



PERILAKU MAKAN MASYARAKAT PEDESAAN DI KALIMANTAN BARAT

EATING BEHAVIOR OF THE RURAL COMMUNITIES IN WEST KALIMANTAN

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Abstrak

Kegiatan konversi lahan di Kalimantan Barat yang cenderung terus meningkat dapat berdampak negatif bagi ketersediaan pangan masyarakat desa yang masih melakukan *food gathering* dan berburu dari suplai alami di sekitar desa atau berternak dengan skala keluarga. Perilaku makan yang salah disertai lokasi desa yang relatif jauh dari fasilitas kesehatan yang lengkap turut menambah risiko kesehatan dan kematian pada masyarakat desa tersebut. Penelitian ini menjelaskan dan menentukan faktor-faktor yang mempengaruhi perilaku makan tiga etnis berbeda di Kalimantan Barat, mencakup Dayak, Madura dan Tionghoa, terkait penurunan ketersediaan lahan sebagai sumber pangan. Survei dilakukan di empat kabupaten dan satu kota dengan sampel diambil secara acak dari populasi etnis Dayak (Kanayatn, Muduk, Ketungau Sesae'), Madura dan Tionghoa. Data perilaku makan dianalisis secara deskriptif mencakup frekuensi dan rutinitas makan, keragaman sumber makanan, estimasi pengeluaran energi harian dan klasifikasi aktivitas fisik sehari penuh, serta kondisi fisik sebagai manifestasi kegiatan makan dari 293 partisipan. Faktor-faktor yang mempengaruhi perilaku makan masyarakat pedesaan Kalimantan Barat adalah pekerjaan, keterlibatan individu dalam kelompok sosial, serta ketersediaan dan keterjangkauan sumber makanan. Konversi lahan hutan dan kebun akan mempengaruhi ketersediaan sumber makanan yang terjangkau termasuk perilaku makan sehat dan seimbang pada masyarakat pedesaan di Kalimantan Barat.

Kata kunci: Kalimantan Barat; Masyarakat pedesaan; Mengumpulkan makanan; Perilaku makan

Abstract

Most rural communities in West Kalimantan were facing negative impact of increasing land conversion activities on their natural food supply. Improper eating behavior and limited health facilities may give more health and death risk to these people. This research described and determined the factors that influenced the eating behavior among three ethnics in West Kalimantan, namely Dayak, Madura and Chinese populations, and the potential impact of land conversion to it. Survey was conducted in four regencies and one city and random sampling was done in three sub ethnics of Dayak (Muduk, Kanayatn, and Ketungau Sesae'), Madura, and Chinese communities. The eating behavior data was analyzed descriptively included meal frequency and routines, the variety of daily food source, individual estimates of energy expenditure, body mass index (BMI) distribution, and sports habit among 293 participants. Four main factors influenced the eating behavior of rural communities in West Kalimantan including types of occupation, individual involvement in social groups, and the availability and affordability of food source. The land conversion activity will certainly influence the affordable food source availability and the eating behavior for healthy and balanced food among the rural communities in West Kalimantan.

Keywords: Eating behavior; Food gathering; Rural communities; West Kalimantan

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INTRODUCTION

Up to the year 2015, almost 70% of the people in West Kalimantan were still living in rural areas (BPS Kalimantan Barat, 2015). Due to the isolated location and low market access, these people were still conducting food gathering activities from natural forest and garden near the village for their daily needs. Some people were also relying on small-scaled farming and cattle products for family consumption. Market access for food were very limited and usually done by the people after getting money from activities such as selling rubber products (Mintosih & Widiyanto, 1997). Land conversion activities in West Kalimantan such as those of the opening of mining areas and the expansion of the monoculture oil palm plantation which deteriorated by the increasing intensity of forest fires had resulted in the decreasing areas of natural forest and garden as food supply to the communities including agricultural land of the local people for rice and vegetables products (Tim Kajian, 2011; Carlson *et al.*, 2012; Ministry of Environment and Forestry, 2014; de Vos, 2016). For example, up to the mid of 2015 there were more than 5 million hectares of forest areas had changed into oil palm plantation (Ministry of Environment and Forestry, 2016).

Considering that the need to get daily supply of food is crucial for the rural communities of West Kalimantan, therefore people's knowledge and decision on fulfilling the nutritional and caloric requirements are strongly depending on the eating behavior of an individual and his/her lifetime experience within a certain group or population. In this case, different populations may have different perspectives on food quality (Cazes-Valette, 2001). Both internal and external factors may influence these people to do their eating activities. Moreover, the tendency of poverty level in West Kalimantan was increasing from 2011-2016 and mainly observed in the rural communities (Setiani & Munawaroh, 2017). Food commodity was giving higher contribution to the poverty level up to 78.68% than non-food commodity (housing, clothing, education, and health) (Mariani, 2018). Besides that, the availability of medical personnel (doctors and specialists) in West

Kalimantan up to December 31st of 2016 was still below national target (Konsil Kedokteran Indonesia, 2017). These medical personnel were mostly found in the city where more complete health facilities were located. In this case, higher problems concerning diseases related to dietary behavior such as those of hypertension, high blood sugar level, overweight and obesity, high cholesterol level, and physical inactivity can be found in rural communities. Therefore, the rural community of West Kalimantan can be considered as one of vulnerable populations susceptible to diseases and death caused by unhealthy eating behavior manifested from individual's lifetime experience within a population. This unfavorable condition is most probably due to the low educational level which may lead to the lack of knowledge among the people, especially those concerning nutritional and hygienic qualities of food.

The information about the eating behavior of the people in rural communities in West Kalimantan is still limited. However, this information is important for determining the proper intervention strategy for any potential problems including diseases caused by unhealthy food and eating activities. On the other hand, the typical heterogeneous populations not only in terms of ethnicity but also in religion and traditional values and customs can give uniqueness to the pattern of daily eating behavior in each community regardless the same environmental condition. Therefore, this study aimed to describe and determine the factors that influence the eating behavior among rural people of Dayak and Madura communities and to consider the effects of land conversion activities, especially those related to the decrease of nature supply of food from forest and garden in West Kalimantan. As a comparison, we described the eating behavior of Chinese population in Singkawang City as a part of the demography of West Kalimantan who also conducted food gathering activity or small-scaled farming for their food supply. In this research, the description of the eating behavior was focused on the meal frequency and routines, the variety of daily food source, estimation of individual energy expenditure and physical activity classification based on his/her daily activities,

and physical condition of the people as the manifestation of such eating behavior.

MATERIALS AND METHOD

Survey was conducted in four regencies and one city in West Kalimantan Province. Three different ethnic groups were chosen randomly, i.e. Dayak, Madura and Chinese populations (Figure 1). Dayak populations was believed to be the native people of Borneo Island. Three subethnics of Dayak population included Dayak Ketungau Sesae' in Sekadau Regency, Dayak Kanayatn in Landak Regency, and Dayak Muduk in Sanggau Regency. Dayak Ketungau was originally named by its distribution along the Ketungau River in Sekadau and Sintang Regencies. Dayak Ketungau Sesae' is one of many subethnics of Dayak Ketungau group and mostly distributed in Sekadau Hulu, Sekadau Hilir and Belitang Districts in Sekadau Regency. In this research, Dayak Ketungau Sesae' people were randomly sampled from Dusun Merah Air, Peniti Village, Sekadau Hilir District, in Sekadau Regency. Dayak Kanayatn is widely distributed in Landak, Mempawah, Kubu Raya and Bengkayang Regencies. Dayak Kanayatn was mostly found in Landak Regency, therefore we collected samples randomly from one of its enclaves in Dusun Maro'o, Gombang Village, Sengah Temila District, in Landak Regency. Dayak Muduk is mainly distributed in Bonti District of Sanggau Regency. In this research, Dayak Muduk samples were taken from Dusun Empodis, Empodis Village, Bonti District, in Sanggau Regency. Madura and Chinese people were spontaneous migrants and distributed mostly in city areas. In this research, Madura people were sampled from TembangKacang Village of Kubu Raya Regency, meanwhile Chinese population from Singkawang Barat District, Singkawang Selatan District and Singkawang Tengah District of Singkawang City (Figure 1). Each population was a well-structured community headed by a chief of tribal council and an administrative village leader, except that of Chinese population in Singkawang City which was randomly collected from three districts and administratively regarded as urban areas, yet the people were still conducting food gathering from surrounding nature supplies. In

daily life, each of these community members speak their mother language, including the three subethnics of Dayak and Chinese populations.

Data collection was done in June 2016 until February 2017. Participants were adults or married males and females aged 18 and above whom randomly sampled by different house. The participants were fully informed about the purpose of the study and informed consent was voluntarily obtained before data collection were taken. Data collection was conducted by distributing the individual questionnaire to all participants. Data included participants' personal information, body height and weight, meal routines and timings, individual's daily activities and timings, daily food consumed, and physical activities including sports habit. We also conducted one-on-one interview with all participants, including elder people, to get better information about his/her daily activities within 24 hours.

All participants had their body height and weight measured by the research team (DE, DRS, H, LG and M) whom registered as students in the Study Program of Biology Education of Tanjungpura University of Pontianak. Height was measured to the nearest 0.1 cm using a portable 2 M stature meter (HYMS-1A, Beijing, China). Weight was also measured to the nearest 100 grams using a digital weight scale (Omron Digital Body Weight Scale HN-283, Japan). All participants were measured barefooted, wearing light clothing, and following anthropometric standards according to Frisancho (1990).

Eating behavior was described quantitatively into six parameters including meal frequency and routines at three regular timings (breakfast, lunch and dinner), the variety of daily food source, individual estimates of energy expenditure, body mass index (BMI) distribution among the participants in each community, and sports habit of the people in the community. The variety of daily food sources were grouped into five food components, i.e. carbohydrate, protein, fiber, vitamin, and mineral. Meal frequency was scored with three-point scales as yes:2, seldom:1, and no:0 for each eating timing. Estimation of individual energy

expenditure within a full day was calculated according to Ainsworth *et al.* (2000) by multiplying the time spent in each activity (in hours) by the assigned metabolic equivalents (METs) value for that activity. Individual energy expenditure was categorized into three activity levels, namely sedentary, moderately active, and active according to Institute of Medicine (2002) with some adjusted modification for these studied communities (reference male is 164 centimeters tall and weighs 60 kilograms; reference female is 155 centimeters tall and weighs 52 kilograms). The BMI was calculated by dividing weight in

kilograms by square of height in meters. BMI values were used to define the physical condition of participants using the WHO BMI classification for Asian populations: severe underweight $<16 \text{ kg/m}^2$, moderate underweight $16\text{--}16.9 \text{ kg/m}^2$, mild underweight $17.0\text{--}18.4 \text{ kg/m}^2$, normal and acceptable health risk $18.5\text{--}23 \text{ kg/m}^2$, normal and increased risk $23.1\text{--}25 \text{ kg/m}^2$, preobese and increased risk $25.1\text{--}27.4 \text{ kg/m}^2$, preobese and high risk $27.5\text{--}29.9 \text{ kg/m}^2$, obesity and high risk $\geq 30 \text{ kg/m}^2$, obese class I $30\text{--}34.9 \text{ kg/m}^2$, obese class II $35\text{--}39.9 \text{ kg/m}^2$, and obese class III $\geq 40 \text{ kg/m}^2$ (WHO Expert Consultation, 2004).



Figure 1. Sampling locations and number of participants from each studied community distributed in four regencies and one city in West Kalimantan Province of Indonesia

RESULT

Characteristics of Participants

A total of 293 individuals (136 males and 157 females) were voluntarily participated in

this research. The distribution and characteristics of participants in each community are presented in Table 1. Most of the participants were married within the age

range of 18–64 years old for males and 18–67 years old for females. The average of male's and female's body height was 155 cm and 164 cm, subsequently. Chinese males and females were slightly taller than the people in other four communities, which was 169 cm for males and 160 cm for females on average.

Except that of Chinese population who lived in Singkawang City, more than half number of people in other four studied communities worked as farmers. Both males and females shared job descriptions except those in connection with household chores and child nurturing. As urban people, a variety of professions among Chinese population was found and characterized by the high percentage of occupations in private sectors namely storekeeper, coiffeur, waiter, cashier, confectioner, tailor, and food seller. However, low educational level was found high in all studied communities. Slightly higher middle educational level was found in Chinese population (32.6% in males and 38.3% in females) located in city areas. Interestingly, high educational level was found highest in Dayak Muduk males (21.1%) and females (9.7%).

Meal Habits

Meal habits among people in the studied communities were characterized by the meal frequency, meal routines and eating time. Meal frequency and meal routines in each community are presented in Table 2. Meal timings were divided into three regular times; breakfast, lunch, and dinner. Dayak Muduk people showed lowest meal frequency (5.16 for males and 5 for females), followed by Chinese population (5.19 for males and 5.28 for females). Based on the frequency of meal routines in each meal timing, more participants skipped breakfast than those who skipping lunch and dinner in all studied communities. A higher number of males preferred to skip breakfast than females, except in Dayak Muduk community where only 51.61% of female and 57.89% of male participants had breakfast.

Chinese males showed lowest meal routines at breakfast (48.84%), followed by Dayak Muduk males (57.89%) and Dayak Ketungau Sesae' males (68%). Meanwhile,

more than 85% of both Madura males and females had breakfast. In general, Madura community had highest meal frequency described by a higher number of the people who ate three times a day compared to the other four communities. On the other hand, both in Dayak Ketungau Sesae' and Dayak Kanayatn communities, dinner was always done by all participants.

Eating time among people in all studied communities can be seen in Table 3. There was a slight difference between the most frequent time to have breakfast, lunch and dinner among communities. The most frequent time to have breakfast for most participants in Dayak Kanayatn and Dayak Muduk communities was 5.00–6.59 a.m., meanwhile most participants in the other three communities had breakfast at 6.00–7.79 a.m. Most participants in Dayak Kanayatn community had lunch at 12.00–1.59 p.m., meanwhile most participants in the other four communities had lunch at 11.00 a.m. until 12.59 p.m. Most participants in Dayak Muduk community had dinner at 5.00–6.59 p.m., meanwhile most participants in the other four communities had dinner at 6.00–7.59 p.m. In general, the most frequent time to have breakfast, lunch and dinner among all communities were 6.00–6.59 a.m., 12.00–12.59 p.m., and 6.00–6.59 p.m., subsequently.

Food Source Variety

Variety of food source was found for each basic food component as listed in Table 4. We grouped the food source into five food components, i.e. carbohydrate, protein, fiber, vitamin and mineral. Fruits and vegetables were grouped as food source for fiber, vitamin, and mineral. There were five food sources of carbohydrate, excluding the potential source of sugars, oligosaccharides, and polysaccharides from vegetables and fruits. Besides rice, we listed other food sources of carbohydrates including tubers (potato, sweet potato, cassava, and taro), corn, cereals, and flour-based food (noodle, bread, cookies, and mixed-vegetable fritters). We also found 13 food sources of protein, 26 kinds of vegetables and 21 kinds of fruits as fiber, vitamin and mineral sources.

Table 1. Distribution and characteristics of participants in each studied community

Characteristic	Sex	Studied Communities					Total
		Dayak Muduk	Dayak Kanayatn	Dayak Ketungau Sesae'	Madura	Chinese	
Number of Samples (n)	Male	19	26	25	23	43	136
	Female	31	25	25	29	47	157
Age	Male	40 (24–67)	42 (24–64)	39 (23–62)	42 (26–64)	31 (18–55)	34 (18–64)
	Female	33 (20–52)	43 (23–63)	37 (20–60)	35 (23–53)	28 (18–49)	38 (18–67)
Body Height (cm)	Male	159 (140–178)	163 (150–174)	163 (150–172)	164 (157–175)	169 (158–181)	164 (140–181)
	Female	151 (140–165)	155 (146–165)	153 (145–170)	153 (140–171)	160 (144–170)	155 (140–171)
Marital Status (%)							
Single	Male	5.3	17.6	8	0	41.9	22.1
	Female	6.5	0	4	6.9	38.3	14.6
Married	Male	94.7	61.5	88	100	58.1	76.5
	Female	93.5	84	92	89.7	61.7	81.5
Widow/Widower	Male	0	2	4	0	0	1.5
	Female	0	7.8	4	3.4	0	3.8
Educational Level (%)							
Low	Male	63.2	80.8	72	87	53.5	71.3
	Female	71.0	84	84	75.9	59.6	72.6
Middle	Male	15.8	19.2	28	8.7	32.6	22.8
	Female	19.4	16	16	20.7	38.3	24.2
High	Male	21.1	0	0	4.3	7	5.9
	Female	9.7	0	0	3.4	2.1	3.2
Occupation (%)							
Teacher	Male	10.5	3.8	0	17.4	4.3	6.6
	Female	9.7	0	0	3.4	0	2.5
Farmer	Male	73.7	80.8	92	60.9	4.3	54.4
	Female	74.2	88	96	58.6	0	54.8
Grocer	Male	0	7.7	4	4.3	2.1	2.9
	Female	6.5	4	4	3.4	2.3	3.8
Housekeeper	Male	0	0	0	0	0	0
	Female	9.7	8	0	13,8	39,5	16,6
Private Sectors	Male	10.5	3.8	0	8.7	61.7	24.3
	Female	0	0	0	20.7	55.8	20.4
Labor	Male	0	3.8	4	8.7	21.3	10.3
	Female	0	0	0	0	2.3	1.3
Government Employee	Male	5.3	0	0	0	0	0.7
	Female	0	0	0	0	0	0
Entrepreneur	Male	0	0	0	0	2.1	0.7
	Female	0	0	0	0	4.7	0.6

Table 2. Meal frequency and meal routines in each studied community

Community	Sex	Meal Frequency*	Meal Routines (%)		
			Breakfast	Lunch	Dinner
DayakKetungauSesae'	Male	5.56	68.0	92.0	100
	Female	5.60	72.0	92.0	100
DayakKanayatn	Male	5.58	72.92	84.62	100
	Female	5.68	72	96	100
DayakMuduk	Male	5.16	57.9	89.5	94.7
	Female	5.00	51.6	93.5	83.9
Madura	Male	5.74	87.0	95.6	91.3
	Female	5.90	93.1	100	100
Chinese	Male	5.19	48.8	97.7	97.7
	Female	5.28	66.0	80.8	85.1
Total	Male	5.43	76.5	96.3	98.5
	Female	5.44	80.9	95.5	95.9

Note : (*) sums of meal frequency of all eating timings

Table 3. Eating time among people in all studied communities

Eating Timing	Time	The Number of People (%) in Each Studied Community				
		Dayak KetungauSesae'	Dayak Muduk	Dayak Kanayatn	Madura	Chinese
Breakfast	5.00–5.59 a.m.	4	16	31	8	12
	6.00–6.59 a.m.	20	28	51	58	53
	7.00–7.59 a.m.	52	14	12	15	19
	8.00–8.59 a.m.	14	6	6	10	13
	9.00–9.59 a.m.	2	-	-	-	2
	10.00–10.59 a.m.	2	-	-	-	-
Lunch	10.00–10.59 a.m.	-	2	-	-	-
	11.00–11.59 a.m.	26	30	6	25	26
	12.00–12.59 p.m.	64	58	73	69	64
	1.00–1.59 p.m.	8	10	22	4	9
	2.00–2.59 p.m.	2	-	-	2	1
Dinner	5.00–5.59 p.m.	2	16	-	4	3
	6.00–6.59 p.m.	80	64	71	63	51
	7.00–7.59 p.m.	16	12	29	27	40
	8.00–8.59 p.m.	2	4	-	2	6

Rice was the main staple food for all participants in all studied communities. Rice might also be processed in several ways, i.e. fried rice, porridge, and yellow (or turmeric) rice. Rice was usually eaten with other side dishes those of meats, vegetables or both. Besides rice, tubers and corn were also considered as staple food especially in Dayak Kanayatn community. However, tubers and corn were more frequently consumed when

there was enough supply. At the other times, other carbohydrate food source besides rice were also considered as snacks, especially flour-based food such as noodles, bread, cookies, and mixed-vegetable fritters. Tubers were also consumed during break time between activities. Cereals were usually bought from small kiosk owned by the local people, yet only consumed by very small percentage of people.

Table 4. Variety of food source consumed by each community members classified into five basic needs of food components (carbohydrate, protein, fiber, vitamin, and mineral)

Food Components	Food Source(s)	Preference Level among Members of the Community (%)					Total Average (%)
		Dayak Ketungau Sesae'	Dayak Kanayatn	Dayak Muduk	Madura	Chinese	
Carbohydrate	Rice	100	100	100	100	100	100
	Flour-based Food	28.0	80.4	52.0	28.8	23.0	54.3
	Tubers	9.0	92.0	10.0	32.7	6.0	28.3
	Corn	0	100	0	17.3	0	20.5
	Cereals	0	2.0	4.0	0	0	1.0
Proteins	Animal Proteins						
	Fish	56.0	96.1	60.0	88.5	76.0	72.0
	Chicken	54.0	74.5	70.0	55.8	78.0	67.9
	Egg	24.0	74.5	78.0	67.3	66.0	62.5
	Pork	24.0	31.4	32.0	0	36.0	25.9
	Snails	0	82.4	0	0	0	14.3
	Shrimp	0	0	32.0	0	8.0	3.4
	Duck	0	7.8	0	0	0	1.4
	Snake	2.0	0	0	0	0	0.3
	Dog	2.0	0	0	0	0	0.3
	Plant Proteins						
	<i>Tempe</i>	8.0	9.8	66.0	46.2	22.0	29.3
	Tofu	8.0	9.8	28.0	36.5	26.0	22.2
	Peanut	0	54.9	0	15.4	1.0	20.5
	Green Bean	0	0	0	1.0	0	12.6
Fibers, Vitamins, Minerals	Vegetables						
	Mustard Greens	62.0	9.8	12.0	80.8	80.0	53.2
	Cassava Leaf	40.0	96.1	92.0	50.0	7.0	50.2
	Water Morning Glory	46.0	17.6	54.0	51.9	43.0	42.7
	Spinach	56.0	11.8	30.0	55.8	50.0	42.0
	Fiddleheads	16.0	92.2	70.0	23.1	0	34.8
	Bamboo Shoots	12.0	100	76.0	0	0	32.4
	Long Bean	32.0	19.6	58.0	0	32.0	28.7
	Eggplant	14.0	94.1	28.0	3.8	1.0	24.6
	Chives	0	78.4	0	0	0	13.6
	Carrots	0	0	6.0	0	36.0	13.0
	Bean Sprout	10.0	0	4.0	3.8	31.0	12.6
	Star Gooseberry/ Sweet Leaf	2.0	9.8	58.0	0	0	11.9
	Beans	0	0	12.0	0	28.0	10.6
	Banana Flower/ Bud	0	43.1	8.0	0	0	8.9
	Onion Leeks	0	0	0	3.8	0	6.8
	Jackfruit	0	5.9	22.0	1.9	0	5.1
	Cabbage	0	0	4.0	0	14.0	5.1

Food Components	Food Source(s)	Preference Level among Members of the Community (%)					Total Average (%)
		Dayak Ketungau Sesae'	Dayak Kanayatn	Dayak Muduk	Madura	Chinese	
	Velvetleaf	0	0	22.0	0	0	3.7
	Chinese Radish	0	0	0	0	10.0	3.1
	Cucumber	8	0	2.0	3.8	0	2.4
	Pumpkin	6	0	6.0	0	0	2.0
	Chinese Okra	0	0	0	2.0	3.0	1.7
	Squash	0	0	0	0	2.0	0.7
	<i>Merudang*</i>	4.0	0	0	0	0	0.7
	Papaya	0	0	4.0	0	0	0.7
	Broccoli	0	0	2.0	0	0	0.3
		Fruits					
	Banana	28.0	98.0	82.5	42.3	42.2	53.6
	Orange	42.0	19.6	40.0	36.5	53.3	38.9
	Papaya	6.0	86.3	20.0	42.3	12.2	30.0
	Apple	2.0	2.0	15.0	11.5	24.4	17.7
	Guava	14.0	0	67.5	0	0	11.6
	Pineapple	0	2.0	0	59.6	0	10.9
	Watermelon	8.0	0	17.5	5.8	2.2	5.5
	Water Apple	0	7.8	0	13.5	4.4	5.1
	Jicama	0	2.0	0	3.8	0	1.0
	Longan	0	0	0	5.8	0	1.0
	Snakefruit	0	0	5.0	1.9	0	1.0
	Dragon Fruit	0	0	0	1.9	1.1	0.7
	Coconut	4.0	0	0	0	0	0.7
	<i>Maram*</i>	4.0	0	0	0	0	0.7
	Jackfruit	0	0	0	0	2.2	0.7
	Pear	0	0	0	1.9	0	0.3
	<i>Rambai*</i>	0	0	0	1.9	0	0.3
	Soursop	2.0	0	0	0	0	0.3
	Starfruit	0	0	0	0	1.1	0.3
	Mango	0	0	0	0	1.1	0.3
	<i>Durian</i>	0	0	0	0	1.1	0.3

Note: (*) local names

Fish, egg, chicken, tofu and *tempe* were mostly consumed protein sources among the people in all communities. Fish and shrimp were both consumed fresh or processed into salted fish, fermented shrimp *cinjalok*, or dried shrimp *ebi*. On the other hand, canned sardines were also consumed by small percentage of people in Dayak Muduk community which obtained from nearby market. Pork was other common protein source among Dayak and Chinese populations, however forbidden for Madura people. On the other hand, beef was

the only red meat consumed by the Madura people, yet only very small percentage of them could afford to buy from the closest traditional market or only consumed on special occasion such as Islamic Holiday of Eid Al-Adha when certain people proceeded animal sacrifice and shared with the whole village people. Snails and duck were mostly common among Dayak Kanayatn people, as well as dog among Dayak Ketungau Sesae' people. Besides tofu and *tempe*, peanut and green bean were the other two protein sources from plant, however, most

participants categorized those two foods into vegetables.

Mustard greens and cassava leaf were the most consumed vegetables by most of the participants in all communities, followed by water morning glory and spinach. Moreover, each community tended to have a certain consumption of vegetable, for instance, Chinese people were more likely to consume mustard greens and spinach to cassava leaf whilst Dayak Kanayatn people highly

consumed bamboo shoots. Some fruits, including cucumber, pumpkin, eggplant, Chinese okra, squash, young papaya and jackfruit, were also considered as vegetables and cooked as side dishes and eaten along with rice. Beans and long bean were also grouped into vegetables, as well as bean sprout, banana flower, and bamboo shoot. Some vegetables, especially carrots, broccoli, and cabbage, were supplied from outside the province, therefore, less people consumed them.

Table 5. Physical status of individuals in each community based on body height and BMI levels according to BMI classification of Asian populations (WHO Expert Consultation, 2004)

Community	Sex	n	Average and Range of Body Height (cm)	Physical Status of Members of Community based on BMI Level (%)							
				Underweight			Normal		Overweight	Obesity	
				Severe	Moderate	Mild	Acceptable Health Risk	Increased Health Risk	High Health Risk		
				<16	16–16.9	17–18.4	18.5–22.9	23–24.9	25–27.4	27.5–30	30.1–33
Dayak Ketungau Sesae'	Male	25	163 (150–172)	0	0	8.0	44.0	28.0	20.0	0	0
	Female	25	153 (145–170)	4.0	0	4.0	48.0	20.0	20.0	8.0	0
Dayak Kanayatn	Male	26	163 (150–174)	3.9	0	11.5	61.5	15.4	3.9	3.9	0
	Female	25	155 (146–165)	8.0	0	8.0	56.0	8.0	16.0	4.0	0
Dayak Muduk	Male	19	159 (140–178)	0	0	10.5	52.6	15.8	10.5	5.3	5.3
	Female	31	151 (140–165)	0	6.5	0	45.2	16.1	25.8	3.2	3.2
Madura	Male	23	164 (157–175)	0	0	0	56.5	8.7	8.7	0	0
	Female	29	153 (140–171)	0	10.3	6.9	48.3	13.8	13.8	3.4	0
Chinese	Male	43	169 (158–181)	4.7	10.8	14.0	55.8	11.6	4.6	0	0
	Female	47	160 (144–170)	0	4.3	19.2	48.9	10.6	12.8	4.3	0
Total	Male	136	164 (140–181)	2.9	4.4	11.0	54.4	14.7	9.6	2.2	0.7
	Female	157	155 (140–171)	1.9	4.5	9.6	48.4	12.7	17.2	4.5	1.3

Banana, orange, and papaya were three kinds of fruit mostly consumed by the people in the studied communities. These fruits were locally produced in West Kalimantan and available at any time of the year. Moreover, bananas and papayas were also traditionally grown by the people for family consumption, especially in rural areas. Certain local fruits were also documented in this research, for

example, guava was commonly consumed by Dayak Muduk community as well as pineapple for Madura community. Fruits variety was higher in Chinese community which administratively located in urban areas and had easier market access, meanwhile, bananas and oranges were still mostly consumed by them. Those two fruits are relatively cheaper than the

other fruits whether in traditional or in modern markets.

Physical Status of Participants

The physical status of the participants in each community were depicted from the body height and BMI profiles according to WHO Expert Consultation (2004) (Table 5). The body height distribution among male participants ranged from 140–181 cm and females 140–171 cm. The average height for males was 164 cm and females 155 cm. Chinese participants showed taller body than the people in other four communities, with the average height of 169 cm for males and 160 for females. On average, Dayak Muduk people were slightly shorter than the other Dayak populations in this study.

Normal BMI with acceptable health risk was only found in 54.4% of male and 48.4% of

female participants. Increased and high health risk were found in 27.2% of male and 35.7% of female participants, meanwhile, the underweight condition was found in 18.4% of male and 15.9% of female participants. Among all participants, severe underweight was also found in 1.9% of males and 2.9% of females. Between communities, underweight condition was more frequent in Chinese population with a total of 29.5% in males and 23.5% in females. However, a higher number of severe underweight condition was found in 3.9% of males and 8% of females of Dayak Kanayatn community. On the other hand, obesity was hardly found in most communities, except that in 5.3% of males and 3.2% of females of Dayak Muduk community.

Table 6. The estimates of energy expenditure and the number of people in each activity level in the studied communities

Community	Sex	n	Daily Energy Expenditure (Calorie)*	Activity Levels (%)			Sports Habit (%)		
				Sedentary	Moderately Active	Active	Yes	Seldom	No
Dayak Ketungau Sesae'	F	25	2292 (1447–2995)	8 (32.0)	3 (12.0)	14 (56.0)	0	7 (28.0)	18 (72.0)
	M	25	2582 (1923–2949)	10 (40.0)	9 (36.0)	6 (24.0)	1 (4.0)	11 (44.0)	13 (52.0)
Dayak Muduk	F	31	2021 (1364–2588)	15 (48.4)	6 (19.4)	10 (32.2)	3 (9.7)	6 (19.4)	22 (71.0)
	M	19	2246 (1632–2993)	11 (57.9)	3 (15.8)	5 (26.3)	3 (15.8)	5 (26.3)	11 (57.9)
Dayak Kanayatn	F	25	2245 (1404–2862)	4 (16.0)	8 (32.0)	13 (52.0)	0	1 (4.0)	24 (96.0)
	M	26	2293 (1531–2994)	19 (73.1)	5 (19.2)	2 (7.7)	1 (3.8)	0	25 (96.2.0)
Madura	F	29	2391 (1367–2997)	8 (27.6)	3 (10.3)	18 (62.1)	4 (13.8)	8 (27.6)	17 (58.6)
	M	23	2610 (1552–2985)	8 (34.8)	8 (34.8)	7 (30.4)	5 (21.7)	6 (26.1)	12 (52.2)
Chinese	F	47	1964 (1425–2637)	33 (70.2)	9 (19.1)	5 (10.6)	8 (17.0)	29 (61.7)	10 (21.3)
	M	43	2118 (1505–2936)	38 (88.4)	4 (9.3)	1 (2.3)	5 (11.6)	11 (25.6)	27 (62.8)
Total	F	157	2151 (1364–2997)	68 (43.3)	29 (18.5)	60 (38.1)	15 (9.6)	51 (32.5)	91 (58.0)
	M	136	2338 (1505–2994)	86 (63.2)	29 (21.3)	21 (15.4)	15 (11.0)	33 (24.3)	88 (64.7)

Note : F= female; M= Male; (*) estimation based on daily activities record

Daily Energy Expenditure and Sports Habit

The estimation of energy expenditure of the people in the studied communities ranged from 1505–2994 calories for males and 1364–2997 calories for females (Table 6). In general, according to the type of activity levels more males were performing sedentary life style which was up to 63.2% than females (43.3%). In this case, females performed more active life styles than males showed by the higher percentage of females in both moderately active and active level of physical activities especially in Dayak Ketungau Sesae', Dayak Kanayatn, and Madura communities. On the contrary, Chinese people showed the least active life style in which more than 70% of male and female participants performed sedentary life style.

Moreover, the type of activity level of an individual did not necessarily show his/her sports habit. Low sports habit was common in all studied communities. For example, nearly all participants from Dayak Kanayatn community claimed that they never did the exercise whether as daily nor spontaneous activities. Among communities, Chinese females and Madura males showed higher percentage of sports habit. Up to 61.7% and 17% of Chinese female participants claimed that they “seldom” and “yes” did the exercise, subsequently. Meanwhile, up to 26.1% and 21.7% of Madura males claimed that they “seldom” and “yes” did the exercise, subsequently.

DISCUSSION

Eating behavior is a complex interplay in which someone acts or conducts over food in response to various situation or stimulus. In this case, not only physiological and genetic factors but also psychological and social factors may influence the individual meal timing, quantity of food intake, and food preference. We found that eating activities were daily routines for the rural communities in West Kalimantan which conducted on the basic three times a day as in many other populations. Skipping meal, especially breakfast, was merely individual's choice eventhough more likely skipped by relatively higher number of participants in Chinese and Dayak Muduk communities than the other three communities. Meanwhile, dinner was

mostly perceived as a “must do” meal therefore conducted by nearly all participants in all communities, especially in Dayak Ketungau Sesae' and Dayak Kanayatn communities.

In general, the most frequent time for breakfast was around 6.00–6.59 a.m., lunch at 12.00–12.59 p.m., and dinner at 6.00–6.59 p.m. Slight difference of meal time between communities, especially for breakfast and lunch, was documented, yet not necessarily depicted the different concept of obtaining energy for the whole-day activities. Most participants in Dayak Kanayatn and Dayak Muduk communities had breakfast at 5.00–6.59 a.m. because they started to work at 6 or 7 a.m. Particular habit could be held by a group of people in certain population. For example, breakfast during breaktime at work was also common for the people in Dayak Ketungau Sesae' community in which food were also shared with the group members. Lunch time was the opportunity to have some rest for about half to two hours before they continued to do the same or different activities. Among farmers, taking bath before lunch was also common, especially in Dayak Kanayatn and Dayak Muduk communities. In Madura community, lunch time was usually adjusted with the time to take *sholat dzuhur* (noon prays) and rest for about an hour before they continued to do different activities. Among Madura people, it was common to have several jobs during daylight. On the other hand, as urban community, less variation of activities before and after lunch was found mostly in Chinese community. Whole-daylight activities were usually stopped around 5 p.m. which was usually started with taking afternoon bath. Dinner time was usually done after the whole family cleaned up and had leisure time. Dinner was mostly considered as important ritual of eating together as a family whether they sat in the same table, gathered around on the floor, or sat on the available chairs in certain room. Overall, eating timings were adjusted with the time of work and leisure time with the intention to get the energy from food or to have all family or group members together. According to Wood (1995), meals are customarily held to regulate the time, especially in the domestic level, and the tradition of eating together is considered as

valuable medium for social bonding within family members and friends.

We also found that skipping or having very early breakfast might influence the people to have lunch as early as 10 or 11 a.m. as observed in Dayak Muduk community. Other research found that skipping breakfast or waiting until 9 or 10 a.m. was not recommended since breakfast was very important to optimize the metabolism and should be done as early as possible (Alexander *et al.*, 2009; Huang *et al.*, 2010). Late dinner is also considered as a mistake that some people may make in his/her daily life. However, we only found late dinner in small percentage of people and 9 p.m. was the latest time they had dinner. Most participants had dinner at 6.00–6.59 p.m. and some others at 7.00–7.59 p.m. The best timing for dinner is also important to make sure the body rested from over digestion. Lying down for bed after meal may cause the food and digestive juices in our stomach press against the bottom of our esophagus, which in turn can cause heartburn, acid reflux, and indigestion. The amount of time food remains in the stomach depends on various factors, including the type and volume of food. Liquids exit the stomach within 1.5–2.5 hours after ingestion. After a typical meal, the stomach is usually empty within 3–4 hours (Seeley *et al.*, 2004).

Having snack between breakfast and lunch or between lunch and dinner were also common among these studied communities, however this activity was not regularly scheduled. Carbohydrate food source were also usually eaten as snacks, especially flour-based food such as noodle, bread, cookies, and mixed-vegetable fritters. Other carbohydrate food sources, such as tubers, corn and cereals, were sometimes considered as snacks, but at the other time could be considered as substitutes for rice as staple food. For example, in Dayak Kanayatn community corn and tubers were consumed as substitutes for rice, especially when there was enough supply for several days. Tubers were usually planted in the garden around the house. This habit was seemed to be preserved by the people until today as observed by Mintosih and Widiyanto (1997) in the 1990's. in Madura community, tubers and corn were sometimes combined

with rice but only by small percentage of people.

Basically, there are seven essential food components that the body needs for energy, growth, tissue repairs and to assist in the metabolic processes of the body, namely carbohydrate, unsaturated fats, protein, fibers, minerals, vitamins, and water. Even though dietary fiber is not categorized as essential nutrient, it is needed to ensure the water absorption along the larger intestine and prevent the constipation. In this research, we focused on five food components including carbohydrates, proteins, fibers, minerals, and vitamins. We found a variety of food source for each food component consumed by the people in the studied communities. Some of the food source were also obtained from nearest markets where usually located in the villages of the same district which more accessible for public transportation means.

Dayak Kanayatn people showed higher variation for carbohydrate sources, followed by Madura and Dayak Muduk communities. Carbohydrates provide energy and spare proteins to be used for growth and maintenance of body tissues rather than energy. However, recommended diet for carbohydrate intake of an individual per day for the prevention of diet-related chronic diseases has been suggested to be from 55% to 75% of total energy (WHO Consultation on Obesity, 2000). Major sources of carbohydrate should also have contained fibers at least 25 g/day for women and 38 g/day for men. Carbohydrate intakes for adults more than 51 years are 20% lower whilst for pregnant and lactating women, 12% higher. Consuming a variety of carbohydrate sources as a daily routine may help the body to get more nutrients. Unfortunately, we found that eating a variety of carbohydrate food sources was only done by small percentage of people within a community or only preserved in certain population. Rice was generally accepted as the main staple food for most Indonesians (Nurdin & Kartini, 2017) regardless the main carbohydrate food source produce in certain population. In order that, the higher preference for eating rice has caused people to think less about the nutritional equality that other carbohydrate sources have.

A variety of protein source food were also consumed by the people in the studied communities. Chicken, fish, and egg were three common food sources of protein from animals, meanwhile, tofu and *tempe* were those from plants. Chicken meat and eggs were usually consumed by the people who kept the chicken around the house, while fish were usually obtained from fishing from the nearby river or water channels. Although the level of protein sources preference was high enough, especially for chicken, fish, and egg, but the frequency of eating was relatively lower than carbohydrate food sources and vegetables. Other protein sources should be obtained from local markets, therefore fewer people consumed them. In addition, hunting and fishing was occasionally done by the people, yet they were meant for family consumption and not for sale. Except for Madura people who practicing Islam, pork was also common for animal protein source even though the consumers were not as many as the other three. On the other hand, beef was only consumed by the very small percentage of people in Madura community and relatively none in Dayak populations. Therefore, less variety of red meat was consumed by the people in these studied communities. In addition, milk and dairy products were not found as a food source of proteins consumed by the participants. There are possible reasons for such behavior which is not discussed in this research.

Low protein intake in the daily diet signified low intake of essential amino acids for the body. High-quality protein sources contain all essential amino acids and include meat, fish and milk products. Most plant sources of protein lack at least one essential amino acid and should be combined in order to supply all the essential amino acids. Protein are needed in nearly every process of the body cells and tissues, therefore low amount of protein in the daily diet may lead to poor health and short body stature. Compared to the people in Chinese population, both Dayak and Madura people had shorter body height on average. Inappropriate protein intake from infancy to childhood can cause disruption in the formation of new body tissues during the growth and development of the body. The daily need of protein intake is roughly 0.8

gram of high-quality protein every day for each kilogram of body weight (Trumbo *et al.*, 2002; Rand *et al.*, 2003).

Among communities, Dayak Muduk people ate more variety of vegetables than other four communities. We found 20 kinds of vegetables consumed by Dayak Muduk people, yet only 11-13 kinds of vegetables were found in the diet of other four communities, even in Chinese community who lived in urban areas with more probable market access. However, most kinds of vegetables were less variable in colors. Green leaves were dominant, especially mustard green, cassava leaf, water morning glory, and spinach. The number of vegetables consumed by the community may strongly reflect the actual condition of the availability of food sources in each location where the community lived in. Moreover, due to geographical factors, some vegetables should be supplied from outside the province, such as carrots, broccoli, and cabbage. Local produce of West Kalimantan in 2016 were only recording 18 and 23 kinds of vegetables and fruits, respectively (Bidang Statistik Produksi-Seksi Statistik Pertanian, 2016). Vegetables were collected from the nearest forest and garden, meanwhile among Chinese population some vegetables were mostly planted in the garden nearby their houses. Among these populations, this activity was mostly done by housewives.

Both the vegetables and fruits provide fibers, vitamins, and minerals. We found more varieties of fruits in Chinese population who lived in administratively urban areas of Singkawang City where the market access was easier than in the other communities. However, local fruits such as bananas and oranges were two kinds of fruits mostly consumed by the people in all communities. Except that for fruits collected from surrounding areas, affordability was assumed to be the main factor that determine the people's decision for fruits consumption as observed in many research (e.g. Dunn *et al.*, 2011; Jones & Charlton, 2015; Miller *et al.*, 2016). Collecting fruits from the forest or garden were cheaper than allocating certain amount of money which mostly done by young people in group. Unlike other food components, the availability of fruits in someone's daily diet was not

considered as number one priority among the people in the studied communities. As observed by Mintosih and Widiyanto (1997), eating fruits was still not considered as recommended food component and regularly consumed in daily diet.

Based on the estimate values of energy expenditure and activity levels conducted by every participant in each community, more females (56.6%) than males (36.7%) were categorized into moderately active and active life styles. However, females were also more prone to overweight in all communities (11.8% in males and 21.7% in females on average). Interestingly, obesity was only found in Dayak Muduk community, but the number was also low (5.3% in males and 3.2% in females). According to Diana *et al.* (2013), the significant risk factors of overweight (including obesity) among women were marital status (married), household income (middle to high income), living settlement (urban area), physical activity (sedentary life style), energy from carbohydrate, and energy from sugary sweetened foods. Based on the results observed in this research, we found that being married and obtaining main energy from carbohydrate food source were two dominant factors for the high prevalence of overweight and obesity among women in these rural communities in West Kalimantan. Diana *et al.* (2013) also found that in Indonesia married women had three times higher risk than single women. The increase of adiposal tissue especially in abdominal area was mostly observed during pregnancy which in turn less likely to be eliminated after the baby was born. In addition, main energy from carbohydrate food source was more likely to obtain especially when the other food source were not or less available. On the other hand, the active life style might psychologically urge people to eat more in order to get more energy without considering the proper balance of calory obtained from daily food.

The average number of calories needed per day among females was 2151 and males was 2338. Madura people showed the highest number of calories needed (2391 in females and 2610 in males on average), meanwhile Chinese people showed the lowest (1964 in females and 2118 in males on average) than

the other four communities. Most people in Chinese community also showed sedentary life style which was up to 70.2% in females and 88.4% in males. As observed by Ding *et al.* (2011), farmers had significantly more occupational physical activity than their non-farming counterparts. Nevertheless, the prevalence of overweight and obesity in Chinese community were lowest for both gender compared to the other four communities. On the other hand, we found that the sport habit among people in Chinese community was higher than that in the other four communities. We assumed that the sedentary life style allowed these Chinese people to spend more time for exercise, yet this habit was mostly not regularly scheduled.

Based on the above explanation, there were four main factors that influence the eating behavior of rural communities in West Kalimantan, namely types of occupation, individual involvement in social groups, the food availability, and individual's affordability to obtain food. We believed that these four factors were interconnected to each other. Most daily energy expenditure was spent in the workplace and sports habit was mainly determined by individual's choice. As seen in Dayak and Madura populations, the psychological desire to meet sufficient energy for his/her heavy work might cause people to eat more than they really need. On the other hand, food preference could not be ascertained in this research in which every individual in community was more depending on the availability and the affordability of food source than the other reasons for consumption, such as taste and health concern. For these reasons, the people were still conducting food gathering from nature supply in his/her surrounding areas or depending on the local produce.

According to the above condition, we assumed that the need to improve the people's welfare in order to increase the availability and affordability of more variety of healthy food were crucial for promoting the balanced and healthy diet among these rural communities. Market access should be increased either by improving the road and public transportation facilities or by developing the village itself. This improvement was also aimed for diversification of business field of the rural

communities, in this case people not only work to get daily food but also to get bigger financial opportunities as well as to drive other economic potential. On the other hand, for the current condition, the land conversion of natural forest and garden which provides food for the rural communities can be disadvantageous especially for certain social groups that have limited access to other affordable food source supply.

CONCLUSION

Among the people in rural communities in West Kalimantan, eating was a three-time daily routine which was oriented to get energy from food. Highest level of preference on carbohydrate, protein, and fiber, vitamin and mineral were rice, fish and *tempe*, mustard green and banana, subsequently. Madura people showed highest meal frequency than Dayak and Chinese communities. Daily energy expenditure was ranged between 1505-2994 in males and 1364-2997 in females. Females showed more active life style than males in all communities. Sports habit was found low in most communities. Severe underweight was found highest in Dayak Kanayatn males (8%), meanwhile the highest percentage of obesity was found in Dayak Muduk males (5.3%). In addition to the three major eating activities, several other eating habits were also found, such as skipping breakfast, having snack between meals, late dinner, and eating together in a group. Carbohydrates were a more important food component than proteins and vegetables and fruits as sources of fiber, vitamins and minerals. Low market access has caused the community to rely more on the availability and the affordability of the food by still conducting food gathering from surrounding areas. This condition also made them more dependent on the supply of affordable food than to get healthy and balanced food. Overall, four main factors influenced the eating behavior of rural communities in West Kalimantan included types of occupation, individual involvement in social groups, the food availability, and individual's affordability to obtain food. The tendency of land conversion especially natural forest and garden which provides food for the rural communities can be disadvantageous

especially for certain social groups that have limited access to other affordable food source supply.

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