Dietary Diversity Using the Minimum Dietary Diversity-Women Indicator in Pregnant Women

Keragaman Makan Menggunakan Indikator *Minimum Dietary Diversity-Women* pada Ibu Hamil

Irfia Ainun Salsabila[1]*, Devi Savitri Effendy[2]

[1,2] Faculty of Public Health, Universitas Halu Oleo, Kendari, Indonesia

*Correspondence:
E-Mail/ Phone Number: salsabilairfia@gmail.com/ 082296153592
Address: Jl. Tunggala, Wua-Wua, Kendari City, Southeast Sulawesi 93117, Indonesia

ABSTRACT

Eating a variety of foods is very important to prevent nutritional deficiencies, especially micronutrients. Low dietary diversity results in vulnerability to nutritional deficiencies. Malnutrition in pregnancy can adversely affect the mother and fetus. This study aims to evaluate the adequacy of dietary diversity and food group consumption patterns of pregnant women in the Lambai Health Centre working area. This type of research is a descriptive study with a *cross-sectional* design. This study was conducted from November to December 2024 in the working area of Lambai Health Centre, Lambai District, North Kolaka. The sampling technique in this study used total sampling so that the sample size was 47 pregnant women. The level of *dietary* diversity was evaluated using the *Minimum Dietary Diversity for Women* (MDD-W) with the criteria of consuming at least five food groups categorized as adequate. The results showed that the majority of pregnant women met the MDD-W criteria (93.6%), and only 6.4% had inadequate dietary diversity. The most consumed food groups were staple foods (100%), namely carbohydrate sources of cereals, tubers, and bananas, meat (95.7%), and green leafy vegetables (93.6%). However, there was no consumption of nuts and seeds. This suggests the need for nutrition education regarding the importance of food variety to support adequate micronutrients during pregnancy.

Keywords: Pregnant women, dietary diversity, MDD-W

ABSTRAK

Mengonsumsi berbagai jenis makanan sangat penting untuk mencegah defisiensi gizi terutama mikronutrien. Rendahnya keragaman pola makan mengakibatkan kerentanan terhadap kekurangan gizi. Kekurangan gizi pada kehamilan dapat berdampak buruk bagi ibu dan janin. Penelitian ini bertujuan untuk mengevaluasi tingkat kecukupan keragaman makanan dan pola konsumsi kelompok pangan ibu hamil di wilayah kerja Puskesmas Lambai. Jenis penelitian ini adalah studi deskriptif dengan desain *cross-sectional*. Penelitian ini dilakukan pada bulan November hingga Desember 2024 di wilayah kerja Puskesmas Lambai Kecamatan Lambai, Kolaka Utara. Teknik pengambilan sampel dalam penelitian ini menggunakan total sampling sehingga besar sampel berjumlah 47 ibu hamil. Tingkat keragaman makan dievaluasi menggunakan *Minimum Dietary Diversity for Women* (MDD-W) dengan kriteria minimal mengonsumsi lima kelompok makanan dikategorikan adekuat. Hasil penelitian menunjukkan mayoritas ibu hamil memenuhi kriteria MDD-W (93,6%) dan hanya 6,4% yang memiliki keragaman makan yang tidak adekuat. Kelompok pangan yang paling banyak dikonsumsi adalah makanan pokok (100%), yaitu serelia, umbi-umbian, dan pisang sumber karbohidrat, daging (95,7%), dan sayuran berdaun hijau (93,6%). Namun, tidak ada konsumsi dari kelompok kacang-kacangan dan biji-bijian. Hal ini menunjukkan perlunya edukasi gizi terkait pentingnya variasi pangan untuk mendukung kecukupan gizi mikro selama kehamilan.

Kata kunci: Ibu hamil, keragaman makan, MDD-W

INTRODUCTION

Eating a variety of foods is essential to prevent nutritional deficiencies, especially micronutrients. Low dietary diversity results in vulnerability to nutrient deficiencies.[1] Malnutrition during pregnancy can be detrimental to the mother and fetus.[2]

Iron deficiency will cause anemia, which can lead to excessive bleeding during delivery. Folic acid deficiency in pregnant women can cause babies to be born with Neural Tube Defects (NTDs).[3,4]

During pregnancy, the mother needs more nutrients than before pregnancy for the growth and development of the fetus in the womb.[5] If the daily nutritional intake does not meet the needs, the fetus will take food reserves stored in the mother's body, so having a normal nutritional status before pregnancy is important.[6]

Nutritional problems that commonly occur in pregnant women include Chronic Energy Deficiency (CHD), overweight, and anemia.[7] In general, the prevalence of CHD in pregnant women in 2023 is 16.9%.[8] The prevalence of anemia has increased from 37% in 2013 to 48.9% in 2018.[9]

In Indonesia, the dietary diversity of pregnant women is mostly in the staple food group and low consumption in the food group of milk and its products, fruits, nuts, and seeds, which tend to be more expensive.[10] This study aims to assess the dietary diversity of pregnant women in the working area of Puskesmas Lambai, Lambai District, North Kolaka.

MATERIALS AND METHODS

This type of research is a descriptive study with a *cross-sectional* design. This design was used to describe the condition of dietary diversity and nutritional status of pregnant women at one particular time. The population in this study were all pregnant women who were actively registered in pregnancy check-up visits at Lambai Community Health Centre in November-December 2024. A total sampling technique was used so that the entire population (n=47) was sampled.

Measurement of upper arm circumference (LILA) was performed by the researcher using a standardized LILA tape. Measurements were taken once on the arm without restrictive clothing after the interview. SEZ criteria were determined based on LILA values <23.5 cm. *Dietary* diversity was assessed using the FAO's Minimum Dietary Diversity for Women (MDD-W) questionnaire covering 10 food groups.[11] Data were collected through interviews using 24-hour *recall* for three non-consecutive days (random days). Consumption of ≥5 food groups per day was categorized as adequate dietary diversity.[12] Data were analyzed univariately using SPSS *statistics* 26 to obtain frequency and percentage distributions of the variables studied.

RESULTS

The results of the study in Table 1 show that most respondents were in the age range of 20-34 years (78.7%), which is the optimal reproductive age. However, there were 6.4% of respondents aged ≤19 years. Most of the respondents had high school (42.6%) and college (23.4%) education, indicating that the majority of mothers had a relatively good level of education.

Table 1. Characteristics of Respondents

Variable	n	%
Age		
≤19 years	3	6.4
20-34 years	37	78.7
≥35 years	7	14.9
Education level		
Not in school/not completed	9	19.1
primary school	7	14.9
Junior high school	20	42.6
High school	11	23.4
Higher education		
Respondent's occupation		
Housewife	37	78.7
Self-employed	2	4.3
Teaching staff	4	8.5
Health worker	1	2.1
Farmer/gardener	1	2.1
Others	2	4.3
Head of household		
Husband	44	93.6
In-laws	2	4.3
Parents	1	2.1
Gestational age		
First trimester	6	12.8
Second trimester	22	46.8
Third trimester	19	40.4
Number of family members		
≤5	40	85.1
>5	7	14.9

Source: Primary Data, 2024

Most of the respondents were housewives (78.7%). The head of the household was mostly the husband (93.6%). Most of the household heads worked as farmers (55.3%) and self-employed (34.0%). Most pregnant women were in their second trimester (46.8%) and third trimester (40.4%). Most families had ≤5 members (85.1%).

Table 2. Nutritional Status and MDD-W of Pregnant Women

Nutritional Status	n	%
Normal	44	93.6
Severe	3	6.4
MDD-W	**n**	**%**
Adequate	44	93.6
Not adequate	3	6.4

Source: Primary data, 2024

Table 2 shows that the nutritional status of pregnant women was mostly normal (93.6%), but there were still 6.4% who experienced SEZ. The majority of pregnant women had adequate MDD-W criteria (93.6%), and only 6.4% had inadequate dietary diversity.

Table 3. Frequency of Consumption by Food Group

Food Group	n	%
Staple food	47	100
Beans and *peas*	34	72.3
Nuts and *seeds*	0	0
Milk and its products	16	34.0
Meat (including internal organs and other small animal proteins)	45	95.7
Eggs	33	70.2
Green leafy vegetables	44	93.6
Other vegetables and fruits rich in vitamin A	31	66.0
Other vegetables	32	68.1
Other fruits	28	59.6

Source: Primary Data, 2024

Based on Table 3 shows that the most consumed food groups are staple foods (100%), namely carbohydrate sources of cereals, tubers, and bananas, meat (95.7%), and green leafy vegetables (93.6%). Meanwhile, there was no consumption of nuts and seeds.

DISCUSSION

The results showed that all respondents (100%) consumed staple food or carbohydrate food groups. The foods consumed varied from simple to complex carbohydrates, such as rice, corn, sago, sweet potatoes, cassava, bananas, vermicelli, bread, and noodles. Although all respondents consumed carbohydrate foods, some of them consumed small amounts. This is due to *morning sickness,* which causes pregnant women to experience a decrease in appetite, especially in the first trimester.

Pregnant women need to increase their energy intake during pregnancy by 25 gr/day in the first trimester and 40 gr/day in the second and third trimesters.[13] Carbohydrates are the main source of energy for the body, which accounts for about half of the total energy intake for the body and, during pregnancy, serves to support fetal growth and development.[14] Long-term inadequate energy intake is one of the determinants that contribute to the incidence of SEZ. These nutritional deficiencies can lead to metabolic disorders, decreased muscle mass, and chronic fatigue that negatively impact maternal and fetal health.

Animal protein consumption among pregnant women showed considerable variation. The majority of respondents consumed meat (95.7%), followed by eggs (70.2%) and milk and its products (34.0%). Although the percentage of meat consumption was very high, the type of meat most consumed was dominated by local fish. Commonly consumed fish species include milkfish, kite, anchovy, tuna, and tilapia. This preference for local fish reflects the sustainable utilization of food resources and indicates a consumption choice that tends to be more economical and healthier than red meat.

The consumption of fish every week during pregnancy has been shown to have a significant effect on increasing the mother's gestational weight as well as the baby's birth weight when compared to mothers who do not consume fish.[15] This can be attributed to the content of essential nutrients in fish, such as omega-3 fatty acids, iron, iodine, and choline. However, some respondents reported not consuming fish due to sensitivity or discomfort with the aroma. This is often an inhibiting factor in fulfilling animal protein intake.

On the other hand, the low consumption of milk and its products (34.0%) indicates a potential gap in fulfilling calcium and vitamin D requirements during pregnancy. Both micronutrients are important in reducing the risk of maternal preeclampsia, neonatal mortality, and miscarriage[16,17]. The types of milk consumed by respondents were specialized milk for pregnancy and other packaged milk.

Thus, although animal protein sources are relatively accessible and available in various forms, their diversity is influenced by preferences and physiological responses during pregnancy.

The results showed that the consumption of green leafy vegetables by pregnant women was very high, reaching 93.6%. These vegetables include kale, moringa leaves, spinach, long bean leaves, yam leaves, katuk leaves, and mustard greens purchased at traditional markets or self-cultivation. The availability and ease of access to these food groups meant that most pregnant women were able to access an important food group in the MDD-W.

Despite the high consumption of green leafy vegetables among pregnant women, the results of this study showed that the consumption of vitamin A-rich vegetables and fruits was still relatively low, at only 66.0%. Low vitamin A intake is a concern because it can cause vitamin A deficiency (VAD). VACD is known to be a major cause of visual impairment and blindness, as well as contributing to decreased immunity and increased risk of infection, both in the mother and fetus.[18]

In addition to these groups, consumption of other vegetables, such as cabbage, long beans, eggplant, banana heart, chayote, young papaya, young jackfruit, bitter melon, and bamboo shoots,

also remained at 68.1%. Meanwhile, consumption of fruits other than those rich in vitamin A only reached 59.6%, indicating that pregnant women have not fully utilized food diversity from the vegetable and fruit groups in their diet. Vegetables and fruits have an important role in meeting the needs of micronutrients such as vitamin C, folate, and potassium and are the main sources of dietary fiber.

Adequate fiber intake during pregnancy not only supports digestion and prevents constipation, which is a common problem in pregnant women, but also plays a role in increasing the diversity of gut microbiota, maintaining glucose homeostasis, reducing the risk of glucose intolerance and preeclampsia, and helping maintain appropriate gestational weight gain.[19] Thus, the low consumption of diverse vegetable and fruit food groups among pregnant women is an indication that nutrition interventions based on education and promotion of healthy food consumption need to be strengthened.

Overall, the results showed that most pregnant women had adequate dietary diversity (93.6%). This achievement reflects that most respondents had consumed at least five of the ten food groups recommended by the *Minimum Dietary Diversity for Women* (MDD-W) indicator. This is a positive marker of diet quality, as the more diverse the food consumption, the greater the likelihood of meeting the macro and micronutrient requirements needed during pregnancy.

Of the ten MDD-W food groups, staple foods (100%), meat (95.7%), and green leafy vegetables (93.6%) were the most consumed. This group includes the main sources of carbohydrates, animal protein, iron, folic acid, and various other important vitamins and minerals. Consumption of foods from this group supports the achievement of normal maternal nutritional status, which in this study is shown by the high proportion of normal nutritional status (93.6%).

However, the consumption of the nuts and seeds food group was recorded at 0%, indicating a gap in consumption diversity. These food groups are important sources of vegetable protein, healthy fats, as well as micronutrients such as magnesium, zinc, and vitamin E. The low consumption of nuts and seeds could be due to price, taste preferences, or lack of knowledge about the benefits of these food groups.

Other food groups with relatively low consumption are milk and its products (34.0%) and fruits other than those high in vitamin A (59.6%). Milk and fruits are the main sources of calcium, vitamin D, fiber, and other essential vitamins and minerals needed by pregnant women. The lack of variety in this group may hinder the achievement of overall nutritional requirements and potentially increase the risk of specific nutrient deficiencies.

The high percentage of mothers with adequate MDD-W is likely also influenced by the nutrition education routinely provided by health workers at Lambai Health Centre. Support from primary health care in providing nutrition counseling and monitoring plays an important role in encouraging pregnant women's awareness to consume a diverse and nutritionally balanced diet.

This finding is in line with other studies in Indonesia that suggest that adequate dietary diversity is positively correlated with good nutritional status and reduces the risk of Chronic Energy Deficiency (CHD) and anemia in pregnant women.[20] However, previous research in the

Kendari Barat sub-district found that the majority of pregnant women had less diverse diets, reflecting differences in geographical, socioeconomic, and public health interventions between regions.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the study, it is known that most pregnant women in the Lambai Health Centre working area have adequate dietary diversity (93.6%) based on a modified approach of the Minimum Dietary Diversity-Women (MDD-W) indicator. The most consumed food groups include staple foods, meat, and green leafy vegetables. However, consumption of nuts and seeds, as well as dairy products and fruits, was low. This consumption pattern shows that although food diversity is generally quite good, there are still certain food groups that are not optimally consumed. Thus, efforts to promote food consumption from under-consumed groups, such as nuts and dairy products, need to be made to improve the overall diet quality of pregnant women.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

REFERENCES

1. Aboagye RG, Seidu A-A, Ahinkorah BO, Arthur-Holmes F, Cadri A, Dadzie LK, et al. Dietary Diversity and Undernutrition in children aged 6-23 months in Sub-Saharan Africa. Nutrents. 2021;13(10).

2. Fatmawati F, Munawaroh M. Hubungan Pengetahuan, Status Gizi dan Pola Makan dengan Kejadian Kekurangan Energi Kronik pada Ibu Hamil di UPTD Puskesmas Bojonegoro Tahun 2022. SENTRI J Ris Ilm. 2023;2(6):1873–82.

3. Koletzko B, Godfrey KM, Poston L, Szajewska H, Goudoever JB Van, Waard M de, et al. Nutrition During Pregnancy , Lactation and Early Childhood and its Implications for Maternal and Long-Term Child Health : The Early Nutrition Project Recommendations. Ann Nutrtion % Metab. 2019;74:93–106.

4. Viswanathan M, Urrutia RP, Kesha, Hudson. Folic Acid Supplementation to Prevent Neural Tube Defects Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA Netw. 2023;330(5):5460–6.

5. Hardinsyah, Anwar K, Martini R, Syah MNH, Ilmi IMB, Artanti GD, et al. Menu Bergizi Menggunakan Pangan Lokal bagi Ibu Hamil. 1st ed. Perhimpunan Pakar Pangan dan Gizi (PERGIZI PANGAN) Indonesia; 2021. 1–25.

6. Kemenkes RI. Pedoman Gizi Seimbang. Jakarta: Kementerian Kesehatan RI; 2014. 1–129.

7. Kementerian Kesehatan Republik Indonesia, United Nations Children's Fund. Gizi Ibu di Indonesia: Analisis Lanskap dan Rekomendasi. Irmawati D, Fajriah E, editors. Jakarta: UNICEF Indonesia; 2023.

8. Badan Kebijakan Pembangunan Kesehatan. Survei Kesehatan Indonesia (SKI) 2023 dalam Angka. Kemenkes BKPK; 2023. 965.

9. Badan Pusat Statistik. Prevalensi Anemia pada Ibu Hamil 2013-2018 [Internet]. Badan

Pusat Statistik. 2021 [cited 2024 Sep 15]. Available from: https://www.bps.go.id/id/statistics-table/2/MTMzMyMy/prevalensi-anemia-pada-ibu-hamil.html

10. Putri WAK, Zaki I, Surijati KA. Minimum Dietary Diversity Women (MDDW) pada Wanita Usia Subur Kurang Energi Kronik. Gema Kesehat. 2023;15(1):17–25.

11. FAO. Minimum Dietary Diversity for Women [Internet]. 2021. 1–176 p. Available from: https://doi.org/10.4060/cb3434en

12. FAO. Dietary Assessment: A resource guide to method selection and application in low resource settings. Rome; 2018. 1–172

13. Permenkes. Peraturan Mentereri Kesehatan Nomor 28 Tahun 2019 tentang Angka Kecukupan Gizi (AKG) yang Dianjurkan untuk Masyarakat Indonesia. 2019.

14. Xue L, Chen X, Sun J, Fan M, Qian H, Li Y. Maternal Dietary Carbohydrate and Pregnancy Outcomes : Quality over Quantity. Nutrients [Internet]. 2024;16(2269):1–22. Available from: https://doi.org/10.3390/nu16142269

15. Gualtieri P, Frank G, Cianci R, Dominici F, Mappa I, Rizzo G, et al. Fish Consumption and DHA Supplementation during Pregnancy : Study of Gestational and Neonatal Outcomes. Nutrients [Internet]. 2024;16(3051):1–14. Available from: https://www.mdpi.com/journal/nutrients

16. Chien M, Huang C, Wang J, Shih C, Wu P. Effects of vitamin D in pregnancy on maternal and offspring health-related outcomes : An umbrella review of systematic review and meta-analyses. Nutr Diabetes [Internet]. 2024;(May):1–13. Available from: http://dx.doi.org/10.1038/s41387-024-00296-0

17. Mahaputra DK. The Role of Hypocalcemia in Preeclampsia : A Review on Calcium Supplementation in Pregnancy. Medicinus. 2025;38(5):12–8.

18. Maia SB, Sandro A, Souza R, F M De, Lins S, S R De, et al. Vitamin A and Pregnancy : A Narrative Review. Nutrients [Internet]. 2019;11(681):1–18. Available from: doi:10.3390/nu11030681

19. Pretorius RA, Palmer DJ. High-Fiber Diet during Pregnancy Characterized by More Fruit and Vegetable Consumption. Nutrients [Internet]. 2021;13(35):1–11. Available from: https://www.mdpi.com/journal/nutrients

20. Cahyani P, Effendy DS. Gambaran Status Gizi dan Pola Makan Ibu pada Keluarga Berisiko Stunting. Miracle Journal of Public Health. 2024;7(2):167–75.