



THE MAKAN INDEX

Investigating Differences in Cost of Living between
Neighbourhoods

2nd Edition

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Executive Summary

IPS Social Lab conducted a survey of hawker food prices to create the Makan Index, an index of relative hawker food prices. In constructing the index, we aim to provide a proxy indicator for the cost of living to understand the characteristics of different neighbourhoods in Singapore.

The prices of seven food items (rice with two vegetables and one meat option, rice with one vegetable and two meat options, *nasi goreng*, chicken rice, chicken *biryani*, iced Milo, and black coffee with sugar) were surveyed in over 100 locations across 26 neighbourhoods. The Index was then correlated against socio-economic characteristics of the neighbourhood, such as proportion of rental flats, age profile (residents above 65 years old), and households with more than S\$10,000 in monthly income.

According to the Makan Index, the most expensive zones are Bishan, Marine Parade and Sembawang, while the cheapest zones are Bukit Merah, Queenstown and Toa Payoh. Food prices can differ by nearly 20% between neighbourhoods. Food prices are not necessarily uniformly higher the closer one is to the city centre. The variability is instead accounted for by socio-economic indicators of the neighbourhoods.

Based on correlation analysis, we found that the Makan Index is negatively correlated with the age of estates, proportion of tenants, proportion of divorced and separated persons, proportion of people living without a family nucleus, and proportion of elderly aged 65 and above. The Index is positively correlated with the proportion of households with at least one family nucleus and three generations. This suggests that the cost of food is lower in mature estates and areas with more socio-economically vulnerable people. In areas where such resident profiles are prevalent, food prices are more affordable.

However, vulnerable populations are not restricted by boundaries, and it is important that budget meal options are available across the island, and not just in pockets of neighbourhoods. We have three main policy recommendations to ensure that food remains affordable for those who are most in need:

1. The National Environment Agency (NEA) could offer rental subsidies for existing hawkers who agree to implement a price cap on certain food items.
2. NEA could build new hawker centres in areas that have higher costs of eating out and low density of hawker centres.
3. The Housing and Development Board (HDB) could consider partnering with food operators to manage not-for-profit coffee shops at HDB void decks, similar to the partnership between NEA and Fei Siong and NTUC Foodfare in the recently-opened Hougang and Bukit Panjang hawker centres.

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Preamble

This 2nd edition of the Makan Index report incorporates additional data collected after the publication of a previous edition of the Makan Index report (15 November 2016) and a commentary published in *TODAY* (“Keeping Singapore’s hawker food affordable and accessible”, 15 November 2016). Thus, the results that appear here will differ slightly.

The Makan Index: Investigating Differences in Cost of Living Between Neighbourhoods

Introduction

This study investigates differences in cost of living between neighbourhoods in Singapore. Specifically, it examines geographical variation in the cost of eating out. To this end, an index that compares the prices of food in hawker centres in different regions in Singapore was constructed.

There are several reasons for selecting the cost of eating out as a heuristic for the cost of living and/or working in a neighbourhood. Food comprises 20% of an average household expenditure, the second largest after housing (Department of Statistics, 2014). One in three Singapore residents eat out more than they eat at home (Lim, 2014). When eating out, 81% say hawker food is the meal of choice (Weber Shandwick, 2015). Hence, there is a case to be made that dining out, and hawker food in particular, represents a significant portion of the everyday expenditure of a resident in Singapore. We will assume that differences in food prices reflect differences in the cost of living and/or working in different areas in Singapore.

Residential profiles of estates vary across the island (Cai, 2011; Department of Statistics, 2010; Sachs, 2003), which result from differing property prices as well as access to amenities, among other factors. Similarly, the prices of food vary across different neighbourhoods. A survey of hawker centres (Leong, Poh & Ng, 2015) looked at the cost drivers of hawker food prices, and it was found that raw materials such as cooking ingredients constitute the largest cost component, followed by manpower and stall rental. As the price of unprepared food ingredients varies by area (Consumers Association of Singapore, 2008), we can expect hawker food to vary accordingly. The study also found that food prices tend to be lower when more stalls sell the same food item.

Neighbourhoods and Hawker Centres in Singapore

Within the local context, the Urban Redevelopment Authority of Singapore (URA) and the Housing and Development Board (HDB) have a strong influence in shaping the development of each neighbourhood.

The URA is responsible for charting the development of each district, through listing of heritage landmarks and common space areas to strengthen the distinct identity of each planning area (URA, n.d.-a). This strategy influences the residential demographics and existing built history of the area, which in turn affects the kind of buildings, facilities and services that are available (URA, n.d.-b).

While URA designs masterplans for land use throughout the country, HDB plays an instrumental role in the provision of public housing to over 80% of Singaporeans (Fernandez, 2010). HDB implements these plans in residential districts. Within each neighbourhood, HDB defines the amenities, facilities and layout of each residential estate, with the aim of encouraging residents to feel a sense of ownership for where they live.

Hawker centres are sheltered, public-space food centres established by the government and managed by the National Environment Agency (NEA). They originated in the 1950s as

regulated areas to contain the itinerant street hawkers scattered around Singapore, which were a public health problem due to poor hygiene conditions (Kong, 2007). Since then, hawker centres have become integral to Singapore culture and lifestyle, and a source of affordable meals. Coffee shops supplement hawker centres by selling similar food items; they are typically run by private operators, operate on a smaller scale and located on the ground floor of HDB blocks.

The Makan Index

In order to compare food prices between different areas, we need a standard of comparison. To this end, we drew inspiration from the Consumer Pricing Index (CPI) as calculated by the Singapore Department of Statistics (Department of Statistics, 2016b) and the Big Mac Index as devised by *The Economist* (2016). The result was the Makan Index.

Both the CPI and Big Mac Index calculate the change in prices of goods over time and space. The CPI calculates the change in price of a representative (and large) basket of goods while the Big Mac Index looks at a single-good basket. The Makan Index is a base index that compares prices across geographical areas, using the price of a basket of hawker food items across different areas of Singapore.

There are two important criteria that need to be fulfilled in order for the Index to be useful as a heuristic (Clements, Lan, & Seah, 2010): First, it is a basket of similar composition that can be compared across different regions, and second, the items are universal and widely available. While we do not presume the Makan Index to be as comprehensive as the CPI, it is representative of the dining culture and eating habits of multicultural Singapore, more so than a single-good basket like the Big Mac Index.

By constructing a geographically-mapped Makan Index, we aim to accomplish two objectives: First, to chart and analyse the geographical differences in cost price, and second, to compare the cost of food against other indicators within a neighbourhood, including age, income, dwelling type and residential profile.

We predicted that the Makan Index would show variability in prices of basic meals across different zones, reflective of neighbourhood profiles. In general, conventional wisdom dictates that the further away the neighbourhood is from the city centre, the less expensive it will be. Differences between neighbourhoods would likely be linked to socio-economic indicators within a neighbourhood, such as monthly household income and the density of rental flats reserved for lower-income groups.

Our results, as will be described below, show that proximity to the city is not a reliable indicator of price, and contrary to expectations, food prices in the central business district (CBD) zones or central districts are not always more expensive.

Method

Data Collection

The Makan Index was constructed using consumer prices of various food items across different regions of Singapore. In order to provide a reliable heuristic of Singaporeans' eating-out habits, seven food items were chosen for the survey: rice with two vegetables and one meat option, rice with one vegetable and two meat options, *nasi goreng* (Malay fried rice), chicken rice, chicken *biryani* (Indian rice dish), iced Milo (chocolate malt drink), and black coffee with sugar. The items were chosen based on two main criteria: representativeness of the diversity in multiracial Singapore and the ubiquity of the dish in local food centres.

The “neighbourhoods” studied in this project refer to the planning areas delineated by URA in its 2008 Master Plan, with some exclusions. National census data organised by planning area recognise only 29 planning areas out of the total 35, including a ‘Central’ zone and ‘Others’. The Makan Index excludes this ‘Central’ zone — which consists of Orchard, Rochor, River Valley, Museum, Outram, Newton, and Downtown Core — and Tanglin due to the low proportion of public housing, and ‘Others’, which includes Mandai, Tengah, and Tuas, among others — for the relatively sparse population and the impracticality involved in comparing the Makan Index with census data. Thus, the Index was reduced to the final count of 26 neighbourhoods.

Data collection was carried out between July and August 2016.¹ In each planning area, at least three hawker centres or coffee shops were visited, collecting three data points for each item in the basket. We do not make a distinction between foods found at hawker centres or coffee shops, as our survey data found prices at the two types of locations to be very similar. Additionally, the distribution of hawker centres and coffee shops varies throughout the country (e.g., newer estates tend to have fewer hawker centres). Some areas have many hawker centres but few coffee shops, or vice versa.

1 URA planning zone	3 data points per item from hawker stalls and/or coffee shops	Rice, two vegetables and one meat
		Rice, one vegetable and two meats
		<i>Nasi goreng</i>
		Chicken rice
		Chicken <i>biryani</i>
		Iced Milo
		Black coffee with sugar

Analysis

The Makan Index score for each planning area was derived by summing the average price of each food item, then dividing it by the lowest aggregate of all the planning areas. Put another way, the neighbourhood with the lowest total average cost would have a Makan Index score

¹ Supplementary data was collected in November 2016.

of 1. A neighbourhood with a higher Makan Index score indicates that it would be more expensive to eat out in.

Once the Index was established, we correlated it against characteristics of the neighbourhoods, such as proportion of tenants (renting as opposed to home-owning); proportion of senior officials, managers, professionals, associate professionals and technicians; proportion of households with a monthly household income above S\$10,000; proportion of singles; proportion of people who are divorced or separated; proportion of households with a family nucleus² and at least three generations residing together; proportion of households without a family nucleus; proportion of holders of a university and/or professional qualification such as a diploma; proportion of residents aged 65 and above; proportion of one- and two-room HDB rental flats, and the age of estate (from the year the estate was first developed).

Data for all the afore-mentioned variables, except age of estate, were obtained or derived from national census data (Department of Statistics, 2016a). Age of estate was obtained through various historical accounts (e.g., National Library Board).

Results

The Makan Index is ranked in Table 2, from the least to the most expensive neighbourhoods. The two least expensive zones are Bukit Merah and Queenstown (both in the Central region) with an index score of 1.00, while the most expensive zones are Bishan, with a score of 1.185, and Marine Parade, with a score of 1.164 (again, both located in the Central region). In other words, compared with Bukit Merah and Queenstown, Bishan, at the other extreme, is nearly 20% more expensive.

The correlation between the Makan Index and other neighbourhood characteristics is given in Table 3. The index is significantly and negatively correlated with proportion of tenants ($r = -.430, p < .05$); proportion of divorced and separated persons ($r = -.391, p < .05$); proportion of households with at least one family nucleus and three generations residing together ($r = .523, p < .01$); proportion of households with no family nucleus ($r = -.523, p < .01$); proportion of elderly aged 65 and above ($r = -.489, p < .05$); and age of estate ($r = -.615, p < .01$). It is also marginally correlated with rental flat density ($r = -.363, p = .075$).

Correlations between the Makan Index and proportion of senior officials, managers, professionals, associate professionals and technicians ($r = .019, p = .928$); proportion of households with a monthly household income above S\$10,000 ($r = .183, p = .371$); proportion of singles ($r = .054, p = .792$); proportion of holders of a university and/or professional qualification such as a diploma ($r = -.088, p = .668$); were found to be statistically non-significant. The full correlation table, including correlations between the variables tested, can be found in Appendix D.

In summary, lower cost of eating out is associated with a higher proportion of people living with no family nucleus, divorced or separated persons, and elderly people above the age of

² A family nucleus can be formed by: (a) a married couple without children; (b) a married couple with never-married child(ren); or (c) one parent with never-married child(ren) (Department of Statistics, 2015).

65. Conversely, areas with lower food cost also have fewer multi-generation households. Relatively cheap areas also tend to be older estates, have a greater density of rental flats, and a higher proportion of tenants.

	Region	URA Planning Zone	Makan Index
1	Central	Bukit Merah	1.000
1	Central	Queenstown	1.000
3	Central	Toa Payoh	1.027
4	Central	Novena	1.029
5	Central	Kallang	1.035
6	North-East	Punggol	1.046
7	East	Bedok	1.049
8	North	Yishun	1.067
9	Central	Bukit Timah	1.069
10	North-East	Ang Mo Kio	1.081
11	North-East	Serangoon	1.086
12	East	Tampines	1.094
12	North-East	Hougang	1.094
12	North-East	Sengkang	1.094
15	West	Jurong East	1.098
16	West	Bukit Panjang	1.101
17	West	Clementi	1.115
18	Central	Geylang	1.118
19	West	Bukit Batok	1.133
20	West	Choa Chu Kang	1.137
21	East	Pasir Ris	1.138
22	West	Jurong West	1.142
22	North	Woodlands	1.142
24	North	Sembawang	1.155
25	Central	Marine Parade	1.164
26	Central	Bishan	1.185

Table 3: Correlation of Makan Index against other indicators

		Makan Index	% Tenancy	% Senior officials, managers, professionals, associate professional & technicians	% Monthly Household Income S\$10K and above	% Single	% Divorced or Separated
Makan Index	Pearson Correlation	1	-0.430*	0.019	0.183	0.054	-0.391*
	Sig. (2-tailed)		0.028	0.928	0.371	0.792	0.048
	N	26	26	26	26	26	26
		% 1 family nucleus, 3 generations and above	% No family nucleus	% University/Professional qualification and other diploma	% Aged 65 and above	% Rental flat	Age of estate
Makan Index	Pearson Correlation	0.523**	-0.523**	-0.088	-0.489*	-0.363	-0.615**
	Sig. (2-tailed)	0.006	0.006	0.668	0.011	0.075	0.002
	N	26	26	26	26	25	22

* $p < .05$ (2-tailed)
** $p < .01$ (2-tailed)

Discussion

Contrary to expectations that Central zones would likely be more expensive than peripheral zones because of proximity to the city and CBD areas, we observed that both extreme ends of the Index were occupied by neighbourhoods in the Central region. In fact, the data shows that differences in cost of food cannot be predicted simply by distance from the city centre.

While all the neighbourhoods in the North-East region occupy the top half of the table (rank 12 and above) and those in the West all occupy the bottom half (rank 14 and below), there is significant variation between neighbourhoods in the Central, East, and North regions. The Makan Index thus suggests that distance from city centre and housing prices in the area do not necessarily drive up food prices. While demand is less elastic in the CBD areas because of the higher purchasing power of office workers, higher competition among stalls selling the same food items acts as a price dampener (Leong, *et al.*, 2015).

The Makan Index has a negative relationship with percentage of tenants, percentage of divorced and separated persons, percentage of households with no family nucleus, percentage of elderly aged 65 and above, and age of estate. These results suggest that the cost of eating out tends to be cheaper in mature estates and areas with a higher proportion of socio-economically vulnerable people. It should be noted that the two variables are highly correlated with not just the Makan Index, but also with each other.

The relationship between socio-economic vulnerability and estate maturity has historical basis. In the past, HDB estates were built with speed and cost-efficiency, the primary aim behind their construction was to create affordable public housing for the masses to live in, whereas newer estates have larger and more upmarket units that reflect Singaporeans' higher standard of living (Fernandez, 2010). Consequently, older estates tend to have a higher proportion of one- and two-room units, which are typically leased for rental. These units are typically rented by single-member households (no family nucleus). Our analysis of national census data shows these neighbourhood characteristics to be highly correlated with one another (see Appendix D).

Another point of interest is to look at the indicators that the Makan Index does not correlate with. For example, the Makan Index does not correlate at all with the percentage of households with a monthly household income above S\$10,000. This observation goes against the conventional wisdom that the cost of eating out in an area would be higher if it has more affluent households. By extension, the cost of eating out may not be dictated by the wealthiest in the zone, but by the lower-income dwellers instead.

Policy Recommendations

While areas with more vulnerable populations (as indicated by proportion of households without family nuclei) tend to have lower food prices, those who live in costlier areas may not have easy access to affordable food. To meet the needs of socially disadvantaged Singaporeans wherever they may live, and prevent pockets of affordable and rich neighbourhoods developing, more needs to be done to ensure affordable food is accessible throughout the country.

New hawker centres set up as a joint effort between NEA and a third-party operator — as Ci Yuan Hawker Centre managed by Fei Siong Food Management in Hougang, and Bukit

Panjang Hawker Centre managed by NTUC Foodfare — are a step in the right direction. These operations run on a not-for-profit basis and institute a price cap on basic meals to ensure affordability.

In addition, NEA could offer rental subsidies to existing hawkers who agree to implement a price cap on certain food items, while HDB could also consider partnering with not-for-profit coffee shop operators to manage the coffee shops found at HDB void decks. Finally, NEA could build new hawker centres in areas that have higher costs of eating out, especially in neighbourhoods with a low density of hawker centres.

Limitations and Future Directions

As an exploratory study, the Makan Index has a few limitations. First, the basket of food items used to construct the Index is not universal. It includes only hawker stalls and coffee shop stalls, and excludes restaurants or air-conditioned food courts typically located within shopping malls. Second, there is variability in the ingredients and the amounts that go into each dish, which is not accounted for — a S\$3 plate of chicken rice in Bukit Panjang may contain more chicken than a similarly-priced one at Jurong East, for example. We hope that by having a variety of items instead of relying on a single item, we are able to minimise the impact from this variation.

Third, it may be that we will see a different picture of geographical differences if delineated by subzones or constituencies instead of broad planning area. However, present restrictions in publicly available data constrain our approach. Finally, correlation does not imply causality. Hence, more data and analysis is needed to determine the causality and interactions between the variables.

Despite these limitations, the clear stratification of food pricing between neighbourhoods and the appearance of strong inter-correlations serve as a proof of concept of this present iteration of the Makan Index. Moving forward, more data on food prices around the island can be collected to reinforce the Index and shed more clarity on cost of living within Singapore. The Index may even be extended to track changes over time, if the survey is carried out as a longitudinal project.

Conclusion

Broadly speaking, the Makan Index serves as a useful comparative index in assessing the cost of eating out across different areas in Singapore. Apart from ensuring that food is kept affordable where it most needs to be, the Index can also be compared against other variables such as the median household income or percentage of people earning less than S\$2,000 a month. Such comparisons would lend evidence to the relationships between cost of food in an area and socio-economic status of its residents.

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APPENDIX A: List of websites indicating the first year of estate establishment

Ang Mo Kio http://eresources.nlb.gov.sg/infopedia/articles/SIP_230_2005-01-25.html

Bedok <https://en.wikipedia.org/wiki/Bedok>

Bishan https://en.wikipedia.org/wiki/Bishan,_Singapore

Bukit Batok https://en.wikipedia.org/wiki/Bukit_Batok

Bukit Merah http://eresources.nlb.gov.sg/infopedia/articles/SIP_779_2005-01-26.html

Bukit Panjang https://en.wikipedia.org/wiki/Bukit_Panjang

Choa Chu Kang https://en.wikipedia.org/wiki/Choa_Chu_Kang

Clementi https://en.wikipedia.org/wiki/Clementi,_Singapore

Hougang <https://en.wikipedia.org/wiki/Hougang>

Jurong East https://en.wikipedia.org/wiki/Jurong_East

Jurong West https://en.wikipedia.org/wiki/Jurong_West

Pasir Ris https://en.wikipedia.org/wiki/Pasir_Ris

Punggol <https://en.wikipedia.org/wiki/Punggol>

Queenstown

<http://eresources.nlb.gov.sg/history/events/ecd861b6-87eb-4f95-bfb9-4cc439cf44ea>

Sembawang https://sqwiki.com/wiki/Sembawang_New_Town

Sengkang <https://en.wikipedia.org/wiki/Sengkang>

Serangoon https://en.wikipedia.org/wiki/Serangoon_North

Tampines <https://en.wikipedia.org/wiki/Tampines>

Toa Payoh

<http://eresources.nlb.gov.sg/history/events/6a0f21de-b30e-4df5-897b-664b1ffdb0da>

Woodlands https://en.wikipedia.org/wiki/Woodlands,_Singapore

Yishun http://eresources.nlb.gov.sg/infopedia/articles/SIP_363_2005-01-18.html

APPENDIX B: Addresses visited by area

Ang Mo Kio	628 Ang Mo Kio Avenue 4 506 Ang Mo Kio Avenue 8 727 Ang Mo Kio Avenue 6
Bedok	58 New Upper Changi Road 59 New Upper Changi Road 16 Bedok South Road 18 Bedok South Road
Bishan	Kim San Leng Food Centre, 511 Bishan Street 13 S-11, 11 Bishan Place 120 Bishan Street 12 503 Bishan Street 11
Bukit Batok	Hong Kah Food Place, 376 Bukit Batok Street 31 324 Bukit Batok Street 33 Food Loft Coffee Shop, 323 Bukit Batok Street 33 506 Bukit Batok Street 52 347 Bukit Batok Street 34
Bukit Merah	Beo Crescent Market, 38A Beo Crescent 716 Havelock Road Seah Im Food Centre, 2 Seah Im Road 112 Jalan Bukit Merah 163 Bukit Merah Central 11 Telok Blangah Crescent 79 Redhill Lane
Bukit Panjang	Bukit Panjang Hawker Centre & Market, 259 Bukit Panjang Ring Road Kim Sang Leng, 259 Bukit Panjang Ring Road 163a Petir Road 628 Senja Road
Bukit Timah	Empress Market Hawker Centre, 7 Empress Road 7th Mile Bukit Timah Food Centre, 116 Upper Bukit Timah Road Sixth Cafélink, 12 Sixth Avenue 18 Toh Yi Drive

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Choa Chu Kang	26 Teck Whye Lane, #01–170 302 Choa Chu Kang Avenue 4 143 Teck Whye Lane #01–245
Clementi	Seng Kee Coffee Shop, 726 Clementi West Street 2 43 Clementi Avenue 3 442 Clementi Avenue 3 722 Clementi West Street 2 #01–150
Geylang	49 Sims Place Hawker Centre 15 Crane Road, Jia Yuan Eating House Geylang Serai Market, 1 Geylang Serai Old Airport Road Food Centre, 51 Old Airport Road
Hougang	Ci Yuan Hawker Centre, 51 Hougang Avenue 9 105 Hougang Avenue 1 806 Hougang Central 684 Hougang Avenue 8 Kovan Market & Food Centre, 209 Hougang Street 21
Jurong East	254 Jurong East Street 24 346 Jurong East Street 31 349 Jurong East Avenue 1
Jurong West	505 Jurong West Street 52 491 Jurong West Avenue 1 496 Jurong West Street 41
Kallang	29 Bendeemer Road Geylang Bahru Food Centre, 69 Geylang Bahru Golden Mile Food Centre, 505 Beach Road North Bridge Road Market, 861 North Bridge Road 69 Geylang Bahru Pek Kio Market, 41 Cambridge Road 17 Upper Boon Keng
Marine Parade	84 Marine Parade Central Dunman Food Centre, 271 Onan Road Mr Teh Tarik @Big Splash, 902 East Coast Park Service Road Marine Parade Hawker's Centre, 50A Marine Terrace Chang Cheng Mee Wah Coffeeshop, 59 Marine Terrace

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	Cheng Tin Yean, 300 Joo Chiat Road
Novena	Whampoa Wet Market and Food Centre, 91 Whampoa Drive 87 Lorong Limau 81, 82, 86, 90 Whampoa Drive 1 Thomson Road
Pasir Ris	Koufu West Plaza, 735 Pasir Ris Street 72 Mr Teh Tahrik Elias Mall, 625 Elias Road 442 Pasir Ris Drive 6
Punggol	671 Edgefield Plains 622d Punggol Central 639 Punggol Drive NTUC Foodfare, 273C Punggol Place Broadway Coffee Shop, 612 Punggol Drive
Queenstown	Alexandra Village Food Centre, 120 Bukit Merah Lane 1 44 Holland Drive Ghim Moh Market, 20 Ghim Moh Road Tanglin Halt Food Centre, 1A Commonwealth Drive
Sembawang	KPT Pte Ltd, 313A Sembawang Drive 406A Sembawang Drive #01-07 1036 Sembawang Road Eating House
Sengkang	433A Sengkang West Way 10 Sengkang Square 437 Fernvale Road Kopitiam Square, 10 Sengkang Square Anchorvale 303 Coffeeshop 267 Compassvale Link
Serangoon	Serangoon Market Food Centre, 267 Serangoon Avenue 3 261 Serangoon Central Drive 237 Serangoon Avenue 151 Serangoon North Avenue 2 214 Serangoon Avenue 4 3 Lorong Liew Lian 204 Serangoon Central Serangoon Garden Food Market, 49A Serangoon Garden Way

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	Tai Wah Foodlink, 151 Serangoon North Avenue 2 Chomp Chomp Food Centre, 20 Kensington Park Road
Tampines	Tampines Round Market, 137A Tampines Street 11 Tampines Mart Coffee Shop, 9 Tampines Street 32 505 Tampines Central 1 419 Tampines Street 41 406 Tampines Street 41
Toa Payoh	74 Toa Payoh Lorong 4 179 Toa Payoh Central 127 Toa Payoh Lorong 1 128 Toa Payoh Lorong 1 93 Toa Payoh Lorong 4 95 Toa Payoh Lorong 4 94 Toa Payoh Lorong 4 75 Toa Payoh Lorong 5
Woodlands	4A Woodlands Centre Rd S11 302 Woodlands Street 31 136 Marsiling Road #01-2188 20 Marsiling Lane
Yishun	744 Yishun Street 72 795A Yishun Ring Road 925 Yishun Central 1 #01-249 Chong Pang Market, 104 Yishun Ring Road 101 Yishun Avenue 5 Khatib Central Mr Teh Tarik, 846 Yishun Ring Road

APPENDIX C: Raw data

Zone	Item	Data 1	Data 2	Data 3	Average	Sum
Ang Mo Kio	2V1M	3.00	3.20	3.20	3.13	21.37
	1V2M	3.60	3.80	3.70	3.70	
	Nasi goreng	4.00	4.00	3.00	3.67	
	Chicken rice	3.00	3.00	2.50	2.83	
	Chicken biryani	6.00	5.50	5.50	5.67	
	Iced Milo	1.30	1.30	1.70	1.43	
	Kopi-O	0.80	0.90	1.10	0.93	
Bedok	2V1M	3.00	2.80	3.00	2.93	20.73
	1V2M	4.00	3.30	3.50	3.60	
	Nasi goreng	3.50	4.00	4.00	3.83	
	Chicken rice	3.00	3.00	2.50	2.83	
	Chicken biryani	6.50	5.00	4.50	5.33	
	Iced Milo	1.30	1.50	1.30	1.37	
	Kopi-O	0.70	1.00	0.80	0.83	
Bishan	2V1M	4.00	3.80	3.60	3.80	23.43
	1V2M	3.80	4.20	4.20	4.07	
	Nasi goreng	5.00	4.00	4.00	4.33	
	Chicken rice	4.50	3.00	3.00	3.50	
	Chicken biryani	6.50	4.50	4.50	5.17	
	Iced Milo	1.60	1.60	1.50	1.57	
	Kopi-O	0.90	1.00	1.10	1.00	
Bukit Batok	2V1M	3.40	3.30	3.20	3.30	22.40
	1V2M	3.80	3.90	3.50	3.73	
	Nasi goreng	4.50	4.00	4.00	4.17	
	Chicken rice	3.50	3.50	3.00	3.33	
	Chicken biryani	5.00	6.00	5.00	5.33	
	Iced Milo	1.80	1.50	1.50	1.60	
	Kopi-O	0.90	1.10	0.80	0.93	
Bukit Merah	2V1M	3.40	2.50	2.80	2.90	19.77
	1V2M	4.20	3.00	3.20	3.47	
	Nasi goreng	3.50	3.50	3.50	3.50	
	Chicken rice	3.00	2.50	2.50	2.67	
	Chicken biryani	5.00	5.00	5.00	5.00	
	Iced Milo	1.30	1.60	1.40	1.43	
	Kopi-O	0.70	0.90	0.80	0.80	
Bukit Panjang	2V1M	3.00	3.50	3.30	3.27	21.77
	1V2M	3.30	3.30	3.80	3.47	
	Nasi goreng	3.50	4.50	4.00	4.00	
	Chicken rice	3.50	2.50	3.50	3.17	
	Chicken biryani	5.00	6.00	5.50	5.50	
	Iced Milo	1.50	1.50	1.50	1.50	
	Kopi-O	0.60	1.10	0.90	0.87	

Makan Index (2nd edition)

Zone	Item	Data 1	Data 2	Data 3	Average	Sum
Bukit Timah	2V1M	3.00	3.00	3.00	3.00	21.13
	1V2M	3.50	3.50	3.20	3.40	
	Nasi goreng	3.50	3.50	4.00	3.67	
	Chicken rice	3.00	3.00	3.00	3.00	
	Chicken biryani	5.50	6.00	6.00	5.83	
	Iced Milo	1.20	1.30	1.50	1.33	
	Kopi-O	0.80	0.90	1.00	0.90	
Choa Chu Kang	2V1M	3.30	3.20	3.30	3.27	22.47
	1V2M	3.90	3.80	3.80	3.83	
	Nasi goreng	4.50	4.00	4.50	4.33	
	Chicken rice	3.50	3.50	3.00	3.33	
	Chicken biryani	6.00	5.00	5.50	5.50	
	Iced Milo	1.40	1.30	1.50	1.40	
	Kop-O	0.80	0.80	0.80	0.80	
Clementi	2V1M	3.30	3.20	3.30	3.27	22.03
	1V2M	3.80	3.60	3.50	3.63	
	Nasi goreng	4.00	4.50	4.00	4.17	
	Chicken rice	3.50	3.00	3.50	3.33	
	Chicken biryani	5.00	5.00	5.50	5.17	
	Iced Milo	1.50	1.30	1.80	1.53	
	Kopi-O	1.00	0.80	1.00	0.93	
Geylang	2V1M	3.50	3.20	3.40	3.37	22.10
	1V2M	4.00	3.60	4.20	3.93	
	Nasi goreng	4.00	5.00	3.50	4.17	
	Chicken rice	3.00	3.00	2.50	2.83	
	Chicken biryani	6.00	6.00	4.50	5.50	
	Iced Milo	1.30	1.60	1.40	1.43	
	Kopi-O	0.80	1.00	0.80	0.87	
Hougang	2V1M	3.80	2.50	3.00	3.10	21.63
	1V2M	4.30	3.00	4.50	3.93	
	Nasi goreng	4.50	4.00	3.00	3.83	
	Chicken rice	3.80	2.50	3.00	3.10	
	Chicken biryani	5.50	4.50	5.00	5.00	
	Iced Milo	1.90	1.20	1.60	1.57	
	Kopi-O	1.40	0.90	1.00	1.10	
Jurong East	2V1M	3.20	3.30	3.20	3.23	21.70
	1V2M	3.50	3.80	3.60	3.63	
	Nasi goreng	4.00	4.50	4.00	4.17	
	Chicken rice	3.50	3.00	3.00	3.17	
	Chicken biryani	5.00	5.50	5.00	5.17	
	Iced Milo	1.50	1.40	1.40	1.43	
	Kopi-O	1.00	0.80	0.90	0.90	
Jurong West	2V1M	3.80	3.50	3.20	3.50	22.57

Makan Index (2nd edition)

Zone	Item	Data 1	Data 2	Data 3	Average	Sum
	1V2M	4.20	4.00	3.50	3.90	
	Nasi goreng	4.50	4.50	4.00	4.33	
	Chicken rice	3.50	3.00	3.50	3.33	
	Chicken biryani	5.50	5.00	5.00	5.17	
	Iced Milo	1.50	1.50	1.30	1.43	
	Kopi-O	1.00	0.90	0.80	0.90	
Kallang	2V1M	3.00	3.30	2.70	3.00	20.47
	1V2M	3.50	3.80	3.40	3.57	
	Nasi goreng	3.80	3.00	4.50	3.77	
	Chicken rice	2.50	3.00	3.00	2.83	
	Chicken biryani	5.00	5.50	4.50	5.00	
	Iced Milo	1.50	1.30	1.50	1.43	
Marine Parade	2V1M	3.70	3.50	3.40	3.53	23.00
	1V2M	4.20	4.00	4.20	4.13	
	Nasi goreng	4.00	3.50	4.50	4.00	
	Chicken rice	3.50	3.00	3.50	3.33	
	Chicken biryani	6.00	4.50	6.00	5.50	
	Iced Milo	1.40	1.10	1.80	1.43	
Novena	2V1M	4.00	2.50	2.70	3.07	20.33
	1V2M	4.50	3.00	3.00	3.50	
	Nasi goreng	3.00	3.00	3.50	3.17	
	Chicken rice	2.50	2.80	3.00	2.77	
	Chicken biryani	5.00	5.00	6.00	5.33	
	Iced Milo	1.50	1.40	2.00	1.63	
Pasir Ris	2V1M	3.50	3.00	3.50	3.33	22.50
	1V2M	4.20	3.80	4.00	4.00	
	Nasi goreng	4.50	3.50	4.00	4.00	
	Chicken rice	3.00	3.00	3.50	3.17	
	Chicken biryani	5.50	5.70	5.00	5.40	
	Iced Milo	1.40	2.00	1.50	1.63	
Punggol	2V1M	3.10	3.20	3.20	3.17	20.67
	1V2M	3.60	3.70	3.80	3.70	
	Nasi goreng	2.00	3.30	3.50	2.93	
	Chicken rice	3.50	3.00	3.00	3.17	
	Chicken biryani	5.00	5.00	5.50	5.17	
	Iced Milo	1.60	1.70	1.40	1.57	
Queenstown	2V1M	3.00	2.70	3.30	3.00	19.77
	1V2M	3.30	3.00	3.70	3.33	

Makan Index (2nd edition)

Zone	Item	Data 1	Data 2	Data 3	Average	Sum
	Nasi goreng	3.50	3.50	3.50	3.50	
	Chicken rice	3.00	3.00	3.00	3.00	
	Chicken biryani	4.00	5.50	4.60	4.70	
	Iced Milo	1.20	1.20	1.70	1.37	
	Kopi-O	0.80	0.80	1.00	0.87	
Sembawang	2V1M	3.30	3.80	3.20	3.43	22.83
	1V2M	3.80	4.20	3.80	3.93	
	Nasi goreng	4.00	4.50	4.00	4.17	
	Chicken rice	3.50	3.50	3.50	3.50	
	Chicken biryani	5.00	6.00	5.00	5.33	
	Iced Milo	1.50	1.50	1.30	1.43	
	Kopi-O	1.10	1.10	0.90	1.03	
Sengkang	2V1M	3.20	3.70	3.50	3.47	21.63
	1V2M	3.80	4.10	4.80	4.23	
	Nasi goreng	3.00	3.50	3.00	3.17	
	Chicken rice	3.00	3.50	3.50	3.33	
	Chicken biryani	5.00	5.00	5.00	5.00	
	Iced Milo	1.40	1.40	1.80	1.53	
	Kopi-O	0.80	0.70	1.20	0.90	
Serangoon	2V1M	3.30	3.60	3.00	3.30	21.47
	1V2M	3.80	3.00	4.50	3.77	
	Nasi goreng	4.00	3.50	4.00	3.83	
	Chicken rice	3.50	3.00	3.00	3.17	
	Chicken biryani	5.00	5.50	4.50	5.00	
	Iced Milo	1.50	1.40	1.50	1.47	
	Kopi-O	1.00	0.80	1.00	0.93	
Tampines	2V1M	2.50	3.80	3.00	3.10	21.63
	1V2M	3.00	4.30	3.50	3.60	
	Nasi goreng	4.00	4.00	4.00	4.00	
	Chicken rice	3.00	3.60	4.00	3.53	
	Chicken biryani	5.50	5.00	3.50	4.67	
	Iced Milo	1.80	1.30	1.50	1.53	
	Kopi-O	1.50	1.10	1.00	1.20	
Toa Payoh	2V1M	3.50	3.00	3.30	3.27	20.30
	1V2M	3.70	3.50	4.00	3.73	
	Nasi goreng	2.00	4.00	3.50	3.17	
	Chicken rice	3.00	3.00	2.50	2.83	
	Chicken biryani	5.00	5.50	5.00	5.17	
	Iced Milo	1.10	1.40	1.40	1.30	
	Kopi-O	0.90	0.70	0.90	0.83	
Woodlands	2V1M	3.90	3.30	3.50	3.57	22.57
	1V2M	3.50	3.80	4.20	3.83	
	Nasi goreng	4.50	3.00	4.00	3.83	

Zone	Item	Data 1	Data 2	Data 3	Average	Sum
	Chicken rice	3.50	3.00	3.50	3.33	
	Chicken biryani	6.00	5.00	5.50	5.50	
	Iced Milo	1.50	1.30	1.60	1.47	
	Kopi-O	1.10	0.90	1.10	1.03	
Yishun	2V1M	3.00	3.70	3.00	3.23	21.10
	1V2M	3.40	4.00	3.50	3.63	
	Nasi goreng	2.50	4.00	4.00	3.50	
	Chicken rice	2.50	2.50	3.00	2.67	
	Chicken biryani	5.00	5.00	6.00	5.33	
	Iced Milo	1.50	2.00	1.50	1.67	
	Kopi-O	1.10	1.10	1.00	1.07	

2V1M – Rice dish with 2 vegetables and 1 meat

1V2M – Rice dish with 1 vegetable and 2 meats

Nasi goreng – Malay rice dish

Chicken rice – Chinese rice dish

Chicken biryani – Indian rice dish

Iced Milo – chocolate malt drink

Kopi-O – black coffee with sugar

APPENDIX D: Correlation table

	Makan Index	% Tenancy	% Senior officials, managers, professionals, associate professional & technicians	% Monthly Household Income S\$10K and above	% Single	% Divorced or Separated	% 1 family nucleus, 3 generations and above	% No family nucleus	% University/ Professional qualification and other diploma	% Aged 65 and above	% Rental flat	Age of estate
Makan Index	1	-.430*	0.019	0.183	0.054	-.391*	.523**	-.523**	-0.088	-.489*	-0.363	-.615**
% Tenancy	-.430*	1	0.207	-0.125	0.274	.574**	-.711**	.813**	0.270	.841**	.921**	.792**
% Senior officials, managers, professionals, associate professional & technicians	0.019	0.207	1	.858**	-0.209	-0.368	-0.292	-0.054	.964**	0.239	-0.071	-0.306
% Monthly Household Income S\$10K and above	0.183	-0.125	.858**	1	-0.293	-.690**	0.026	-.461*	.861**	-0.173	-.423*	-.687**
% Single	0.054	0.274	-0.209	-0.293	1	0.120	0.084	.462*	-0.268	.458*	0.209	.442*
% Divorced or Separated	-.391*	.574**	-0.368	-.690**	0.120	1	-.409*	.730**	-0.356	.522**	.777**	.673**
% 1 family nucleus, 3 generations and above	.523**	-.711**	-0.292	0.026	0.084	-.409*	1	-.590**	-0.386	-.632**	-.634**	-.509*
% No family nucleus	-.523**	.813**	-0.054	-.461*	.462*	.730**	-.590**	1	-0.048	.911**	.774**	.844**

Makan Index (2nd edition)

	Makan Index	% Tenancy	% Senior officials, managers, professionals, associate professional & technicians	% Monthly Household Income S\$10K and above	% Single	% Divorced or Separated	% 1 family nucleus, 3 generations and above	% No family nucleus	% University/ Professional qualification and other diploma	% Aged 65 and above	% Rental flat	Age of estate
% University/ Professional qualification and other diploma	-0.088	0.270	.964**	.861**	-0.268	-0.356	-0.386	-0.048	1	0.230	-0.052	-0.291
% Aged 65 and above	-.489*	.841**	0.239	-0.173	.458*	.522**	-.632**	.911**	0.230	1	.708**	.749**
% Rental flat	-0.363	.921**	-0.071	-.423*	0.209	.777**	-.634**	.774**	-0.052	.708**	1	.748**
Age of estate	-.615**	.792**	-0.306	-.687**	.442*	.673**	-.509*	.844**	-0.291	.749**	.748**	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

