

Food consumption and dietary diversity of women in transmigrant area Buol, Central Sulawesi and original location Demak, Central Java, Indonesia

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ABSTRACT

Introduction: The transmigration scheme of the Indonesian government was aimed at easing overpopulation in Java by moving people to less populated areas. This study investigated food consumption and dietary diversity of women from the original location and transmigration rice farming areas. **Methods:** Food intake using a single 24-hour dietary recall was determined among women of reproductive age in Demak, Central Java (original location) and Buol, Central Sulawesi (transmigrant area). Food taboos were investigated using focus group discussions (FGDs). Dietary diversity and its score were obtained from 387 and 121 women in Demak and Buol, respectively, while 38 women from both areas participated in four FGDs on food taboos. **Results:** On average, women from both study areas had low dietary diversity scores, especially among lactation mothers. Rice, swamp cabbage, spinach and *tempeh* were popular in both areas. Fruits and vegetables from own cultivation or collected as wild foods were consumed in Buol, while women in Demak consumed comparatively more purchased foods (fruits and vegetables, legumes, meat and fish). Fewer types of food was avoided during pregnancy and lactation in Buol. **Conclusion:** While some food intake behaviour was similar in both study areas, differences were observed as influenced by economic and environment factors. Food intake of Demak women was influenced by household purchasing power, while Buol women depended on own grown food and gatherings from nearby forest. As dietary diversity scores in both areas was low, nutrition interventions are suggested to improve maternal food intake during pregnancy and lactation.

Keywords: Transmigration, women, dietary diversity

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INTRODUCTION

Nutrition plays an important role in maternal and child health, whereby optimum nutrition in early life is the foundation for future health. Maternal nutritional requirements increase during pregnancy and lactation period, not only for her own well-being, but also for healthy growth and development of the child (Black *et al.*, 2008). One of the indicators of maternal dietary adequacy is dietary diversity (Kennedy, Ballard & Dop, 2011). During pregnancy and lactating period, many nutritious foods are restricted because of traditional beliefs globally, including Asia (Banu *et al.*, 2016; Gao *et al.*, 2013; Mohamad & Ling, 2016). Food taboos tend to limit women's dietary intake (Asi & Teri, 2016; Gadegbeku *et al.*, 2013; Mohamad & Ling, 2016) and may result in inadequate weight gain of the pregnant women.

Transmigration in Indonesia refers to the movement of state-sponsored migrants since 1969 from densely inhabited regions to dispersed periphery settlements of the country (Arndt, 1983). Transmigration provides dietary acculturation affecting local food habits. Migrants, including transmigrants are known to retain intake of their traditional foods, and/or adopt the diets of the local people (Satia-Abouta, 2003; Rosenmüller *et al.*, 2011; Novotny & Rumalatu, 1995).

This study aimed to obtain information on food consumption and dietary diversity of Javanese women, living in a transmigrated area as second generation (Buol, Central Sulawesi), and Javanese women living in the original location of the transmigrants (Demak, Central Java).

MATERIAL AND METHODS

This report was based on data from two cross-sectional survey projects targeting Javanese women farmers. The first study

was carried out among women living in Demak, Central Java in December 2014, while the second study was conducted among women farmers in Buol, Central Sulawesi, a transmigrated intervention area of World Agroforestry Centre (also known as International Centre for Research in Agroforestry, ICRAF) in December 2015.

Study sites and subjects

Prior to the study, we identified that the most vulnerable group as reported by the Indonesian Ministry of Health (MoHRI) was farmers, with the highest proportion of malnourished women and children, based on adult body mass index (BMI) and stunting, respectively (MoHRI, 2013). Demak has high rice productivity (the sixth highest in 2013 in Central Java province, and one of the Indonesian rice buffer areas), but it had the seventh highest prevalence of child malnutrition in the province. The inhabitants of Demak are mostly Javanese and comprised mostly rice-farming households. Eight villages in Karanganyar, seven villages in Dempet and one village in Gajah were categorised as rice surplus areas and were chosen as sites for quantitative data collection (Purwestri *et al.*, 2017).

A high prevalence of stunting, wasting and underweight was reported among children in Central Sulawesi according to the 'Food Security and Vulnerability Atlas of Indonesia 2015' of the World Food Programme (WFP) (WFP, 2015). Despite its high rate of child malnutrition, Buol district in Central Sulawesi province was also considered as a rice-stock production area due to the high production of rice. In Buol, several villages were identified as rice growing transmigrant areas, including Boilan and Kokobuka villages. Residents in these two villages were mostly transmigrant families comprising mostly Javanese and Balinese, as well as some Lomboknese

and Sundanese. These ethnic groups are well known for their rice farming background and hardworking character. They had moved to these villages through the transmigration programme of the government of Indonesia.

A calculated minimum sample size of 330 mothers in Demak was determined based on stunting prevalence of 31.1% in Central Java (MoHRI, 2013), with a confidence level of 95% and a power of 0.8. Meanwhile in Buol, a minimum samples size of 95 mothers was calculated based on wasting prevalence of 6.4% in Central Sulawesi (MoHRI, 2010), and with a confidence level of 95%. In this way, mothers of malnourished young children were selected for this study of dietary behaviour before and after transmigration. All women of reproductive age from rice farming households in Demak and Buol were invited to participate in the study.

Prior to the qualitative research in each study site, an observational study was carried out in each district, in order to select the villages based on socio-economic and demography characteristics. Lists of focus group discussion (FGD) respondents (about six to maximum ten persons per group) were provided by midwives, voluntary workers (cadres) in both study sites. A total of 38 participants were purposively selected and interviewed. All of them voluntarily joined this study and agreed to be recorded.

Data on selected general and socio-demographic characteristics, dietary diversity, and consumed foods among women were collected using a one day 24-hour recall (Murphy, 2003; Arimond & Ruel, 2004). Dietary intake data of the women obtained from the one day 24-hour recall were grouped, based on the Women Dietary Diversity Score (WDDS), as follows (1) starch staples (combination of cereal, white roots and tubers), (2) dark green leafy vegetables, (3) other

vitamin A rich fruits/vegetables/tubers, (4) other fruits and vegetables, (5) organ meat, (6) meat and fish, (7) eggs, (8) legumes, nuts, and seeds, (9) milk and milk products (Kennedy *et al.*, 2011). If a food group was consumed, it was coded as 1 (one), but if not consumed, it was coded as 0 (zero). Dietary diversity score was derived by summing all codes in each food group and categorised based on low (equal and below food groups) and high dietary diversity (above four food groups). Median dietary diversity score was further determined.

Focus group discussions (FGDs) among the women in Demak were carried out in Kedungwaru Kidul village (Karanganyar subdistrict) and Dempet village (Dempet subdistrict). In Buol, FGDs were conducted among women farmers in two villages, namely Kokobuka (highland) and Boilan (lowland) from Tiloan subdistrict. The FGDs gathered information on food avoidance/taboos and beliefs during pregnancy and lactating period, including socio-cultural factors and reasons behind these beliefs.

All procedures performed in the study involving human subjects were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The objectives of the study were explained to the participants of the FGDs, followed by a verbal consent prior to the interviews and recordings. The participants were informed that their names were not revealed. A written consent was obtained from the respondents before the women were interviewed regarding their socio-demographic situation and dietary intake using a structured questionnaire. The study protocol in Demak was approved by the Ethics Committee of the Faculty of Medicine, University Brawijaya, Malang-Indonesia (No. 10.7.50.444). Ethics Committee of the Health Polytechnic

Ujung Pandang-Indonesia approved the study protocol in Buol (No. 078/KEPK-SE/XI/2015).

Data analysis

Data from FGDs were recorded and transcribed. The second author (RCP) listened to the recording interviews multiple times in order to list all important keywords and coded them in Microsoft Excel. Thematic keywords were gathered, grouped and analysed based on the study objectives. In the case of unclear information, the author checked with the local field officer and voluntary workers. The first draft of FGD results was shared with the local field-officers or voluntary workers for correctness of the interpretation.

The quantitative data were checked graphically for normality and homogeneous variance. The Mann-Whitney test was used for comparing non-parametric means of dietary diversity scores. Categorical data were analysed using generalised linear model and Fisher's exact test. Statistical analysis was performed using IBM SPSS Statistics Version 22 and statistical significance is indicated by p -value <0.05 .

RESULTS

Food intake and dietary diversity scores

In total, 387 and 121 eligible women in Demak and Buol, respectively were included for data analysis. Out of these participants, there were a few pregnant and several breastfeeding women in both study areas during the surveys. Based on 24-hour dietary recall, among the top three commonly consumed food items in both Buol and Demak were rice and dark green leafy vegetables (mostly swamp cabbage, spinach), followed by legumes (tofu/tempeh, long beans). All women in both areas consumed rice as their staple food.

Food consumption data and dietary diversity scores are shown separately for pregnant, lactating and all women (Table 1). While there was no significant difference in intake of dark green leafy vegetables between the women (overall) in the two areas, women in Buol showed significantly higher consumption of vitamin A rich fruits and vegetables (e.g. mango, longbeans and okra), gathered mostly from their own gardens or nearby forest. Also, the women in Buol consumed significantly more dairy products than women in Demak. Overall, the women in Demak had higher intake of other types of fruits and vegetables that were mostly purchased (e.g. banana, sapodilla, cabbage). Other purchased foodstuffs consumed in Demak were meat and fish (chicken, catfish), legumes (tempeh/tofu).

More than half (57.7%) of the women in Demak had a low dietary diversity score (consumed less than four food groups), which was significantly lower than that in Buol (73.6%). Consumption of tofu/tempeh, meat and other protein food sources was reported as only 'sometimes', based on FGDs in both Buol and Demak. They agreed that consumption of protein foods was dependent on household purchasing power. Some women in both study sites reared chickens for meat and eggs.

Based on the women's 24-hour recall of food intake, pregnant women in Demak mostly consumed rice and vegetables (cabbage, swamp cabbage, spinach), along with a side-dish, either meat/fish (usually fried cat fish) and legumes (tofu/tempeh). In Buol, pregnant women mainly consumed rice and vegetables (swamp cabbage, spinach), followed by either legumes (tofu/tempeh) or meat (chicken). The results also showed that the lactating women in both study sites had lower dietary diversity scores (median: 3-4, range 1-7) than the non-pregnant -non lactating women (median:

Table 1. Food consumption and dietary diversity scores among women from Demak (original location) and Buol (transmigran area)

Food groups [†]	Women in Demak				Women in Buol			All women in Demak vs. in Buol <i>p</i> -value [‡]
	Pregnant (<i>n</i> =12)	Lactating (<i>n</i> =250)	NP-NL (<i>n</i> =125)	Total (<i>n</i> =387)	Pregnant (<i>n</i> =9)	Lactating (<i>n</i> =35)	NP-NL (<i>n</i> =77)	Total (<i>n</i> =121)
Staple food (rice), % (<i>n</i>)	100.0 (12)	100.0 (250)	100.0 (125)	100.0 (387)	100.0 (9)	100.0 (35)	100.0 (77)	100.0 (121)
Dark green leafy vegetables, % (<i>n</i>)	75.0 (9)	64.8 (162)	56.0 (70)	62.3 (241)	44.4 (4)	65.7 (23)	63.6 (49)	62.8 (76)
Other vitamin A rich fruits and vegetables, % (<i>n</i>)	16.7 (2)	28.4 (71)	26.4 (33)	27.4 (106)	44.4 (4)	42.9 (15)	55.8 (43)	51.2 (62)
Other fruits and vegetables, % (<i>n</i>)	83.3 (10)	70.4 (176)	59.2 (74)	67.2 (260)	33.3 (3)	34.3 (12)	23.4 (18)	27.3 (33)
Organ meat, % (<i>n</i>)	0.0 (0)	0.8 (2)	3.2 (4)	1.6 (6)	0.0 (0)	0.0 (0)	1.3 (1)	0.8 (1)
Meat and fish, % (<i>n</i>)	83.3 (10)	64.0 (160)	65.6 (82)	65.1 (252)	33.3 (3)	42.9 (15)	45.5 (35)	43.8 (53)
Eggs, % (<i>n</i>)	33.3 (4)	32.4 (81)	40.8(51)	35.1 (136)	22.2 (2)	37.1 (13)	31.2 (24)	32.2 (39)
Legumes, nuts and seeds, % (<i>n</i>)	75.0 (9)	79.2 (198)	76.8 (96)	78.3 (303)	55.6 (5)	34.3 (12)	48.1 (37)	44.6 (54)
Dairy products, % (<i>n</i>)	2.0 16.7)	3.2 (8)	0.0 (0)	2.6 (10)	33.3 (3)	17.1 (6)	18.2 (14)	19.0 (23)
Median of women dietary diversity score (minimum, maximum)	5 (3,6)	4 (1,7)	4 (2,7)	4 (1,7)	4 (2,6)	3 (2,7)	4 (2,7)	4 (2,7)
Low dietary diversity score (≤ 4), % (<i>n</i>)	25.0 (3)	51.6 (129)	(72) 57.6	52.7 (204)	66.7 (6)	71.4 (25)	75.3 (58)	73.6 (89)

[†]Data are presented as relative value (absolute count) (for categorical data), or median (minimum, maximum)[‡]Data were analysed using a generalised linear model or Fischer exact test (for categorical data) and using the Mann-Whitney test (dietary diversity score)

4, range 2-7). During the FGDs, the women informed that during pregnancy and lactation, they were prohibited from consuming certain foods, as instructed by their mothers or mothers-in-law.

Food beliefs during pregnancy and lactation

Women from both areas believed that foods that they craved for during pregnancy should be consumed somehow “to prevent over-production of saliva (*ngeces*) after the baby is born”. Unlike during pregnancy, lactating women were advised to consume more soup made from spinach and *katuk* leaves (*Sauropus androgynus* or *daun katuk*). The list of prohibited foods and reasons for not allowing women to take those foods during pregnancy and lactation is shown in Table 2.

The women in Demak reported that traditional herbal medicine or '*jamu*' was often recommended by older women, traditional healers (*dukun*) or traditional birth attendants (*dukun bayi*) to improve health and breastmilk production. '*Jamu*' is the local term for local herbal medicines usually made from leaves, bark, roots and flowers (Afdhal & Welsch, 1988; Romuli & Romuli, 2015). In Demak, herbal medicines were part of a series of traditional health care, including counseling and massage, provided by traditional birth attendants. Consuming the herbs after delivery (so called '*jamu selapan*') was prescribed for 40 days for maintaining the “health” of the uterus.

Although not all the women followed all the foods restrictions, most of them agreed that young woman, especially those giving birth for the first time, and those who lived close to their mother or mother in-law, were more likely to comply with the taboos and beliefs. Women with higher education levels (senior high school and above) were more likely to refuse adhering to local

food taboos, especially if the foods are known to cause allergic reactions to her or to her child.

DISCUSSION

The types of food consumed and dietary diversity of Javanese women in the original residential location (Demak, Central Java) and transmigrant area (Buol, Central Sulawesi) showed significant differences, as influenced by their economic status and habitats. Dietary modifications occurred among women in the transmigrant area in Buol.

Women from rice farming transmigrant families in Buol maintained their previous food habits of eating rice, tempeh and tofu. Similar findings were reported among transmigrants from western parts of Indonesia, including Central Java, whereby they retained their food habits of eating rice although relocated to a sago-based staple food area in Moluccas (Novotny & Rumalatu, 1995). The native Buol had gradually abandoned sago as their staple food, and considered consuming sago only in a food insecure situation. The women also believed that eating rice is healthier than sago. It is also interesting to note that tempeh and tofu were not available before the arrival of the Javanese transmigrants in Buol. Currently, these foods can be found sold daily by the local vendors. There are also some home industry of tempeh/tofu making in Buol, indicating that the Javanese have introduced these foods after relocation. Residents in Demak usually substitute beef with other meat, e.g. carabeef due to the historical influence of Hindu, which was the religion of ancient Demak inhabitants.

This study found the median dietary diversity score of the women in Demak and Buol critically low (equal and below four) (USAID, AED, UNICEF & IFPRI, 2008), especially among lactating women.

Table 2. Food taboos beliefs of pregnant and lactating women in Demak and Buol based on focus group discussions

Phase	Food taboos		Reasons
	In Demak	In Buol	
Pregnancy	Eggplants		Pregnant mother will be lacking internal strength and go limp ("lemes")
	Pineapple, jackfruits, carbonate drinks, or ginger		Increase the womb temperature and stimulate spontaneous miscarriage during early pregnancy
	Too much sugar		Cause nausea, vomit
	Squid		Fetus will be lacking internal strength and go limp
	Shrimp	Shrimp	Fetus will bend both legs to chest direction ("melungker") causing difficulty during delivery
	Fish (in general)	Chicken egg and fish	Prolong the bleeding and to avoid fishy smell after delivery
	Fish corks		The infant will be born too big, thus cause difficulty during delivery
	Consume plenty of carbohydrate-source of foods		The infant will be born too big, thus cause difficulty during delivery
Lactation	All vegetable soups with meat; or drink too much water		Delay in healing process of delivery wound
	Young jackfruits ("kluweh")		Mother will get fever
	Sweet potato		Cause further bleeding for lactating mother
	Orange		Mother and baby will get respiratory infection (cough and runny nose)
	Sapodilla fruits ("sawo")		Mother will get fever
	Ice water		The baby will catch a cold
		Chicken egg and fish	To avoid fishy smell of breastmilk, and the breastfed children
	Chili		The baby will get diarrhea

Pregnant women in both locations showed a slightly higher median dietary diversity scores, and this could be attributed to public health programmes that provide pregnant women with iron supplements and health/nutrition education in both locations. Butte & King (2005) and Dewey (1997) emphasised the importance of increasing nutrient intake among pregnant and lactating women.

Food taboos mentioned by the FGD participants in Buol were significantly fewer than in Demak. As the second generation of the Javanese transmigrants, the cultural beliefs that they received might have been modified owing to influence of different food environments, e.g. some of the restricted foods were not locally available. In contrast, in Demak, the respondents living in close proximity with older women, traditional healers and birth attendants, continued to practise several food taboos during pregnancy and lactation.

Food taboos of pregnant women in Ethiopia (Zerfu, Umeta & Baye, 2016), Kenya (Kariuki *et al.*, 2016) and China (Lee *et al.*, 2009) were reportedly rather similar to the prohibited foods in this study. Restriction was mainly on consumption of high energy, protein-rich foods, selected fruits and vegetables. The major reasons for restricting food intake among pregnant women were fear of difficult delivery as a result of having a big baby, and consumption of certain foods perceived to cause the foetus to be in an abnormal position. These findings are similar to another study in Central Java (Hartini *et al.*, 2005) and in Malaysia (Mohamad & Ling, 2016). Other reasons include fear that certain foods might cause spontaneous miscarriage and the baby born with deformities. Some believe that eating shrimps could cause difficulty during labour because the foetus might be positioned like a shrimp (*melungker*). This study and that

by Hartini *et al.* (2005) in Central Java, reported that chicken egg was prohibited during pregnancy and lactation as eating eggs could result in continued bleeding after delivery.

Food restrictions for lactating mothers (mostly vegetables and fruits) were common in both study locations. Main reasons for food avoidance during lactation were concern for the mother getting sick and producing inadequate and low-quality milk for the baby. Similar findings were also reported in Mexico (Santos-Torres & Vásquez-Garibay, 2003). Lactating women were also advised to consume *katuk* and spinach soup, which is believed to induce breastmilk production, and to give more energy to the mothers (especially spinach). Spinach soup was one of the most commonly consumed dark green leafy vegetable by the Javanese women in Demak, especially during lactating period. Traditional herbs (*jamu*) were also believed to improve health status and breastmilk production. Younger and women from lower income status tend to believe that they should follow food recommendations and restrictions.

Limitations of study

Consumption data were limited by a single 24-hour recall which is known for shortcomings including not being typical of usual intake. We did not perform in-depth interviews of older women, including traditional healers or birth attendants. They are known to exert influence on food beliefs in the community.

CONCLUSION

Javanese transmigrants in Buol maintained their food intake of rice, tofu and tempeh. Reasons for food taboos during pregnancy and lactating women were common in both study sites, indicating the persistence of

dietary restriction practices despite transmigration. It is suggested that nutrition information be provided to women on the shortcomings of avoiding foods during pregnancy and lactation, especially nutrient-rich foods that are important for the health of the mother and child.

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Authors' contributions

RCP, planned the study design, implemented the study, performed data analysis and interpreted the data; BL, planned the study design, implemented the study, performed data analysis and interpreted the data; NNW, planned the study design, implemented the study, performed data analysis and interpreted the data; IF, implemented the study; ZB, performed data analysis and interpreted the data; JH, performed data analysis and interpreted the data; all authors drafted the article, gave valuable comments, contributed to the final version of the manuscript and approved the final manuscript.

Conflict of interest

The authors have declared that no competing interests exist.

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