

Indigenous and Produce Vegetable Consumption in Selangor, Malaysia



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Abstract The discovery of increased health-protecting properties of nutrient bioactive compounds in vegetables found in several studies has been strongly connected to the recommendation of consuming higher intake of vegetables as one of the vital dietary components. Malaysian indigenous and produce vegetables are among of the plants that possess variety of the health benefit compounds which will alleviate micronutrient-related deficiencies. The main purpose of this study is to compare the consumption pattern of indigenous and produce vegetables in rural and urban setting. A cross-sectional survey was conducted in both study area, Shah Alam and Tanjung Karang. A stratified random sampling was employed. About 213 households were selected, 91 from the rural area in Tanjung Karang, Kuala Selangor, and 122 from the urban area in Shah Alam. Quantitative data collected include the household demographic profile and socio-economic characteristics, availability, accessibility, diversity and consumption of Malaysian indigenous and preferences of vegetables. Moreover, data are collected on knowledge on health-protecting benefits related to test the relation with consumption of indigenous and commercial vegetables in both settings. There is no significant difference in factors that influence the consumption pattern of indigenous and produce vegetables except for availability of vegetables sold in both study areas. Unavailability of indigenous vegetables sold contributes to low intake frequency. Small production and less market demand due to unpopularity of indigenous vegetables are the reasons for the lack of availability in both study areas.

Keywords Consumption · Indigenous · Vegetables

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1 Introduction

Being a country with multi-ethnic and multicultural populations, the diversity of Malaysian foods has become one of the main attraction and symbol of life in Malaysia. Eating trends have evolved according to the passage of time, and recently, people are adapting to current eating trends to cope with rapid and busy living. Furthermore, the rapid growth of Malaysia food industry and 24-h food vendors contributes unhealthy eating trends and lifestyle. In the recent National Health and Morbidity Survey (Ministry of Health Malaysia 2015), the main highlights were given to the prevalence of fruit and vegetables consumption among Malaysian. The survey found that only 6.0% of Malaysian adults consumed 5 serving or more fruits or vegetables per day which is very low. From NHMS survey, it was found that almost half of Malaysian adults 18 years and above have hypercholesterolaemia (47.7%), 17.5% having diabetes and 30.3% having hypertension. Low consumption of vegetables, poor nutritional and diet choices, lack of knowledge and difficulties of obtaining healthy foods are several other factors that contribute to unhealthy lifestyle and eventually lead to the development of chronic diseases such as cardiovascular disease, cancer, diabetes and others (Langat 2014). Socio-economic and psychological characteristics influence the individuals' preferences on type and amount of vegetable consumption (Yeh et al. 2016).

In the current eating trends, it can be said that vegetables and fruits are the least food group eaten by people (Mad Nasir et al. 2010). The consumption pattern of vegetables is influenced by (1) availability (Yeh et al. 2016), (2) awareness level (Kendzierski et al. 2015), (3) socio-economic background (Patrick et al. 2005; Zimmer and Prachuabmoh 2012) and (4) preferences (Farragher et al. 2016). These studies suggested that low consumption of vegetables, poor nutritional and diet choices, lack of knowledge and difficulties of obtaining healthy foods are several other factors that contribute to unhealthy lifestyle and eventually lead to the development of chronic diseases such as cardiovascular disease, cancer, diabetes and others (Langat 2014). A cross-sectional study was conducted by comparing the consumption of indigenous vegetables and produce vegetables in urban and rural areas. Indigenous vegetables are defined as crops from which the tender leaves, stems and petioles are harvested and used in the preparation of vegetables. These crops are subdivided into roots or tubers and leafy (Department of Agriculture Forestry and Fisheries 2009). Produce vegetables are defined as crops that commonly sold by supermarkets, farmer's market and greengrocers (Morgan 1991). The conceptual framework involved independent and dependent variables which are types of vegetables and consumption pattern of indigenous vegetables and produced vegetables. In this study, affecting the relationship between independent and dependent variables was the confounding variables which are the availability and accessibility, preferences, socio-economic status, level of awareness and food behaviour pattern.

2 Methods

2.1 Study Design

We chose to conduct a cross-sectional study in urban and rural areas. The areas chosen for this study are categorized into rural and urban area. Rural is defined as any area with population less than 10,000 people having agriculture and natural resources in which its population either clustered, linear or scattered. Meanwhile, urban is defined as gazette areas with their adjoining built-up areas, which had a combined population of 10,000 or more at the time of the Census 2010 or the special development area that can be identified, which at least had a population of 10,000 with at least 60% of population (aged 15 years and above) were involved in non-agricultural activities. Tanjung Karang in Kuala Selangor area was chosen as the rural setting and Shah Alam for urban setting.

2.2 Sampling Method

Stratified random sampling was employed as sampling method for this study as two different settings are used. Stratified random sampling is a method of sampling that involves division of population into different subgroups. The sample is then selected from each subgroup by selecting an equal number of elements from each subgroup. The sample size was determined by using Eq. 1:

$$ss^0 = \frac{Z^{02} * (p) * (1 - p)}{c^{02}} \quad (1)$$

where Z = Z value (e.g. 1.96 for 95% confidence level); p = percentage picking a choice, expressed as decimal (0.5 used for sample size needed); c = confidence interval, expressed as decimal (e.g. 0.1 = \pm 1).

Total 192 households were chosen from both settings, and samples chosen were approached physically with sets of questionnaire and information sheet explaining the purpose of this study at the first page. Besides that, consent form was also attached. Participation is fully voluntary and no money reimbursement was made. Inclusion criteria for samples in this study are permanent residents who are currently living in Kuala Selangor and Shah Alam area and are able to understand the questionnaire provided. The exclusion criteria for samples in this study are non-resident of the study area and samples who have allergy towards any kind of vegetables.

2.3 Study Procedure

This study was done through observation and questionnaire. Observation was made on availability of both types of vegetables at supermarkets, market, minimarts in the study areas. A total of six supermarkets and three markets were observed in Shah Alam area. Meanwhile in Tanjung Karang, one supermarket, two markets and one minimarket were observed. Different modes are chosen for questionnaire administration: (1) online survey, and (2) interviews, depending on participant's convenience. This study used self-administered online survey form and interview administration to distribute questionnaire. Interview-administered approach was used to distribute questionnaire only when email approach is not applicable in certain situation.

2.4 Research Tools

1. Questionnaire on Vegetables Consumption Pattern

Questionnaire used for this study is self-developed and consists of five sections: section one contains the socio-demographic data of samples, section two is about sample's common knowledge regarding benefits of vegetables consumption, section three is about the availability of vegetables in sample's residence area, section four is about the sample's preferences and frequency of vegetables consumption, and section five is about the behaviour and readiness of samples towards vegetables consumption. Different sections of the questionnaire are obtained from various established food and behaviour questionnaires.

2. Observation on Availability of Vegetables Sold

We went to places where residents of study areas usually go to purchase vegetables. The availability of the vegetables sold to the resident was observed. The farmers or greengrocers were also interviewed on what kind of vegetables consumers buy, the highest purchasing type of vegetables and factors influenced consumers purchasing level.

Content Validity

In developing survey form used in this study, the validation procedures of instrument tested were only at the first phase which includes only facet and content validity. The survey form has gone through expert's judgment (lecturers) and gained several critics in terms of appearance, relevance and representatives of its elements.

Data Analysis

Data collected were analysed by using Statistical Package of Social Science (SPSS) version 21.0. Types of statistical analysis used are chi-square and descriptive analysis. Data collection procedures are summarized in Fig. 1.

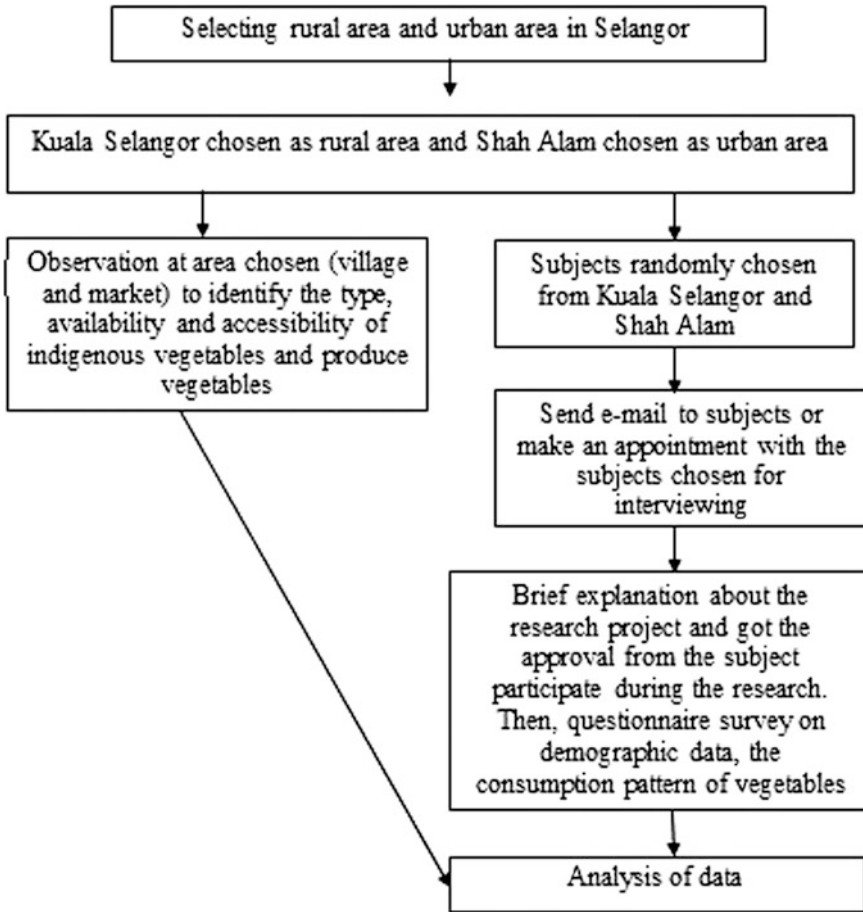


Fig. 1 Data collection procedure

3 Results

3.1 Subject Characteristics

There was a good response rate (127%, $n = 122$ from 96 households) of urban survey population and (94.7%, $n = 91$ from 96 households) from rural survey population with total 213 respondents completing the survey form as compared to total 192 households chosen for the study. 57.3% of total respondent came from urban area and 42.7% came from rural area. 34.7% from respondents secured more than RM3000 for household income per month, followed by 31% of them securing less than RM1000 per month. 90.1% of them received tertiary level of education followed by 8.9% of them receiving secondary level and 0.5% at primary level of education. The list of data can be referred in Table 1.

Table 1 Subject characteristics

Characteristics	Total (N = 213)	Men (n = 46)	Women (n = 167)			
	n	(%)	n	(%)	n	(%)
<i>Residence area</i>						
Urban	122	57.3	29	23.8	93	76.2
Rural	91	42.7	17	18.7	74	81.3
<i>Term of resident</i>						
<1 year	13	6.1	1	7.7	12	92.3
1–3 years	36	16.9	10	27.8	26	72.2
3–5 years	27	12.7	11	40.7	16	59.3
>5 years	137	64.3	24	17.5	113	82.5
<i>Age</i>						
13–19 years	8	3.8	0	0	8	100
20–39 years	191	89.7	43	22.5	148	77.5
40–64 years	14	6.6	3	21.4	11	78.6
>65 years	0	0	0	21.6	0	78.4
<i>Race</i>						
Malay	211	99.1	46	21.6	165	78.2
Chinese	1	0.5	0	0	1	100
Indian	0	0	0	0	0	0
Others	1	0.5	0	0	1	100
<i>Religion</i>						
Islam	211	99.1	46	21.8	165	78.2
Buddha	1	0.5	0	0	1	100
Hindu	0	0	0	0	0	0
Christian	1	0.5	0	0	1	100
Others	0	0	0	0	0	0
<i>Marital status</i>						
Single	186	87.3	37	19.9	149	80.1
Married	27	12.7	9	33.3	18	66.7
Divorced	0	0	0	0	0	0
<i>Number of person per household</i>						
1–2 person	16	7.5	5	31.3	11	68.8
3–5 person	73	34.3	16	21.9	57	78.1
6–7 person	70	32.9	11	15.7	59	84.3
>7 person	54	25.4	14	25.9	40	74.1
<i>Type of diets</i>						
Normal	212	99.5	46	21.7	166	78.3
Vegan	1	0.5	0	0	1	100
Vegetarian	0	0	0	0	0	0
Lacto-ovo	0	0	0	0	0	0
Lacto	0	0	0	0	0	0

(continued)

Table 1 (continued)

Characteristics	Total (N = 213)	Men (n = 46)	Women (n = 167)			
	n	(%)	n	(%)	n	(%)
<i>Education level</i>						
None	1	0.5	0	0	1	100
Primary education	1	0.5	0	0	1	100
Secondary education	19	8.9	7	36.8	12	63.2
Tertiary education	192	90.1	39	20.3	153	79.7
<i>Household income</i>						
<RM 1000	66	31	17	25.8	49	74.2
RM 1000–RM 2000	38	17.8	11	28.9	27	71.1
RM 2000–RM 3000	35	16.4	6	17.1	29	82.9
>RM 3000	74	34.7	12	16.2	62	83.8
<i>Groceries expenses per month</i>						
<RM 100	19	8.9	3	15.8	16	84.2
RM 100–RM 300	93	43.7	21	22.6	72	77.4
RM 300–RM 500	55	25.8	7	12.7	48	87.3
>RM 500	46	21.6	15	32.6	31	67.4

3.2 Preferences of Vegetables Intake

A total of 26 indigenous vegetables and 27 produce vegetables were evaluated for sample’s preferences. Indigenous vegetables and produce vegetables are categorized according to their shapes and texture. To date, there is no report published on consumption pattern of indigenous vegetables in Malaysia. Therefore, the results from this study for these vegetables would provide new information about the consumption pattern of these vegetables (Fig. 2).

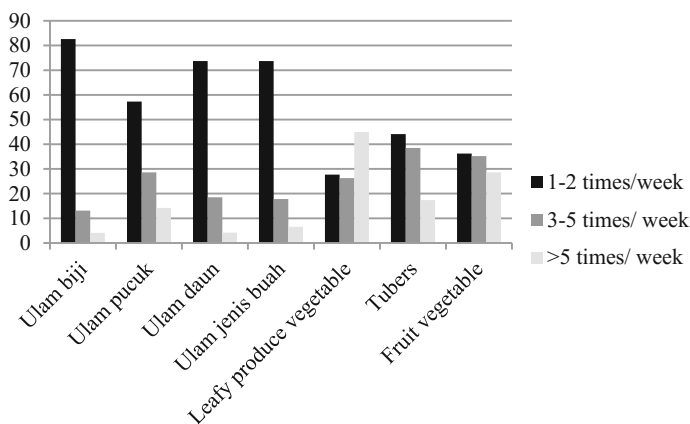


Fig. 2 Intake frequency for different categories of vegetables

Table 2 Preferences of vegetables intake

Vegetables category		Preferences			
		Highest (%)		Lowest (%)	
Indigenous vegetables	Indigenous pea, ulam biji	Bitter bean	52.10	Dogfruit	46
	Indigenous shoot, ulam pucuk	Fern shoot	78.90	Papaya shoot	61
	Indigenous leaves, ulam daun	Ulam raja	57.80	Papaya Flower	51.60
	Indigenous fruit vegetables, ulam jenis buah	Young papaya	64.80	Bitter Chinese melon	61
Produce vegetables	Leafy produce vegetables	Salad	91.10	Celery	23
	Tubers	Potato	96.70	Lotus root and Radish	52.60
	Fruit vegetables	Cucumber	78.90	Bitter melon	62

Among these vegetables, the highest intake frequency of indigenous vegetables is once a week (Table 2). Contrary to produce vegetables, the distribution of intake frequency is well distributed throughout the week. For leafy produce vegetables, the highest intake frequency is twice intake per week, followed by five intake and everyday intake per week. For tubers, the highest intake frequency is once a week, followed by thrice and twice a week. Moreover, for fruit vegetable, the highest intake frequency is twice and thrice a week, followed by once a week and four intakes per week.

3.3 Knowledge on Vegetables in Both Residency Areas

All items in this section ask about general knowledge regarding benefit of vegetables to health. Most of the respondent with mean of 97.9% ($n = 209$) answered the questionnaire correctly. Three other questions in the section are about general knowledge regarding vegetables and with mean 80.9% ($n = 172$) of respondent answer correctly. Chi-square analysis indicated that there are no significant relationships between residency areas with level of knowledge regarding benefits of vegetables to health ($p < 0.05$).

3.4 Preferences and Availability of Vegetables

Chi-square analysis indicated that there is no significant value to prove the strong correlation between these two variables except for two items questioning the sources of vegetables the survey population consumed with score ($p = 0.029$) and the reason behind unavailability of vegetables with score ($p = 0.006$).

Based on observation done in both study areas, there are a lot of access and availability of produce vegetables such as in supermarkets, daily wet market and minimarts on daily basis. Different for indigenous vegetables, most of it rarely sold in supermarkets and daily wet market in urban areas but it can be found sold only on farmers' market day or known to the local as Pasar Tani. Meanwhile for rural areas, half of the indigenous vegetables listed in this study were available in wet market or weekend market nearby the study area.

3.5 Behaviour and Readiness Towards Vegetable Consumption

This section asks on the tendency to consume vegetables under certain circumstances such as different environment, taste and perception. Furthermore, preferences of how the vegetables are served for consumption were also asked. The analysis indicated that there is no statistical significance between food behaviour and availability of vegetables in studied areas ($p = 0.008$).

4 Discussion

The consumption of some underutilized indigenous vegetables has been restricted by lack of knowledge regarding health-protecting benefits of the plant. Level of education is no longer a barrier to vegetable consumption pattern among Selangor rural and urban area. This is comparable to several studies, for instance, a study done on Portuguese adults which found that educational attainment was more frequently associated with food intake compared to income. In several studies, it shows that low income is associated with a poorer dietary quality. Household income did not significantly influence the monthly grocery expenses as the expenses depend on the amount of person in a household. Many studies that tried to find out correlations between nutrition knowledge and dietary intake failed to prove the statistical significance resulting in more curiosity to find out the relevancy of correlation between nutrition knowledge and dietary intake. The result in this study shows that there is no significant relationship between the level of knowledge regarding benefits of vegetables and intake frequency among population in both areas in Selangor. This may due to majority of folks in both areas received tertiary level of education. This is contrary to a study on relationship between nutrition knowledge and food intake that support the relationship between nutrition knowledge in promoting healthier diet intake. Availability of vegetables in particular area is crucial to the influence of consumption pattern because most of the population purchased vegetables in nearby supermarket or grocery store. However, the availability of indigenous and produce vegetables sold in supermarkets or grocery store

is different. Through observation, most indigenous vegetables rarely sold commercially in supermarket or daily wet market and only can be found on farmer's market day. This may due to small production of these crops and also less market demand. Less market demand may be driven by unpopularity of indigenous vegetables among Malaysian citizens.

5 Conclusion

It can be concluded that intake frequency of both types of vegetables was not influenced by the difference in residency areas. Other factors tested in this study such as household income, level of education, nutrition knowledge, preferences and availability and food behaviour show no statistical significance between rural and urban setting. It is suggested that the development of the survey form used in this study is continued until the last phase in future research to produce more valid and reliable data that contribute to a bigger scope of statistical analysis. It is also recommended that the subject of either Malaysian indigenous vegetables or any indigenous vegetables existed worldwide is further explored in future research in terms of consumption pattern, nutrient contents and their benefit in combating diseases.

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