings of the study

Chapters four to seven provide answers to the research questions covering the urbanisation, migration, and food security linkages, this section presents a summary of the major findings.

8.3.1 Migrants tended to experience improvements in food access and their diets after migration to Shanghai

The study shows that migrants did experience changes in their food security after migration to Shanghai. The survey found changes in two aspects: improved food access and diets. Most

importantly, migrants tended to have better food access. Nearly two thirds of the surveyed migrants claimed that they had both better economic and physical access to food after migrating to Shanghai, resulting mainly from an increase in food choices, incomes, and the food stores in their communities.

As a result of improved food access, they were able to maintain better diets after migration, particularly they had increased diversity in their diets. In spite of the common consumption of staple foods both before and after their migration, migrants were able to include more food groups in their diets after migration. Their commonly consumed food groups in Shanghai were vegetables, animal meat, eggs, fish, poultry meat and fungus, with the last two newly added to their diets after their move to Shanghai. Moreover, there was increased consumption of other aquatic products (shrimps, crabs, shell fish etc.) as well as milk and milk products, which would undoubtedly increase their nutritional intake. This seems not to be the case for migrants in other nations. For instance, a study of the effect of migration on changes in food consumption patterns of migrants in Ghana found an inverse trend, pointing out the tendency among migrants towards a shift in their food consumption patterns to less nutritious foods such as sugar and beverage (Karamba et al. 2011).

8.3.2 Changes found in breakfast after migration to Shanghai: from home preparation to purchasing

In spite of the seldom changed meal patterns of the surveyed migrants, another migration induced change in the food consumption patterns of migrants is the shift from home preparation to purchasing food outside the home for breakfast, due to changed work patterns and lifestyles after migration. This is similar to the well-known "nutrition transition" happening in developing countries, which has resulted from the shift towards lower work-related physical activities and sedentary lifestyles in the process of urbanisation (Popkin 1999).

As a result of this change, diets at breakfast tended to be more diverse after migration, with the increased consumption of food items that are more common in breakfasts in urban China. These foods include Baozi, Chinese cruller, soy milk, milk and pasty, which are difficult to be accessed in rural China due to the dispersed food markets and less convenient transport system. The share of migrant consumers of those foods doubled or tripled after migration. Therefore, the commonly consumed foods of migrants at breakfast increased from mainly porridge, steamed bun, eggs and vegetables to not just porridge, steamed bun, but also included Baozi, soy milk, and Chinese cruller. The breakfasts after migration became lighter for about one fifth

of the surveyed migrants who used to have rich breakfasts including the consumption of vegetables, eggs and meat.

8.3.3 The increase in the consumption of nutritious food groups

Apart from more diverse breakfasts after migration, the survey found that migrants tended to also have better diets for lunch and supper after migration, these two meals were regarded to be more important than breakfast by most migrant participants. In addition to rice, vegetables, pork, eggs, fish and legumes, poultry meat and fungus became another two commonly consumed food groups by the majority of migrants in Shanghai. Moreover, the share of migrants who regularly consumed beef actually experienced the greatest increase after migration, from 17.3 percent to 45 percent after migration. This was followed by the consumption of other aquatic products, which were regularly consumed by half of the migrants after migration, but only by a third beforehand.

8.3.4 Staple foods and animal meat contributed to most of the dietary energy intake of migrants

According to the consumption frequencies of the food groups estimated by the migrants in the survey, their diets basically consisted of healthy food groups. As a normal diet of the majority of the surveyed migrants was made up of staple foods (primarily rice), vegetables, animal meat, poultry meat, fruits and fish as defined as the “essential food groups”, which represent a typical Chinese diet. Less nutritious or unhealthy food groups such as fast food, processed food, snacks, soft drinks and alcohol were not common in their diets. A high 90 percent of the surveyed migrants claimed that their consumption of those food groups was the same as before their migration. Furthermore, according to the seven-day recall of food consumption by the migrants, their major dietary energy source was staple foods and animal meat, contributing respectively to 32.4 percent and 26.3 percent of their average dietary energy intake. Moreover, the majority of the participants only had fruit as a snack, which contributed to 5.3 percent of their average daily energy intake. The high energy intake from animal meat as well as a trend of daily consumption among the respondents implies the high demand for animal meat, which is a major characteristic of “nutrition transition” in Asia, particularly China (Kearney 2010). However, it should be note that the seven-day recall also revealed that almost half of the respondents were vulnerable to food insecurity, as their average daily energy intake was under the Minimum Dietary Energy Requirement by FAO.

8.3.5 The impact of the sending of remittances on migrants' food consumption

It was found that the amount of remittances migrants sent back to their rural families did influence their food consumption in a negative way. The surveyed migrants who were not sending remittance back home were more likely to more frequently consume most food groups except alcohol, which was more likely to be more frequently consumed by those sending a large part of their income as remittances due mainly to their age and gender. They were also more likely to live alone in Shanghai with families at home. This finding is of important significance, as it serves to bridge the gap in the research into the remittance-food security nexus, which has tended to focus on the benefits of remittance on the food security of the origin households rather than the migrants themselves. In addition, it implies that examining the impact of disposable income rather than total income on food consumption patterns may lead to a better understanding.

8.3.6 The association between food preference, awareness of healthy diets and the consumption of a food group

The survey established that food preferences not only led to higher consumption frequencies of each food group, but also explained more frequent consumption of most food groups among migrants with different socio-demographic and economic characteristics. The consumption of fish, poultry meat and soft drinks among the gender groups were exceptions, as they tended to be determined largely by income and industry of occupation, and the awareness of healthy diets among males and females.

Generally it was found that an awareness of a healthy diet tended to have beneficial effects on the food consumption of migrants. Respondents with a higher awareness of a healthy diet tended to have a higher likelihood of regular consumption of healthier and more nutritious food groups, particularly fruit, aquatic products, milk and milk products. They were also less likely to consume less nutritious foods, particularly alcohol and snacks. This trend was also established among migrants with different socio-demographic characteristics particularly age, and occupational industry for both males and females.

The study found that respondents who were more likely to consume the essential food groups showed a higher likelihood of preference for them, as well as a higher awareness of healthy diets. This is also the case for the consumption of milk and other aquatic products, although they were less popular among the respondents. For other irregularly consumed food groups, those who showed a higher likelihood of consumption tended to have a lower awareness of a

healthy diet while they also showed a higher likelihood of preference for them. This may be related to their age, gender, income and industry of occupation.

It needs to be pointed out here, however, that the consumption of fast food and soft drinks was more likely to be related to higher socio-economic status and preferences rather than any awareness of a healthy diet. Migrants with a higher awareness of healthy diets were much more likely to consume fast food, although usually on an irregular basis, as they were more likely to have higher incomes, educational levels as well as higher preferences for fast food. Similarly, soft drinks were more likely to be regularly consumed by respondents who paid high attention to healthy diets who were also more likely to have higher incomes, educational levels, although they showed a lower preference for them.

8.3.7 The relationship between socio-demographic characteristics and migrants' food consumption patterns

It was found that age, gender and occupational industry of respondents influenced their food consumption. Generally, age was negatively related to the frequent consumption of the food groups, with the exception of alcohol. Males were more likely to have animal sourced foods (mainly meat and animal organs) that were rich in fat and calories compared to females. They were also much more likely to be regular consumers of unhealthy food groups, particularly alcohol and soft drinks. Females were more likely to consume more nutritious and healthy food groups like fruits and milk.

Respondents engaging in higher levels of physical activity at work, particularly those who worked in the construction industry consumed meat and animal organs most frequently, while those who worked in the business and services industries were most likely to consume nutritious and luxury food groups, such as aquatic products, fruits and milk products on a regular basis. They were also more likely to consume fast food, which is also a luxury food group for most migrants, although it is not that nutritious and healthy. Variations in the levels of consumption by other characteristics basically related to the distribution of age, gender and occupational industry, while variations by education reflect the positive association between education and income. Of most importance, it was found that there was a significant correlation between respondents' age, gender, income, education as well as industry of occupation and their daily energy intake and dietary diversity, and they also varied substantially by their body mass index (BMI).

8.3.8 Geographical characteristics of migrants also played a role in shaping their food consumption patterns

The survey also found that the area of origin of migrants and the district where they lived in Shanghai did influence their patterns of food consumption, particularly soft drinks and other aquatic products. Those who moved from the eastern provinces were most likely to be regular consumers of these two food groups, whereas respondents from the western provinces were least likely to consume them regularly. On the other hand, migrants who lived in the inner city were most likely to consume soft drinks and other aquatic products regularly. However, interestingly, those from the far suburb – Songjiang consumed poultry meat, which was one of the essential food groups, on an irregular basis compared to the regular consumption of it among those who lived in Putuo and Pudong.

8.4 Limitations of the study

This section points out some limitations of the study and provides some suggestions for future research within the nexus of the migration-food security/food consumption linkages.

One of the main limitations encountered in the study was the lack of a comprehensive comparison of the food consumption patterns between migrants and other population groups, particularly the urban resident populations in Shanghai and the general rural population in China. Secondary data on the food consumption patterns of the general urban and rural populations in China were not available in the existing literature. Although the statistical year book of the National Bureau of Statistics of China releases data on per capita intake of major food groups both nationwide and by regions, these data were not enough to outline the food consumption patterns of specific population groups, as the intake of snacks and drinks as well as consumption frequencies of each food group were not included in the statistical year book. At the same time, the study was not able to collect primary data on the food consumption of non-migrant populations due to time and budget limitations on the study. The study would have been able to provide a better understanding of the food consumption of migrants in Shanghai through comparisons with non-migrant groups, rather than only comparing their consumption patterns before and after migration to Shanghai by the selected characteristics and hometown origins etc.

Another important limitation is related to the possible bias of the food intake data of the surveyed migrants. Given the limitations of manpower and budget, it is not practical to ask the participants to record their daily food intake with standard measures such as scales or the

number of whole items such as fruits. Therefore, the application of the seven day recall cannot accurately record the specific amount of food consumed by the participants. In addition, diet information recalled over a seven day period cannot cover seasonal variations throughout the year that can result in fluctuations in dietary energy intake, although it covers short-term variations compared to the 24-hour recall. Due to the rare referable literature related to this research, the lack of sufficient comparison of the findings in this thesis with situations in other nations would also be a limitation of the thesis.

8.5 Future research implications

The *hukou/non-hukou* segregation between migrants and urban residents due to the restriction of the household registration system in China has rendered rural to urban migrants a disadvantaged population in the cities in terms of job opportunities and social welfare (Lu and Wan 2014), which would definitely influence migrants' food consumption in the urban areas. Therefore, given the different degrees of nutrition transition between rural and urban areas due to variations in work patterns and lifestyles (Smil 2000; Zhai et al. 2009), as well as food availability and infrastructure, comparisons of food consumption patterns between different population groups, particularly migrants and urban/rural residents, would lead to a more comprehensive understanding of the impacts of migration and urbanisation on migrants' food consumption. More importantly, this would provide implications on future food security from the perspective of food demand through examining the drivers of food consumption patterns among different population groups. This would be a significant research topic for future researchers interested in the linkages between urbanisation, migration and food security.

Given the positive relationship between food preferences and migrants' food consumption and the beneficial effects of an awareness of healthy diets, it is important to investigate how the interaction between food preference and awareness of healthy diets affects the food consumption patterns among different population groups. Although the study found that food preferences, awareness of healthy diets and respondents' socio-demographic characteristics were interrelated in influencing their food consumption patterns, more in-depth research is needed to find out the mechanism of the interactions between those three dimensions and which one plays the most important part in influencing people's food consumption patterns. The findings would provide important policy implications on promoting healthy food consumption patterns through awareness campaigns and price policies on foods.

The survey found that it is highly likely that migrants aged 40 or above might be the most vulnerable to food insecurity, when compared to their counterparts younger than 40, they were more likely to earn 5000 yuan or less a month, while sending more than 30 percent of their incomes back home every year. This resulted in reduced and poor purchasing power and thus lowest likelihood of frequent consumption of most food groups, particularly the nutritious ones. This may result in insufficient nutrition or even limited food intake, undermining their health in the long run.

8.6 Conclusion

As has been pointed out by Gerbens-Leenes and Nonhebel (2005), food security needs serious attention in the near future, given the increasing population, degraded resources for agricultural production, globalisation of the food market and changing food consumption patterns. Food consumption patterns are not only a direct determinant of an individual's food security, but also linked to their health condition (e.g. Beaglehole 1992; Moomaw et al. 2012; Zimmet et al. 1997). Moreover, they are also an important reflection of food demand and can further influence future food availability according to available resources (e.g. Gerbens-Leenes and Nonhebel 2002; Moomaw et al. 2012; Smil 2000). However, food consumption patterns vary between different population groups, due to a series of factors such as socio-demographic and economic characteristics, and endogenous factors including awareness of healthy diets and food preferences. As an important population group in China in the process of rapid urbanisation, migrants' food security is important in promoting their well-being as well as food security for the whole population. However, this has received little attention in the research into the linkages between urbanisation, migration and food security, which has been primarily focused on the rural area by examining the influences of urbanisation and migration on rural agricultural production and the food security of the rural households through remittances sent from their migrant members (e.g. Crush 2013; Lacroix 2011). Therefore, the thesis can help contribute to covering such a gap by focusing on the food consumption patterns of rural to urban migrants through the case study in Shanghai.

In spite of its limitations, the objective of the study was achieved as the empirical findings presented have answered the research questions that were raised at the beginning of the thesis. On the one hand, migrants have benefited from migration and urbanisation through improved food access and diets, although the change in their food consumption patterns was not very substantial. It is important to note that their consumption of western food groups such as fast

food and soft drinks had seldom changed. On the other hand, there was a possibility that migrants may be vulnerable to food and nutrition insecurity after migration. The empirical results have indicated that the sending of remittances had immediate impacts on respondents' food consumption, with those who sent large remittances less likely to consume most of the food groups, particularly the nutritious ones. However, it must be noted that the majority of the surveyed migrants were sending remittances home every year, with one third of them sending more than 30 percent of their incomes back to their rural families every year. This has tended to receive the most research attention in respect to impact on home communities.

In addition to the findings on the migration/urbanisation-food security linkage, the empirical findings of the study also indicated that socio-demographic characteristics, food preferences and awareness of healthy diets (perceptions on the characteristics of a healthy diet; perceptions on the importance of having healthy diets; degree of attention to healthy diets) can determine migrants' food consumption patterns. In particular, the age, income and industries of employment of males and females played a more important role in determining migrants' food consumption patterns compared to other socio-demographic characteristics. Given the on-going industrial restructuring in China, with an increasing proportion of business and services jobs in the economy, consumption patterns of people working in those industries have important implications on the food demand in future urban food markets. This is also the case for the consumption patterns evident among the young and the old, given the increasing proportion of the aged population in China.

Appendix 1 Shanghai Migrant Food Consumption Survey Questionnaire

Questionnaire code：	Respondent code：
Location：	Date：

Dear Sir/Madam：

This survey is part of the PhD research project "Migration and Food Security in Urban China: A Case Study in Shanghai from the perspective of food consumption" Conducted by Lingling Liao, PhD student in the University of Adelaide. This survey intends to collect data about consumption patterns and their determinants of rural migrants in Shanghai, providing policy and research implications in the area of food security. We would like you to spend some time for this survey. This survey is anonymous, all information to be collected is for the purpose of academic research only. This survey is anonymous, and its results will be used for academic research. If you agree to participate in this survey please tick here: □

Part I Food Consumption Information

A1. How often do you pay attention to information about healthy diet? [ ]

（1）Never （2）Seldom （3）Often

A2. What does healthy diet mean to you? Please tick all that apply

（1）Low calorie foods A2a [ ]

（2）Low carbs A2b [ ]

（3）Low fat A2c [ ]

（4）Low sodium A2d [ ]

（5）Low sugar A2e [ ]

（6）Fresh A2f [ ]

（7）Nutritionally balanced A2g [ ]

（8）Organic A2h [ ]

（9）Natural A2i [ ]

（10）Whole grains A2j [ ]

（11）Don't know A2k [ ]

（12）Other, please specify：_____ A2l

A3. How important is it to you to have healthy diets? Please select from 1-5 [ ]

1(not important at all) 2 3(ordinary) 4 5 (very important)

A4. Please describe how much do you like/dislike the following foods. Please select from 1-5

A4a. Animal meat（beef, mutton, pork etc.）：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4b. Animal organs：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4c. Poultry（chicken meat, duck meat etc.）：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4d.Fish：[ ] 1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4e. Other aquatic products（shrimp, crab, bell）：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4f.Vegetables：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4g.Fruits：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4h.Puffed food（potato chips, popcorn etc.）：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4i.Milk and milk products（e.g. milk, yoghurt, butter, cream etc.）：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4j. Sweet foods（e.g. candies, cakes, ice cream etc.）：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4l. Fast food (e.g. McDonald's, KFC)：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4m.Processed food ：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4n.Soft drinks：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A4o.Alchohol：[ ]

1（dislike very much） 2 3(neutral) 4 5 (like very much)

A5. How is your food usually prepared? Check the most usual one.

（1）Steamed A5a [ ]

（2）Boiled A5b [ ]

（3）Stewed A5c [ ]

（4）Fried A5d [ ]

（5）Baked A5e [ ]

（6）Other, please specify：_____ A5f

A6. Usually, how many meals do you eat every day? _____

A7. Please describe your daily meals (including eating frequency and foods usually eat (eat at least once per month) at each meal) before and after your migration.

A7a1	**A7b1**
Frequency of breakfast：__ times/ week；	Frequency of breakfast：__ times/ week；
A7a2：Foods usually eat at breakfast:	**A7b2** Foods usually eat at breakfast:
（1）Porridge A7a21	（1）Porridge A7b21
（2）Chinese crullerA7a22	（2）Chinese crullerA7b22
（3）Steamed bun A7a23	（3）Steamed bun A7b23
（4）Baozi A7a24	（4）Baozi A7b24
（5）Wonton A7a25	（5）Wonton A7b25
（6）Dumpling A7a26	（6）Dumpling A7b26
（7）Sesame seed cake A7a27	（7）Pasty A7b27
（8）Chinese hamburger A7a28	（8）Chinese hamburger A7b28
（9）Noodle A7a29	（9）Noodle A7b29
（10）Rice noodle A7a210	（10）Rice noodle A7b210
（11）Rice A7a211	（11）Rice A7b211
（12）Corn A7a212	（12）Corn A7b212
（13）Sweet potato A7a213	（13）Sweet potato A7b213
（14）Pork A7a214	（14）Pork A7b214
（15）Beef A7a215	（15）Beef A7b215
（16）Mutton A7a216	（16）Mutton A7b216
（17）Poultry A7a217	（17）Poultry A7b217
（18）Fish A7a218	（18）Fish A7b218
（19）Egg A7a219	（19）Egg A7b219
（20）Vegetables A7a220	（20）Vegetables A7b220
（21）LegumesA7a221	（21）LegumesA7b221
（22）Fungus A7a222	（22）Fungus A7b222
（23）Seaweeds A7a223	（23）Seaweeds A7b223
（24）Fruits A7a224	（24）Fruits A7b224
（25）Milk A7a225	（25）Milk A7b225
（26）Soy milk A7a226	（26）Soy milk A7b226
（27）Fruit juice A7a227	（27）Fruit juice A7b227
（28）Vegetables juice A7a228	（28）Vegetables juice A7b228
（29）Yoghurt A7a229	（29）Yoghurt A7b229
（30）Bacon A7a230	（30）Bacon A7b230
（31）Ham A7a231	（31）Ham A7b231
（32）KFC/McDonald’s A7a232	（32）KFC/McDonald’s A7b232
（33）Cake A7a233	（33）Cake A7b233
（34）Soda cookies A7a234	（34）Soda cookies A7b234
（35）Sweet cookies A7a235	（35）Sweet cookies A7b235
（36）Can A7a236	（36）Can A7b236
（37）Pickles A7a237	（37）Pickles A7b237
（38）Instant noodles A7a238	（38）Instant noodles A7b238
（39）Other, aquatic products A7a239	（39）Other aquatic products A7b239

A7a3	**A7b3**
Frequency of lunch：__ times/ week；	Frequency of lunch：__ times/ week；
A7a4 Foods usually eat at lunch:	**A7b4** Foods usually eat at lunch:
（1）Porridge A7a41	（1）Porridge A7b41
（2）Chinese crullerA7a42	（2）Chinese crullerA7b42
（3）Steamed bun A7a43	（3）Steamed bun A7b43
（4）Baozi A7a44	（4）Baozi A7b44
（5）Wonton A7a45	（5）Wonton A7b45
（6）Dumpling A7a46	（6）Dumpling A7b46
（7）Pasty A7a47	（7）Pasty A7b47
（8）Chinese hamburger A7a48	（8）Chinese hamburger A7b48
（9）Noodle A7a49	（9）Noodle A7b49
（10）Rice noodle A7a410	（10）Rice noodle A7b410
（11）Rice A7a411	（11）Rice A7b411
（12）Corn A7a412	（12）Corn A7b412
（13）Sweet potato A7a413	（13）Sweet potato A7b413
（14）Pork A7a414	（14）Pork A7b414
（15）Beef A7a415	（15）Beef A7b415
（16）Mutton A7a416	（16）Mutton A7b416
（17）Poultry A7a417	（17）Poultry A7b417
（18）Aquatic products A7a418	（18）Aquatic products A7b418
（19）Egg A7a419	（19）Egg A7b419
（20）Vegetables A7a420	（20）Vegetables A7b420
（21）LegumesA7a421	（21）LegumesA7b421
（22）Fungus A7a422	（22）Fungus A7b422
（23）Seaweeds A7a423	（23）Seaweeds A7b423
（24）Fruits A7a424	（24）Fruits A7b424
（25）Milk A7a425	（25）Milk A7b425
（26）Soy milk A7a426	（26）Soy milk A7b426
（27）Fruit juice A7a427	（27）Fruit juice A7b427
（28）Vegetable juice A7a428	（28）Vegetable juice A7b428
（29）Yoghurt A7a429	（29）Yoghurt A7b429
（30）Bacon A7a430	（30）Bacon A7b430
（31）Ham A7a431	（31）Ham A7b431
（32）KFC/McDonald’s A7a432	（32）KFC/McDonald’s A7b432
（33）Cake A7a433	（33）Cake A7b433
（34）Soda cookies A7a434	（34）Soda cookies A7b434
（35）Sweet cookies A7a435	（35）Sweet cookies A7b435
（36）Can A7a436	（36）Can A7b436
（37）Pickles A7a437	（37）Pickles A7b437
（38）Instant noodles A7a438	（38）Instant noodles A7b438
（39）Other, please specify_____ _ A7a439	（39）Other, please specify_____ A7b439

A7a5 Frequency of supper：__ times/ week； **A7a6** Foods usually eat at supper: （1）Porridge A7a61 （2）Chinese crullerA7a62 （3）Steamed bun A7a63 （4）Baozi A7a64 （5）Wonton A7a65 （6）Dumpling A7a66 （7）Pasty A7a67 （8）Chinese hamburger A7a68 （9）Noodle A7a69 （10）Rice noodle A7a610 （11）Rice A7a611 （12）Corn A7a612 （13）Sweet potato A7a613 （14）Pork A7a614 （15）Beef A7a615 （16）Mutton A7a616 （17）Poultry A7a617 （18）Aquatic products A7a618 （19）Egg A7a619 （20）Vegetables A7a620 （21）LegumesA7a621 （22）Fungus A7a622 （23）Seaweeds A7a623 （24）Fruits A7a624 （25）Milk A7a625 （26）Soy milk A7a626 （27）Fruit juice A7a627 （28）Vegetable juice A7a628 （29）Yoghurt A7a629 （30）Bacon A7a630 （31）Ham A7a631 （32）KFC/McDonald’s A7a632 （33）Cake A7a633 （34）Soda cookies A7a634 （35）Sweet cookies A7a635 （36）Can A7a636 （37）Pickles A7a637 （38）Instant noodles A7a638 （39）Other, please specify_____A7a639	**A7b5** Frequency of supper：__ times/ week； **A7b6** Foods usually eat at supper: （1）Porridge A7b61 （2）Chinese crullerA7b62 （3）Steamed bun A7b63 （4）Baozi A7b64 （5）Wonton A7b65 （6）Dumpling A7b66 （7）Pasty A7b67 （8）Chinese hamburger A7b68 （9）Noodle A7b69 （10）Rice noodle A7b610 （11）Rice A7b611 （12）Corn A7b612 （13）Sweet potato A7b613 （14）Pork A7b614 （15）Beef A7b615 （16）Mutton A7b616 （17）Poultry A7b617 （18）Aquatic products A7b618 （19）Egg A7b619 （20）Vegetables A7b620 （21）LegumesA7b621 （22）Fungus A7b622 （23）Seaweeds A7b623 （24）Fruits A7b624 （25）Milk A7b625 （26）Soy milk A7b626 （27）Fruit juice A7b627 （28）Vegetable juice A7b628 （29）Yoghurt A7b629 （30）Bacon A7b630 （31）Ham A7b631 （32）KFC/McDonald’s A7b632 （33）Cake A7b633 （34）Soda cookies A7b634 （35）Sweet cookies A7b635 （36）Can A7b636 （37）Pickles A7b637 （38）Instant noodles A7b638 （39）Other, please specify_____A7b639

A8. Do you snack? [ ]

（1）Yes （2）No → skip to A10

A9. When do you snack? Please tick all that applicable and specify what you usually eat at each snack time.

Morning A9a：[ ]

（1）Candies A9a1 [ ]

（2）Chocolate A9a2 [ ]

（3）Nuts A9a3 [ ]

（4）Dessert（cake, ice cream etc.）A9a4 [ ]

（5）Puffed foods（potato chips, popcorn etc.）A9a5 [ ]

（6）Pork snacks A9a6 [ ]

（7）Beef snacks A9a7 [ ]

（8）Bean products A9a8 [ ]

（9）Poultry snacks A9a9 [ ]

（10）Fish snacks A9a10 [ ]

（11）Squid A9a11 [ ]

（12）Preserved fruit A9a12 [ ]

（13）Fresh fruit A9a13 [ ]

Afternoon A9b：[ ]

（1）Candies A9b1 [ ]

（2）Chocolate A9b2 [ ]

（3）Nuts A9b3 [ ]

（4）Dessert（cake, ice cream etc.）A9b4 [ ]

（5）Puffed foods（potato chips, popcorn etc.）A9b5 [ ]

（6）Pork snacks A9b6 [ ]

（7）Beef snacks A9b7 [ ]

（8）Bean products A9b8 [ ]

（9）Poultry snacks A9b9 [ ]

（10）Fish snacks A9b10 [ ]

（11）Squid A9b11 [ ]

（12）Preserved fruit A9b12 [ ]

（13）Fresh fruit A9b13 [ ]

Night A9c：[ ]

（1）Candies A9c1 [ ]

（2）Chocolate A9c2 [ ]

（3）Nuts A9c3 [ ]

（4）Dessert（cake, ice cream etc.）A9c4 [ ]

（5）Puffed foods（potato chips, popcorn etc.）A9c5 [ ]

（6）Pork snacks A9c6 [ ]

（7）Beef snacks A9c7 [ ]

（8）Bean products A9c8 [ ]

（9）Poultry snacks A9c9 [ ]

（10）Fish snacks A9c10 [ ]

（11）Squid A9c11 [ ]

（12）Preserved fruit A9c12 [ ]

（13）Fresh fruit A9c13 [ ]

Late night（after 10 pm）A9d：[ ]

（1）Candies A9d1 [ ]

（2）Chocolate A9d2 [ ] （3）Nuts A9d3 [ ]

（4）Dessert（cake, ice cream etc.）A9d4 [ ]

（5）Puffed foods（potato chips, popcorn etc.） A9d5 [ ]

（6）Pork snacks A9d6 [ ]

（7）Beef snacks A9d7 [ ]

（8）Bean products A9d8 [ ]

（9）Poultry snacks A9d9 [ ]

（10）Fish snacks A9d10 [ ]

（11）Squid A9d11 [ ]

（12）Preserved fruit A9d12 [ ]

（13）Fresh fruit A9d13 [ ]

A10. How often do you drink alcohol? Please choose one of the following and fill in the number of times.(Note: if you drink less than 4 times a month please choose 2, if you drink less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____/month

（3）_____ times/year

（4）Never

A11. How often do you drink soft drinks? Please choose one of the following and fill in the number of times.(Note: if you drink less than 4 times a month please choose 2, if you drink less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____/month

（3）_____ times/year

（4）Never

A12. How often do you eat animal meat? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____/month

（3）_____ times/year

（4）Never

A13. How often do you eat poultry meat? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____/month

（3）_____ times/year

（4）Never

A14. How often do you eat animal organs? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____/month

（3）_____ times/year

（4）Never

A15. How often do you eat fish? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A16. How often do you eat other aquatic products (e.g. Shrimp, Crab& shell)? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A17. How often do you eat milk and milk products (e.g. milk, yoghurt, butter, cream)? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A18. How often do you eat sweets（e.g. candies, cakes, ice cream etc.）? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A19. How often do you eat Puffed food（potato chips, popcorn etc.）? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A20. How often do you eat Fast food (e.g. McDonald's, KFC)? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A21. How often do you eat processed food? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A22. How often do you eat Vegetables? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A23. How often do you eat fruits? Please choose one of the following and fill in the number of times.(Note: if you eat less than 4 times a month please choose 2, if you eat less than 12 times a year please choose 3)

（1）_____ times /week

（2）_____times /month

（3）_____ times /year

（4）Never

A24. On average, how much do you spend on your food per month? _____Yuan

A25. Has your consumption of the following foods increased/reduced/stayed the same since your migration?

A25a. Staple food (rice, noodle, cereals)：[ ]

（1）reduced（2）increased（3）stayed the same （4）N/A

A25b. Animal meat：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25c. Poultry meat：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25d. Fish：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25e. Other aquatic products (shrimp, crab, shell)：[ ]

（1）reduced（2）increased（3）stayed the same （4）N/A

A25f. Animal organ：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25g. Milk and milk products（e.g. milk, yoghurt, butter, cream etc.）：[ ]

（1）reduced（2）increased（3）stayed the same （4）N/A

A25h. Vegetables：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25i. Fruits：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25j. Fast food (e.g. McDonald's, KFC)：[ ]

（1）reduced（2）increased（3）stayed the same （4）N/A

A25k. Puffed foods (e.g. potato chips, popcorn etc.)：[ ]

（1）reduced（2）increased（3）stayed the same （4）N/A

A25l·Processed food: [ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25m. Sweets（e.g. candies, cakes, ice creams）：[ ]

（1）reduced（2）increased（3）stayed the same （4）N/A

A25n. Soft drinks：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A25o. Alcohol：[ ]（1）reduced（2）increased（3）stayed the same （4）N/A

A26. What are your food sources? Could you please estimate how many percentage those food sources cover the food you consume? Please tick all that applicable and fill in the number of percentage. (Note, all options add up to 100%)

（1）Food offered for free by employer：_____%

（2）Food bought from canteen in work place:_____%

（3）Supermarkets (e.g. Walmart, Carrefour, Auchan, RT-Mart etc.)：_____%

（4）Nearby farmer's markets：_____%

（5）Informal market/street food：_____%

（6）Restaurants：_____%

（7）Food provided by neighbours or friends：_____%

（8）Online purchasing：_____%

（9）Food from hometown：_____%

（10）Food aid：_____%

（11）Other:_____%

A27. How much do you think the following factors influence your food consumption? Please select from 1(not at all influential)-5(extremely influential)

Influential Factors	**Degree of Influence**				
	Not at all	**Slightly**	**Somewhat**	**Very**	**Extremely**
Income A27a	1	2	3	4	5
Health A27b	1	2	3	4	5
Living Condition A27c	1	2	3	4	5
Job 29d	1	2	3	4	5
Transportation A27e	1	2	3	4	5
Market location A27f	1	2	3	4	5
Food availability in market A27g	1	2	3	4	5
food price A27h	1	2	3	4	5
Food preference A27i	1	2	3	4	5
Hukou A27j	1	2	3	4	5
Degree of education A27k	1	2	3	4	5
Knowledge about healthy diet A27l	1	2	3	4	5
Dietary habits of local people A27m	1	2	3	4	5

A28. Is your food access improved/worsened/unchanged after your migration? [ ]

（1）Unchanged （2）Worsened （3）Improved-> please answer **A28a.**

A28a. How is your food access improved? Check all that apply.

（1）More food choices [ ]A28 a1

（2）More income [ ] A28a2

（3）Better transportation [ ] A28a3

（4）More food stores in the neighbourhood [ ] A28a4

（5）Cheaper food price [ ] A28a5

（6）Other, please specify：_____ A28a6

A29. Does your expenditure on food increase after migration? [ ]

（1）Yes （2）No--> skip to A30

A29a. What are the reasons of the increase? Check all that apply.

（1）More income A29a1 [ ]

（2）More food choices A29a2[ ]

（3）Heavier workload A29a3 [ ]

（4）For the sake of health A29a4 [ ]

（5）Better transportation A29a5 [ ]

（6）More food stores in the neighbourhood A31a6 [ ]

（7）Higher food price A31a7 [ ]

A29b. Which one listed above is the major reason for the increase of your food expenditure? [ ]_____

A30. Is your diet improved/worsened/unchanged after migration? [ ]

（1）Improved-->Please answer A30a

（2）Worsened--> Please answer A30b

（3）Unchanged-->Skip to A31

A30a. How is your diet improved? Check all that apply.

（1）Higher frequency of meat consumption A30a1 [ ]

（2）Higher frequency of fruit consumption A30a2[ ]

（3）Higher frequency of vegetable consumption A30a3[ ]

（4）Higher frequency of dairy consumption A30a4[ ]

（5）More types of food consumed A30a5[ ]

（6）Higher Frequency of aquatic products consumption A30a6[ ]

A30b. How is your diet worsened? Check all that apply.

（1）Lower frequency of meat consumption A30b1[ ]

（2）Lower frequency of fruit consumption A30b2[ ]

（3）Lower frequency of vegetable consumption A30b3[ ]

（4）Lower frequency of dairy consumption A30b4[ ]

（5）Less types of food consumed A30b5[ ]

（6）Lower frequency of aquatic products consumption A30b6 [ ]

A31. Have you ever experienced food shortage after your migration to Shanghai?

（1）Yes （2）No

A32. How do you like to change your current food consumption pattern? Check all that apply.

（1）Increase animal meat consumption A321 [ ]
（2）Reduce animal meat consumption A322 [ ]
（3）Increase poultry meat consumption A323[ ]
（4）Reduce poultry meat consumption A324[ ]
（5）Increase dairy consumption A325[ ]
（6）Reduce dairy consumption A326[ ]
（7）Increase fruit consumption A327[ ]
（8）Reduce fruit consumption A328[ ]
（9）Increase vegetable consumption A329[ ]
（10）Reduce vegetable consumption A3210 [ ]
（11）Eat more diverse diet A3211[ ]
（12）Eat less diverse diet A3212[ ]
（13）Won’t change current diet A3213[ ]

Part II Employment and Economic Condition

B1. What is your work status? [ ]

（1）Full time job （2）Part time job

B2. Which of the following is your major employer? [ ]

（1）Self-employed

（2）Self-employed businessman

（3）Private company

（4）Collective enterprise

（5）State-owned enterprise

（6）Foreign funded enterprise

（7）Joint venture enterprise

（8）Public institution

（9）Party and government institutions

（10）Other, please specify：_____

B3. Please indicate your occupation type：[ ]

（1）Agriculture, forestry, husbandry and fishery production

（2）Do business with yourself

（3）Processing and manufacturing industry

（4）Construction industry

（5）Transportation industry

（6）Warehousing industry

（7）Wholesale and retail industry

（8）Catering industry

（9）Hotel industry

（10）Tourist industry

（11）Entertainment industry

（12）Information and consulting service industry

（13）Real estate

（14）Finance, security, insurance industry

（15）Other social services industry

B4. On average, you work _____hours a week

B5. Please indicate your monthly income belongs to which of the following (Yuan) [ ]

（1）3000 and under （2）3001-5000 （3）5001-10000 （4）10000 and more

B6. Has your income increased after your migration? [ ]

（1）Yes, has increased about_____% （2）No

B7. On average, you send ___% of your yearly income home

B8. What are your remittances used for? Check all that apply.

（1）Buying food B81 [ ]

（2）Buying agricultural inputs B82 [ ]

（3）Paying children’s education fee B83 [ ]

（4）Paying children’s living expenses B84 [ ]

（5）House construction B85 [ ]

（6）Supporting the elderly B86 [ ]

（7）Other, please specify:_____ B87

Part III Living Condition

C1. Which of the following best describes your accommodation? [ ]

（1）Own without mortgage (i.e. without any loans)（2）Own with mortgage

（3）Tenant, paying rent to private landlord

（4）Tenant, paying rent in low-rent housing provided by Shanghai government

（5）Accommodation is provided rent free by the employer

（6）Accommodation is provided rent free by the relatives/friends/other family members in Shanghai

C2. Who do you live with in Shanghai? [ ]

（1）Live alone （2）Live with spouse/partner （3）Live with children

（4）Live with spouse/partner and children （5）Live with colleagues/friends

（6）Live with relatives/families(parents, siblings)

C3. What facilities are in your accommodation? Check all that apply

（1）Tap water [ ]

（2）Private kitchen [ ]

（3）Shared kitchen [ ]

（4）Television [ ]

（5）Fridge [ ]

C4. Please indicate, normally, how do you get to the following places and how long does it take.

C4a. Farmer's market/ supermarket usually visit

C4a1: means of transportation：_____; C4a2: time taken: _____minutes

C4b. Work place：

C4b1: means of transportation：_____; C4b2: time taken: _____minutes

C5. How satisfied (or dissatisfied) you are with your accommodation? Please select from 0-5

0(Not satisfied at all) 1 2 3(neutral) 4 5(very satisfied)

C6. How do you pay for your food in Shanghai? (Note, all options add up to 100%)

（1）Self-payment, accounting for _____% of total food expenditure C61

（2）Food allowance offered by employed (including food stamp and free meals), accounting for _____% of total food expenditure C62

（3）Food allowance offered by the government (including food stamp and free meals), accounting for _____% of total food expenditure C63

Part IV Demographics

D1. Age:_____

D2. Gender: (1) Male (2) Female

D3. Height: _____cm

D4. Weight: _____Kg

D5. Ethnicity: [ ]

（1）Han （2）Hui （3）Tujia （4）Miao （5）Man

（6）Korean （7）Zhuang （8）Inner Mongolia （9）Dong （10）Yi

（11）Bouyei （12）Uygur （13）Bai （14）Yao （15） Hani

（16）Other, please specify_____

D6. Marital status：[ ]（1）Married （2）Unmarried

D7. Education：[ ]

（1）Never been to school（2）Primary school （3）Middle sch （4）High school

（5）College diploma （6）Bachelor degree （7）Master degree （8）Secondary vocational school

D8. Hometown：[ ]

（1）Beijing （2）Tianjin （3）Hebei （4）Shanxi （5）Inner Mongolia

（6）Liaoning （7）Jilin （8）Heilongjiang （9）Jiangsu （10）Zhejiang

（11）Anhui （12）Fujian （13）Jiangxi （14）Shandong （15） Henan

（16）Hubei （17）Hunan （18）Guangdong （19）Guangxi （20）Hainan

（21）Chongqing （22）Sichuan （23）Guizhou （24）Yunnan （25） Xizang

（26） Shaanxi （27）Gansu （28）Qinghai （29）Ningxia （30）Xinjiang

D9. The place of your current Hukou：[ ]

（1）Rural hometown （2）Shanghai (3) Other, please specify: _____

D10. Your current Hukou status：[ ]

（1）Urban Resident Household （2）Agricultural Household

D11. Have you ever migrated to other cities before migrating to Shanghai [ ]

（1）Yes （2）No

D12. How long have you lived in Shanghai：_____months

D13. Is your migration to Shanghai permanent/temporary/cyclical? [ ]

（1）Permanent （2）Temporary （3）Cyclical （4）Not sure

D14. What is the major reason for your migration to Shanghai? [ ]

（1）Better economic opportunities (i.e. better employment or business opportunities)

（2）Marriage （3）Occupation mobility （4）Join spouse （5）Join relatives or friends

（6）Better education resources （7）Better public facilities （8）More convenient transportation

（9）Poor economic prospects in rural hometown (i.e. unemployment, low productivity or underdevelopment)

（10）Natural disasters (please specify：_____）

Part V Food Frequency Questionnaire

Please recall your eating frequency and quantity for the following foods in the past 7 days, guidance is given as below.

Example

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Rice	3times; 250g			…	…	…	…
Noodle		Once; 150g					
Millet			Once; 250g				
Milk	Once; 250g						
Sweet potato		Once; 150g					
Other：							
Steamed staffed bun（filled with pork）			***Once; 100g***				
Steamed bun		***Once; 100 g***					
Dumpling			***Once; 200g***				
…							

Note: 1 liang=50g, 100 ml=100 g

E1 Staple Foods	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Rice	e.g.: 3 times; 0.5kg						
Noodle							
Millet							
Corn							
Sweet potato							
Other：							

E2 Meats and Meat Products (including organs)		**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Animal meat and products	Pork	e.g.: 3 times; 0.5kg						
	Beef							
	Mutton							
	Sausage							
	Pork liver							
	Other:							
Poultry meat and products	Chicken							
	Duck							
	Other：							

E3 Aquatic products (fish, shrimp, crab, Shell)	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Shrimp, Marine	e.g.: 3 times; 0.5kg						
Shrimp, Fresh water							
Shrimp, Jiwei							
Lobster							
Crab							
Grass Carp							
Silver Carp							
Common Carp							
Goldfish Carp							
Bream							
Fatheaded Carp							
Ricefield eel							
Hairtail							
Snakehead							
Other：							

E4 Dairy	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Milk (Carton/glass)	e.g.: once; 250g						
Yoghurt (Glass)	e.g.: once; 150g						
Other：							

E5 Eggs	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Chicken eggs	e.g.: 3 times; 0.5kg						
Duck eggs							
Goose eggs							
Quail eggs							
Preserved eggs							
Salted duck eggs							
Other：							

E6 Legume and products	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Soybean	e.g.: 3 times; 0.5kg						
Black soybean							
Ormosia							
Mung bean							
Green soybean							
Kidney bean							
Broad bean, with seed coat							
Broad bean, without seed coat							
Soybean curd							
Bean curd stick							
Bean curd jelly							
Soy milk							
Hyacinth bean							
Cowpea							
Common cowpea							
Garden pea							
Chickpea							
Gorse							
Other：							

E8 Fungi and mushroom	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Oyster mushroom	e.g.: 3 times; 0.5kg						
Needle mushroom							
Shitake, fresh							
Shitake, dried							
Mongolian mushroom							
Winter mushroom							
Black fungus							
White fungus							
Kelp							
Laver							
Other：							

E9 Fresh vegetables	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
White radish	e.g. 3 times; 0.5kg						
Carrot							
Eggplant							
Tomato							
Okra							
Winter melon							
Chayote							
Cucumber							
Bitter gourd							
Pumpkin							
Loofah							
Zucchini							
Chinese cabbage							
Bok choy							
Rape							
Chinese little greens							
Mini Chinese cabbage							
Broccoli							
Cauliflower							
Cabbage							
Celery							
Lettuce							
Romaine lettuce							
Lettuce stem							
Crown daisy							
Asparagus							
Lotus root							
Water bamboo							
Yam							
Taro							
Potato							
Spinach							
Chinese chives							

E10 Fruits	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Apple	e.g.: 3 times; 0.5kg						
Banana							
Pear							
Peach							
Plum							
Grape fruit							
Apricot							
Date							
Grape							
Pomegranate							
Mulberry							
Orange							
Longan							
Mango							
Pineapple							
Durian							
Pitaya							
Hami melon							
Water melon							
Muskmelon							
Honeydew							
Other：							

Appendix 2 Food preference by characteristics of respondents

Table 1 Food preference by age

Food groups	Preference	Consumption frequency (%)			
		<30	30-39	40-49	50+
animal meat	neutral	15.5	7.9	7.0	3.1
	like	81.0	90.7	92.2	96.9
	dislike	3.6	1.3	0.8	0.0
fruit	neutral	20.2	6.6	14.1	9.4
	like	78.6	90.1	85.2	84.4
	dislike	1.2	3.3	0.8	6.3
fish	neutral	13.1	5.3	6.3	3.1
	like	83.3	94.7	90.6	96.9
	dislike	3.6	0.0	3.1	0.0
poultry meat	neutral	28.6	22.5	26.6	12.5
	like	65.5	74.8	71.1	87.5
	dislike	6.0	2.6	2.3	0.0
other aquatic products	neutral	35.7	23.8	34.4	37.5
	like	56.0	74.2	60.9	62.5
	dislike	8.3	2.0	4.7	0.0
animal organs	neutral	13.1	21.9	16.4	15.6
	like	22.6	29.1	46.9	46.9
	dislike	64.3	49.0	36.7	37.5
milk and milk products	neutral	40.5	42.4	40.6	34.4
	like	53.6	35.8	21.1	18.8
	dislike	6.0	21.9	38.3	46.9
soft drinks	neutral	39.3	51.0	41.4	31.3
	like	39.3	25.2	17.2	3.1
	dislike	21.4	23.8	41.4	65.6
sweets	neutral	58.3	60.9	57.8	40.6
	like	22.6	20.5	18.8	15.6
	dislike	19.0	18.5	23.4	43.8
puffed food	neutral	29.8	26.5	32.8	28.1
	like	22.6	13.9	18.0	15.6
	dislike	47.6	59.6	49.2	56.3
alcohol	neutral	50.0	47.0	38.3	21.9
	like	4.8	11.9	26.6	37.5
	dislike	45.2	41.1	35.2	40.6
fast food	neutral	58.3	71.5	56.3	53.1
	like	22.6	4.0	6.3	6.3
	dislike	19.0	24.5	37.5	40.6
processed food	neutral	34.5	27.2	33.6	43.8
	like	4.8	6.0	10.2	15.6
	dislike	60.7	66.9	56.3	40.6

Table 2 Food preference by gender

Food groups	Preference	Consumption frequency (%)	
		Male	female
animal meat	neutral	8.1	10.4
	like	89.6	89.6
	dislike	2.2	0.0
fruit	neutral	16.7	2.4
	like	80.0	97.6
	dislike	3.3	0.0
fish	neutral	8.1	4.8
	like	89.6	94.4
	dislike	2.2	0.8
poultry meat	neutral	25.9	20.8
	like	71.5	75.2
	dislike	2.6	4.0
other aquatic products	neutral	27.0	39.2
	like	69.3	56.0
	dislike	3.7	4.8
animal organs	neutral	19.3	14.4
	like	41.9	20.0
	dislike	38.9	65.6
milk and milk products	neutral	40.4	41.6
	like	29.3	42.4
	dislike	30.4	16.0
soft drinks	neutral	47.4	36.0
	like	23.0	25.6
	dislike	29.6	38.4
sweets	neutral	64.4	43.2
	like	6.7	48.8
	dislike	28.9	8.0
puffed food	neutral	25.9	36.8
	like	9.3	34.4
	dislike	64.8	28.8
alcohol	neutral	51.9	23.2
	like	24.4	1.6
	dislike	23.7	75.2
fast food	neutral	61.9	63.2
	like	8.9	8.8
	dislike	29.3	28.0
processed food	neutral	33.3	29.6
	like	8.5	6.4
	dislike	58.1	64.0

Table 3 Food preference by hometown

Food groups	Preference	Consumption frequency (%)		
		Eastern province	Middle province	Western province
animal meat	neutral	14.4	7.0	5.5
	like	83.8	91.3	94.5
	dislike	1.8	1.7	0.0
fruit	neutral	9.0	14.4	9.1
	like	87.4	83.8	89.1
	dislike	3.6	1.7	1.8
fish	neutral	8.1	6.1	9.1
	like	88.3	93.9	85.5
	dislike	3.6	0.0	5.5
poultry meat	neutral	37.8	19.2	18.2
	like	58.6	79.0	74.5
	dislike	3.6	1.7	7.3
other aquatic products	neutral	27.0	28.8	47.3
	like	70.3	67.2	45.5
	dislike	2.7	3.9	7.3
animal organs	neutral	20.7	17.0	14.5
	like	22.5	42.4	29.1
	dislike	56.8	40.6	56.4
milk and milk products	neutral	35.1	41.9	47.3
	like	40.5	31.0	29.1
	dislike	24.3	27.1	23.6
soft drinks	neutral	45.0	44.5	38.2
	like	26.1	23.6	20.0
	dislike	28.8	31.9	41.8
sweets	neutral	55.0	61.6	47.3
	like	21.6	18.3	23.6
	dislike	23.4	20.1	29.1
puffed food	neutral	27.9	27.5	40.0
	like	19.8	17.5	10.9
	dislike	52.3	55.0	49.1
alcohol	neutral	45.9	45.0	27.3
	like	10.8	22.3	9.1
	dislike	43.2	32.8	63.6
fast food	neutral	62.2	63.8	56.4
	like	4.5	10.9	9.1
	dislike	33.3	25.3	34.5
processed food	neutral	27.0	35.4	29.1
	like	1.8	11.4	5.5
	dislike	71.2	53.3	65.5

Table 4 Food preference by length of residence

Food groups	Preference	Consumption frequency (%)		
		<5 years	5-9 years	≥9 years
animal meat	neutral	11.7	6.8	8.5
	like	86.7	91.1	90.7
	dislike	1.7	2.1	0.8
fruit	neutral	13.3	11.0	12.4
	like	83.3	86.3	86.8
	dislike	3.3	2.7	0.8
fish	neutral	10.8	6.2	4.7
	like	86.7	92.5	93.8
	dislike	2.5	1.4	1.6
poultry meat	neutral	21.7	21.2	30.2
	like	75.8	73.3	69.0
	dislike	2.5	5.5	0.8
other aquatic products	neutral	35.8	28.1	29.5
	like	58.3	67.8	68.2
	dislike	5.8	4.1	2.3
animal organs	neutral	15.0	20.5	17.1
	like	35.0	30.1	40.3
	dislike	50.0	49.3	42.6
milk and milk products	neutral	42.5	39.7	40.3
	like	35.8	33.6	31.0
	dislike	21.7	26.7	28.7
soft drinks	neutral	36.7	54.1	38.8
	like	27.5	22.6	21.7
	dislike	35.8	23.3	39.5
sweets	neutral	56.7	55.5	61.2
	like	23.3	19.9	17.1
	dislike	20.0	24.7	21.7
puffed food	neutral	31.7	28.8	27.9
	like	20.8	12.3	19.4
	dislike	47.5	58.9	52.7
alcohol	neutral	38.3	50.7	38.0
	like	20.8	8.9	23.3
	dislike	40.8	40.4	38.8
fast food	neutral	57.5	63.7	65.1
	like	15.8	7.5	3.9
	dislike	26.7	28.8	31.0
processed food	neutral	40.0	32.9	24.0
	like	8.3	6.2	9.3
	dislike	51.7	61.0	66.7

Table 5 Food preference by education

Food groups	Preference	Consumption frequency (%)		
		Primary school or none	Middle school	High school or above
animal meat	neutral	5.6	8.1	13.0
	like	94.4	90.7	83.5
	dislike	0.0	1.2	3.5
fruit	neutral	9.3	12.2	14.8
	like	88.9	84.3	84.3
	dislike	1.9	3.5	0.9
fish	neutral	7.4	6.4	7.8
	like	90.7	91.3	91.3
	dislike	1.9	2.3	0.9
poultry meat	neutral	16.7	28.5	25.2
	like	79.6	69.2	71.3
	dislike	3.7	2.3	3.5
other aquatic products	neutral	38.0	29.7	26.1
	like	59.3	66.3	68.7
	dislike	2.8	4.1	5.2
animal organs	neutral	17.6	19.8	14.8
	like	42.6	35.5	27.0
	dislike	39.8	44.8	58.3
milk and milk products	neutral	42.6	36.0	46.1
	like	22.2	36.6	39.1
	dislike	35.2	27.3	14.8
soft drinks	neutral	39.8	43.6	47.8
	like	15.7	26.7	27.0
	dislike	44.4	29.7	25.2
sweets	neutral	56.5	53.5	65.2
	like	25.9	22.1	11.3
	dislike	17.6	24.4	23.5
puffed food	neutral	36.1	26.7	27.0
	like	24.1	19.2	7.8
	dislike	39.8	54.1	65.2
alcohol	neutral	29.6	45.9	50.4
	like	20.4	19.8	10.4
	dislike	50.0	34.3	39.1
fast food	neutral	57.4	57.6	73.9
	like	7.4	11.0	7.0
	dislike	35.2	31.4	19.1
processed food	neutral	38.0	31.4	27.8
	like	12.0	5.8	7.0
	dislike	50.0	62.8	65.2

Table 6 Food preference by income

Food groups	Preference	Consumption frequency (%)	
		≤5000	>5000
animal meat	neutral	11.2	6.1
	like	86.5	93.3
	dislike	2.3	0.6
fruit	neutral	14.9	8.9
	like	82.8	88.9
	dislike	2.3	2.2
fish	neutral	7.4	6.7
	like	90.7	91.7
	dislike	1.9	1.7
poultry meat	neutral	22.8	26.1
	like	74.4	70.6
	dislike	2.8	3.3
other aquatic products	neutral	36.7	23.9
	like	56.7	75.0
	dislike	6.5	1.1
animal organs	neutral	16.7	18.9
	like	33.0	37.2
	dislike	50.2	43.9
milk and milk products	neutral	44.7	36.1
	like	30.2	37.2
	dislike	25.1	26.7
soft drinks	neutral	40.9	47.2
	like	20.9	27.2
	dislike	38.1	25.6
sweets	neutral	51.2	65.6
	like	24.2	15.0
	dislike	24.7	19.4
puffed food	neutral	32.1	26.1
	like	21.9	11.7
	dislike	46.0	62.2
alcohol	neutral	37.7	48.9
	like	12.1	23.3
	dislike	50.2	27.8
fast food	neutral	57.2	68.3
	like	11.6	5.6
	dislike	31.2	26.1
processed food	neutral	36.3	27.2
	like	8.4	7.2
	dislike	55.3	65.6

Table 7 Food preference by remittance

Food groups	Preference	Consumption frequency (%)		
		None	1-30	>30
animal meat	neutral	9.9	10.7	6.7
	like	87.0	89.3	92.7
	dislike	3.1	0.0	0.7
fruit	neutral	16.1	9.5	9.3
	like	81.4	85.7	90.0
	dislike	2.5	4.8	0.7
fish	neutral	10.6	3.6	5.3
	like	87.6	95.2	92.7
	dislike	1.9	1.2	2.0
poultry meat	neutral	28.6	23.8	20.0
	like	67.1	72.6	78.7
	dislike	4.3	3.6	1.3
other aquatic products	neutral	31.7	29.8	30.7
	like	63.4	67.9	65.3
	dislike	5.0	2.4	4.0
animal organs	neutral	16.8	17.9	18.7
	like	31.1	29.8	42.0
	dislike	52.2	52.4	39.3
milk and milk products	neutral	39.8	41.7	41.3
	like	41.0	35.7	24.0
	dislike	19.3	22.6	34.7
soft drinks	neutral	37.9	47.6	48.0
	like	28.6	26.2	17.3
	dislike	33.5	26.2	34.7
sweets	neutral	53.4	56.0	63.3
	like	22.4	21.4	16.7
	dislike	24.2	22.6	20.0
puffed food	neutral	26.7	25.0	34.7
	like	18.6	20.2	14.0
	dislike	54.7	54.8	51.3
alcohol	neutral	41.0	39.3	46.7
	like	18.6	11.9	18.7
	dislike	40.4	48.8	34.7
fast food	neutral	59.0	69.0	62.0
	like	11.8	6.0	7.3
	dislike	29.2	25.0	30.7
processed food	neutral	29.2	34.5	34.0
	like	5.0	6.0	12.0
	dislike	65.8	59.5	54.0

Table 8 Food preference by occupation

Food groups	Preference	Consumption frequency (%)		
		Processing& manufacturing	Construction	Business& services
animal meat	neutral	9.7	6.8	8.6
	like	89.7	91.5	88.7
	dislike	0.5	1.7	2.6
fruit	neutral	9.2	11.9	15.9
	like	89.7	83.1	81.5
	dislike	1.1	5.1	2.6
fish	neutral	8.1	6.8	6.0
	like	90.3	86.4	94.0
	dislike	1.6	6.8	0.0
poultry meat	neutral	23.8	18.6	27.2
	like	73.0	81.4	68.9
	dislike	3.2	0.0	4.0
other aquatic products	neutral	30.8	28.8	31.8
	like	63.8	67.8	65.6
	dislike	5.4	3.4	2.6
animal organs	neutral	17.8	13.6	19.2
	like	33.5	40.7	34.4
	dislike	48.6	45.8	46.4
milk and milk products	neutral	42.7	40.7	38.4
	like	29.7	32.2	38.4
	dislike	27.6	27.1	23.2
soft drinks	neutral	48.6	37.3	40.4
	like	22.2	22.0	26.5
	dislike	29.2	40.7	33.1
sweets	neutral	61.1	52.5	55.6
	like	16.8	20.3	23.8
	dislike	22.2	27.1	20.5
puffed food	neutral	27.6	30.5	31.1
	like	16.2	15.3	19.2
	dislike	56.2	54.2	49.7
alcohol	neutral	45.4	40.7	40.4
	like	18.9	27.1	11.3
	dislike	35.7	32.2	48.3
fast food	neutral	60.5	62.7	64.2
	like	9.2	18.6	4.6
	dislike	30.3	18.6	31.1
processed food	neutral	31.9	32.2	32.5
	like	7.0	18.6	4.6
	dislike	61.1	49.2	62.9

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