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Dataset on Household Food Ingredients and Source Areas of Urban Residents in Yantai, Lanzhou, Xinxiang, and Jiujiang Cities of China (2020)

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Abstract: China's new dual circulation policy has increased the country's dependence on food supplies from foreign countries, and improving the self-sufficiency of the urban food supply is key to alleviating the insufficient elasticity of China's food supply system. Given the significant differences in the dietary structures of urban residents across different regions, analyzing the proportions of local supplies and the regional differences in urban residents' food ingredients from a global perspective has become an urgent. To this end, in April 2020, online questionnaires based on existing relevant research were distributed to more than one thousand households in the cities of Yantai, Lanzhou, Xinxiang, and Jiujiang; 752 valid completed questionnaires were collected. The questionnaire covers four aspects: residents' basic household situations, consumption of different ingredients, sourcing of ingredients, and factors affecting residents' purchase of ingredients. Finally, a survey dataset of household ingredients and source areas for urban residents in Yantai, Lanzhou, Xinxiang, and Jiujiang was compiled. The content of this dataset includes: (1) food ingredient import data from Gansu, Henan, Jiangxi, and Shandong provinces in 2019; (2) a summary table of the household recipe survey questionnaire in four cities; (3) household socioeconomic characteristics in the four cities; (4) per capita food consumption in the four cities; (5) degree of localization and globalization and coefficient of variation of food demand in the four cities; and (6) factors affecting residents' purchase of food ingredients. The dataset is stored in. xlsx format, consisting of a single file with data size of 209 KB.

Keywords: urban residents; food consumption; regional differences; dual circulation

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1 Introduction

The methodological exploration of the globalization and localization of important products is a fundamental aspect of empirical research on China's dual circulation policy. Food consumption and trade are related to national transportation and people's livelihoods, and food security is an important foundation for national security[1]. As an advocate of natural order, the 18th-century physiocratic scholar Quesnay paid attention to the circular process of the national economy, focusing on cyclical social reproduction. In contrast, Smith's mercantilist theory holds that the global scale of trade cannot be changed, pointing to the modern Western European promotion of unified domestic markets and the formation of world markets. Since the global financial crisis in 2008, international trade disputes have been frequent, and the security of supply chains, including food, has become an important issue in China. Therefore, the country has proposed a policy of "accelerating the construction of a new development pattern dominated by the domestic macro cycle and mutually promoting domestic and international dual cycles". At the same time, the pace of securing China's urban food supply and protecting arable land across the region is also accelerating. China's food security strategy of "focusing on ourselves, basing ourselves on the domestic market, ensuring production capacity, appropriate imports, and technological support" is inherently consistent with the dual cycle. Since 2000, China has transformed from a net grain exporter into a net importer. With the expansion of the trade deficit in agricultural products, China's grain self-sufficiency rate has continued to decline[2,3], and urban households' exogenous food dependence has become a matter of urgent concern.

Understanding the source characteristics of household food consumption and different urban residents' proportion of local food supplies can help clarify the domestic demand for ecologically sound products; it is also a fundamental research response to the new development pattern of dual circulation. In China, residents of regions at different developmental stages differ significantly in their dietary habits[4–6]. Focusing on the differences in food consumption among residents in different regions can also help guide local food consumption and reduce losses and waste during the processes of food transportation and consumption[7].

The existing relevant datasets include the dietary guidelines for Chinese residents revised by the Chinese Nutrition Society[8] as well as the main food consumption patterns of Chinese residents published by the National Bureau of Statistics. These datasets are based on the average food intake of residents across the country, and they recommend daily food intake values for different populations. While they provide universal guidelines, these datasets often target the population as a whole, ignoring regional and urban differences in food intake. At the same time, existing research rarely involves the analysis of the sources of residents' food ingredients; particularly lacking is the classification and interpretation of the levels of localization and globalization of residents' recipes. In addition, statistical yearbooks generally adopt a sampling survey method involving only 100 households and lacking basic information and statistical data on the surveyed households. Therefore, with regard to domestic demand under the dual circulation policy, existing datasets offer limited contributions to issues such as local food security, reducing food transportation and food waste, and improving regional food security[9,10].

Based on the practical background and existing research, this dataset takes Lanzhou, Jiujiang, Xinxiang, and Yantai cities as the research areas and uses household recipe

questionnaires to gather information on the consumption of food materials, the demand for locally sourced foods, the degree of globalization, and factors affecting residents' purchases of food ingredients in different cities. This dataset was gleaned from a targeted questionnaire design in terms of research objects, research content, and other aspects. The data collection methods for determining residents' food ingredients from both local sources and those beyond their immediate locality can provide new data references for improving food security in different regions.

2 Metadata of the Dataset

The metadata of the Food questionnaire statistics from Yantai, Lanzhou, Xinxiang and Jiujiang cities of China (2020)[11] is summarized in Table 1. It includes the dataset's full name, short name, authors, year, temporal resolution, spatial resolution, data format, data size, data files, data publisher, and data sharing policy, etc.

Table 1 Metadata summary of the Food questionnaire statistics from Yantai, Lanzhou, Xinxiang and Jiujiang cities of China (2020)

Items	Description
Dataset full name	Food questionnaire statistics from Yantai, Lanzhou, Xinxiang and Jiujiang cities of China (2020)
Dataset short name	FoodQuestionnaireStatisticsFourCities2020
Authors	Zhao, M. X., College of Architecture, South China University of Technology, arzhao@scut.edu.cn Yao, Y. X., College of Architecture, South China University of Technology, 1589120345@qq.com Wang, J. Y., College of Architecture, Tianjin University, 19994339180@163.com
Geographical region	Lanzhou, Jiujiang, Xinxiang and Yantai in China
Year	2020
Data format	.xls Data size 209 KB
Data files	Tab. 1. Import data of food in Gansu, Henan, Jiangxi and Shandong of China in 2019 Tab. 2. Summary of survey questionnaires on household ingredients and source areas in Lanzhou, Yantai, Xinxiang, and Jiujiang cities of China Tab. 3. Social and economic characteristics of residents in four cities Tab. 4. Per capita consumption of four cities' residents Tab. 5. The degree and coefficient of variation of localization and globalization of food in four cities Tab. 6. Factors affecting residents' purchase of food in four cities
Foundation	National Social Science Foundation (22&VHQ009)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	***Data*** from the Global Change Research Data Publishing & Repository includes metadata, datasets (in the *Digital Journal of Global Change Data Repository*), and publications (in the *Journal of Global Change Data & Discovery*). ***Data*** sharing policy includes: (1) ***Data*** are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use ***Data*** subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute ***Data*** subject to written permission from the GCdataPR Editorial Office and the issuance of a ***Data*** redistribution license; and (4) If ***Data*** are used to compile new datasets, the 'ten percent principal' should be followed such that ***Data*** records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[12]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS/ISC, GEOSS

3 Methods

In response to the policy background of the new development pattern of dual circulation, the data collection of the questionnaire was divided into regions, and the degree of localization and globalization of food ingredients was measured by means of food source. This dataset focuses on four medium-sized cities, Yantai, Lanzhou, Xinxiang, and Jiujiang. These cities are located in the eastern, western, central northern, and southern regions of China and are

strongly representative in terms of natural environment, taking into account terrain and landforms such as mountains, plains, lakes, and coastal areas.

The import data on food ingredients from the four provinces in this dataset comes from the trade statistics of import and export goods published by the General Administration of Customs of the People's Republic of China. The calculation was based on the countries where trading partners are located, and the total import value of various types of food in the four provinces was calculated. The data from the household questionnaire survey were drawn from the authors' questionnaire survey. Existing research has shown that reducing household food waste can effectively improve food security patterns, so many studies related to food waste rely mainly on household questionnaire survey methods [13-14]. Based on this, the author distributed an online questionnaire to thousands of households in four cities in April 2020. 752 valid questionnaires were ultimately collected, including 203 in Yantai, 203 in Lanzhou, 115 in Xinxiang, and 194 in Jiujiang. The questionnaire covers four aspects: basic household situation, consumption of different ingredients, source of ingredients, and factors affecting residents' purchase of ingredients.

This dataset classifies residents' consumption of ingredients into 12 major categories: grains, beef and mutton, bean products (legumes), eggs, dairy products, vegetables, poultry, oils, aquatic products, pork, fruits, and others. These categories are based on general dietary intake, and respondents indicated the amount consumed in the household in each category (for example, the consumption range of fruit ingredients is 0–400 g, 400–800 g, 800–1,200 g, 1,200–1,500 g, and above 1,500 g).

Referring to existing relevant research[4], the per capita food consumption of residents was calculated by equation (1), in which FC represents the daily per capita consumption of food ingredients; FC_f is the household consumption of ingredients in grams; N_a is the number of adults in the family (unit/person); N_Y is the number of young children in the family (unit/person); t is the age correction coefficient, and this dataset is taken as 0.56 of adult food consumption, based on existing research.

$$FC = \frac{FC_f}{N_a + t \times N_Y} \tag{1}$$

In addition, this study required respondents to fill in the source of ingredients based on the origin of the ingredients indicated on the packaging. This questionnaire divides the sources of food ingredients into three categories: domestic, local, and imported. "Domestic" refers to food ingredients sourced in the city of consumption, "local" refers to food ingredients sourced outside the city of consumption but within China, and "imported" refers to food ingredients sourced overseas[12]. China relies mainly on imports for some crops (such as soybeans) used for soybean products and raw materials for feed grain. Therefore, when conducting in-depth research, the feed consumed by animals used for meat should be split and calculated based on the specific gravity of the feed. However, due to the objective description of the questionnaire data in this dataset, the import rate of some crops used in feed for pigs, cows, and sheep was not considered in the calculation.

To compare the degree of differences in the sources of different ingredients in the four cities surveyed, this study referred to relevant concepts in the field of statistics and calculated the coefficient of variation of various ingredients using Equation (2), in which *Cv* is the coefficient of variation for any ingredient, a_i and σ_i are the average and standard deviation of class *i* ingredients in the four cities. In theory, the larger the value of Cv_i, the more significant the difference in the consumption of such ingredients among the four cities.

$$Cv_i = \frac{\sigma_i}{a_i} \tag{2}$$

Finally, the factors affecting household residents' food purchases were classified according

to six features: price, quality, nutritional value, regional identity, eating habits, and convenient transportation. The degree of impact was determined by respondents' choices among five options: no impact, small impact, moderate impact, large impact, and great impact.

4 Data Results and Validation

4.1 Data Composition

Tab. 1 of the dataset shows import data for food materials in the four provinces of Gansu, Shandong, Henan and Jiangxi in 2019, providing a preliminary indication of the global network characteristics of imported food in different provinces. Shandong used the most foreign food goods, while Jiangxi used the fewest foreign food goods (Figure 1).

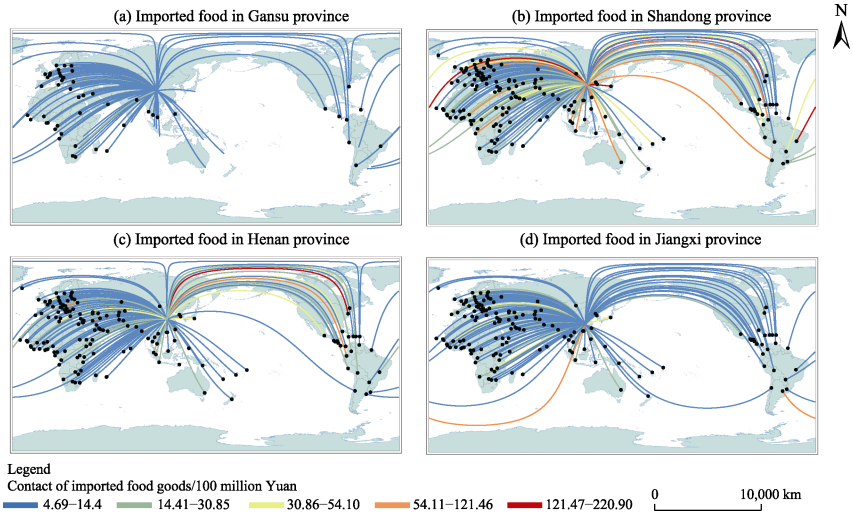

Figure 1 Maps of distribution of food import countries in Gansu, Shandong, Henan, and Jiangxi provinces (2019)

The food questionnaire statistics include the socioeconomic attributes of the surveyed households in four cities, the household consumption of different ingredients on a given day, the source of the consumed ingredients, and the factors affecting the purchase of ingredients. The specific contents include: (1) import data on food ingredients used in Gansu, Henan, Jiangxi, and Shandong provinces in 2019; (2) original data from the questionnaire survey on family recipes of urban residents in four cities; (3) basic information and statistical data of residents' families, including city of residence, age structure of family members, monthly household income, specific residence type, and shopping location. Specific residential areas are divided into five options: urban center, urban suburbs, county and urban areas, towns, and villages (the research focuses on the dependency characteristics of urban families, and this research dataset only includes the first three types of residential areas). The shopping locations are divided into five options: large supermarkets, bazaars, meat and vegetable markets, online shopping, and nearby convenience stores; (4) daily per capita food consumption calculated based on household recipes; (5) degree of localization and globalization of food demand in the four cities, as well as the coefficient of variation of various types of food materials, calculated based on the sources of respondents' household food materials; and (6) factors influencing residents' purchase of food materials in the four cities.

4.2 Data Results

Table 2 shows basic information on the surveyed households. Respondents in this survey

were mainly younger adults between 18 and 60 years old, accounting for 67.45% of the population of the four cities averaged, and the most common family size was three or four. Urban residents account for the majority of the respondents, with 83.78% of households located in urban centers and suburbs. Shopping locations were mostly concentrated in large supermarkets, meat and vegetable markets and nearby convenience stores, with large supermarkets accounting for 31.33%. The proportions of bazaar and online shopping were relatively small[15].

Table 2 Basic information on surveyed households in the four cities

Socioeconomic attributes	Meaning	Result-percentage(%)	Socioeconomic attributes	Meaning	Result-percentage(%)
Age	Under 4	6.13	Residence type	Urban central area	61.44
	4–17	15.83		Suburbs	22.34
	18–45	40.65		County urban area	16.22
	46–60	26.8	Food shopping location	Supermarket	31.33
	Older than 61	10.59		Bazaar	7.95
Monthly household income	Less than 2,500 Yuan	2.7		Meat and vegetable market	27.25
	2,500–4,200 Yuan	10.29		Online shopping	8.95
	4,201–8,400 Yuan	32.6		Convenience store	24.52
	8,401–30,000 Yuan	45.71			
	30,001–42,000 Yuan	5.64			
	42,001–67,000 Yuan	1.96			
	67,001–170,000 Yuan	0.86			
	More than 170,001 Yuan	0.25			

Table 3 shows the daily per capita consumption of different ingredients by household residents. According to the table, the overall daily per capita food consumption is about 1100g, with relatively low figures from Yantai and Xinxiang. With regard to dietary structure, households in the four cities consume principally grains, vegetables, and fruits, supplemented by dairy products, beef and mutton, and poultry, while consuming less oil, bean products, and other types of food. The research data matches the per capita daily food consumption of residents indicated in the 2020 yearbook data of each province, and the data are highly reliable.

Table 3 Daily per capita consumption of different ingredients in four cities (g)

Food type	Lanzhou	Xinxiang	Jiujiang	Yantai	Food type	Lanzhou	Xinxiang	Jiujiang	Yantai
Oils	24.74	24.74	23.13	18.53	Eggs	48.97	53.89	41.88	40.68
Bean products	20.88	23.07	34.06	27.55	Aquatic products	104.94	62.67	147.61	102.94
Dairy	104.80	93.85	88.87	80.83	Vegetables	204.75	185.74	213.40	219.23
Pork	86.57	83.50	65.01	77.24	Fruits	240.94	200.62	158.81	162.87
Beef and mutton	118.51	49.32	70.76	53.13	Grain	236.18	215.79	276.48	207.81
Poultry	58.6	52.69	88.40	47.41	Sum	1249.89	1045.45	1208.43	1038.22

Table 4 shows the proportion of different food sources in the four cities. Overall, domestic ingredients dominate the four cities, but there are significant differences in the degrees of localization and globalization of different ingredients in the four cities. Among them, Xinxiang and Lanzhou relied more on domestic food, while Yantai and Jiujiang showed a relatively high degree of localization of ingredients.

Table 5 shows the coefficient of variation of various food ingredient-producing areas in the four cities. From the table, it can be seen that the difference in the proportion of domestic consumption of food ingredients was the smallest, but that there were still significant relative differences (coefficient of variation greater than 0.25) in domestic grains, oils, aquatic products,

Table 4 Proportion of different food sources in the four cities (%)

Food sources	Lanzhou	Xinxiang	Jiujiang	Yantai
Global	2.04	3.43	1.38	3.00
Local	37.77	32.78	25.06	20.30
Domestic	60.91	63.79	73.55	76.70

and dairy products, reflecting the impact of differences in natural resource endowments on food production. In addition, contrary to the proportion of domestic food consumption, there was a significant difference in the proportions of various imported food ingredients. The maximum was 1.57 (for oils) and the minimum was a mere 0.28 (for miscellaneous).

Table 5 Coefficient of variation of different types of food

Food sources	Food type											
	Grai-n	Oils	Bean Produ-cts	Beef &mutt-on	Pork	Poult-ry	Eggs	Fruit-s	Vegeta-bles	Aquatic products	Da-ir-y	Othe-rs
Global	0.94	1.57	1.27	0.49	0.69	1.16	1.12	0.32	0.69	0.80	0.42	0.28
Local	0.41	0.54	0.60	0.32	0.26	0.65	0.77	0.09	0.36	0.63	0.35	0.12
Domestic	0.27	0.36	0.10	0.15	0.03	0.09	0.04	0.08	0.05	0.30	0.27	0.21

Figure 2 analyzes the composition of regional sources of different food materials in the four cities surveyed. The results show that the localization of eggs, vegetables, and pork in the four cities was relatively high, and the differences between the four cities were small. In terms of the degree of localization, fruits and other types of food (snacks, etc.) had the highest proportion of local ingredients and small differences. However, there were significant differences in the domestic and local sourcing of dairy products, aquatic products, and oils in the four cities. This result is closely related to the resource endowments and dietary habits of various regions. For example, the proportion of dairy products sourced from Lanzhou is much higher than that of the other three cities, which is mainly related to the breeding of cattle and sheep by herdsmen in this area; Lanzhou residents are therefore more likely to consume dairy products produced by domestic cattle and sheep. The proportion of various types of imported food materials in the four cities was relatively low, and there was a significant difference in the importing of aquatic products and of other foods (snacks, etc.).

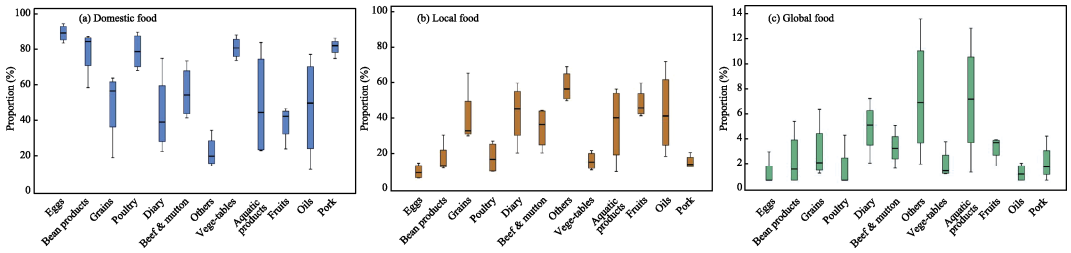

Figure 2 Proportions of domestic, local, and globally sourced foods in the four cities

Table 6 shows the analysis of factors affecting residents' purchase of food materials. Overall, the quality and nutritional value of food materials had a significant impact on whether residents decide to purchase food materials, reflecting the importance that contemporary residents place on food safety and healthy eating. Dietary habits, food prices, and residents' regional identification with the origin of food materials had less impact on residents' purchasing behavior. In terms of promoting domestic demand to encourage the dual circulation system, given that residents are currently focused on the nutritional value and quality of food materials, it is recommended to utilize land resources for high value-added crop and livestock farming to match residents' demand for enhanced nutrition and quality while also fulfilling the desired conversion of general grain crops.

4.3 Data Verification

All data in this dataset were drawn from the questionnaire survey. In order to reduce the impact of deviation on the study, the questionnaire interval design, survey and processing were strictly completed in combination with official documents such as the Chinese Residents' Dietary Guide while conducting a complete examination of the dietary habits of residents in the four cities surveyed. After obtaining the questionnaire data, in order to ensure reliability,

Table 6 Analysis of factors affecting respondents' purchase of food (%)

Degree of impact	Price	Quality	Nutritional value	Regional identity	Eating habits	Transportation convenience
No impact	11.78	7.98	9.08	20.25	18.28	12.52
Low impact	23.56	6.26	7.85	28.1	17.06	12.64
Moderate impact	38.04	16.44	24.05	35.83	28.47	25.4
Large impact	19.26	40.61	38.28	11.66	24.91	33.62
Great impact	7.36	28.71	20.73	4.17	11.29	15.83

we cleared the data of respondents who took too little time to complete the questionnaire and those from questionnaires that contained unreasonable responses. Finally, the reliability of the questionnaire results was tested, and the results showed a good Cronbach's α coefficient of 0.806, indicating that the questionnaire's data results are highly reliable.

5 Discussion and Conclusion

In the process of creating a new dual circulation development pattern, China has increased its food dependence on foreign countries due to internal factors such as the reduction of grain sowing areas and the growing tendency of the rural labor force to work elsewhere as well as external factors such as inefficient grain distribution and lack of authority in the international grain market, while the uncertainty of overseas trade obstructs both internal and external cycles. Under the security concept of ensuring "basic grain self-sufficiency and absolute food security", attaching importance to and guaranteeing China's food security has become an important proposition in the dual circulation development pattern. Solving the dilemma of domestic food security can help lay a solid foundation for the policy and potentially even become its driving force and primary support. However, the dietary structure of urban residents in different regions in China is quite different. Therefore, further studies should analyze the regional characteristics of food consumption from the perspective of globalization. This dataset focuses on the majority of medium-sized cities in China, with Yantai, Lanzhou, Xinxiang, and Jiujiang as the research objects. It mainly investigates urban households of three or four with stable incomes. Based on a family recipe questionnaire survey, it focuses on the characteristics of food consumption among residents in different regions. The data results indicate that:

(1) The total daily food consumption of residents in the four cities is similar, but there are significant regional differences in the consumption of different food materials. For example, the consumption of beef, mutton, and dairy products is the highest among Lanzhou Hui people due to the influence of their halal diet; the inland city of Xinxiang has the lowest consumption of aquatic products.

(2) Domestic ingredients in all four cities dominate, with local ingredients in second place and imported ingredients as the least common. Yantai and Jiujiang use the highest proportions of domestic ingredients. Meanwhile, there is a significant difference in the degree of globalization among different ingredients in the four cities, while the difference in domestic ingredients is relatively small.

(3) Among the factors that affect the purchase of food materials by residents in the four cities, the quality, nutritional value, and transportation convenience during the purchase process have a greater impact on the purchase of food materials, while dietary habits, food prices, and regional identity have a relatively small impact.

In summary, the above data analysis results are significant for understanding the dietary characteristics of households in medium-sized cities in China and formulating differentiated strategies to prevent food waste. Objectively considering the resource endowments and consumption characteristics of various regions, formulating targeted land use plans for forest, farmland, water, grass, and other types of food production land, and improving the supply chain efficiency of domestic food transportation/storage will help to lay a solid foundation for ensuring the new dual circulation development pattern.

In subsequent research, this dataset can provide data support for scholars studying China's food security issues as well as a reference for relevant policymakers to implement the dual circulation development policy with regional differences. In addition, it is possible to conduct extensive research based on existing data, such as converting the per capita food consumption of different urban households into corresponding land resource usages based on the concept of the ecological footprint, and providing a basis for local governments to scientifically formulate territorial spatial planning so as to better implement the development strategy of "storing food in the ground, storing food with technology". In addition, future research can combine logistics supply data to calculate the energy and water consumption of food supply networks based on the diversity of sources of food materials. A comprehensive analysis of basic information and regional characteristics of food consumption among different urban households could also be conducted to explore the factors influencing food consumption among urban households in different areas. These are topics that can be focused on in the future.

Author Contributions

Zhao, M. X. conducted the overall design of the dataset. Alfonso Mejia provided guidance on questionnaire design. Zhao, M. X. and Mejia, A. designed the algorithms for the dataset. Wang, J. Y. contributed to the data processing and analysis. Yao, Y. X. wrote the data paper. Cen, J. H. did the Data Verification.

Conflicts of Interest

The authors declare no conflicts of interest.

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