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ASSOCIATION OF EATING HABITS AND COOKING METHODS WITH BREAST TUMORS AMONG CHILDBEARING AGED URBAN WOMEN IN INDONESIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background*: breast tumors is the single most commonly detected benign or malignant tumors among women and has now become a global health burden.*

Objective: *This study aimed to determine the associations of eating habits and cooking methods with a breast tumor in childbearing-aged Indonesian urban women.*

Materials and Methods*: This was a cross-sectional study using a community survey of research of non-communicable disease 2016 database from the ministry of health of Indonesia. In total,28558 women, aged 25 – 49 years old were retrieved from the database. Eating habits and cooking methods were measured using a validated food frequency questionnaire. A forward logistic regression analysis was used to examine the association of eating habits and cooking methods with the risk of breast tumors.*

Results*: Higher education level was positively associated with the incidence of breast tumors (OR = 1.10, 95%CI: 1.01-1.20, p = 0.026). Seafood (OR = 0.88, 95% CI: 0.80-0.96, p = 0.006) and fast foods (OR = 1.10, 95% CI: 1.00-1.20, p = 0.049) were associated with the incidence of breast tumor among urban women. Roasted/smoked cooking method was positively associated with risk of breast tumor (OR = 1.27, 95%CI: 1.01 – 1.61, p = 0.043).*

Conclusion*: Our study is the first community-based study in Indonesia investigating the association of eating habits and cooking methods with the incidence of breast tumors among childbearing-aged urban women. High intake of seafood was associated with a lower risk of breast tumors, while fast foods and roasted/smoked cooking method belief to have a detrimental effect on a breast tumor. Prospective studies are needed to confirm the present study findings.*

Keywords *: eating habits, cooking methods, breast tumor, urban women*

BACKGROUND

A tumor is a mass of abnormal tissue. These are two types of breast tumors includes non-cancerous or benign and those are cancerous or malignant. Worldwide, the malignant breast tumors is the single most commonly detected malignant tumors among women and has now become a global health burden [1, 2]. In Indonesia, the incidence of malignant breast tumors continues to increase every year and represents the leading cause of malignant tumors mortality among women [2]. The incident rate of malignant breast tumors may differ by geographical location. Certain environmental and lifestyle factors including diet play a significant role to enhance malignant breast tumors [3]. Literature has shown that diet alone, can accounts for approximately 35% of all malignant tumor cases. Therefore, it is essential to recognize dietary habits including cooking methods for malignant breast tumors risk [4].

For the past years, a large number of studies have evaluated the association of particular foods with their composition including eating habits with the advancement of malignant breast tumors [5, 6]. According to the report released by World Cancer Research Fund and the American Institute for Cancer Research (WCRF/AICR) prospected an increase in malignant breast tumors risk among women eating higher-fat diets compared with those eating lower-fat diets [7]. Eating and cooking habits extremely vary among countries or regions. Soy food, which is mainly consumed in Asia has been found to have a low risk for malignant breast tumors among women [8], likewise, total dairy food consumption including milk also appears to be riskless

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[9]. In contrast, another prospective cohort study conducted in South Korea revealed that consuming high-cholesterol foods grilled meat, and inconsistent eating habits seems to be associated with an elevated risk of malignant breast tumors among adult women [10].

However, most previously published studies on the association of diet and malignant breast tumors were focus on single food items or nutrients. Investigating overall eating habits together with cooking methods might be more significant in determining breast tumors etiology rather than evaluating diets separately as a result of the complexity and combinations of food or nutrients among individuals [11, 12]. Following healthy eating habits such as fruits, vegetables, fish, olive oil and whole grains is likely to be advantageous to reduce malignant breast tumors among middle-aged women [13]. A study has reported that moderate consumption of pan-fried/bread-coated fried white meat and well-done or stewed red meat have a minimal risk for malignant breast tumors. Moreover, the total intake of processed/cured meat was considered for having a strong association with triple-negative tumors [14]. Preventive dietary measures to deteriorate malignant breast tumors risk could also include the use of olive/liquid oils for cooking and quitting the use of mayonnaise as salad dressing [15]. Since limited studies using a large sample size particularly among Indonesian urban women investigating these issues, therefore in this study, we aimed to determine the associations of eating habits and cooking methods with a breast tumor on childbearing-age in Indonesian women.

MATERIALS AND METHODS

Study population

This cross-sectional study was used a database from a community survey of research of non-communicable disease in 2016. This survey was conducted by the Department of research and development Ministry of Health of Republic Indonesia. The major aim of this survey was to obtain the prevalence rate of women with positive breast tumors in urban areas in Indonesia. The cross-sectional study was conducted on August – September 2016 in selected 76 districts/cities using cluster random sampling from 34 provinces. The target sample was 70.000 urban women. The inclusion criteria were women age 24-65 years and willing to participate in research and sign informed consent. The exclusion criteria were women with serious physical illness, very severe communication disorders, pregnant and breastfeeding women less than 6 months. Data was collected through interviews and the interviews were conducted at the participant's house by trained enumerators. The enumerators would ask a series of general and personal questions including education status and occupation. In total, 39.188 women were recruited by Ministry of Health of Republic Indonesia. After excluded those who were ≥ 50 years old (n=10258) and not having breast tumors examination (n=372), a total of 28.558 women were used for the analysis. This study was approved by Esa Unggul University's ethical review board (0180-20.175/DPKEKEP FINAL-EA/UEU/VII/2020).

Assessment of breast tumors

In this study, the examination of breast tumors used the clinical breast examination method. A certified medical doctor or midwife carried out the clinical breast examination (inspection and palpation) at the primary healthcare clinics. They assessed breast position (asymmetric or not), the skin of the breast (normal, reddish, swollen, wet wounds or pulling), and the areola of the breast (normal, retracted, wet wounds or abnormal fluid appears). Moreover, the palpation examination was carried out to check the lump (number, size, quadrant location, consistency, mobility, and tenderness) and the presence of enlarged lymph nodes at the armpits. The subjects were categorized as positive if the clinical breast examination show the lump and the presence of enlarged lymph nodes at the armpits and inversely.

Assessment of eating habits, cooking methods, and other covariates

A food frequency questionnaire (FFQ) was used to assess participants eating habits and cooking methods in the last month. In the FFQ, 106 food items (Supplementary file 1) were categorized into twelve food groups (meats, eggs, innards organs, processed meats, seafood, milk and dairy products, fast foods, beans or legumes, light-colored vegetables, dark leafy vegetables, fruits, and oils). We also assessed the habit of alcohol drinking. Meanwhile, seven types of cooking methods, namely roasted/smoked, fried, grilled, boiled, pan-fried/sautéing, steamed, and raw/fresh were also retrieved from the FFQ. Each food item and cooking method had seven response scores (1 to 7) ranged from never, 1x/month, 2-3x/month, 1-2x/week, 3-4x/week, 5-6x/week, and daily. Meats and dark-leafy vegetables consist of seven food items. Processed meats, seafood, and fast foods consist of four food items. Milk and dairy products and beans or legumes consist of nine food items. While eggs, innards organs, light-colored vegetables, fruits, and oils consist of 3, 5, 18, 30, and 6 food

items respectively. The minimum and maximum consumption scores for meats, eggs, innards organs, processed meats, seafood, milk and dairy products, fast foods, beans or legumes, light-colored vegetables, dark leafy vegetables, fruits, and oils are 7-49, 3-21, 5-35, 4-28, 4-28, 9-63, 4-28, 9-63, 18-126, 7-49, 30-210, 6-42, respectively. Eating habits for each food group were categorized as low (below the median/2-quintile) and high (above the median/2-quintile). Moreover, the cooking methods were categorized as a 'regular' method if they used roasted/smoked, fried, boiled, pan-fried/sautéing, steamed, and raw/fresh cooking methods ≥ 3-4x/week, and grilled cooking method ≥ 2-3x/month, and 'infrequent' if otherwise [10]. Other covariates such as education status were dichotomized as low (below high school) and high (above high school). While working status was categorized as no (not working or still studying) and yes (engaged in professional working).

Data analysis

Statistical analysis was performed using STATA version 13 (STATA Corp LLC, Texas, USA). A chi-squared test was used to compare the categorical variables among the characteristics of women with breast tumors incidence. A general linear model was used to compare the eating habits score of each food group according to breast tumors incidence. Meanwhile, an adjusted (age, education, and working status) and forward selection of logistic regression was performed to determine the most dominant variables associated with breast tumors among urban women. We used forward logistic regression tests with a predictive model by selecting each independent variable. First, all independent variables that produced *p-value* < 0.25 were selected for further analysis. Second, variables that have met the previous selection criteria will be adjusted one by one (variables with p-value > 0.05 will be removed gradually) until there were only variables with p < 0.05.

RESULTS

From a total of 28558 women, 8.3% (n = 2376) of those had a breast tumor. Characteristics of urban women across breast tumors status are shown in Table 1.

Table 1. Characteristics of study participants according to breast tumors status

All (n = 28558)		Breast tumors		p [a]
		Negative (n = 26182)	Positive (n = 2376)	
Age, years	38.4 ± 6.6	38.4 ± 6.6	38.6 ± 6.6	
Education level				0.028*
Low	13788 (48.3)	12692 (48.5)	1096 (46.1)	
High	14770 (51.7)	13490 (51.5)	1280 (53.9)	
Working status				0.05*
No	18222 (63.8)	16750 (64.0)	1472 (62.0)	
Yes	10336 (36.2)	9432 (36.0)	904 (38.0)	
Alcohol drinking				0.368
No	27695 (97.0)	25398 (97.0)	2297 (96.7)	
Yes	863 (3.0)	784 (3.0)	79 (3.3)	
Food consumption score				
Meats	11.5 ± 3.3	11.5 ± 3.2	11.7 ± 3.4	0.006*
Eggs	7.6 ± 3.2	7.6 ± 3.2	7.7 ± 3.3	0.242
Innards organs	5.8 ± 1.5	5.8 ± 1.5	5.9 ± 1.6	0.096
Processed meats	5.8 ± 2.3	5.8 ± 2.3	5.9 ± 2.3	0.473
Seafood	10.2 ± 3.7	10.2 ± 3.7	10.0 ± 3.8	0.011*
Milk and dairy products	11.1 ± 3.1	11.1 ± 3.1	11.3 ± 3.3	0.015*
Beans or legumes	19.0 ± 4.9	19.0 ± 4.9	19.0 ± 4.9	0.554
Light colored vegetables	35.5 ± 12.6	35.5 ± 12.6	35.7 ± 12.7	0.609
Dark-leafy vegetables	15.3 ± 4.4	15.3 ± 4.4	15.4 ± 4.5	0.861
Fruits	44.6 ± 12.3	44.6 ± 12.3	44.5 ± 12.3	0.877
Oils	13.4 ± 2.8	13.4 ± 2.8	13.5 ± 3.0	0.500
	4.8 ± 1.6	47 ± 1.6	4.8 ± 1.7	0.010*

	All (n = 28558)	Breast tumors		P [a]
		Negative (n = 26182)	Positive (n = 2376)	
Fast foods				
Cooking method [b]				
Roasted/smoked				0.035*
Infrequent	27756 (97.2)	25463 (97.2)	2293 (96.5)	
Regular	802 (2.8)	719 (2.8)	83 (3.5)	
Deep-fried				0.045*
Infrequent	2449 (8.6)	2219 (8.5)	230 (9.7)	
Regular	26109 (91.4)	23963 (91.5)	2146 (90.3)	
Grilled				0.066
Infrequent	25384 (88.9)	23299 (89.0)	2085 (87.8)	
Regular	3174 (11.1)	2883 (11.0)	291 (12.2)	
Boiled				0.998
Infrequent	13943 (48.8)	12783 (48.8)	1160 (48.8)	
Regular	14615 (51.2)	13399 (51.2)	1216 (51.2)	
Pan-fried/Sautéing				0.589
Infrequent	11846 (41.5)	10848 (41.4)	998 (42.0)	
Regular	16712 (58.5)	15334 (58.6)	1378 (58.0)	
Steamed				0.093
Infrequent	27005 (94.6)	24776 (94.6)	2229 (93.8)	
Regular	1553 (5.4)	1406 (5.4)	147 (6.2)	
Raw/fresh				0.564
Infrequent	16254 (56.9)	14915 (57.0)	1339 (56.4)	
Regular	12304 (43.1)	11267 (43.0)	1037 (43.64)	

Data are presented as number (percentage) for categorical variables and mean ± standard deviation(SD) for continuous variables.

[a] P-value was analyzed by chi-square for categorical variables and a general linear model for continuous variables.

[b] 'Regular' method if they used roasted/smoked, fried, boiled, pan-fried/sautéing, steamed, and raw/fresh cooking methods ≥ 3-4x/week, and grilled cooking method ≥ 2-3x/month, and 'infrequent'if otherwise

* significant (p-value < 0.05)

Positive breast tumors women had higher education levels (53.9%), higher consumption score of meats (11.7 ± 3.4 vs. 11.5 ± 3.2; p = 0.006), milk and dairy products (11.3 ± 3.3 vs. 11.1 ± 3.1; p = 0.015), and fast food (4.8 ± 1.7 vs. 4.7 ± 1.6; p = 0.010) but lower intake of seafood (10.0 ± 3.8 vs. 10.2 ± 3.7; p = 0.011). Additionally, positive breast tumors women used fried cooking method regularly (90.3%, p = 0.045).

Logistic regression analysis revealed that seafood and fast food were significantly associated with the incidence of breast tumors (Table 2).

Table 2. Logistic regression of eating habits and incidence of breast tumors

	Adjusted logistic regression		Forward logistic regression	
	OR (95% CI)	P	OR (95% CI)	P
Meats				
Low	1.00		1.00	
High	1.02 (0.94 – 1.11)	0.605	1.00 (0.91 – 1.10)	0.969
Eggs				
Low	1.00		1.00	

	Adjusted logistic regression		Forward logistic regression	
	OR (95% CI)	**P**	**OR (95% CI)**	**P**
High	1.08 (0.99 – 1.18)	0.072	1.09 (0.99 – 1.20)	0.069
Innards organs				
Low	1.00		1.00	
High	1.04 (0.95 – 1.13)	0.444	1.03 (0.93 – 1.14)	0.572
Processed meats				
Low	1.00		1.00	
High	0.98 (0.90 – 1.07)	0.705	0.94 (0.85 – 1.04)	0.234
Seafood				
Low	1.00		1.00	
High	0.91 (0.84 – 0.99)	0.028	0.88 (0.80 – 0.96)	0.006*
Milk and dairy products				
Low	1.00		1.00	
High	1.07 (0.99 – 1.17)	0.105	1.06 (0.97 – 1.16)	0.167
Beans or legumes				
Low	1.00		1.00	
High	1.02 (0.94 – 1.11)	0.658	1.01 (0.92 – 1.11)	0.835
Light-colored vegetables				
Low	1.00		1.00	
High	0.99 (0.92 – 1.09)	0.973	0.98 (0.88 – 1.10)	0.760
Dark-leafy vegetables				
Low	1.00		1.00	
High	1.02 (0.93 – 1.11)	0.693	1.02 (0.92 – 1.12)	0.720
Fruits				
Low	1.00		1.00	
High	1.01 (0.93 – 1.10)	0.871	0.99 (0.89 – 1.10)	0.911
Oils				
Low	1.00		1.00	
High	0.98 (0.90 – 1.07)	0.677	0.98 (0.90 – 1.08)	0.732
Fast foods				
Low	1.00		1.00	
High	1.11 (1.02 – 1.22)	0.018	1.10 (1.00 – 1.20)	0.049*

[a] adjusted by age, education level, and working status

* significant (p-value < 0.05)

Low: < median/2-quintile scores of 11.0 (meats), 7.0 (eggs), 5.0 (inn,ards organs), 5.0 (processed meats), 10.0 (seafood), 9.0 (milk and dairy products), 18.0 (beans or legumes), 33.0 (light coloredvegetables), 15.0 (dark-leafy vegetables), 41.0 (fruits), 12.0 (oils), and 4.0 (fast foods); high if otherwise.

Adjusted and forward logistic regression showed that seafood negatively associated with breast tumors (OR = 0.91, 95% CI: 0.84 – 0.99, p = 0.028 and OR = 0.88, 95% CI: 0.85 – 1.04, p = 0.006 respectively). In contrast, fast foods were associated with increased 10% risk of breast tumors (95% CI: 1.00 – 1.20, p = 0.049). Furthermore, only roasted/smoked cooking method was positively associated with the incidence of breast tumors (OR = 1.27, 95% CI: 1.01 – 1.61, p = 0.043) (Table 3).

Table 3. Logistic regression of cooking methods and incidence of breast tumors

	Adjusted logistic regression[a]		Forward logistic regression	
	OR (95% CI)	**P**	**OR (95% CI)**	**P**
Roasted/smoked				
Infrequent	1.00		1.00	
Regular	1.28 (1.01 – 1.61)	0.04	1.27 (1.01 – 1.61)	0.043*
Deep-fried				
Infrequent	1.00		1.00	
Regular	0.86 (0.74 – 0.99)	0.038	0.87 (0.75 – 1.01)	0.066
Grilled				
Infrequent	1.00		1.00	
Regular	1.12 (0.99 – 1.28)	0.079	1.10 (0.96 – 1.26)	0.168
Boiled				
Infrequent	1.00		1.00	
Regular	0.99 (0.91 – 1.08)	0.894	0.99 (0.91 – 1.09)	0.911
Pan-fried/Sautéing				
Infrequent	1.00		1.00	
Regular	0.98 (0.90 – 1.06)	0.586	0.98 (0.90 – 1.07)	0.637
Steamed				
Infrequent	1.00		1.00	
Regular	1.16 (0.97 – 1.38)	0.100	1.13 (0.94 – 1.35)	0.186
Raw/fresh				
Infrequent	1.00		1.00	
Regular	1.01 (0.93 – 1.10)	0.821	1.03 (0.94 – 1.12)	0.550

[a] adjusted by age, education level, and working status

"Infrequent" was defined as ≤ 1-2 times/week (roasted/smoked, fried, boiled, pan-fried/sautéing,steamed, raw/fresh) and ≤ 2-3 times/month (grilled) while "regular" if otherwise.

DISCUSSION

In this study, our evaluation showed that the incidence of breast tumors in Indonesia was significantly associated with higher education levels and fast foods as well as roasted/smoked cooking methods among childbearing-aged urban women. Whereas, total seafood consumption was substantially associated with a low risk of breast tumors incidence. The evidence relating to individual education level to risk for breast tumors is still unclear. Nonetheless, education differences in cancer prevalence have long been observed [16]. However, it is not well known, if such a relationship will continue to exist in Indonesia following adjustment for individual risk factors of breast tumors. The findings of this present study are similar to previous publications of elevated risk of breast tumors among women with higher education levels [17, 18]. A prospective cohort study conducted in the United State has shown that women with the least education level had a lower risk of invasive malignant breast tumors [16]. In another study, the relationship between education level and malignant tumors risk becomes completely insignificant after multivariate adjustment for unhealthy lifestyles [19]. Perhaps, such analysis might give a plausible description about the connection between education and cancer for public health concern. Inconsistent results have also been observed in several studies conducted to investigate the role of education level in breast tumors survival. Among the studies, one reported no relationship found between education and breast tumors [20], while others revealed a high survival rate among women with lower [21] or higher [22] education level.

Eating habits have been identified to involve both in the development and prevention of breast tumors [23] but the evidence is yet to be cleared [24]. Since breast tumors is a hormone-related malignancy, the diet may enhance its consequences through the hormonal level, anti-oxidation as well as growth factors [25, 26]. From the literature review, we noticed an increased risk of breast tumor-associated with high consumption of fast foods, which similarly concurred with our study [27]. Fast foods are typically meat and sweet diets with a large quantity of sugar and fat, prepared as baked goods, burgers, and deep-fried foods like chips, french fries, and chicken pieces [7]. Furthermore, fast foods have been linked to a diet prepared with limited essential nutrients and frequent intake of it may lead to overconsumption of energy [28]. High energy consumption may trigger the release of essential hormonal factors such as estrogen, insulin-like growth factor (IGF)-1, and sex hormone-binding globulin, which all play a significant role in the proliferation of malignant tumor cells [29]. A group of researchers from Poland has reported that consuming fast food daily (100 gr) is threefold likely to increase the risk of malignant breast tumors. In their study, they further discovered that refined meat including burgers, sausage, and pizza containing sodium nitrate, is transformed into nitrosamine, which is considered carcinogen [30].

Cooking methods vary among regions or countries; therefore, differences in the incidence rate of breast tumors may occur. The type of cooking methods applied for preparing diet may also have an impact on malignant tumors cell growth. In the recent study, our findings indicated that prepared meals by roasting or smoking are associated with an elevated risk of breast tumors. The roasted or smoked cooking method involved the use of high temperatures to prepare food. During our literature review, no study specifically reported that consuming high-temperature cooked food, for example eating grilled/barbecued and smoked meat, is associated with primary prevention of breast tumors, it is however been reported that women to reduce consuming high-temperature cooked meat due to the formation of carcinogenic compounds [31]. A study conducted among US females showed that grilled/barbecued and smoked meat consumption are the main origin of polycyclic aromatic hydrocarbons (PAHs) [32] and have been regarded to increase the proportion of breast tumors [33, 34]. PAHs together with another carcinogenic mutagen such as heterocyclic amines (HCAs) are found highly in meat cooked at high temperatures [35]. HCAs are formed when muscle meat which consists of amino acids and creatinine reacts at high temperatures [36]. Meanwhile, PAHs are formed at the surface of the meat when it cooked directly on an open flame, resulting in pyrolysis of the fat. Imperfectly combusted meat also leads to carbon and hydrogen from fat react with hot coals and produce smoke [35].

Seafood has been identified associated with breast tumors. Increasing evidence has emerged showing an increased risk of breast tumors linked with the intake of seafood (like fresh-water fish and marine fish), which is not in support of other literature conducted distinctively [37- 39]. Our results are, however, similar to other publications, in which malignant tumors risk is reduced with high seafood consumption [40]. Seafood such as fish (oily fish or fish oils) is regarded as the major source of n-3 polyunsaturated fatty acids (n-3 PUFA), which can effectively deteriorate the risk of malignant breast tumors among women [41, 42]. In addition, fish oil or a diet rich in eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) may also inhibit metastases development and further suppress tumors progression [43-45]. However, the epidemiologic evidence showing the relationship between seafood and breast tumors risk is limited to our understanding.

Our study has certain strengths: it is the first study to examine the association of eating habits and cooking methods among childbearing Indonesian urban women. Second, the sample size was selected from 34 provinces in Indonesia, thus it may represent all areas of the Indonesian archipelago. However, several limitations should also be mentioned. First, the cross-sectional study design limits us to identify the causality of the results. Second, potential misclassification bias of self-reported FFQ may occur and the questionnaire included only frequency information, not portion size. Therefore, the intake amount for each participant could not be calculated. Finally, the adjustment for confounding variables was modest in our study. Additional residual confounding variables such as energy and protein intake, genetic or family history, and nutritional status may affect the present findings.

CONCLUSIONS

In summary, higher education levels, consumption of fast foods, and roasted/smoked cooking methods were identified as major risk factors associated with the incidence of breast tumors among childbearing-aged urban women living in Indonesia. In contrast, only seafood was discovered having reduced risk for breast tumors. The current study appears to provide the possible high- and low-risk factors associated with breast tumors incidence in Indonesia. Therefore, it is substantial to establish awareness and disseminate information about good eating habits and cooking methods to minimize the risks of breast tumors. The findings of this study suggest that changes in eating habits and cooking methods might impact how breast tumors generate.

However, the relationship between eating habits and cooking methods in breast tumors is complicated, more studies might be required for clear evidence.

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Supplementary Table 1. Food groups and food items list

Food groups	Food items
Meats	Chicken, chicken skin, duck, beef, pork, lamb, and buffalo meat
Eggs	Chicken egg, duck egg, egg yolk
Innards organs	Chicken liver, brain, chicken blood, cow liver, cow intestine
Processed meats	Corned beef, meat ball, sausage, cow tripe
Seafood	Shrimp, fish, salted fish, dried fish
Milk and dairy products	Liquid skim milk, powder skim milk, yogurt, cheese, lamb milk, cow milk, sweetened condensed milk, buffalo milk, full cream milk
Fast food	Fried chicken, burger/hotdog, pizza, French fries
Beans or legumes	Green bean, soy bean, red bean, peanut, black-eyed pea, oncom, tofu, tempeh, soy milk
Light vegetables	Green bean, luffa acutangula, baby corn, cabbage, cucumber, cauliflower, yardlong bean, winged bean, chayote, white radish, young jackfruit, bitter melon, young papaya, bamboo shoot, mung bean sprout, eggplant, tomato, carrot
Dark-leafy vegetables	Spinach, broccoli, choy sum, limnocharis flava, water spinach, Gnetum gnemon leaves, bok choy
Fruits	Avocado, grapes, red apple, green apple, star fruit, cantaloupe, langsat, durian, watery rose apple, guava, orange, ambarella, Japanese persimmon, lychee, mango, mangosteen, passion fruit, melon, jackfruit, pineapple, pear, papaya, banana, rambutan, sapodilla, salak, watermelon, soursop, sugar apple, strawberry
Oils	Coconut, margarine, butter, coconut oil, palms oil, coconut milk

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