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Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

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Biodiversity and Nutrition Availability in a Matriarchal System in West Sumatra

Wahyudi David[1], Anwar Kasim[2] and Angelika Ploeger[3]
[1]Department of Food Science and Technology, Bakrie University, Jakarta, Indonesia
[2]Department of Food Science and Technology, Andalas University, Padang, Indonesia
[3]Department of Organic Food Quality and Food Culture, Kassel University, Witzenhausen, Germany

Abstract: Meals are human creation that unconsciously represents the way in which part of the world they are living and based on they culture background. Recently, the issue about food is not only how to prepare it but as well as how to get nutritious food supporting human health from limited natural resources. From this view point, choosing food gives an insight not only on the nutrition itself but about cultural and environmental factors as well. The objective of this study is to investigate if biodiversity plays still an important role in supporting local food security and sustaining nutrition intake in a matriarchal system. The study was done in Minangkabau; in coastal area, hilly area and lake area of West Sumatera, Indonesia. Participatory Rural Appraisal (PRA) was used to investigate biodiversity and nutrition intake. Qualitative and quantitative research technique include: In-depth interview and survey were carried out. The data was coded and clustered by using MAXQDA10. The results indicate that the matriarchal system is still playing an important role in nutrition intake in Minangkabau. The mother plays important roles in kitchen activity, meal decision and land ownership, although she is not involved directly into farming. The mother plays important role to increase the nutrition intake in the household by using local food diversity or by cultivating spices in the backyard. Thus matriarchal system generates kitchen representing women activity and play still an important role in managing the farm to fork activities.

Key words: Biodiversity, nutrition intake, matriarchal system, West Sumatra

INTRODUCTION

Local food security is closely related to accessibility and availability including diversity of food which considers local biodiversity (David, 2011a). Preservation of biodiversity needs the awareness and responsibility of people on their ecological environment while choosing, preparing, consuming and enjoying (Meier-Ploeger, 2001). Indigenous nutrition intakes are usually rich in biodiversity, creating a demand for bio-diverse agricultural products. Therefore, if the demand for these nutrition intakes can be sustained, the agricultural biodiversity in a region such as West Sumatra can also be preserved for generations to come, subsequently supporting local food security.

According to Altieri (2001) traditional farming systems are based on biodiversity where genetic diversity is a key component to manage risk and reliance on agro-chemical. One of the most important features of traditional farming system is their high degree of biodiversity (Altieri, 2003) which will also contribute in preventing the erosion of genetic resources. Moreover, a farming system provides a lifestyle that binds a household together and subsequently leads to passing of family heritages to future generation's trough inheritance of the farm (Edward *et al*., 1993). According to Brown and Hodgkin (2007) one of the indicators in managing genetic diversity in situ is protection of traditional knowledge. The genetic diversity is important in providing adaptation to environmental changes and extremes and providing the natural variation for the future (Brown and Hodgkin, 2007).

In Minangkabau culture (most populous West Sumatran ethics), women are responsible to pass knowledge to their clan and inheritances. There are not many adequate manuscripts or monographs giving information about when the matriarchal system in Minangkabau started. But one of the reasons to keep the inheritance as the woman's role is to avoid the conflict between the brothers who hereditary have different fathers. The Minangkabau are an excellent example that illustrates the practicality managing biodiversity and natural resources and their nutrition intake. In Minangkabau, as one of the biggest matriarchal clans, the mother plays a role from agricultural production up to preserving and processing of food. The interesting motivation of the Minangkabau is they maintain their farmland in unique way to prepare their food in comparison to other Southeast Asian culture.

The Minangkabau's kinship system does not require women to leave their relatives when they marry; women inherit land and women play an active role in food production all for their families (Van Esterik, 2008).

Corresponding Author: Wahyudi David, Department of Food Science and Technology, Bakrie University, Jakarta, Indonesia

After more than three decades of research, it is clear that men and women play different roles within the agricultural production and processing of food and occupy different socioeconomic positions as a result of these different roles. Since, households and other social units have an impact on long term well being related to their environments (Carr, 2008), the role and individual activity of family members become more important to be studied. Choosing policies for agriculture development requires the use of information about the existing role of matriarchal system, gender and education in Minangkabau (West Sumatra, Indonesia) to give positive contribution in both traditional farming systems and Nutrition intake. Therefore, the objective of this study is to investigate, if women still play an important role in the food chain and taking care of the regional biodiversity supporting local food security and sustained nutrition intake in matriarchal system in West Sumatra.

MATERIALS AND METHODS

The primarily data collection method is Participatory Rural Appraisal (PRA) which is comprised of qualitative and quantitative. PRA is an approach for holistic analysis for local condition with participation of local stakeholders (Grenier, 1998).

In qualitative data collection the method is ethnography (observation and in depth interview) with key persons and local people. The observation covers all about the daily life activities from cultivation up to nutrition intake. The observation is recorded to multimedia devices (small audio recorder). According to Rapley (2009), using recorder is easy to reply and produce transcript and then selectively draw on these to provide demonstration of emerging argument. The sampling technique in this investigation is the snowball sampling. It is very useful to find out whom people know and how they now each other, it is also useful in this study of small, bounded, or difficult to find the population. The qualitative analysis is used MAXQDA version 2010 software (VERBI GmbH) for text analysis and voice analysis (Corbin, 2008). This software is developed by Philip University Marburg, Germany.

In quantitative data collection, survey was conducted by using structured questionnaire for the households with a personal in home survey. The structured questionnaire covers nutritional intake and land status of ownership, crops production and demography. 50 respondents at each site (200 in total) voluntarily participated in this study. The research was done in West Sumatra, in four different topological sites: The study was completed at four locations in West Sumatera; *Nagari Ulakan* (NU) (coastal area), *Nagari Aia Batumbuak* (NAB) (hilly area), *Nagari Padang Laweh Malalo* (NPLM) (lake area), *Nagari Pandai Sikek* (NPS) (hilly area). The rainfall ranged from 1400- 4800 mm annually with fertile soils.

RESULTS

Biodiversity: The intensive agriculture policy in Indonesia enforced the farmer within the last few decades and by these changes of traditional farming system in the research areas might have happened. However, the topographic (soils, altitude, rainfall and temperatures) is assumed not as a factor that reflects a change of high of biodiversity related to food ingredient. The region NPLM has a higher-biodiversity related to food ingredient-compared to other site (NU, NAB and NPS) in West Sumatra even though this side is relatively similar in temperature (19-38°C) and rainfall (1400-4762 mm/year). The highest biodiversity is because of the awareness of local people in NPLM (Fig. 1 and 2). People realized, they are in unfavorable climate and topographic condition. Therefore they are more prepared for any possibilities in change e.g., climate change. Topographically the location experiences cloudy conditions daily, the winds come from the top of the hill, north east of the NPLM. Interestingly, there is not enough rainfall even though data shows an annual rainfall is

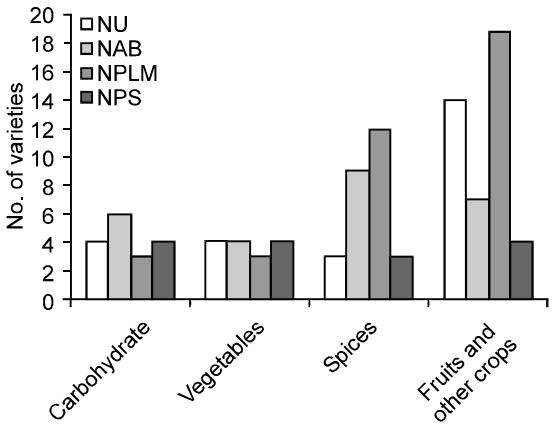

Fig. 1: (a) Biodiversity distribution

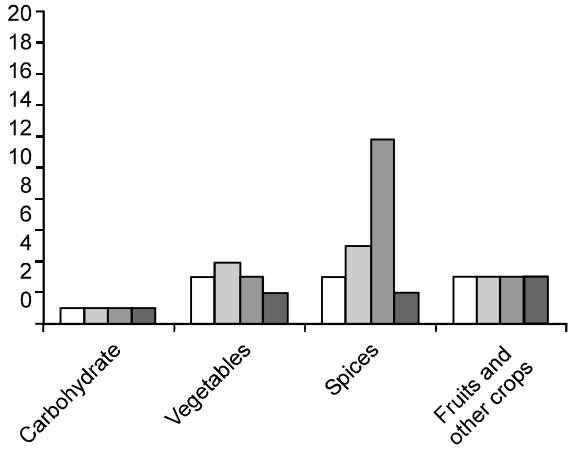

Fig. 2: Biodiversity's daily consume of local people

Table 1: Percentage of nutrition intake from nutrient availability in Nagari Ulakan (NU), Nagari Aia Batumbuak (NAB), Nagari Padang Laweh Malalo (NPLM), Nagari Pandai Sikek (NPS) (n = 200)

Carbohydrate	Rice (100%)			
Main core	NU	NAB	NPLM	NPS
Protein	Fish (88%) Egg (12%)	Fish (62%) Egg (30%) Chicken (8%)	Fish (32%) Egg (12.7%) Meat (30.7%) Peanut (10.5%) Tofu (7%) Tempeh (3.5%)	Fish (88%) Egg (10%) Tofu/Tempeh (2%)
Vegetables	Cassava leaf (64%) Spinach (16%) Other (24%)	Cassava leaf (26%) Cabbage (16%) Cucumber (2%) Carrot (14%)	Cucumber (25.4%) Cassava leaf(60.6%) Jackfruits (14%)	Cassava leaf (10%) Jackfruit (2%)
Fruits	Banana (40%) Papayas (20%) Oranges (44%)	Banana (40%) Papayas (20%) Oranges (44%)	Banana (48%) Papaya (45%) Watermelon (7%)	Banana (56%) Papaya (20%) Orange (10%)
Type of preparation	Frying, boiled, Sate	Frying, boiled, Sate	Frying, boiled, cook	Frying, boiled, Sate
Durable food intake par day 3 = normal	100% eat 3 times	86% eat 3 times 14% eat 2 times	58% eat 3 times 42% eat 2 times	84% eat 3 times 16% eat 2 times

Source: David (2011b)

reaching 4600 mm/year, the rains largely fall behind the hill. People describe this phenomenon as "shadow of the rain area". Despite this high annual rainfall, the particular valley where they live does not benefit because of the topography diversity (David, 2012). Water flows into adjacent regions. However, there are also some advantages to this local micro-climate. The dry wind blowing from the top hill creates conditions in which pests and plant diseases cannot survive. This seasonal and predictable phenomenon provides a dependable and ecological plant protection strategy. They have more initiative to cultivate the spices in the backyard.

Furthermore, *rangkiang* and *kapuak* (traditional storage for rice) is no longer being used in this region. Farmers normally sell their paddies directly on the field after harvest even though not popular and banned by culture. Lately, the storage culture has become flexible because they need money to make the harvest secure. This way of selling instead of storage the crop started in the late 1970's, rice became a cash crop, stimulating farmers to sell it, rather than save it.

Nutrient pattern: An obvious fact is that carbohydrates are consumed only from rice at the four investigated regions in West Sumatra even though people do have different staple crops (Table 1). Most of the people said that if they do not eat rice they have not really eaten a proper meal. Fish has become the most prominent protein source in all sites even though some of them live far from fresh water fish resources. NPLM, for example, has the lowest fish consumption even although this region is very close to a lake. But this fact does not reflect that people in NPLM do not like fish but rather that they prefer to eat fresh fish or that they know about pollution of the lake. Based on these investigation only two sites in West Sumatra is consuming fish, NU and NPLM. NAB and NPS only eat salted fish. Cassava leaf is the common vegetable for all investigated sites which is very easy to grow and easy to prepare. NPLM has the highest availability of spices, out of 29 used spices in Minangkabau's food, NPLM has 12, followed by NAB, NPS and NU. In most of the four sites people have 2-3 meals per day (Table 1) or two times a day with one peripheral meal in *Lapau* (coffee stall). Three daily meals are considered without peripheral diet.

Nutrition intake: In all sites, the mother typically cooks once a day and decides about the ingredient and food preparation of the daily meal. She prepares the spices, firewood and main meal. The activity starts normally from 9 to 11am. The meals; breakfast, lunch and dinner, are prepared at the same time. For dinner, only rice is prepared, while the main menu is only re-heated. Rice must be always warm; it is symbol of protection, wellness, safety and delicacy. Fried food is preferred but sometime boiled and sautéed meals are also enjoyed. The mother gets spices from a weekly market but some of the women still cultivate herbs and spices in their backyard which is important for biodiversity. Women still use a firewood stove giving a unique taste to their food. Firewood can be easily found from the surrounding area. When food is left over, it will be stored in a cabinet and often consumed the next day.

Matriarchal system: The mother plays an important role in deciding the daily meal (breakfast, lunch and dinner). The role includes land ownership, food storage, spices, teaching her daughter, education, in general and almost all activities in the kitchen. Young women learn to cook from their mothers. It is traditional knowledge that is passed from generation to generation through experience. It's obvious that the transfer of knowledge in cooking is dependent on mother-daughter relations. Since most of the young girls have less time together

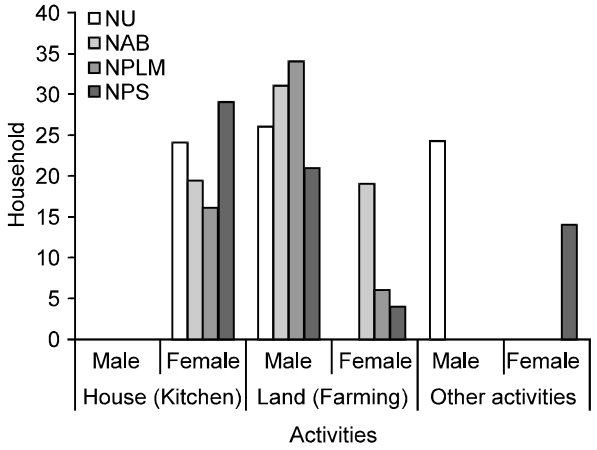

Fig. 3: Mother, grandmother and daughter involved in cooking (n = 200)

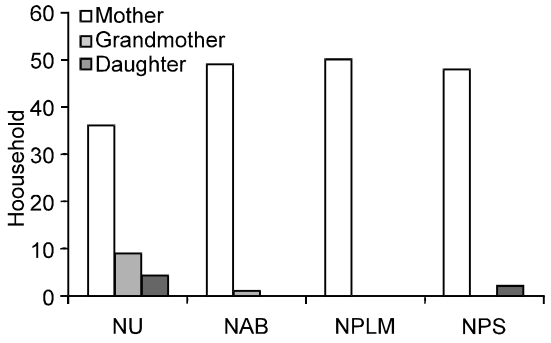

Fig. 4: Gender and activities (n = 200)

with their mother due to the time requirement of school, only a few of them are now involved in the kitchen (Fig. 3). As global changes support the formal education of more young females, finding time for the cultural transfer of these rich food traditions is becoming a challenge.

Husband does not interfere in cooking, or decides what food will be cooked. These decisions are the absolute authority of the wife and will not be questioned by the husband.

Even though Minangkabau's are matriarchal but most farmers tend to be men, working on the land with help from women (Fig. 4). Women hire man and woman for the work on the field. In NAB, women get paid less than men for harvesting work which is because of the disproportionate number of women in the workforce. In NPLM, women have set up an initiative to cultivate the spices in their backyard thus saving money. Farming and fishing in NU is a job belonging to men, even though some women in NU are allowed to help or work on the land but not at sea. In NPS, women sometimes help the men to work on the land but most of the time they are at home, doing non-agricultural activities. Therefore, even tough women (matriarchal system) have still a big role in society and family; they have less activity on the farmland itself. This means that the transferring the knowledge of traditional farming systems occurs through father-son or father-nephew interactions, whereas the knowledge about meals are in the hands of women.

DISCUSSION

The results of the investigation show that processing techniques, ingredients and spices needed for food preparation are known only by the mother that is why this can be called a Nutrition intake family secret. The techniques: slicing, mixing, sautéing, grinding and portioning this all influences the final taste of a meal. The mother has the role teaching their daughter how to cook and it is a source of shame in the Minangkabau culture if a girl cannot cook well. The challenge of today is the decreasing time for interactions between mother and daughter (observation, teaching). There is an unwritten cultural expression that a woman is not fully a woman when she cannot cook well. Therefore, from the time that girls become teenagers, they are helping their mothers to prepare and cook for daily food. This role has been respectfully accepted by men. Men are still not involved in cooking and preparing food. Men trust what women prepare and cook. Women try to make to a good meal even though they are under economical pressure. Men are not used to cooking when they are married and in some parts of Indonesia, it is shameful for men to cook. Men cook only on special occasions, festivals, or if he has a job in a restaurant. In some cultures in Indonesia to cook would even threaten a man's masculinity (Fürst, 1997). In Minangkabau culture cooking is a gender specific activity even though this boundary between men and women role have become very unclear in the last decade. The mother plays an important role as land owner and head of the kitchen. Men are not allowed to cook; it is still shameful when men perform the work of women. The other reason that the kitchen is a place associated with women (mother) is that in preparing their families food, a woman is still expressing her sense of protection as an apart of the mothering role.

There is no discrimination between men and women in the job but it is culturally recognized that, in all sites in West Sumatra, farming is men's job. Men tend to work on the land even though women have the role of owning the land. Looking additional income besides farming, in NU fishing is a man's job. In NPS weaving is only a woman's job. This activity is very helpful for gaining extra income. Fishing is still recognized as a man's job, only *menenun (weaving)* and kitchen activity is recognized as a woman's activity. Both men and women had the same opportunity to get an education. Many men get further higher education because women tend to get married earlier. The traditional farming system changes because not many of the young generation are choosing agriculture as their job.

In NU, NPLM and NPS most the young boys have gone to *marantau* (traditional migration); if they are single, they are free to do migration. If wage work is not available in the immediate area, the household labor allocation strategy may necessitate one or more member becoming involved in circular migration (Gubhaju, 2009). Increased income is the goal of these young boys but it is a different situation with young women. Most of them have gone to *marantau* because of arranged marriages even though in the last few years arranged marriages have decreased slightly. Most of the people in *rantau* (migration destination) are not even concerned about their land ownership in their village. They simply trust their relatives to take care of it but often this will result in conflicts. The heads of clans are responsible for making sure the land is divided based on the customary law. This law requires that the female gains the biggest part. Men get a smaller portion of this inheritance and leads fewer resources to feed their families therefore motivate them to go *marantau* and/or change the farming system. Local government policy is inseparable with national policies which have been regulated since 1968. The emphasis in this regulation is largely focus on food production and supply, with little attention to food distribution purchasing power for accesses to food (Simatupang, 2007). In all investigated sites, the intensive agricultural program does not guarantee that farmers will get more income. At the same time, increased yields produce a surplus which automatically lowers selling prices.

Men and women have equal opportunities for getting a formal education. With the exception that women have fewer chances to continue onto higher education, mostly because of arranged marriages. Even if a woman continues to maintain control of her own land, lower levels of education would make her less likely to benefit from non agricultural income. Improvements in female schooling observed in the younger generation could enable women to move out of agriculture (Quisumbing, 2001).

Young women learn to cook from their mothers. It is traditional knowledge that is passed from generation to generation through experience. It's obvious that the transfer of knowledge in cooking is dependent on mother-daughter relations. Since most of the young girls have less time together with their mother due to the time requirement of school, only a few of them are now involved in the kitchen (David, 2011c).

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