



## Dietary Intake and Nutritional Status of Javanese Women in Rice Surplus Areas: a Comparison between Lactating and Non-lactating Women

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### ABSTRACT

*Maintaining optimal maternal nutrition is essential for the mother's health and the child's growth and development. Throughout the lactating period, maternal nutrition is significant due to the child's high nutritional needs. Therefore, an increase in food consumption is necessary. This research aimed to analyze the dietary intake and nutritional status of lactating and non-lactating women living in rice-producing areas in Central Java, Indonesia. A cross-sectional study was conducted from December 2014 to February 2015 in Demak Regency. As many as 375 participants were recruited and analyzed in this study. The results showed that the mean BMI-score of non-lactating mothers was higher than that of breastfeeding mothers ( $p=0.039$ ). However, the nutritional status between the two groups of women was not significantly different. Significantly more lactating women consumed dark green leafy-colored vegetables (68.8%) and other vegetables (59.2%) than the non-lactating mothers (54.4%,  $p=0.065$  and 36.8%,  $p=0.001$ , respectively). Regarding the selected macro and micronutrient intakes, statistically significant differences between the two groups of women could not be proven. In short, dietary intake between women within the different physiological statuses and BMI categories showed that they consumed around the same amount of macro-and micronutrient intakes and food groups, except for the high vegetable consumption among lactating women.*

**Keywords:** dietary intake, nutritional status, lactating women, non-lactating, rice-producing area

### ABSTRAK

Menjaga gizi ibu tetap optimal sangat penting untuk kesehatan ibu dan tumbuh kembang anak. Selama masa menyusui, status gizi ibu sangat penting karena kebutuhan zat gizi yang tinggi. Oleh karena itu, peningkatan konsumsi makan perlu dilakukan. Penelitian ini bertujuan untuk menganalisis asupan makanan dan status gizi ibu menyusui dan tidak menyusui yang tinggal di daerah penghasil beras di Jawa Tengah, Indonesia. Studi potong lintang dilakukan antara Desember 2014 dan Februari 2015 di Kabupaten Demak. Sebanyak 375 peserta direkrut dan dianalisis dalam

penelitian ini. Hasil penelitian menunjukkan bahwa rerata skor IMT ibu tidak menyusui lebih tinggi dibandingkan ibu menyusui ( $p=0,039$ ); Namun, status gizi antara kedua kelompok ibu tidak berbeda secara signifikan. Ibu menyusui secara signifikan lebih banyak mengonsumsi sayuran berdaun hijau tua (68,8%) dan sayuran lainnya (59,2%) dibandingkan yang tidak menyusui (54,4%,  $p=0,065$  dan 36,8%,  $p=0,001$ ). Berkenaan dengan asupan makro dan mikronutrien, perbedaan yang signifikan secara statistik antara kedua kelompok wanita tidak dapat dibuktikan. Kesimpulannya, asupan makanan antara kelompok ibu dalam status fisiologis dan kategori BMI yang berbeda menunjukkan bahwa mereka mengonsumsi asupan makro dan mikronutrien dan kelompok makanan dalam jumlah yang sama, kecuali konsumsi sayuran yang tinggi pada ibu menyusui.

**Kata kunci:** asupan makan, status gizi, ibu menyusui, tidak menyusui, area penghasil beras

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## INTRODUCTION

Maintaining optimal maternal nutrition is essential not just for the mother's health, but also for the child's growth and development. Undernutrition continues to be prevalent worldwide, and often poses an economic and health burden within the low- and middle-income countries. It is reported that 3.5 million deaths and 35 percent of the disability-adjusted life-years of children under five years are caused by maternal and child undernutrition. A large percentage of this underlying problem causes children to suffer from stunting, wasting, and intrauterine restriction growth (1). From the beginning of pregnancy until the child's second birthday, the period provides a critical window of opportunity to improve the child's growth development. (2). Optimal breastfeeding during the first two years of life presents various benefits for the child. Similarly, it also offers numerous health benefits for the mother. Maternal nutrition is vital throughout the lactating period due to the high nutritional needs (3)(4). Therefore, an increase in food consumption is necessary. However, the diet quality of Indonesian mothers is low due to the low consumption of rich nutrient-dense foods (5).

In Indonesia, the economic development improvement has resulted in an increase in wealth, a decrease in poverty, and increased food energy intake (6). Consequently, an increase in wealth

within the developing countries may result in a nutrition transition (7)(8), which has been taking place across Indonesia (9). The condition includes transitioning from consuming healthy vegetables, fruits, and grains, to higher consumption of more high-energy dense processed foods (10). The typical Indonesian diet predominantly consists of white rice. It is responsible for 50% of the caloric intake consumed by the population (11). Additionally, the national survey has reported that many Indonesians consume foods high in food additives, sweetened products, and fatty foods (12). Riskesdas (2013) reported that 8.87 percent of the adult population in Indonesia has a Body Mass Index (BMI) under 18.5, while 32.9 percent have a BMI over 25 (12). The double burden of malnutrition is defined as the simultaneous existence of both undernutrition and over-nutrition of macro- and micro- nutrients within the same population during the same lifetime (13). The growing rate of overweight and obesity within Indonesia has increased, simultaneously the problem of undernutrition still remains (13). This dual burden is a growing challenge in the Indonesian population, which can also occur within the same household (14). Over-nutrition is known to be associated with increased risks of non-communicable diseases such as diabetes, hypertension, and coronary heart disease (15). Additionally, studies found that

medical care costs are higher for overweight and obese individuals (16). In contrast, undernutrition is also an additional drawback for individuals. Undernutrition is associated with shorter stature, impaired cognitive development, lower income, and lower productivity in manual labor (17).

The growing phenomenon of the dual burden of malnutrition is raising concerns in Indonesia, especially for mothers and their children. Maternal nutrition affects their child's health outcomes, resulting in specific adult outcomes (e.g., height, cognitive development, economic status, Body Mass Index) (17). However, limited data is available about the dietary intake and nutritional status of women who are lactating and not lactating living in rice surplus areas in Indonesia. Therefore, this study aimed to examine lactating women's dietary intake and nutritional status compared to non-lactating ones living in rice-producing areas in Central Java, Indonesia.

## **METHODS**

### ***Study Design***

This study was part of a research project called "Association of dietary habits and nutritional status of women and children living in food surplus areas of Central Java, Indonesia." From December 2014 to February 2015, a cross-sectional survey was conducted in Demak Regency, Central Java, Indonesia. Demak regency, in Central Java province, had the sixth-highest rice productivity in comparison with the other 35 Regencies and at the same time the seventh-highest percentage of child malnutrition (indicated by weight-for-age Z-score  $\leq 2SD$ ) of 9.4% in 2012 (18). The research project was a collaboration between the Faculty of Medicine, Nutrition Department, University of Brawijaya, Malang, Indonesia, and the Institute of Biological Chemistry and

Nutrition, University of Hohenheim, Stuttgart, Germany.

### ***Data Collection***

A field survey was conducted in Karanganyar, Dempet, and Gadjah to examine the dietary intake and nutritional status of the women living within these rice-producing subdistrict areas in the Demak Regency, Central Java, Indonesia. All locations were considered the rice buffer areas within the Demak Regency, Central Java, Indonesia. Eight villages in Karanganyar, seven in Dempet, and one in Gajah, which were categorized as rice surplus areas, were chosen as sites for data collection (19).

Before the onset of the study, a structured questionnaire was developed and pretested at the University of Hohenheim, Germany, the University of Brawijaya, Malang-Indonesia, and in Demak region. The questionnaire assessed household socio-demographic information and general characteristics from the mothers. A 24-hour recall dietary intake was also obtained to investigate the women's diet. Women were weighed using a SECA body scale, and height was measured using microtoise.

### ***Study Subject***

A calculated minimum sample size of 330 mothers and their children for the cross-sectional survey in Demak was determined based on a stunting prevalence of 31.1% in Central Java (12) with a confidence level of 95% and a power of 0.8. As the focus of this study was the women, only results from the women were included, while results of the children are presented elsewhere. (19) (20).

### ***Data Analysis***

The mean, standard deviation, minimum, and maximum were calculated for the women's age, anthropometrics,

BMI, women's dietary diversity score (WDDS), nutrient intake, and the percent of nutrient intake fulfilled according to their recommended dietary allowance.

BMI of the women was calculated using weight (kg)/ height<sup>2</sup> (m<sup>2</sup>). Based on the WHO recommendation for BMI: 18.5 was considered underweight, 18.50-24.99 was normal weight, above 25 was categorized as overweight and obese (21). The two groups of women analyzed were lactating versus non – lactating ones (non-lactating and non – pregnant).

The food groups were developed based on a 24-hour recall dietary intake and separated into eight different categories (1) carbohydrate sources (combination of cereal, white roots, and tubers), (2) protein source-foods (from animal and plant-based), (3) vitamin A-source vegetables, (4) other vegetables, (5) vitamin A-source fruits and other fruits, (6) oils, (7) sugar and sweets, (8) factory-produced foods to understand the dietary habit of the women. Furthermore, selected macro- and micronutrient intake of the women were compared to the Indonesian dietary guidelines (*Angka Kecukupan Gizi* 2013). The proportion of the mentioned food groups was calculated and correlated with intake of the food groups and the physiological status of the women.

Residuals were previously checked graphically for normality and homogeneous variance. Independent T'test and the Mann-Whitney test were used to analyze the normally (such as age) and not-normally distributed data (dietary diversity score). Consumption of each food group between the two physiological statuses of the women was analyzed using the chi's square test or Fischer's exact test. Correlation between BMI of the women and percent fulfillment of selected nutrients intake in this study was analyzed using Spearman correlation. Linear regression with a stepwise approach was applied to identify

predictors of BMI of the women. The following covariates, which were associated with nutritional status based on references and the predictor's significant correlation between BMI, were included in the initial model: women's age, occupation and level of education of the women, household monthly expenditure, and consumption of protein-source, oil and vegetables. To designate the statistical significance in all analyses, a p-value of less than 0.05 was used. Statistical analysis was performed using IBM SPSS Statistics Version 22. The software Nutrisurvey was used to analyze and convert the women's diet intakes from the 24-hour-diet recall into nutrient intakes.

All procedures performed in this study involving human participants were following the ethical standards of the institutional and/or national research committee and in line with the 1964 Helsinki declaration and its later amendments and comparable ethical standards. The study protocol was approved by the Ethics Committee of the Faculty of Medicine, Brawijaya University No 575/EC/KEPK/10/2014. Informed consent was obtained from all individual participants included in the study who-volunteered to join.

## RESULTS

### *Characteristic Respondents*

Originally, 387 mothers living within rice-producing sub-district areas in the Demak Regency, Central Java, Indonesia, were recruited in this survey. Twelve pregnant mothers were excluded from the analysis because of their physiological status; thus, their nutritional status could not be defined. Therefore, the final sample size of this study was 375 mothers. Table 1 shows the general characteristics of the women living within study areas. There were 33.1% (n = 125) not lactating women and 66.9% (n = 250) lactating women. The

mean age of all women was  $30.9 \pm 6.5$  years. Their average height was  $151.5 \pm 4.7$  cm, with an average weight of  $55.9 \pm 10.8$ . Even though lower values in average weight were found among lactating versus non – lactating women ( $55.1$  kg vs.  $57.4$  kg), significance was not found ( $p = 0.081$ ). However, the BMI scores of the lactating women were significantly lower than non-lactating women ( $p=0.039$ ). The BMI ranges for lactating and non-lactating women were:  $14.7$ - $35.4$  and  $14.9$ - $40.6$ , respectively. In total, above 30% of women in this study were categorized as overweight/obese.

When looking closer at the BMI data, we found that this difference is due to the frequency of lactating women being categorized obese with 9.2 compared to 18.4 among non – lactating women ( $p = 0.039$ ).

Around 83% of the women received education for nine years or less. The median monthly routine and non-routine expenditure for each household was € 156.8. Over 50% of both lactating and non-lactating women have no occupation and were categorized themselves as housewives. There were no significant differences between lactating and non-lactating women in education, expenditure, and occupation.

### ***Food Consumption and Dietary Intake***

All women in the study area consumed rice as their main carbohydrate source of foods (Table 2). Some of them also consumed cassava or sweet potato as snacks. Consumption of plant protein-source of foods (mostly from fermented soya (tempe) and tofu) and oil was very prevalent in the study area, and no difference was found between the two groups. Interestingly, lactating women consumed more vegetables, for both dark green leafy and colored vegetables (vitamin A-source ( $p=0.065$ )) and other vegetables ( $p=0.001$ ) compared to their non-lactating counterparts (Table 2).

There were no differences found among consumption of fruits, oil, sugar and sweets as well as a factory – produced foods between both groups of women. However, only about half of the women in both groups consumed fruits, and almost half of the women consumed factory produced foods.

Dietary intake and percent fulfillment of macro-and the micro nutrient intake for lactating and non-lactating women were generally below 100 % (Table 3), except for vitamin A intake among non – lactating women. The percent fulfillment for energy, protein, fat, carbohydrate, niacin, pantothenic acid, pyridoxine, and vitamin B12 was only reached with 50 – 80 %. An even lower percent fulfillment was found for dietary fiber, vitamin D, thiamin, riboflavin, folic acid, calcium, and iron with 20 – 40 %. Non – lactating women had a significantly higher percent fulfillment of energy, protein, fats, carbohydrates, vitamin A, vitamin B (thiamin, riboflavin, pantothenic, pyridoxine, B12), iron and zinc intake compared to lactating women.

No correlation was found between the BMI of the women and percent fulfillment of the selected nutrients intake and food groups. The computed linear regression on BMI of the women showed a significant positive association with women's age ( $r^2 = 0.092$ ,  $p=0.000$ ) and with those non-lactating vs lactating women ( $r^2 = 0.102$ ,  $p=0.048$ ).

## **DISCUSSION**

### ***Nutritional Status***

In this study, the number of overweight/obese was more than 30% in both lactating and non-lactating women. The proportions were higher than another research in Bogor in 2016, whereas nearly 19% of their subjects (lactating women) were overweight/obese (BMI  $>25$  kg/m<sup>2</sup>). Meanwhile, the prevalence

of overweight/obese was approximately 31% (22).

In contrast to the previous study by Hailelassie et al. (23), which found 25% of the breastfeeding participants were undernourished, our finding revealed that less than 10% of women's energy decreased.

were categorized as underweight. The possible reason is the pre-pregnancy screening in public health centers in the study area was done intensively; thus, the number of lactating women with chronic energy deficiency

**Table 1. Characteristics of Lactating and Non-lactating Women<sup>1</sup>**

	<b>Total n= 375</b>	<b>Lactating n= 250</b>	<b>Not Lactating n= 125</b>	<b>p<sup>3</sup></b>
<b>Age</b>	30.9 ± 6.5 [17, 50]	30.6 ± 6.5 [17, 50]	31.5 ± 6.6 [19, 45]	0.248
<b>Height (cm)</b>	151.5 ± 4.7 [138.6, 165.0]	151.6 ± 4.7 [140.7, 165.0]	151.1 ± 4.8 [138.6, 163.4]	0.362
<b>Weight (kg)</b>	55.9 ± 10.8 [32.8, 90.3]	55.1 ± 9.8 [32.8, 80.3]	57.4 ± 12.5 [33.6, 90.3]	0.081
<b>BMI (kg/m<sup>2</sup>)</b>	24.3 ± 4.5 [14.7, 40.6]	24.0 ± 4.1 [14.7, 35.4]	25.1 ± 5.1 [14.9, 40.6]	0.039
- Undernourished	7.7 (29)	8.0 (20)	7.2 (9)	0.069
- Wellnourished	50.7 (190)	53.6 (134)	44.8 (56)	
- Overweight	29.3 (110)	29.2 (73)	29.6 (37)	
- Obese	12.3 (46)	9.2 (23)	18.4 (23)	
<b>Education (%)</b>				0.770
≤ 9 years	83.2	82.4	83.6	
> 9 years	16.8	17.6	16.4	
<b>Expenditure per month (€)<sup>2</sup></b>				0.743
Median [25 <sup>th</sup> , 75 <sup>th</sup> ]	156.8 [115.1, 222.7]	155.5 [116.9, 229.0]	161.6 [112.3, 208.8]	
<b>Main occupation (%)</b>				0.071
- No occupation/ housewife	61.6	64.4	56.0	
- Farmer	14.9	12.0	20.8	
- Non-farmer	23.5	23.6	23.2	

<sup>1</sup> Data are presented as mean ± sd, median [25<sup>th</sup>, 75<sup>th</sup>] or %; all such values

<sup>2</sup> 1 Euro = IDR 15,240

<sup>3</sup> Data are analyzed using independent t' test or Mann-Whitney test (normally or not normally distributed data) or Chi's square test for categorical data

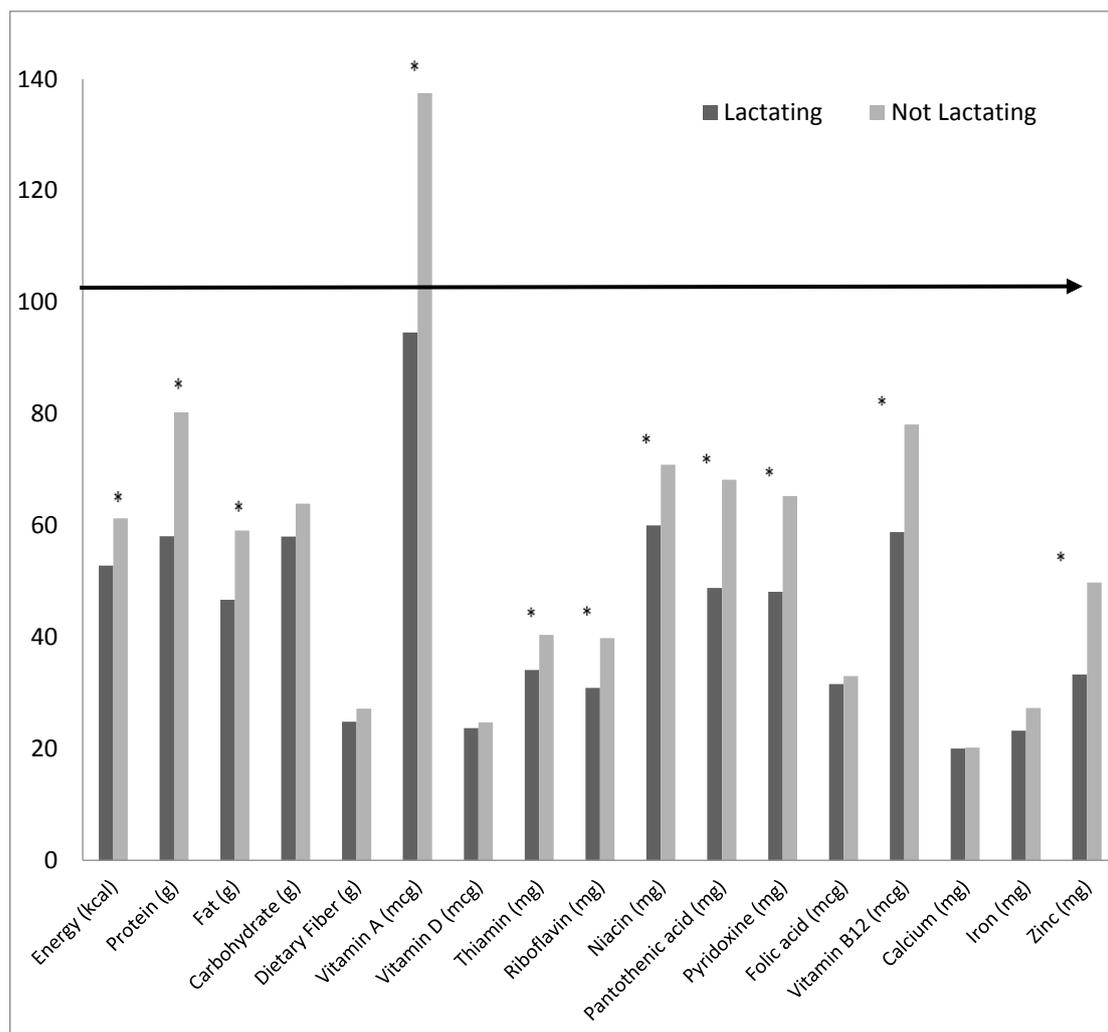
**Table 2. Consumption of selected food groups of lactating and non-lactating women in the study area**

Food groups <sup>1</sup>	Lactating (n=250)	Non-Lactating (n=125)	p-value
Carbohydrate-source	100.0 (250)	100.0 (125)	-
Protein-source	99.2 (248)	98.4 (123)	0.603
Dark green leafy and colored vegetables	68.8 (172)	59.2 (74)	0.065
Other vegetables	54.4 (136)	36.8 (46)	0.001
Fruits	49.2 (123)	51.2 (64)	0.715
Oil	94.0 (235)	92.8 (116)	0.654
Sugar and sweets	38.4 (96)	36.8 (46)	0.763
Factory-produced foods	41.6 (104)	41.6 (152)	1.000

<sup>1</sup>% (n)***Dietary Intake***

The nutritional status of the women in the study area resulted from a recurrence of inadequate intake, as shown in Figure 1, which might also be related to the time the research took place. The time of the study (December through February) took place during the planting season. During this time, the climate was experiencing a brief monsoon, which was followed by a long dry period, usually November through January. At this time, there was a limited supply of food, and Indonesians went through a food shortage season. Households who relied on rain-fed agriculture worried about the seasonality changes, and they had concerns with their

incomes and food availability. In this study, one of the household entry criteria was fathers' primary employment or side jobs should fall within the agriculture sectors such as farmers, tenant farmers, sharecroppers, and farmworkers. In addition, about 15% of women's main employment also fell within the farming categories and 2 percent of the total women stated it as their side job. Due to their dependency on farming as their family's main source of income and employment, some women admitted having a limited food supply and could not consume enough food during the time of the study.



Note: Independent T' test was used to calculate least square means. Values denoted by an asterisk were significant at  $p < 0.05$

**Figure 1: Percent of Nutrient Intake Fulfilled According to Indonesian Recommendation for Lactating and not Lactating Women**

For defining food groups in Table 2, a one-day 24-hour recall of food intake of the women, including all days in a week, was performed. Furthermore, one confirmation question was added for confirming that the collected dietary recall was their habitual intake. According to (24) and (25), the one-day 24-hour dietary recall could produce similar valid results as the multiple days.

Regardless of their physiological status, the percent fulfillments of selected nutrients of the women in the study were mainly below the Indonesian dietary intake recommendation per day. The

situation worsened among the lactating women in the study area since this group was emphasized to increase their nutritional intake (3) and (4). As a consequence, the lactating women in the study area were more at risk of developing undernutrition. Despite inadequate dietary intake of the women, about 37.9 and 49.1% of the lactating and non-lactating women were categorized as overweight or obese. It is essential to note that the mean weight of women in the study ( $\pm 55$  kg) was already according to the recommended weight. At the same time, their average height ( $\pm 151$ ) was

about 8 cm shorter than the recommended height used in the Indonesian guidelines.

As reported by Wirawan et al. (2018), the women in Demak were advised to consume more soup made from spinach and katuk leaves (*Sauropus androgynus*) or daun katuk during the lactating period, which was likely to increase the proportion of lactating women who consumed vegetables (26). Most vegetable consumption of the lactating women was spinach, followed by fried carrots and cabbage patties, and raw string beans. Although a significantly higher proportion of lactating women consumed vitamin A-source vegetables, their percent fulfillment of vitamin A was significantly lower than non-lactating women, as presented in Table 2 and Figure 1.

More than 90% of the women consumed rice and fried foods (indicated by oil consumption) and fewer vegetables and fruits. If the monotonous energy-dense intake would be continued, accompanied by their sedentary lifestyle, their BMI would be expected to be higher after they are getting older, as also explained by the linear regression model. Therefore, an improved diet quality on nutrient-dense foods is proposed then to increase the consumption of an energy-dense diet.

Evidence found that the lactating women living in Demak, Central Java, Indonesia, are not fully meeting the Indonesian recommended nutrient intakes. It was shown that lactating women were consuming about the same amount of nutrients as non-lactating women. As a result, the nutrients consumed resulted in a lower percentage of fulfillment for their recommended nutrient intake, and this is due to higher nutrient requirements as breastfeeding women. The comparable nutrient intake between lactating and non-lactating women and the food taboos might cause the lactating women to consume low

macro and micronutrient intake as recommended. Both lactating and non-lactating women ate a medium range for the diversity of food. However, it was shown that lactating women consumed more vegetables than non-lactating women, leading to their higher folic acid consumption. The high vegetable consumption may be because of their beliefs that spinach leaves would help them to produce more milk. If more quality foods would be consumed, the recommended nutrient intake may be fully fulfilled.

Our study showed that both lactating and non-lactating women were consuming high energy and a high-fat diet consisting of white rice, palm oil, fried tempeh, fried tofu. They likely consumed these types of foods because they were less expensive than animal products such as chicken, beef, buffalo, and eggs. In addition, palm oil was often used for cooking and frying due to the high availability within the Indonesian markets. On average, all the women had low fruit intakes, consistent with the national survey from Riskesdas 2013 (12).

Despite not meeting the recommended nutrient intakes, other studies found that lactating women were still able to produce enough milk with all the required nutrients for their infants. However, undernourished lactating women should receive supplements or food supplements and continue to breastfeed their child.

This study also found that the dual burden of malnutrition exists within the rural setting. There were 7.7% of undernourished women and 41.6% of over-nourished women in this study. The prevalence of over-nourished women is five times higher than the undernourished women in this study. Although fewer undernourished women were found in the study area, the rising rate of over-nourished women is a serious concern.

Both undernourished and over-nourished women are at high risks of having short and long-term adverse health effects.

During November through January, the climate in Indonesia experiences a short dry season. At this time, it is also the planting season for the farmers in Demak. As a result, farmers and their families experience low income and low food availability, and households may consume less food than usual. This study was conducted around the same period, from December through February. Consequently, the lean season may explain the low food consumption recorded from the lactating and non-lactating women. Therefore, the study's limitation was that the survey was done only in one season (planting season).

The dietary intake between women within the different BMI categories showed that they consumed around the same amount of macro- and micronutrient intakes. The study results implied that over-nourished are consuming around the same amount as someone who is undernourished. There are many factors on why over-nourished women reported low dietary intakes. For example, these reasons could be due to their cultural beliefs, socio-demographics, life status, social desirability, and personal health reasons.

Both dietary quantity and quality are a concern for both lactating and non-lactating women. High-energy foods such as rice are the main staple of food, and there were low intakes of foods rich in micronutrients for many women. The situation with low quantity and quality intakes may not be seen as a problem. Thus, it may result in more significant problems in the future, such as health problems. In addition, the women's children could also be affected in the future, such as having low birth weight, being stunted, and/or wasted.

In addition to the local food restrictions for lactating women, the

women also showed some limited nutrition knowledge on healthy foods. More nutrition knowledge should be implemented to achieve better health and nutrition status for themselves and their children. Nutrition education intervention should also include other family members (e.g., husbands, mothers, mothers-in-law) to help them understand the importance of healthy maternal nutrition. Hence, they would better understand promoting child development and preventing future health problems for their children.

Similarly, non-lactating women were also not consuming enough macro- and micronutrients. Nutritional education should also be implemented to teach women the importance of their nutritional status and consuming various foods. If the reproductive-aged women decide to conceive a baby, their improved nutritional status and dietary intake could improve the nutritional condition of their infant.

To help increase food quality intake, women should be introduced to different ways to prepare variety of meals consisting of diverse food groups. Considering that white rice is low in macro- and micronutrients, women should consume other forms of carbohydrate-based foods, such as sweet potato, cassava, and corn. Less palm oil consumption is also recommended to help promote better health, especially for over-nourished women. Popular foods such as tempeh and tofu could be cooked in other ways such as baking, grilling, or steaming them. Additionally, they can also be added with different types of foods such as soups and stews.

## CONCLUSION

In conclusion, the study found that the nutritional status between lactating and non-lactating women living in Demak, Central Java, Indonesia was not significantly different. Moreover,

their dietary intake is not fully meeting the Indonesian recommended nutrient intake. The dietary intake between women within the different BMI categories showed that they consumed around the same amount of macro- and micronutrient intakes. The study results implied that over-nourished consumed around the same amount as someone who is undernourished.

The 7.7% of undernourished women in this study indicated a nutrition intervention should be implemented to prevent them from falling into more severe conditions. The guidelines for preventing malnutrition currently comprises children below five years and pregnant women only. It is recommended to include undernourished lactating women in the guidelines for preventing malnutrition at the local health center, such as providing lactating women with iron supplements. In addition, attention should be given to overweight and obese women. Health and nutrition intervention to improve their diet and physical activity (e.g., sport activities) is recommended, together with regular monitoring on their health status (e.g., weight and blood pressure monitoring).

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