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SUPERMARKETS, WET MARKETS AND FOOD PATRONAGE IN NANJING, CHINA

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Abstract

Although supermarkets have become a dominant food outlet for urban residents in developed countries, studies of food purchasing in developing countries such as China report a persistence of traditional food outlets, despite a proliferation of supermarkets over the past two decades. Yet, little is known about urban residents' use of various food sources in the Chinese context. Building on the debate over the rise of supermarkets and the persistence of traditional food outlets, this paper analyzes the landscape of competing food sources including supermarkets, wet markets, restaurants, online food markets, urban agriculture and others. Based on the HCP citywide survey of 1,200 households in Nanjing, China, the paper looks at the purchasing frequency of a comprehensive list of food items in different food retail outlets, the accessibility of these outlets, and also the use of different food sources. We found that while supermarkets are the top source for purchasing staple grains, dairy products and processed food, wet markets still prevail for purchasing fresh produce and meat. The data demonstrates the high level of food accessibility in Nanjing and also indicates the significance of food sources beyond conventional retailing outlets, such as online food markets, urban agriculture and restaurants, in people's daily lives.

Keywords

food retail, food sources, food patronage, urban food security, China

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Introduction

Competition among various retail formats is a feature of the food landscape in many cities in the Global South (Crush and Frayne 2011, D'Haese and van Huylenbroeck 2005, D'Haese et al 2008, Fox et al 2004, Gorton et al 2011, Neven et al 2006). Studies of this competition in Asia have focused on the "rise of supermarkets" and the persistence of wet markets (Zhang and Pan 2013). Reardon et al (2003, 2012) argue that as the "supermarket revolution" continues in developing countries, modern food retail channels with large centralized distribution system will gradually displace fragmented local markets. In similar vein, Hu et al (2004) predicted that supermarkets, with their high growth rate, would become the dominant food retail channel in urban China in the near future. Ortega et al (2015) conclude that growing food safety concerns among Chinese consumers is accelerating the shift to modern food retail. Gorton et al's (2011) analysis of food retailing in Thailand concludes that supermarkets are perceived by consumers to demonstrate both price and quality advantages over wet markets.

Despite the rapid diffusion of modern food retailing outlets such as supermarkets and hypermarkets (Reardon and Gulati 2008), various studies have found that they have not displaced traditional retailing formats such as wet markets and small stores (Bai et al 2008, Goldman et al 1999, Goldman and Hino 2005, Ho 2005, Veeck and Veeck 2000). This is especially true in Chinese cities where traditional marketing channels still have over 80% of the market share of vegetable retail (Zhang and Pan 2013). Cross-platform shopping for food, as opposed to one-stop shopping, is common among urban consumers in China and other countries (Bai et al 2008, Goldman 2000). People tend to shop for processed and packaged food in supermarkets but purchase fresh produce, especially vegetables, from wet markets (Zhang and Pan 2013). In Qingdao city, Bai et al (2008) found that supermarkets and hypermarkets do not compete extensively with wet markets and small stores. Sociocultural factors such as the preference for daily purchase of fresh produce (Goldman et al 2002, Zhang and Pan 2013), psychological satisfaction from bargaining and shopping habits (Maruyama and Wu 2014), and economic factors such as the price advantage of traditional markets (Cui 2011), all enable the persistence of wet markets as a major choice for vegetable purchase in Chinese cities.

Although the changing landscape of food retailing in cities of the South has attracted considerable attention, the question of where and how urban residents get their food has not been fully explored. Urban residents do not only purchase their food from supermarkets or wet markets. Other food sources include restaurants, street vendors, online orders, food provided at work, and urban agriculture (Hamilton et al 2014). Urban residents around the world also get food from their urban or rural relatives, community kitchens, food banks, their neighbours, scavenging and even begging (Crush and Frayne 2010a, Letts 2013, Tarasuk 2001, Vitiello et al 2015). Yet, it is unclear where and how various types of food commonly consumed by people in their daily lives are sourced. Moreover, on the issue of what types of food are purchased in wet markets and supermarkets, existing studies only focus on very few food groups (Bai et al 2008) rather than the full range of food items that are regularly consumed. In this discussion paper, we argue that the narrow focus on competition among conventional food outlets, particularly supermarkets and wet markets, has limited understanding of urban food security in the Global South.

Food security in the Chinese context is usually understood narrowly as a rural production issue in the sense of maintaining national food self-sufficiency (Si and Scott 2016, Zhang 2011). However, food security is becoming an increasingly urban issue with China's rapid urbanization (Regnier-Davies 2015). Where and how urban dwellers get their food reflects the availability, accessibility and affordability of food in cities, which are all critical dimensions of urban food security (Crush and Frayne 2010b). This changing socioeconomic context makes the existing discussion on food security in China outdated and irrelevant. A better understanding of urban food security issues in China is urgently required and a re-investigation

of urban residents' food sourcing behaviour is an essential component of this exercise.

The paper first discusses the changing landscape of food sources in Chinese cities, especially traditional food outlets and the rise of supermarkets. After a brief overview of the food system in the city of Nanjing, the study area, the paper presents the research methods, including the sampling strategy, data collection and analytical methods of a city-wide food security study conducted by the Hungry Cities Partnership in 2015. In the course of the survey, data was collected on the purchasing patterns of 40 different food items from 22 different food sources. Although the research did not interrogate consumer motivations or factors shaping food purchasing behavior, the survey data does depict household food purchasing behaviour across a full list of food items. This provides a new methodological perspective on the supermarkets versus wet markets debate.

The Changing Food Landscape in Chinese Cities

Wet Markets

Before the 1980s and the liberalization of food retail in China, food distribution in cities was largely controlled and managed by the state. There was very limited private sector participation including by small shops, hawkers and wet markets (Hu et al 2004). With the gradual emergence of the market economy, private capital was allowed into the food retail sector to compete with state-owned food retail outlets. Wet markets, privately-owned small shops and street vendors rose to prominence in a sector once dominated by state-owned enterprises. Buying fresh produce from wet markets became the norm among urban consumers (Wang 2002).

Wet markets in contemporary Chinese cities are either run by private or state-owned companies, both of which are profit-driven (Hu et al 2004, Zhang and Pan 2013). These companies collect fees from vendors (either farmers or resellers) for renting space and the costs of garbage disposal, utilities, security and facility maintenance. All types of commonly consumed foodstuffs are available in wet markets. Vegetable stalls sell many varieties of vegetables. Fresh chicken and fish are slaughtered and normally lightly processed on site. The vendors in the wet markets are either farmers or resellers who source food from wholesale markets. Vendors compete with each other and the price of food is subject to market fluctuation. Consumers enjoy the freedom of picking, comparing and bargaining. Although wet markets in many Chinese cities have been shut down in city renovation projects, their popularity remains undiminished due to their proximity to residential neighbourhoods, low prices and the freshness of the produce (Wang et al 2015).

The Rise of Supermarkets

Thomas Reardon has periodized the "rise of supermarkets" in developing countries into three waves (Reardon and Gulati 2008, Reardon et al 2012). The first wave started in the early 1990s in South America, East Asia (except China) and South Africa. The second wave began in mid-to-late 1990s in Mexico, Central America and Southeast Asia. And the third wave refers to the rapid development of supermarkets in China, India and Vietnam beginning in the late 1990s and early 2000s. Supermarket reform transformed the foodscape of many cities in developing nations with profound health, social and economic implications (Battersby and Peyton 2014, Reardon and Berdegué 2008).

The rise of supermarkets began in China in the late 1990s (Hu et al 2004, Reardon and Gulati 2008), more than a decade after the beginning of the liberalization of the state-operated urban food retail system (Zhang and Pan 2013). The process significantly accelerated after 2004 when China started to relax its longstanding restrictions on foreign direct investment in the retail sector (Wang 2002). Multinational corporations such as Carrefour, Walmart and Metro have become top food retail chains in China and in 2013, total sales revenue for supermarkets in China was 288.9 billion CNY (USD 46.6 billion), with an annual growth rate of 11.5%

(Chen et al 2013). Supermarkets and hypermarkets[1] are preferred for packaged and processed foodstuffs and higher quality food including many imported food as well as certified organic foods (Zhou et al 2015). The market-led profit-driven development of supermarkets has encroached on the market share of traditional food outlets (Wang 2002).

Other Food Sources

Besides wet markets and supermarkets, other types of food outlets such as convenience stores, private fruit and/or vegetable shops, and street vendors (including street markets), play an important role in shaping the urban food landscape in China and contribute to the diverse range of food sources for Chinese urban residents (Fung Business Intelligence Center 2014, 2015, Swider 2015, Veeck and Veeck, 2000). The food retail space is extremely dynamic and conventional food retail outlets have recently found new competitors in cyber space.

Few studies of food markets have paid attention to the emerging new trend of food e-commerce, although online sales of fresh produce have been growing exponentially since 2010 (Zhu 2014). According to Hong (2015), the total sale of agri-food products on Ali, the largest e-commerce platforms in China, grew at 112% annually between 2010 and 2013.[2] Zhang and Jiang (2014) show that in 2014, the total sale of agri-food products on Ali platforms was 48.3 billion CNY (USD7.86 billion). Snacks and nuts was the most popular food group sold on Ali platforms, accounting for 32% of total sales. This was followed by tea leaves and drinks (18%); meat, vegetables and fruits (17%); supplements and functional foods (17%); staple grains, cooking oils and dried food (11%); and flowers and ornamental plants (6%). The most popular food was dates, which reached total sales of more than 1.8 billion CNY (USD0.29 billion). Nanjing ranked 16th on the purchase of food online among Chinese cities.

Yang and Wang (2015) suggest that the popularity of online food sales is driven by increased consumer preference for higher food quality and safety, perceived to be key attributes of food sold online. AliResearch's own reports support the argument, as regions in east China with higher income levels spent the most on online shopping for agri-food products (Zhang and Chen 2013, Zhang and Jiang 2014). As one of the richest provinces in China, Jiangsu province, of which Nanjing is the capital, ranked 3rd among all the 31 provinces and districts covered in these reports. The 23-28 age group were also the most active online shoppers for agricultural products, comprising 32% of all online sales of agri-food products. Most of these people are young white-collar workers. AliResearch predicts that unprocessed food (such as vegetables and meat) will become the most popular products as this group gets older.

Additional food sources for urban residents include self-grown or raised food; food received from relatives; shared meals with neighbours and/or other households in the community; food provided by neighbours and/or other households in the community; food borrowed from others; food provided at work; food provided to children at school; community food kitchens; and begging. Although these are considered marginal and uncommon food sources in China, studies in other countries have found that they do play an important role for the most food insecure households (Crush and Frayne 2010a, 2010b). Against the backdrop of this general discussion of the food landscape in Chinese cities, the following section elaborates on the food system in Nanjing.

The Food Economy in Nanjing

Located downstream of the Yangtze River in east China and about 300 km northwest of Shanghai, Nanjing (also known as Nanking) is the capital city of Jiangsu province with a total population of 8.2

[1] In the Chinese context, hypermarkets are stores with more than 6,000 square metres of floor space, supermarkets range in size from 800 to 6,000 square metres, and convenience stores are usually less than 400 square metres (Hu et al 2004).

[2] Agri-food products refer to not only food (including vegetables, fruits, meat, seafood, nuts, snacks, cooking oil, staple grains, and drinks) but also non-food products (such as flowers and ornamental plants).

million. It ranked 12th in China in size according to the 2010 census. Nanjing is the cradle of contemporary Chinese industrial development and one of the country's top ranked cities in terms of the size of its economy. There are four hierarchical administrative levels in Nanjing: the municipal (shi), districts (*qu*), sub-districts (*jiedao*) and neighbourhoods (*juweihui* or *cunweihui*). In total, Nanjing has 11 districts, 100 sub-districts and townships, and 307 neighbourhoods in 2014. Each neighbourhood has one or more sub-neighbourhoods (*shequ* or *xiaoqu*).

With the exception of leafy greens, most of the food consumed in Nanjing comes from outside the city, especially other regions in Jiangsu province and nearby Anhui province. Vegetables and fruits are also imported from Shandong, Hainan and foreign countries. Zhou and Lu (2008) found that food from outside Nanjing accounts for 77% of all the food sold in the city's markets. Although Nanjing's urban core has very little land dedicated to urban agriculture, there are various attempts at growing food around residential buildings, especially on tiny front yard gardens and unused land. Balcony and rooftop gardening is found on a few buildings. According to the Nanjing Agriculture Committee, Nanjing's peri-urban areas had 242,000 ha of farmland in 2011 and 46% of it was used for growing grains and oil seed crops and 22% for vegetable growing.

The extensive network of wet markets and supermarkets are major food retailers in Nanjing. There are an estimated 240 wet markets in the city (Voice of China 2016). The construction of wet markets has been a mandatory urban planning requirement for the development of new neighbourhoods. The Planning, Construction and Management of Wet Markets in Nanjing (Municipal Government of Nanjing 2003) issued by the municipal government specified that "for every 50,000 m^2 of newly constructed residential neighbourhoods, more than 1000 m^2 of wet market space should be constructed" (Clause 5). This regulation ensures a spatially dense distribution of wet markets. Various actors are involved in the construction and management of wet markets in Nanjing. Wet markets are run by either private companies, state-owned enterprises, or governmental agencies.

Thousands of supermarkets are also widely distributed around Nanjing's residential neighbourhoods. A recent study found that the average service radius of large supermarkets in Nanjing was only 700 meters and most of them were located near large residential areas (Ji and Zhao 2010). With a large number of small and medium sized supermarkets, competition is fierce (Xiao et al. 2013). Supermarkets are believed to be the main outlet venue for processed food, staple grains and certified food. Besides wet markets and supermarkets, special food stores, bakeries, restaurants, street vendors and other various food outlets are also playing critical roles in people's daily lives.

The Regulations on the Management of Temporary Street Vendors in Nanjing in 2009 (Nanjing City Management Committee Office, 2009), the first ever city-level bylaw in China that officially allows the operation of street vendors, makes Nanjing an interesting case of informal food economy development. This widely debated regulation allows vendors with permits to operate in certain areas (for example, residential neighbourhoods, small alleys and vacant land) during certain periods of the day while prohibiting street vending along main roads and specific areas. This has ameliorated the tension between street vendors and enforcers of city management (para-police known as *chengguan*) who are frequently reported clearing out street vendors with coercive methods in other cities (Swider 2015). The regulation reportedly fosters the livelihoods of poor local residents and also makes food services more accessible in Nanjing (Li 2009, Shen 2009).

Nanjing is typical of Chinese cities in terms of changing dietary patterns; that is, increasing consumption of processed food and sugar while "consumption of grains (especially coarse grains), tubers, vegetables and legumes has been declining." (FORHEAD 2014: 17). In Nanjing, Wang et al (2013) conducted a survey of food intake by 1,255 residents in three districts. They found that Nanjing residents consumed too much fat and salt and too few vegetables, fruits, aquatic products,

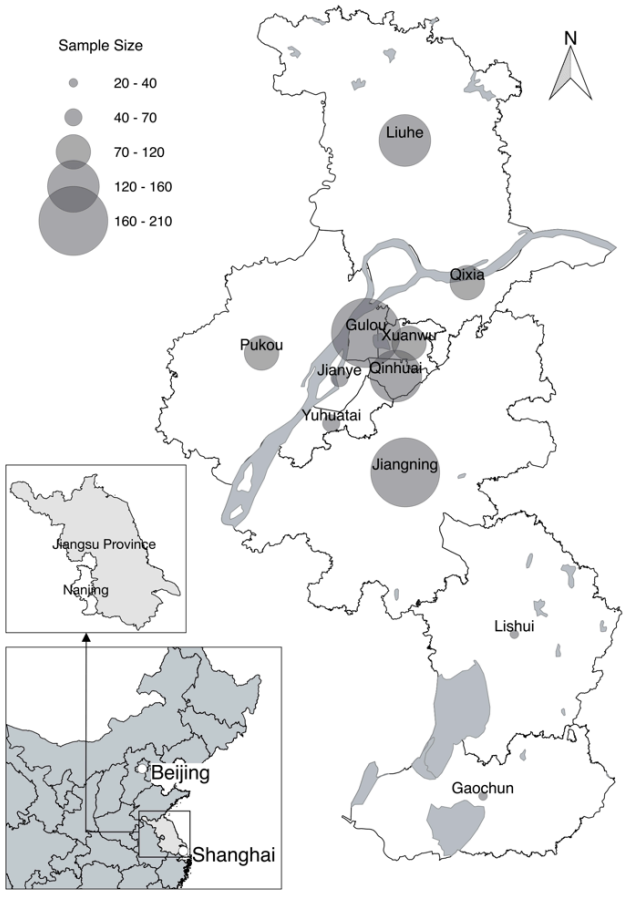
and soybean products and nuts. Some 32% of the informants were overweight and 10% were obese. According to the Statistics Yearbooks of Nanjing, since 2000, and especially after 2004, food prices in Nanjing have grown rapidly with an average annual increase of 6.8% between 2004 and 2014. Data on the annual expenditures of Nanjing residents reveals that dining out has contributed to the increase in total food expenditures. In 2014, Nanjing residents spent 1163 CNY (USD189) per person per annum on dining out, which accounted for 25% of average total expenses on food.

Methodology

The Hungry Cities Partnership household food security survey sampled 1,200 households in Nanjing in July 2015. Households were defined as all people who were staying together in a dwelling unit at the time of the survey. It did not include relatives who were away working in other places for longer periods or relatives staying in the rural areas. To ensure a good geographic coverage of Nanjing, two or more sub-districts were randomly sampled within each of the 11 districts of Nanjing based on the total number of sub-districts within each district (proportional allocation). The exceptions were Gaochun district and Lishui district as there is only one urban sub-district in each. In total, 29 sub-districts were randomly sampled. One hundred communities were randomly sampled from these 29 sub-districts. The 1,200 households were therefore drawn from all 11 districts, 29 sub-districts and 100 sampled communities (larger sample sizes were drawn from communities with bigger population sizes).

Within each community, fieldworkers were evenly spaced across the community and used a random number generator to randomly select the buildings they would sample and then the floor which they would sample. Once the floor was randomly selected, the enumerators systematically sampled apartments in these buildings (every 3rd apartment). If a household was unable to respond to the survey, the next household was approached. The enumerators repeated this step until the sample size was reached within each community. Figure 1 demonstrates the spatial distribution of the sample. In total, 78% of surveys were conducted in apartment buildings. In most cases, more than one survey was conducted in a same apartment building or buildings nearby. Therefore, each dot in the map represents one or more households.

FIGURE 1: Spatial Distribution of Surveyed Households in Nanjing



The HCP survey instrument collected basic data on the household as well as extensive information about food sources, consumption information, and perceptions of food security and food safety. The survey was administered electronically using the ODK data collection app preinstalled on tablets. The data was synthesized into excel and SPSS for statistical analysis. As part of the survey, respondents were provided with a list of 40 food items that members of their household might have purchased in the previous month (30 days). They were asked

three questions for each food item selected: (a) whether and how many times the household had purchased this food item; (b) where the household normally purchased the food item; and (c) the location of the outlet where the household normally purchases this food item.

Use of Different Food Sources

The survey first examined whether and how frequently Nanjing residents obtained food from 22 different food sources (Table 1). Wet markets and supermarkets are the dominant food sources with patronage levels of 93% and 87% of households respectively. However, the frequency of patronage of these two major food sources varied significantly. Wet markets are visited extremely frequently with 75% patronizing them at least 5 days a week and another 22% at least once a week. Supermarkets are patronized less frequently, although 81% shop there at least once a week. What these figures suggest is that the vast majority of Nanjing residents patronize both wetmarkets and supermarkets, rather than one to the exclusion of the other. This raises the possibility that they tend to purchase different kinds of products at these two outlets, a question returned to below.

The third most frequently used food source in Nanjing are restaurants (patronized by 43% of households). Most households who visit restaurants do so either once a week or once a month. Other sources of food purchase, from the most common to the least common, are small shops (grocers, cafés, butcheries and bakeries) (30%), street vendors (24%), online shopping (17%), fast food/takeaways

TABLE 1: Food Sources and Frequency of Patronage

Food Sources	% of households	Frequency of patronage (% of households)				
		At least five days a week	At least once a week	At least once a month	At least once in six months	At least once a year
Wet markets	92.6	75.2	22.1	2.3	0.3	0.1
Supermarkets	87.0	16.7	63.9	17.8	1.5	0.1
Restaurants	43.3	3.2	24.0	45.6	21	6.1
Small shops	29.8	16.9	58.9	19.8	3.6	0.8
Food provided at work	27.4	91.5	7.9	0.0	0.6	0.0
Street vendors	23.6	15.8	58.6	22.5	2.1	1.0
Food provided to children at school	19.3	97.0	1.7	0.9	0.4	0.0
Online market shopping	17.4	4.8	26.2	58.1	7.1	3.8
Food sent by relatives in rural areas	15.9	1.6	17.2	35.9	33.3	12.0
Fast food take away	15.5	12.8	33.2	42.8	7.5	3.7
Corner shop/community shop	11.6	19.3	54.3	20.0	5.0	1.4
Household grows it in rural areas	9.9	78.3	11.7	6.7	3.3	0.0
Household grows it in urban areas	5.6	52.9	30.9	10.3	4.4	1.5
Food sent by relatives in another part of city	5.5	3.0	23.9	35.8	31.3	6.0
Share meals with neighbours and/ or other households in community	4.5	0.0	16.4	45.5	29.1	9.0
Livestock owned by household	2.8	8.8	14.7	38.2	26.5	11.8
Food provided by neighbours and/ or other households in community	2.1	4.0	32.0	48.0	12.0	4.0
Food sent by relatives in other cities or towns	1.7	0.0	10.0	15.0	30.0	45.0
Begging	0.1	100.0	0.0	0.0	0.0	0.0

(16%) and corner stores (15%). Some, such as street vendors and small shops are patronized relatively frequently while others, such as online shopping and fast food, are less frequent.

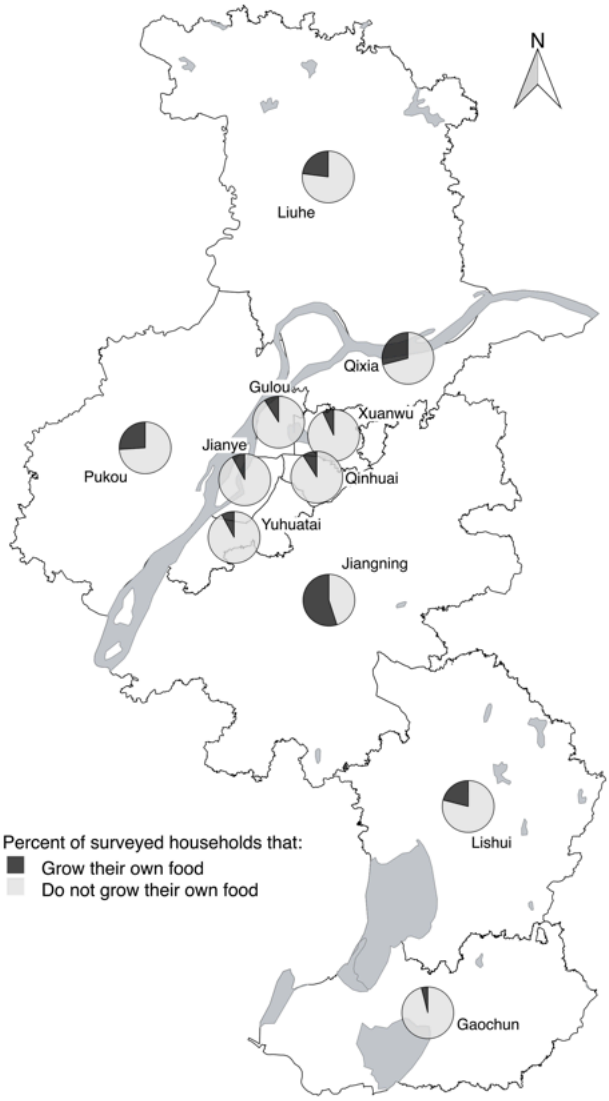
Other sources of food for a minority of households include meals at work (27%) and at school (19%). Both have high frequency of use. Much less significant were rural-urban food transfers (16%), food from relatives in other parts of the city (6%) and food from relatives in other urban areas (2%). Food sharing or borrowing within the community was uncommon. Begging was almost non-existent.

Urban agriculture is thought not to be widely practiced within Nanjing (Si 2016). Regulations in Nanjing even prohibit agricultural practices in public green spaces (Standing Committee of the People's Congress in Nanjing, 2012). However, as many as 21% of surveyed households were actually engaged in urban agriculture, including growing food and raising animals, despite the prohibitions.

Figure 2 shows the spatial distribution of households that grow their own food. While urban agriculture practices were found all over Nanjing, most happens in peri-urban districts, particularly Jiangning, Qixia and Pukou. Almost all (95%) of the urban agriculture in Nanjing was vegetable production. Only 66 households raised livestock, mainly chickens. Most growing food were doing so on their own housing plot or in residential areas. The fieldwork identified various types of urban agriculture within the city, including front yard and backyard gardening, rooftop gardening, container gardening, and vegetable growing on undeveloped land. In one case, a whole slope outside a newly built neighbourhood was farmed in spite of the nearby sign saying "public green space, no farming." When asked why they grow food, the local residents said they did not trust the quality of vegetables (i.e. chemical contamination and residues) sold in markets. Food safety turned out to be a driver for urban agriculture. Middle-aged and elderly residents also undertake urban agriculture as a recreational activity.

The major factor preventing more people from engaging in urban agriculture was identified as the lack of access to land. In total, 93% of households said this was a constraint. Other reasons given for not growing food were that buying food was easier (69%), and constraints of time and labour (56%). Survey respondents generally disagreed that farming was for rural people only (77%), that access to farming inputs was a problem (67%), or that whatever they grew would be stolen (67%).

FIGURE 2: Distribution of Urban Agriculture in Nanjing



Food Consumption Patterns

Vegetables and fresh fruits are the most commonly purchased food items in Nanjing (Table 2). Other central items in the diet of most households include fresh pork (the dominant form of meat consumption

TABLE 2: Food Items Purchased and Frequency of Purchase

	% of households purchasing food item	Frequency of purchase (% of households)				
		At least five days a week	At least once a week	At least twice a month	At least once a month	Less than once a month
Fresh/cooked vegetables	87.7	81.1	16.3	0.8	0.4	0.8
Fresh fruit	87.7	25.4	65.6	5.6	2.3	0.9
Fresh pork	85.5	12.9	69.3	10.3	5.6	1.4
Rice	79.3	4.2	4.7	11.2	56.7	21.8
Eggs	77.5	7.4	45.8	24.6	17.7	2.6
Noodles/pasta	71.6	4.6	49.9	23.3	16.3	4.2
Fresh fish	71.6	4.0	72.2	13.9	7.7	1.3
Cooking oil	64.8	0.6	1.4	3.8	57.1	34.9
Fresh milk	59.5	39.4	31.0	11.4	15.4	2.2
Steamed bread	58.3	23.1	60.0	9.2	5.0	2.3
Fresh chicken	49.3	2.3	49.7	27.2	17.3	3.2
Patty/pies/steamed buns with stuffing	48.0	31.5	50.9	6.7	6.9	2.9
Powdered milk/yoghurt	46.8	25.8	49.5	9.5	11.8	2.5
Snacks	43.1	8.0	51.7	15.7	17.2	6.3
Sugar	40.9	0.8	6.1	5.5	53.1	32.7
Fresh beef	32.9	2.3	41.5	26.1	22.1	7.0
White bread	28.1	4.1	64.2	16.1	13.2	2.3
Tea/coffee	27.9	1.5	3.0	5.6	39.5	46.9
Brown bread	20.7	8.4	59.4	14.7	13.1	4.4
Rice noodles	17.6	2.3	28.6	21.6	27.7	19.7
Sweets/chocolate	17.2	7.2	43.3	13.9	22.1	10.6
Cooked beef	16.7	3.0	40.6	27.2	21.3	6.4
Chips/French fries	15.7	7.4	46.3	15.8	20.5	8.4
Kidney, liver, tripe (offal)	15.0	2.7	29.1	19.2	36.3	12.1
Canned vegetables	11.8	2.1	17.5	24.5	32.3	21.7
Fresh shellfish	10.6	3.9	28.1	35.2	25.0	7.8
Cooked chicken	7.2	3.4	43.7	20.7	24.1	8.0
Cooked pork	6.0	6.9	69.4	12.5	6.9	1.4
Fresh lamb	6.0	4.2	25.0	19.4	29.2	20.8
Frozen fish	5.7	1.4	31.9	37.7	13.0	15.9
Frozen chicken	5.2	1.6	49.2	25.4	19.0	4.8
Frozen pork	3.5	7.1	52.4	21.4	7.1	11.9
Canned fruit	2.6	3.2	6.5	29.0	41.9	16.1
Cooked fish	1.9	4.3	34.8	13.0	39.1	8.7
Frozen beef	1.7	9.5	38.1	19.0	23.8	9.5
Frozen lamb	1.2	0.0	28.6	7.1	35.7	21.4
Cooked lamb	1.0	8.3	16.7	16.7	41.7	8.3
Frozen shellfish	0.6	14.3	0.0	28.6	42.9	14.3
Cooked shellfish	0.5	16.7	16.7	0	33.3	33.3
Canned meat	0.3	0.0	0.0	0.0	100.0	0.0

in China generally), rice, eggs, noodles, fresh fish and cooking oil. While milk is not part of the traditional diet in China, 60% households had purchased milk in the previous month and the number purchasing powdered milk/yoghurt was also high (47%). This, taken with the relatively high percentage of dairy purchase is indicative of the westernization of diets. Fish, chicken and beef are the three other major meat and seafood items following pork.

Most households purchase fresh/cooked vegetables at least five days a week. This indicates easy access to vegetable outlets, mainly wet markets, and a strong local vegetable supply network in Nanjing. It also suggests that Nanjing residents value the freshness of vegetables, a strong tradition among Chinese consumers (Veeck and Veeck 2000). The frequency of purchase is also high for fresh milk with almost 40% of households purchasing it on a daily basis. Pork and fresh fish are bought at least once a week, implying the availability of refrigeration facilities. The least frequently purchased items are cooking oil and rice. This is mainly because of the limited amount of daily consumption of cooking oil and the fact that rice is bought in bulk.

Wet Markets and Supermarkets

As noted above, most households in Nanjing source food at both wet markets and supermarkets. The key question in assessing if there is a "competitive struggle" for market share between these two major types of outlet is whether consumers tend to purchase different items at each. Table 3 shows the most commonly used food outlets and other food outlets to purchase each of the food items. First, with respect to fresh produce, wet markets are clearly more popular for fresh and cooked vegetables, and fresh pork, fish, chicken, beef and offal. Supermarkets clearly predominate as a source for only two items: fresh milk and cooked lamb. The only items where there appears to be a split market are eggs and to a lesser degree, lamb and shellfish. Most cooked meat is also fairly evenly split between supermarkets and wet markets. One area of apparent competition is around frozen meat. However, less than 10% of households normally purchase frozen products (Table 2). Fresh fruit is also obtained from street vendors and small shops (by around 20% of households), while a smaller number purchase pork and beef from butcheries. Small shops and butcheries also have a relatively significant, though smaller, share of the cooked meat market.

In contrast to fresh produce, the picture with processed food is very different. With the exception of patty and pies (where small shops have the greatest market share), supermarkets are patronized far more for all types of processed food. Over 80% of households shop at supermarkets for items such as powdered milk, snacks, sugar, cooking oil and sweets/chocolate. The main competitor for processed foods are not the wet markets but small shops and it may well be that supermarkets pose a significant threat to these smaller retail outlets. The major reasons for supermarket patronage are supermarkets have greater variety of food (84%), supermarkets do not cheat (81%), food in supermarkets is cleaner and hygienic (62%), safer (59%), and of better quality (54%). Respondents generally believe that food at supermarkets is too expensive, which is the major reason for not shopping there. In addition, over a third of households go directly to bakeries for their white and brown bread.

None of the other retail sources of food command a significant market share although cooked chicken is obtained by 20% of households at restaurants and 15% at take-aways. A quarter of households also obtain cooked pork at restaurants. Online shopping tends to be a source of items such as snacks, sweets/chocolates, and tinned fruit and meat.

Location of Food Outlets and Food Accessibility

The location of food sources is a critical indicator of food accessibility. Table 4 shows the location of the main outlet where households normally purchase their food. It is clear from the table that most food

TABLE 3: Sources of Purchased Food Items

	% of Households that Purchased the Food Item				
Food items	Wet markets	Super-markets	Street vendors	Small shops/ grocers	Butchery/ bakery
Fresh produce					
Fresh/cooked vegetables	92.6	22.1	4.9	2.0	0.2
Fresh fish	92.4	17.6	0.7	0.5	0.9
Fresh chicken	87.6	24.1	1.2	0.7	6.4
Kidney, liver, tripe (offal)	85.2	20.9	0.0	3.3	4.9
Fresh pork	83.8	25.6	1.0	1.3	13.9
Fresh beef	76.7	34.1	0.3	0.5	11.3
Fresh shellfish	68.0	44.5	0.0	0.8	1.6
Fresh lamb	67.6	40.8	1.4	2.8	9.9
Fresh fruit	59.2	45.9	18.5	22.8	0.2
Eggs	55.9	59.7	1.1	5.5	0.0
Fresh milk	5.5	65.3	0.1	10.4	0.0
Cooked food					
Cooked beef	47.0	30.7	0.0	20.3	20.8
Cooked pork	36.1	33.3	2.8	15.3	19.4
Cooked chicken	35.6	33.3	1.1	33.3	12.6
Cooked shellfish	33.3	16.7	0.0	0.0	0.0
Steamed bread	32.7	28.5	10.8	28.9	6.5
Cooked lamb	16.7	66.7	0.0	8.3	8.3
Cooked fish	21.7	21.7	0.0	4.3	4.3
Chips/french fries	2.6	94.2	0.0	19.5	0.0
Processed food					
Pasta	40.9	58.2	0.7	15.2	0.1
Rice noodles	34.7	70.9	0.5	12.2	1.4
Patty/pies/steamed buns with stuffing	34.2	11.2	17.1	35.4	3.5
Rice	25.3	71.7	0.8	13.2	0.3
Canned meat	25.0	75.0	0.0	0.0	0.0
Tinned/canned vegetables	24.5	69.9	0.7	11.2	0.0
Cooking oil	9.6	89.0	0.1	4.1	0.0
Sugar	7.5	88.3	0.0	14.5	0.2
White bread	5.4	76.3	0.3	9.7	31.7
Tea/coffee	4.5	75.7	0.3	16.9	0.0
Brown bread	4.3	73.2	0.0	9.8	40.6
Snacks	4.2	92.0	0.8	24.9	0.6
Powdered milk/yoghurt	3.5	82.3	0.0	9.9	0.0
Sweets/chocolate	3.4	91.3	0.5	16.3	1.0
Canned fruit	3.2	87.1	0.0	3.2	0.0
Frozen food					
Frozen fish	59.4	49.3	1.4	0.0	1.4
Frozen chicken	60.3	50.8	1.6	1.6	6.3
Frozen pork	52.4	78.6	0.0	2.4	4.8
Frozen beef	57.1	71.4	0.0	0.0	4.8
Frozen lamb	42.9	71.4	0.0	0.0	7.1
Frozen shellfish	28.6	100.0	0.0	0.0	0.0
Note: Multiple response question					

TABLE 4: Location of food outlets where food items normally purchased

Food items	Food outlet location (% of households)					
	Within walking distance	On road to or from work	Downtown/ CBD	Other shopping area	Outside the city	Other
Fresh produce						
Fresh/cooked vegetables	93.0	5.1	0.5	7.4	0.3	1.5
Fresh pork	92.1	5.0	0.2	9.5	0.4	0.3
Fresh fruit	91.8	9.1	0.3	10.9	0.4	1.7
Fresh chicken	91.3	5.7	0.0	8.5	0.7	0.7
Kidney, liver, tripe (offal)	91.2	5.5	1.1	7.7	0.0	0.0
Fresh fish	90.8	4.3	0.3	8.9	0.3	1.2
Fresh beef	90.0	6.5	1.0	10.8	0.3	1.3
Eggs	88.5	5.4	0.6	10.4	1.8	2.7
Fresh shellfish	88.3	4.7	0.0	11.7	0.0	0.0
Fresh lamb	85.9	5.6	2.8	11.3	0.0	0.0
Fresh milk	73.2	4.3	1.0	13.2	0.8	16.0
Cooked food						
Patty/pies/steamed buns with stuffing	93.6	8.1	0.0	3.3	0.0	0.7
Steamed bread	93.2	5.4	0.1	6.0	0.4	0.9
Cooked chicken	93.1	16.1	4.6	16.1	0.0	0.0
Cooked beef	87.6	11.9	1.0	12.4	0.0	0.5
Chips/french fries	86.8	6.3	4.7	16.3	1.6	2.1
Cooked lamb	83.3	16.7	0.0	0.0	0.0	16.7
Cooked pork	79.2	15.3	0.0	16.7	0.0	0.0
Cooked shellfish	66.7	33.3	16.7	16.7	0.0	16.7
Cooked fish	62.5	17.4	4.3	26.1	0.0	0.0
Processed food						
Pasta	89.1	5.0	0.8	11.7	0.5	1.0
Sugar	88.5	2.0	0.0	11.3	0.6	1.6
Snacks	87.2	8.2	2.1	19.5	1.3	4.0
Rice	86.8	4.9	0.7	14.0	1.8	4.1
Canned vegetables	84.6	4.9	0.0	9.1	0.7	5.6
Brown bread	83.4	13.8	4.0	17.0	1.2	0.0
Rice noodles	83.2	7.9	0.9	16.4	1.9	0.9
Sweets/chocolate	83.1	6.3	2.9	16.4	2.4	5.3
Powdered milk/yoghurt	83.0	4.1	0.4	14.0	1.1	6.0
Cooking oil	82.9	3.2	2.0	17.5	1.7	2.3
White bread	81.4	12.6	2.3	20.3	0.9	1.4
Tea/coffee	78.6	1.5	2.1	16.1	3.6	8.0
Canned meat	50.0	50.0	0.0	0.0	0.0	0.0
Frozen food						
Frozen chicken	90.5	9.5	0.0	11.1	1.6	0.0
Frozen pork	85.7	9.5	0.0	16.7	0.0	0.0
Frozen beef	85.7	9.5	4.8	4.8	0.0	4.8
Frozen fish	82.6	7.2	1.4	15.9	0.0	1.4
Frozen lamb	78.6	21.4	0.0	7.1	0.0	7.1
Frozen shellfish	71.4	0.0	0.0	42.9	0.0	0.0
Canned fruit	71.0	12.9	0.0	12.9	3.2	6.5

Note: Multiple response question

outlets were within walking distance of the home. More than 80% of households bought most food items in their neighbourhoods or within walking distance. More than 90% of households purchased the top three most commonly purchased food items (vegetables, fresh fruit and fresh pork) within walking distance. This signifies not only a very high degree of accessibility of all food outlets throughout the city but also the spatially dense food supply networks in Nanjing. The diverse and dense network of fresh food supply in Nanjing reflects one of the key advantages of China's urban food system in terms of resilience or capacity to withstand and/or adapt to changes of environmental, socioeconomic and political situations (Pingali et al 2005).

Conclusion

The Hungry Cities household survey provides the first comprehensive understanding of household food patronage patterns in Nanjing. Food patronage includes such diverse food sources as online food markets, restaurants, urban agriculture, community kitchens, and getting food from neighbours and relatives. However, the primary value of the survey is the light it sheds on the debate over the relationship between wet markets and supermarkets in the Chinese urban context. This paper underscores the critical role of wet markets in supplying vegetables and fruits as well as all kinds of meat to urban residents. Rather than being displaced by supermarkets, wet markets maintain a strong niche in the face of supermarket competition.

After two decades of rapid development, supermarkets have become the top choice for purchasing staple grains, dairy products, eggs, and processed food. Supermarkets that vary in size and type (i.e. independent stores, domestic chains, and foreign supermarkets chains) are commonly distributed across Chinese cities. With a much faster growth rate than that of the retail sector in general, supermarkets have displaced many traditional food outlets (Wang 2002, Zhang and Pan 2013). The growing popularity of supermarkets was fostered not only by the great variety but also the safety and hygienic conditions of their food. The fact that supermarkets do not cheat in terms of measurement of quantity is another factor that drives their patronage. Moreover, the dominance of supermarkets in the retailing of processed food mirrors the increasing consumption of processed food.

Since 2002, the state has attempted to phase out wet markets in some large Chinese cities including Nanjing by converting them to supermarkets (*nong gai chao*) (Hu et al 2004, Zhang and Pan 2013). However, this state-led initiative failed in many cities. More than a decade later, nearly three-quarters of consumers in Nanjing still visit wet markets at least five days a week. A key question for further investigation is why Nanjing people prefer to buy vegetables, fruits and meat from wet markets. Probable reasons include easy accessibility, freshness of food, and negotiable low prices. In addition, wet markets are not simply food outlets but have other social and recreational functions and constitute a critical element that enriches urban life in China (Wang et al 2015).

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