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## Review Article

# The Contribution of Indonesian Women's Eating Habit to Iron Deficiency Anemia

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## Abstract

Iron nutrition anemia is a major problem in Indonesia, especially for women who are of reproductive age. Based on previous studies, women have less healthy diets, which impacts anemia. This study was aimed at describing eating behavior in women from various aspects in depth. This study reviewed related articles and books to describe eating behavior in women from various aspects in depth. It is necessary to study the eating behavior in women from various aspects in depth. Anemia is a term used to refer to a state of decline in hemoglobin concentration in the blood caused by a lack of iron required for the formation of hemoglobin. Hemoglobin is made by red blood cells, whose primary function is to carry oxygen to all parts of the body. Thus, this substance is vital and needed in particular for women of childbearing age. Hemoglobin formation is strongly affected by iron intake. Modifying eating habits is recommended for women of productive age.

**Key words:** Eating behavior, iron nutrition anemia

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**Data Availability:** All relevant data are within the paper and its supporting information files.

## **INTRODUCTION**

The prevalence of iron deficiency anemia<sup>1</sup> in pregnant mothers is 35-75%. In addition, more than 50% of pregnant mothers in Indonesia suffer from anemia caused by a deficiency in iron, folic acid and vitamin B12. Brugnara<sup>2</sup> corroborated that anemia is attributable to a lack of nutrition and loss of blood. Nutrition anemia is a major nutrition problems in Indonesia, in addition to protein energy, iodine and vitamin A deficiencies. 163.5% of pregnant women, 55.5% for toddlers, 24-35% of school-age children, 30-40% of adults and 20-30% of adult workers in Indonesia are anemic. Improving maternal health and reducing the risk of maternal mortality is one of the Millennium Development Goals (MDGs). The target of reducing maternal mortality rate and childbirth in 2015 was 102 per 100,000 live births. However, the maternal mortality rate in Indonesia is the highest in ASEAN. Based on the Indonesian Demographic and Health Survey in 2007, the maternal mortality rate was 228 per 100,000 live births and maternal mortality rate increased significantly in 2012. Almost one out of three pregnant women suffers from anemia that results in complications in pregnancy, delivery and the health of the infant. The WHO reported that malnutrition in pregnant women results in the occurrence of the health problems in the fetus and child.

## **FOOD DISTRIBUTION DISCRIMINATION**

One of the contributing factors to the prevalence of anemia in Indonesia is food-related gender habits. This practice prioritizes nutritious food for the father as head of the family, then boys, girls and finally the mother. Royston<sup>3</sup> reported that adult women and children usually eat after the men and consequently, they tend to get less nutritious food. Zahrulianingdyah<sup>4</sup> corroborated that middle-class people prioritize men at every dining occasion. In addition, Zahrulianingdyah<sup>5</sup> described that those in low socio-economic communities follow this practice. The pattern is also found in Bangladesh in which the patrilineal system is strong. Females in all age groups receive less food compared to males<sup>6-9</sup>. Abdullah and Wheeler<sup>10</sup> reported that children do not receive sufficient food. However, the food distribution for girls was lower than for boys. This practice greatly contributes to the nutritional status of women, especially for pregnant mothers which in turn impacts the prevalence of iron nutrition anemia. Zahrulianingdyah<sup>11</sup> found that mothers of childbearing age in the village Mangli had poor nutritional knowledge (48.4%), an unhealthy diet (63%) and iron deficient anemia (40%).

## **IRON DEFICIENT ANEMIA**

Women's eating habits contribute to the prevalence of anemia, which can lead to a high maternal mortality rate in females of reproductive age. Anemia is a condition in which there is a reduced hemoglobin concentration in the blood caused by a lack of iron. Hemoglobin (Hb) exists in red blood cells, whose primary function is to carry oxygen to all parts of the body<sup>12,13</sup>. According to the Department of Health, nutrition anemia is defined as a deficiency of hemoglobin levels in the blood caused by a lack of iron. Iron deficiency that often causes nutrition anemia is associated with a lack of iron, folic acid and vitamin B12. In Indonesia, most of the anemia is caused by a lack of iron, which is known as iron nutrition anemia. According to Arisman<sup>14</sup>, the clinical definition of anemia includes: (1) Decline in hemoglobin and hematocrit levels and the number of red blood cells below the normal value set for the individual and (2) Iron nutrition anemia is a condition in which hemoglobin, hematocrit and red blood cell levels are lower than the normal value, as a result of a deficiency in one or more of the essential elements of food that can affect the deficiency. Iron, folic acid, vitamins and other mineral elements are needed for hemoglobin, which is formed in the bone marrow. Hemoglobin is derived from animal (liver, meat, bowel and yolk) and plant foods (green vegetables, a staple food and grains).

According to Gibney *et al.*<sup>15</sup>, the human body needs iron for the synthesis of the protein that carries oxygen, hemoglobin and myoglobin and for the synthesis of an enzyme that contains iron and participates in electron transfer reactions and oxidation-reduction reactions. The duodenum absorbs iron, then, it is taken through mucous membranes and into the blood to the carrier protein (transferrin) in the plasma that transports it into the cell or bone marrow for erythropoiesis. Transferrin takes iron into the tissue through a specific cell membrane receptor on transferrin. The cell receptor binds to the complex transferrin and iron on the cell surface and brings them into the cell to release iron. Anemia is partly caused by: (1) A shortage of raw inputs of iron (iron deficiency), (2) Bone marrow disorders (aplastic anemia), in which the formation of hemoglobin is abnormal, as in thalassemia, resulting in a short life span of red blood cells and (3) Folic acid deficiency<sup>13</sup>. According to Wirakusumah<sup>16</sup>, iron is most instrumental in nutrition anemia and iron deficiency is one of the leading causes of anemia compared to other nutrient deficiencies, such as folic acid, vitamin B12 and other trace elements. Therefore, anemia is often associated with iron nutrition anemia. According to Arisman<sup>14</sup>, in general, there are three causes of iron deficient anemia: (1) Chronic

blood loss, as a result of peptic ulcer disease, hemorrhoids, or parasite infestation, (2) Insufficient iron intake and inadequate iron absorption and (3) An increasing need for iron in the formation of red blood cells, which commonly takes place during fetal growth, puberty, pregnancy and lactation. In general, the primary factors that cause nutrition anemia are blood loss, the destruction of red blood cells and a lack of red blood cell production. A major cause of anemia is the lack of consumption of iron from food or poor absorption of iron<sup>17</sup>. Iron is sometimes poorly absorbed because it is inhibited by other substances, such as tannins in tea. In addition to the factors described, the loss of blood in large quantities, such as from menstruation, childbirth, accident, surgery, or hookworm infection can also contribute to anemia. There are four basic approaches to prevent iron deficient anemia according to Arisman<sup>14</sup>: (1) Tablet or iron injection, (2) Education to increase iron intake through food, (3) Control of infectious diseases and (4) Fortification of staple foods with iron. Baltussen *et al.*<sup>18</sup> reported that a common strategy to overcome or prevent anemia in pregnant women is through oral iron supplementation. Iron supplements, such as ferrous iron salts (ferrous sulfate and ferrous gluconate) are mostly used due to their low cost and high bioavailability<sup>19</sup>. Zahrulianingdyah<sup>11</sup> suggested that counseling is one way to prevent anemia. The prevalence of anemia in women, especially in women of reproductive age is due to a lack of proper nutrition. In order to overcome the presence of iron nutrition anemia, it is important to change unhealthy eating habits with education and training in nutrition.

The most common symptoms of anemia include: (1) Fatigue, (2) Paleness in the face, lips, tongue, palms and feet, as well as nails, (3) Dizziness, (4) Weakness, (5) Lethargy, (6) Shortness of breath, (7) A fast beat heart, (8) Constipation and stomach discomfort and (9) Headache. According to Arisman<sup>14</sup>, the signs and symptoms of iron deficient anemia, such as paleness, fatigue, palpitations, tachycardia, breathlessness, increased susceptibility to infection, certain behavioral disorders, intellectual performance and workability are not typical and are often not obvious. Paleness can be seen on the palms, nails and palpebral conjunctiva. Anemia can affect work performance<sup>16</sup>. Based on previous studies, light anemia reduces labor ability, in the fields or other workplaces, due to fatigue and weakness, resulting in the decline of work productivity. Additionally, it affects the body's resistance to infection.

### **PREVENTION OF ANEMIA**

One way to prevent anemia is to consume food, such as red meat, fish, liver and eggs, in sufficient quantities<sup>20</sup>. Good

sources of iron include: (1) Red meat and eggs, (2) Peas/dry beans, (3) Green leafy vegetables and (4) Dried fruit. Plant sources include green vegetables, nuts, cereals or grains and fruits. Consuming varied food following the recommendations of a balanced meal can help to prevent iron nutrition anemia. To improve the absorption of iron in the body, it is recommended to consume vitamin C and avoid drinking tea after the main meal, 2 h before the meal and two hours after eating.

An extensive and persuasive effort is required to induce behavioral changes so that people in the community will adopt food diversification<sup>11</sup>. The only lasting solution is to help people consume iron-rich food regularly, to encourage the intake of iron absorption promoters, such as vitamin C and prevent the consumption of excessive iron absorption-inhibiting factors. According to Gibney *et al.*<sup>15</sup>, it is important to: (1) Increase the consumption of iron-rich food, such as nuts, green vegetables and other vegetables and meat, (2) Encourage regular consumption of foods rich in vitamin C, such as citrus, guava and kiwi, (3) Increase the addition of iron-rich food for infants and (4) Suggest avoiding foods that can inhibit the absorption of iron, especially in women and children. The ideal prevention method includes providing nutritional counseling periodically to improve eating habits.

### **CHANGING WOMEN'S EATING HABITS**

Changing or shifting eating habits is not easy. Foster and Anderson<sup>21</sup> argued that food is influenced by culture. Any substance that is eaten needs endorsement from culture. There is not one group, even in a state of acute starvation that uses all available nutrients as food. The classification of food and non-food is constrained by religious taboos, superstitions, beliefs about health and history. Therefore, it is important to distinguish between nutrients and food. A nutrient is defined as a substance that can preserve and maintain the health of an organism. Food is a cultural concept; any substances need to be approved by society before it is considered to be food. Suhardjo<sup>22</sup> reported that cultural factors play an important role in nutritional problems in various communities. Cultural factors influence eating habits of the society. This influence is sometimes on the contrary with the principles of nutritional science. Eggs, for example, in Indian society are considered taboo if consumed by children, especially girls, because they are believed to cause jaundice and swelling and are believed to turn the girls into thieves<sup>23</sup>. Sanjur<sup>24</sup> also reported that daily eating habits are influenced by many factors, including environmental factors, income levels and cultural factors.

Nutrition involves psychological, social and cultural elements. Khumaidi<sup>25</sup> and Suhardjo<sup>22</sup> corroborated that the need to eat includes the urge to overcome hunger but also there are also physiological, psychological, social and cultural factors involved. Martianto and Ariani<sup>26</sup> argued that food consumption is affected by many economic and cultural factors, including the availability of food, education, lifestyle and others. However, sometimes the element of prestige becomes very prominent in these choices as well.

The pattern of food consumption is derived from eating habits. Foster and Anderson<sup>21</sup> argued that changing eating habits is one of the most difficult and resilient elements to change. According to Berg<sup>27</sup>, eating habits are formed as a result of the socialization process based on the environment, including cognitive, affective and psychomotor processes. In line with this opinion, Groundlund<sup>28</sup> in referring to Bloom<sup>29</sup> taxonomy theory, argued that there are three areas of behavior that can be observed as a result of counseling activities:

- The cognitive region, starting from the level of knowing, understanding, using, analyzing, synthesizing and evaluation
- The affective region, starting from the level of receiving, giving, responding, assessing, organizing and living
- The psychomotor region, starting from the ability to perceive, mental readiness, physical and emotional, guided response, mechanism and complex physical response

Graeff *et al.*<sup>30</sup> argued that human behavior is the result of experience and human interaction with the environment which manifests in the form of knowledge, attitudes and actions. In other words, behavior is based on a person's reaction to a stimulus that comes from outside and inside him or herself. Soehardjo<sup>23</sup> argued that the eating habits are a social and cultural phenomenon which illustrates the behavior of the values held by a person or group of individuals. Leagens, as quoted from Zahrulianingdyah<sup>11</sup>, stated that individual behavior includes everything which becomes his or her knowledge, attitudes and usually conducted by him or her (action); therefore, the action does not arise from within the individual, but the result of the personal interaction with the environment. Some of the factors which motivate the occurrence of a behavior include: (1) The environmental condition, (2) Personal encouragement, such as willingness, feeling, emotion, instinct, needs, desires and intentions and (3) The objectives.

This theory suggests that human food consumption is affected by various factors, such as the consideration of what is appropriate and what should or should not be eaten, how to get it, how to process it, how to eat it and others. These activities occur repeatedly and eventually form the family eating habit. The family eating habits evolve into group or community eating habits. Nutrition education and counseling to women of productive age are expected to reach the three levels because the ultimate goal of nutrition counseling is to obtain new knowledge, appreciation and application of healthy eating habits. Until now, household affairs were considered to be work performed by women only<sup>5</sup>. Thus, the mother played a major role in family food. The knowledge and skills acquired from education and experience come from the mother.

## **CONCLUSION**

The rate of iron nutrition anemia in Indonesia is the highest in ASEAN. Prevention is accomplished by providing iron tablets, supplementary food and nutritional counseling. Nutrition education and training attempts to change the eating habits of women of reproductive age, who are a cornerstone concerning food management in the family. Changing or shifting eating habits is not easy; however, if it is conducted by persuasion continuously through understanding (cognitive), acceptance (affective) and application (psychomotor), it is expected to result in healthy eating habits that meet nutritional requirements. The mother is responsible for the fulfillment of the nutritional needs of the family. Therefore, she is the core of the realization of nutritious, balanced and safe meals in the family. Nutrition education and training given to the mothers must be sustained with post-training assistance so that the change in eating habits becomes permanent and integrated into a new behavior. In addition, there must be a concrete example given by traditional leaders, religious leaders, government and academic communities. It is expected that the government, through the relevant departments, the various elements of society (social organization, the family welfare education program, women's groups and religious organization), jointly or individually has a strong commitment to provide nutrition counseling and training in order to form good nutrition behaviors that will impact the health of family, community and country. For future research, we suggest a joint study examining eating habit behaviors in women of reproductive age from various disciplines. It is expected that all relevant

institutions simultaneously performing a synchronous effort will realize the importance in changing people's behavior towards healthy eating habits.

### **SIGNIFICANCE STATEMENTS**

This study provided characterization of eating behavior of women and related it to the prevalence of iron deficiency anemia because the rate of iron nutrition anemia in Indonesia is the highest in ASEAN. This study was expected to assist the public health policy makers to refocus the nutrition education and training for women of reproductive age. Nutrition education and training should attempt to change the eating habits of women of reproductive age.

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