The Relationship between The Diet Pattern with Nutritional Status of Pregnant Woman of Dayak Kenyah Tribe in Tabang Sub-District, Kutai Kartanegara Regency in 2014

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Abstract

Based on the data, there is a lack of nutritional status of pregnant women in Dayak Kenyah tribe. Diet is an effort for improving the nutritional status by fulfills the needs of pregnant women. The purpose of this study is to determine the relationship between diet and nutritional status of pregnant women in Dayak Kenyah tribe. The study design is a cross sectional in which the diet (type of food, frequency of meals, and method) as an independent variable and nutritional status as the dependent variable. The population is all of Dayak Kenyah pregnant women, who live in Tabang Sub-district with 72 respondents as the samples. Data were collected by questionnaire as Food Frequency Questionnaire (FFQ) and calculation of nutritional status as measured by measurement of Upper Arm Circumference (MUAC) and Hemoglobin (Hb). Data analysis using SPSS programe by using the chi-square at a significance level of á = 0.05. The result of the study are 12 respondents have a good diet with not anemia, 27 respondents have a good diet with anemia, 6 respondents do not have a good diet and with not anemia, and 27 respondents do not have a good diet with anemia.

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Out of all samples, 36 respondents have a good diet and are not suffered of Chronic Energy Deficiency (CED), 3 respondents have a good diet and are suffered with CED, 30 respondents have not a good diet and are not suffered CED, and 3 respondents have not a good diet with CED. As the conclusion there is no significant relationship between the diet and nutritional status of pregnant women with p (0.29) and p (0.83).

Keywords: diet; nutritional status; pregnant women.

1. Introduction

Pregnant women are one of the groups who are vulnerable to malnutrition, because of an increase in nutritional requirements to meet the needs of the mother and fetus. Wrong diet in pregnant women have an impact on the occurrence of nutritional disorders including anemia, less weight gain and fetal growth retardation [1, 2].

According to Harper in 1986; Diet (Dietary Pattern) is the way in which a person or group of people choose and consume foods as a reaction to the influence of physiological, psychological, cultural and social.

A diet consists of a variety of information that gives an idea of the kinds and amount of food consumed every day by one person and has a characteristic to every community. Food consumption is the total amount of food available for consumption [3]. Dietary patterns and eating habits are influenced by the culture (abstinence and taboo) and also by other factors such as environment, the availability of foods, economic considerations, education and nutrition awareness. Economic and non-economic factors influence each other, even very dominant socio-cultural factors [4]. While the final reason is the nutritional value.

The proper diets, regular, balanced, varied and nutritious have been giving a positive impact on the body. The impact is marked with normal nutritional status or commonly called the Body Mass Index (BMI). BMI is the standard used to calculate the weight (kg) and height (m^2) to determine the actual status of the state of the body. For pregnant women were measured by regular monitoring of the increase of body weight every month.

Nutritional status is the state of health of an individual or group that has been determined by the degree of physical needs for energy and other nutrients derived from food and measured the physical impact by anthropometric examination [5]. Nutritional status of a person is a picture of what is consumed in the long term. Nutritional status can be malnutrition and over nutrition. Shortage of one nutrient can cause disruption of the consequences of deficiency diseases.

Nutritional status of pregnant women is very important to note because the various adverse effects can happen either to the mother or the pregnancy itself on the health of the fetus. The nutritional status of pregnant women can be measured with the measurement Upper Arm Circumference (MUAC) and the Weight. MUAC measurement is a way to determine the risk of energy and protein deficiency in childbearing women. MUAC measurements cannot be used to monitor changes in nutritional status in the short term.

Basic Health Research by [6] found anemia in adult women in East Kalimantan Province level is 24.2%, exceeding the national rate of 19.7% and Chronic Energy Deficiency in childbearing women is 17%, exceeding

the national rate of 13.6%. The analysis on the coverage of iron tablet supplementation (Fe3) and antenatal care (K4) showed a large gap between the coverage Fe3 with K4. Basic Health Research form [7] reveal that antenatal care visit (ANC) 4 times only amounting to 61.4% and coverage of iron tablet supplementation (Fe3) > 90 tablets in pregnant women is only 18%. Both are far from the target of the MDG's respectively 95% and 85%. Survey of Nutrition Awareness Family (Kadarzi) 2007 (8) in Kutai regency showed that the compliant of consuming 80-90 iron tablet among pregnant women only 34.9%, and for the Sub-District Tabang only 12.8% and it is low among all sub-districts in Kutai regency.

2. Method

This study was a analytic-observational and cross sectional study design. The study population was all pregnant women in Tabang Sub-District – a very remote area (±480 miles) from the capital of Kutai Kartanegara Regency with the main inhabitants is Dayak Kenyah tribe. Samples were 72 pregnant women. Samples were taken based on the normal distribution or Gausse Distribution. The criteria for the sample were pregnant women who were willing to follow the research. The experiment was conducted during the month of July 2013 to May 2014. Data collection was done by trained field officers and using a food frequency questionnaire (food frequency questionnaire). Hemoglobin levels of pregnant women assessed in the field through cyanmethemogobin method using the blood HemoCue photometer. Measurements of upper arm circumference (MUAC) were measured using MUAC tape. Food frequency data was processed by manual and Excell Software program. Bivariate analysis was done using SPSS 16.0.

3. Result and Discussion

In general, the dietary can be defined as a way or behavior of a person or group of people in selecting and using food ingredients in the menu on a daily basis which includes the type of food, the amount and frequency of eating food that is based on social and the culture factors in which they live.

Diet is basically the cultural concept related to food and is heavily influenced by the prevailing socio-cultural elements in the society groups, such as social values, social norms and cultural norms related to food, what is considered good and not good.

Based on the results of a food frequency in this study found that rice is a main diet and patterns of consumption of pregnant women and families in the Dayak Kenyah tribe in Tabang. All of them consumed it as a staple food, and approximately 86.6% were the result of the production of their own farm. Instant noodles as a new fast food menu tends to be a pattern but not as a staple food. It sometimes is served as supplementary foods or vegetables, as well as a corn are only consumed as a vegetable.

Table 1: A Diet Pattern of Dayak Kenyah Tribe in Tabang Sub-district, Kutai Kartanegara, 2014

Type of Foodstuffs	Total				
	Every	2-3 times in	Once in a	Once in a	Never

	day	a week	week	month	
Staple food					
Rice	72	0	0	0	0
Corn	0	25	13	28	6
Cassava	0	14	15	35	8
Sweet potatoe	0	2	4	26	35
Sago	0	0	4	10	58
Instant Noodle	11	38	14	8	1
Others	0	0	0	0	72
Animal side dish					
Meat	2	38	17	10	5
Chicken	0	14	18	32	8
Egg	8	48	12	3	1
Viscera	0	3	1	10	58
Fresh Fish	11	43	9	6	3
Dried fish	1	10	10	28	23
Seafood	0	2	1	12	57
Frog	0	0	0	1	71
Snail	0	0	0	3	71
Vegetable dishes					
Tempe/tofu	3	23	16	23	7
Soybeans	0	1	1	6	64
Greenbeans	0	10	10	33	19
Peanuts	1	12	13	33	13
Long beans	0	20	1	5	46
Vegetables					
Water spinach	3	53	6	6	4
Spinach	1	39	10	11	11
sweet potato leaves	0	7	0	12	53
Cassava leaves	9	43	9	3	8
Moringa leaves	0	0	0	1	71
Papaya leaves	1	13	2	3	55
Sauropus androgynusleaves	0	6	0	1	65
Momordica leaves	0	0	0	0	72
Sweet Brassica leaves	0	14	3	6	52
Bitter Brassica leaves	2	15	5	2	48
Nephrolefis bisserata (sword	0	0	3	1	68

fern)	1	16	3	4	48
Danum fern	0	17	6	1	48
Red fern	0	0	0	0	72
Athyrium	0	7	1	2	62
Cucumber leaves	0	0	5	1	66
Pineaples (Umbut nenas)	0	0	1	0	71
Sweet potato (Umbut keladi)	0	0	1	0	71
Cane (Umbut tebu)	1	13	4	6	48
Yellow Cucurbita (pumpkin)	1	2	5	0	64
White cucurbita	0	0	3	0	69
Velvet leaf (Limnocharis)	0	0	5	0	67
Mushroom	0	0	0	1	71
Flower of banana	1	9	1	0	61
Solanum	1	4	1	0	66
Bamboo sprout	0	4	3	0	65
Carrots	0	3	4	0	65
Potato	0	15	3	1	53
Purple eggplant	0	1	0	0	71
Onion leaves	0	3	1	2	66
End rattan	0	2	1	0	69
Galangal	0	4	2	1	66
Cabbage	0	6	1	0	65
Cucumber	0	1	0	0	71
Babby corn	0	1	0	0	71
Squash					

Fruits

Banana	6	34	13	13	6
Mango	0	2	6	34	30
Orange	1	10	8	31	22
Papaya	0	9	9	31	23
Breadfruit	0	0	0	1	71
Water melon	0	0	0	1	71
Longan	0	1	1	4	66
Salak / bark	0	0	1	0	71
Apple	0	0	1	0	71
Guava	0	1	0	0	71
Pine apple	1	0	0	0	71
Water apple	0	0	1	0	71
Rambutan	0	0	0	4	68

Young coconut	0	0	0	1	71
Durian	0	0	0	2	70
Lansium/Langsat	0	1	0	2	69
Jackfruit	0	0	0	1	71
Beverages					
Tea	54	3	4	3	8
Coffee	33	3	5	8	23
Sugar	60	2	2	0	8
Milk	32	8	4	9	19
Oil					
Coconut oil	0	5	9	42	16
Palm oil / cooking oil	64	3	2	0	3

Source: Primary Data

In the group of meats; there are meat, chicken, eggs and fresh fish into the diet of pregnant women and families in the Dayak Kenyah tribe of Tabang. Those foods are good sources of protein and iron are high and easily available in the community. The meat (56.7%) was obtained from the results of their own pet or hunting cattle, chicken (75%) of pet itself, eggs (45.2%) of his own pet chickens and wet fish (35.7%) were searched and arrested from the rivers, creeks and lakes. This can save costs on food for the family. Likewise, the group of vegetables, which is being a dietary, is water spinach, spinach and cassava leaves. Consumption of other green vegetables was also high but did not become a pattern. Consumption of green vegetables is very good for health. Its contain the higher levels of carotene, vitamin C, vitamin A and iron compare to other vegetables [9]. Vitamin C may help the absorption of iron in the prevention of anemia, but when the iron is consumed in limited quantities, the function of vitamin C as an enhancer of iron will not run [10]. Vitamin C has a very important role in the absorption of non-haem iron, especially iron which is found in many plant foods. Therefore, the less consuming vegetables and fruit can inhibit the absorption of iron in the body that can cause anemia. Vitamin A also plays a role in the absorption of iron in the body so that the required intake sufficient to facilitate the absorption of iron, especially the consumption of fruits and vegetables that are rich in vitamins. Vitamin A is a fat soluble vitamin that can help absorption and mobilization of iron for red cell formation. The low status of vitamin A will make iron stores cannot be utilized for the process of erythropoiesis. In addition, Vitamin A and β-carotene will form complexes with iron to create iron remains dissolved in the intestinal lumen so that iron absorption can be helped [11]. Vitamin A deficiency can cause interference with the metabolism of iron [12, 13, 14]. Vitamin A deficiency can cause anemia through effects on iron metabolism, hematopoiesis, and increased susceptibility to infection [15]. Some nutritional research from around the world shows a close relationship between vitamin A deficiency and anemia [14]. There is clear evidence of the relationship between serum retinol and indicators of iron and vitamin A deficiency is considered as one of the causes of anemia [15].

In addition to common vegetable consumed by the people of Indonesia, there is also typical Dayak Kenyah vegetables themselves. As said by Suhardjo that the diet of population in a country or region are usually

available from local food or from food grown on the spot for a long period of time [16]. Therefore, there is a plant type which is commonly known as ferns (**Pteridophyta)** in the Dayak Kenyah community, a plant that grow freely around the village or in the forests. The types of that ferns which is widely consumed are *danum paya' (red fern), paku julut* and *paku pa'it*. These vegetables are very well trusted to be consumed by pregnant women in order to get health and not less blood and also very well taken when the body feels less comfortable. The fulfillment of this green vegetable is a daily dietary of pregnant women and families in Dayak Kenyah community. The ferns (**Pteridophyta)** are easily and widely available around the community. It was 58.9% from the own farm, and the rest from the forests.

Foodstuffs of vegetable and group of beans such as peanuts and green beans did not become a pattern for pregnant women and Dayak Kenyah families. However *tempe* (a kind of food produced from soybean) is famous as a food ingredient from Javanese that has become a national food ingredient and known even in other countries, has been a family pattern in pregnant women in the Dayak Kenyah tribe of Tabang. According to information from health workers from health centers in Tabang and Ritan clinics known that *tempe* sold in Tabang and Ritan was derived from the production of people or inhabitants in 3 (three) different villages or places. The first was located in the village of Sungai Lunuk which was a Dayak Punan tribe lived. The tempe here were produced by the Javanese people who live there, both located in the capital sub-district of Tabang, was produced by people of Kutai tribe, soy material derived from downstream (city district) only the packaging was done in the Tabang Sub-District and being a homemade production by Dayak people in Ritan Baru village.

Husaini and Husaini stated that eating habits can be changed and will change, even if the change does not take place easily. The changes will occur if the individual is aware and have the desire and the need for being changed [17].

Fruits group, which became the pattern, was bananas and papayas. Fruits are not easily available in the villages in Tabang Sub-district. The fruits such as oranges, apples and thorny palm are usually sold at seasonal local market or purchased when go to town. Other local fruits were Isao fruit (*Euphoria cinerea*) which is still in family of *Dimocarpus longan* and durian fruit.

In the group of beverages, there were coffee, sweet tea and milk that being a pattern in the family. The research results of Suhaimi on the natives of Borneo recommended to reduce the daily habit of drinking tea and coffee with lots of sugar, and transferred to the consumption of vegetables, fruits and beans because their food quality scores were above the ideal food quality scores [18].

Moreover, for the group of oil; cooking oil is only the pattern while the coconut milk is not a dietary pattern. According to the traditional leaders, the coconut milk is not commonly used for cooking and not become a pattern in the diet of the family because of the habits in Apo Kayan, their place of origin in Ddistrict of Bulungan (now Malinau District) where very rarely grow coconut trees and this also affects the pattern of family cuisine menu in Dayak Kenyah that only boiled. Coconut trees here are less produce fruits because its altitude which is too high [19]. Likewise meat just boiled with herbs lemon grass alone, do not use many types of herbs and the fish is simply grilled or baked. Food processing only boiled and baked or grilled. It is very rarely cooked

by frying. This supports for healthy living, as in the case of meat processing, to get lean meat should be cooked with roasted, baked and boiled. This method is better than fried [9]. Likewise with seasoning or MSG, they also use the seasoning from their nature vicinity; its name leaves *Mekai* (*Albertisia papuana Becc*) instead of MSG.

Based on the study of Suhaimi, it was found that the quality scores of a group of food commodities oily fruits and seeds are under the ideal of food quality score. Hence, it was therefore advisable to increase the consumption by adding variations to process food, vegetables with coconut milk and hazelnut and adapted to local tastes.

Frequency of pregnant women in consuming food of Dayak Kenyah tribe was generally three times a day following the usual pattern, but there are also only eat twice a day, while eating with a frequency of more than 3 (three) times a day is just 4.2%.

Frequency of pregnant women eat in a day was known that 63.9% with a frequency of eating was three times a day, 31.9% with a frequency of eating was 2 (two) times a day and 4.2% with the frequency of eating was more than 3 (three) times in a day (Table 2).

Table 2: Distribution of Frequency of Eating in a Day (Main Food) on Pregnant Women in Dayak Kenyah in Tabang, Kutai Kartanegara in 2014

Frequency of Eating	n	%
2 times	23	31,9
3 times	46	63,9
>3 times	3	4,2
Total	72	100,0

Source: Primary Data 2014

a.   Diet relationship with Anemia

A diet affects the incidence of anemia. In this study, the relationship between anemia nutritional status of maternal with dietary was not statistically significant at $p = 0.29$.

The relationship between anemia nutritional statuses with diets is presented in Table 3.

From Table 3, it is known that pregnant women who have a good diet, there are 30,8% of pregnant women who are not anemic and 69,2% of pregnant women who are anemia. While those with less diet, there are 18,2 % of pregnant women who are not anemic and 81,8% of pregnant women who are anemic. The statistical test shows that $p = 0.29$, meaning that the relationship is not statistically significant. The relationship between diet with anemia in pregnant women of Dayak Kenyah tribe, although not statistically significant, but it is clear that pregnant women who have a good diet also have better nutritional status regarding of anemia.

Table 3: Relationship between Nutritional Status (anemia) with Diet (Food Frequency) of Pregnant Women in DayakKenyah Tribe, Tabang, Kutai Kartanegara in 2014

Category of FFQ	Category of Anemia				Total		The value of p
	Non Anemia		Anemia				
	N	%	n	%	n	%	
Good	12	30,8	27	69,2	39	100	0,29
Less	6	18,2	27	81,8	33	100	
Total	18	25,0	54	75,0	72	100	

Source: Primary Data 2014

A diet pattern is a qualitative picture of the family eating habits and formed in the family which is strongly influenced by customs [20], work location and the location of settlements [21]. The diet of pregnant women and families of Dayak Kenyah illustrates that their diet supports the prevention and controlling of anemia in pregnant women. Some food sources of high iron belong to the diet of Dayak Kenyah family such as meat, fish, eggs, chicken, tempe/tofu, cassava leaves, spinach and water spinach. Based on the data of this study, it is noted that the type of food sources which are high in iron into a pattern is able to reduce the incidence of anemia in pregnant women of Dayak Kenyah tribe. The evidence of this relationship can be known from the results of the cross tabulation between food sources with high iron. For a meat in diet pattern, the consumption of meat in every day is stating that 50% of pregnant women are not anemia, while who never eat meat, only 40% without anemia. This means that the meat diet can reduce 10% incidences of anemia in pregnant women of Dayak Kenyah tribe. Further, the chicken diet can reduce the incidence of anemia by 3.6%; eggs can reduce by 25% of the incidence of anemia, reduction of 12.2% from wet fish, tempe reduced by 19% of the incidence of anemia, spinach reduced by 54.5% of the incidence of anemia. Whereas in water spinach and cassava leaves had a higher percentage with anemia in pregnant women who consumed each day than never consumed, and it turned out pregnant women who consumed every day was the age of the second and third trimesters of pregnancy meant that the age of the hemodilution (blood thinning).

In addition, it is also important that the most of food ingredients was gotten from their own business without having to be purchased. One of the culture that also supports to eat healthy foods, especially to prevent anemia is a way to process the meat in Dayak Kenyah which was more done by roasted or baked and boiled, very rarely cooked by frying as good sources of iron are lean meats and how to process the meat so lean that with roasted, baked and boiled. The way on how to cultivate Dayak Kenyah cuisine was a pattern that had been formed from their ancestors who used to live in Apo Kayan. In that time, it was very difficult to get coconut oil and thus reflected in their cuisine menu with almost no milk.

Many researchers studied the effect of various types of proteins on the level of non-heme Fe absorption showed that the protein from beef, chicken, fish and eggs can be more effective in increasing the availability of biological Fe. The choice of eating animal sourced foods along with cassava leaves or spinach (as a source of

non-heme Fe), will cause the amount of Fe to be absorbed and retained body becomes higher. The increase in absorption is due to the presence of Meat, Poultry and Fish Factor (MPF factor) which makes Fe becomes more soluble, so it is more easily absorbed by the body [22].

b.   The Relationship between Diet Pattern with Nutrition Status (Lila) in Pregnant Woman

Relationship between diet and nutritional status of pregnant women Lila is presented in table 4.

Table 4: The Relationship between Nutritional Status (CED) with Diet Pattern of Pregnancy Woman in Dayak Kenyah, Tabang Sub-District, Kutai Kartanegara in 2014.

FFQ	Nutritional Status Lila				Total		The value of p
	Normal		CED				
	n	%	n	%	n	%	
Good	36	92,3	3	7,7	39	100	
Less	30	90,9	3	9,1	33	100	0,83
Total	66	91,7	6	8,3	72	100	

Based on Table 4, it is known that pregnant women who have a good diet, there are nine (9) out of every 10 pregnant women who are not suffered of CED and 1 (one) out of every 10 pregnant women, are suffered of CED, as well as who have lack of diets, there are 9 (nine) out of every 10 pregnant women who are not suffered of CED and 1 (one) out of every 10 pregnant women who are suffered of CED. Statistical analysis showed p = 0.83 means that do not meaningful.

A diet pattern did not significantly associated with nutritional status (Upper Arm Circumference = UAC) of pregnant women, p> 0.05. However it can be explained that a mother with a good diet had a higher percentage a normal UAC (92.3%) than pregnant women with less diet (90.9%). The percentage of pregnant women who had suffered of Chronic Energy Deficiency (CED) is only 8.3%.

A good diet should be formed as an effort to meet the nutritional needs, especially for pregnant women who need good nutrition. A diet that does not comply will cause excessive or deficient nutrient intake (22). Research Susilo (2000) found that CED in pregnant women in Bantul approximately 28.69% caused by the diet pattern that not good where 17.2% had a meal frequency is less than 3 times / day and 55.7% had eating during pregnancy less or the same as before pregnancy.

4. Conclusion

Relationship between diet and nutritional status of anemia in pregnant women Dayak Kenyah tribe is statistically not significant (P = 0.29). Similarly, the relationship between diet and CED status of pregnant

women shows a non-significant relationship (p = 0.83).

Reference

[1] Ojofeitimi EO, Ogunjuyigbe PO, Sanusi, et al. *Poor Dietary Intake of Energy and Retinol Among Pregnant Women: Implications for Pregnancy Outcome in Southwest Nigeria.* Pak. J. Nutr. 2008; 7 (3): 480-484.

[2] Choudhury N and Ahmed S.M, 2011. Maternal Care Practices Among the Ultra poor Households in Rural Bangladesh: A qualitative Exploratory Study, *BMC Pregnancy and Childbirth,* 11: 15.

[3] Hadju V, N and Kesumasari C Djafar, 1999. *Practical Guidelines of Basic Nutrition*, Public Health Faculty, Hasanuddin University, Makassar.

[4] Fatimah, Hadju V, Bahar B, Abdullah Z, 2011. *Consumption Patterns and Hemoglobin Levels in Pregnant Women in Maros, South Sulawesi-*, Makara, Health, Volume 15, No. 1, June , 2011, 31-36.

[5] Suhardjo, 1996. *Food and Nutrition Planning*, Publisher; Bumi Aksara, Jakarta.

[6] The Ministry of Health, 2008. *National Report of the 2007 Basic Health Research ,* Jakarta.

[7] The Ministry of Health, 2010. National Report of The 2010Basic Health Research, Jakarta.

[8] The Kutai Kartanegara Regency Health Authority, 2007 Report Survey of the Family Awareness on Nutrtion in Kutai Regency, Tenggarong.

[9] Indiarti MT, 2010. *Food for Pregnancy*, Publisher: Pustaka Panasea, Yogyakarta.

[10] Setijowati Nanik. 2012. *The Influence of Mothers' Characteristics and Food Consumption with Status Of Anemia In Pregnancy In Puskesmas Dinoyo Malang.* Journal of Nutritional Science Program, Medical Faculty of Brawijaya University, Vol. 2. No. 1. 20-22

[11] Kirana Dian Purwitaningtyas. 2011. *Relationships Between Nutrients Substance Intake and Patterns of Menstruation With the Occurance of Anemia In Teenagers At Senior Middle School No 2 Semarang.* Research article. Diponegoro University.

[12] Mejia LA, Chew F. 1988. *Haematological effect of supplementing anaemic children with vitamin A alone and in combination with iron.* Am J Clin Nutr. 48: 595-600.

[13] Suharno D, West CE, Muhilal, Karyadi D, Hautvast JGAJ. 1993. *Supplementation with vitamin A and iron for nutritional anemia in pregnant women in West Java*, Indonesia. Lancet. 342: 1325-1328.

[14] Ahmed F, MR Khan, Karim R, Taj S, Hyderi T, Faruque MO, et al. 1996. *Serum retinol andbiochemical measures of iron status in adolescent schoolgirls in urban Bangladesh.* Eur J Clin Nutr. 50: 346-351

[15] Semba RD & Bloem MW. 2002. *The anemia of vitamin A deficiency: epidemiology and pathogenesis.* Eur. J. Clin. Nutr. 56: 271-281

[16] Suhardjo, 1989. Sosiocultural ofNutrition, Ministry of Education and Cultural, General Directorate of Higher Education, Center of Inter-University of Food and Nutrition, Bogor Agricultural University.

[17] Husaini M.A and Y.K. Husaini, 1986. *Nutrition: Brain Development and Learning Ability*, Nutritionist Association of Indonesia, Journal of Indonesia Nutrition, 10: 31-38, Jakarta

[18] Suhaimi A, 2007. *Food Consumption and Nutritional Status on Indigenous Peoples in East Kalimantan (Social, Cultural and Economic Approaches)*, unpublished dissertation, Hasanuddin University Post Graduate Program, Makassar.

[19] Soedjito, 2005. *Apo Kayan: A Hunk of Heaven in the Land of Kenyah,* Publisher: Association of Indonesia Ecology, Indonesian Council of Science, Bogor.

[20] Tan G, Melly, D Abunain, Suharso, Raharjo, Soetedjo and Soenardjo, 1970. *The Aspects of SocioCultural of Consumption Patterns and Eating Habits in Five Rural Villages in Indonesia.* National Economic and Social Institute, Directorate of Nutrition, Ministry of Health, Jakarta.

[21] WHO, 1976. System of Nutrition Observation and Monitoring, Translation AD Sediaoetama, Bharata Karya Aksara, Jakarta.

[22] Sulistyoningsih H, 2012. *Nutrition for Mother and Child Health*, Publisher: Graha Ilmu,Yogyakarta.