Overview of Chronic Energy Deficiency (CED) in Pregnant Women Based on Demographic Factors, Knowledge and Social Support

Ni Ketut Alit Armini[1*], Umi Nafiatul Hasanah[1], Iqlima Dwi Kurnia[1], Mira Triharini[1]

Abstract--- Chronic Energy Deficiency (CED) is the leading cause of maternal death. Pregnant women with poor nutritional status can cause CED. The purpose of this study was to determine the correlation between demographic characteristics, knowledge, and social support with chronic energy shortages in pregnant women. This study used a cross-sectional design. The population is pregnant women at the Tanah Kali Kedinding Public Health Center. The total sample of 186 respondents was taken by simple random sampling technique. The independent variables in this study were demographic characteristics (age, pregnancy distance, number of births, education level, employment status, income), knowledge and social support, while the dependent variable is the incidence of CED in pregnant women. Data were obtained by questionnaire and UAP measurement and analyzed using a chi-square test. There was a correlation between demographic factors based on age (p = 0.002), number of births (p= 0.012), pregnancy distance (p = 0.015), occupation (p=0.025) with CED in pregnant women, but there was no relationship educational factors (p= 0.444) and family income (p = 0.801). There is a relationship between knowledge (p=0.015) and social support (p=0.023) with CED in pregnant women. Demographic characteristics, knowledge, and social support have important contributions to the chronic lack of energy in pregnant women. It is important to provide counselling and assistance to pregnant women to increase awareness about fulfilling nutrition. Further experimental research needs to be done by providing interventions to overcome chronic energy deficiency in pregnant women.

Keywords--Demographic, Knowledge, Support, Women, Chronic Energy Deficiency

I. INTRODUCTION

Chronic Energy Deficiency (CED) is a leading cause of maternal death. Pregnant women with poor nutritional status can cause CED [1] Pregnant women with good nutritional knowledge will likely provide nutrients that meet the needs of themselves and the baby [2]. The risk of CED will be even greater if pregnant women have less energy sufficiency and an increasingly heavy level of physical activity, and come from poor families[3].

Social support encourages pregnant women to obtain balanced nutrition during pregnancy, so that it can have a

[1] *Faculty of Nursing Universitas Airlangga, Surabaya Indonesia*

Corresponding author
Ni Ketut Alit Armin
Email: nk.alita@fkp.unair.ac.id

positive influence. Social support during pregnancy can reduce biological sensitivity to psychological pressure, which can protect the fetus from the harmful effects of increased stress-related cortisol [1], [4]. A mother's social support can be obtained from the family, especially from her husband and friends in the neighborhood. The higher the social support provided by the husband, the higher the mother's motivation to maintain health during pregnancy[3], [5]. The results of the 2016 nutritional status monitoring survey showed an increase in the percentage of pregnant women with Chronic Energy Deficiency (CED) by 2.9%. The percentage of CED pregnant women in 2016 was 16.2% and in 2015 it was 13.3% [6]. The expected target should decrease. The Basic Health Research in 2018 obtained the proportion of pregnant women aged 15-49 years with Upper Arm Circumference (MUAC) <23.5cm or at risk of CED in Indonesia by 17.3% [6]. Data were obtained from the Surabaya City Health Office in 2018 of 681 pregnant women who came for a pregnancy check-up at the Tanah Kali Kedinding Public Health Center, 145 women (21.3%) experienced CED. This figure exceeds the target set by PSG in 2019 at 19.7%. Based on a preliminary study conducted through interviews with 15 pregnant women who came for antenatal care at Tanah Kali Kedinding Public Health Center, eight pregnant women did not know about CED, nutrients that are important for pregnancy, the dangers that occur if nutrient deficiency. MUAC has been used as a proxy indicator of the risk of CED for pregnant women [7]. Maternal upper arm circumference <23.5cm is a risk factor for the incidence of low birth weight babies [8]. According to Ariyani et al.'s study, MUAC is more used to determine the risk of CED in pregnant women because MUAC is relatively stable [11].

Pregnant women must have adequate nutrition because the nutrients obtained will be used for themselves and the fetus [1][9]. If the mother experiences nutritional deficiencies during pregnancy, the fetus will reduce the growth and development of the body's cells and the impact of reducing the growth and development of the body's cells will be permanent until adulthood [10], [11]. When pregnant women experience lack of energy and protein, they usually experience a lack of intake of other nutrients, including vitamins and minerals so that pregnant women at risk also experience a lack of various micronutrients, including iron and folic acid [5], [12].

The government has made various efforts to reduce the incidence of chronic energy deficiency in pregnant women by providing additional food. Health workers also need to involve people around pregnant women in explaining the incidence of chronic lack of energy and the dangers of pregnancy. Motivation from people around is very important so that pregnant women always check for pregnancy and consume nutritious and high food. A mother who is pregnant must have a good nutritional status [13]. Nutrition improvement is not only during but also before pregnancy so that the mother can start the pregnancy with good nutritional conditions [14]. The study aims to analyze the incidence of chronic energy deficiency in pregnant women based on demographic characteristics, knowledge, and social support.

AI. METHODS

- Research design

This study uses a descriptive correlational design with a cross-sectional approach. Measurement of independent and dependent variables was conducted once only. The collected data were then interpreted and analyzed to prove the hypothesis accepted or rejected.

- Population, Samples, and Sampling

The population in this study was all pregnant women who visited the Mother and Child Health (MCH) Polyclinic, Tanah Kali Kedinding Public Health Center, Surabaya. Study population 346 pregnant women. Sampling used a simple random sampling technique. The sample size is 186 respondents.

- Research variable

The independent variables in this study are demographic characteristics, namely mother's age, pregnancy distance, number of births, education level, occupation, income; knowledge; and social support. The dependent variable is the incidence of chronic energy deficiency (CED) in pregnant women.

- Research Instrument

Research instruments used questionnaires covering demographic characteristics, knowledge, and social support. The instrument was tested for validity and reliability on 21 pregnant women in the area of Kenjeran Public Health Center. The demographic data questionnaire consisted of age (< 20 years and > 35 years or 20-35 years), the interval of pregnancy (<2 years or > 2 years), number of births (< 3 times or > 3 times), level of education (not completing elementary school, SD, SMP or SMA and PT), work status (working or not working) and income (< city wage or ≥ city wage). Knowledge level questionnaire included 12 question items arranged with correct type = 1 false = 0. Social support questionnaire was adopted from the previous questionnaire and included 16 statement items in the form of a Likert scale with a value of 1 = never, 2 = sometimes, 3 = often, 4 = always, with scoring knowledge and support for three categories as less = 0-55, enough = 56-75 and good = 76-100. The incidence of CED in pregnant women was identified by measuring the circumference of the upper arm using the band category < 23.5cm, which occurred CED, while > 23.5cm did not.

- Research procedure

Data collection was carried out when pregnant women   waiting for assessment performed antenatal care at the Mother and Child Health (MCH) policlinic. Data collection began with requesting approval from respondents through informed consent. The time for filling out the questionnaire for each respondent was around 10-15 minutes. Retrieval of data was by giving questionnaires on demographic characteristics, knowledge, and social support. After the respondent completed the questionnaire, the researcher took measurements of MUAC using the MUAC tape. Although the mother's upper arm circumstance data were already in the MCH book, the researcher validated the accuracy of the data.

- Data analysis

Data analysis used Chi-Square statistical test with significance level α <0.05 Data analysis was carried out through several stages, namely: editing, coding, data entry, tabulating, and cleaning data.

- Ethical Clearance

This research was conducted by research ethics through the Faculty of Nursing Health Research Ethics Commission Universitas Airlangga with No. 1413-KEPK.

BI. RESULTS

The results of this study include demographic and specific data   used to analyze the relationship between the variables. Table 1 shows determinants of demographic characteristics with Chronic Energy Deficiency (CED) in pregnant women. Most pregnant women were aged 20-35 years with 138 respondents (74.2%), but there were also those aged < 2 0 and > 35 years as many as 48 respondents (25.8%). The majority of experiences of births ≤ 3 times were 153 (82.3%). Most of the pregnancy distance ≥ 2 years were 111 respondents (59.7%). In total as many as 109 were housewives (58.6%), and 77 respondents were working outside the home (41.4%). Respondents who graduated from elementary school to junior high school were 68 respondents (36.6%), while respondents who had a high school education level to tertiary education were 118 respondents (63.4%). Respondents with family income < city wage were 148 respondents (79.6%), only 38 respondents (20.4%) had family income ≥ city wage. Demographic characteristics with a value of ρ < 0.05 are age, number of births, pregnancy spacing, and occupation. The education and family income sub-variables have

values   ρ> 0.05.

Table 1. Determinants of demographic characteristics with Chronic Energy Deficiency (CED)

Demographic Sub Variable	Category	Chronic Energy Deficiency (CED)				Totally		Significance
		Yes		No				
		n	%	n	%	n	%	
Age (years)	<20 and >35	20	10.8	28	15.1	48	25.8	ρ =0.002
	20-35	27	14.5	111	59.7	138	74.2	
Number of birth	> 3	14	7.5	19	10.2	33	17.7	ρ =0.012
	< 3	33	17.7	120	64.5	153	82.3	
Pregnancy spacing	< 2 years	26	14	49	26.3	75	40.3	ρ =0.015
	> 2 years	21	11.3	90	48.4	111	59.7	
Occupation	worked	26	14	51	27.4	77	41.4	ρ =0.025
	housewife	21	11.3	88	47.3	109	58.6	
Education	elementary, junior school	15	8.1	53	28.5	68	36.6	ρ =0.444
	senior school-higher education	32	17,2	86	46.2	118	63.4	
Family income	< city wage	38	20,4	110	59.1	148	79.6	ρ =0.801
	> city wage	9	4,8	29	15.6	38	20.4	

Table 2. Determinants of knowledge and social support with Chronic Energy Deficiency (CED)

Variable	Category	Chronic Energy Deficiency (CED)				Total		Significance
		Yes		No				
		n	%	n	%	n	%	
Knowledge	Sufficient	23	12.4	41	22	64	34,4	ρ =0.015
	Proper	24	12.9	98	52.7	122	65.6	
	Totally	47	25.3	139	74.7	186	100	
Social Support	Insufficient	4	2.2	15	8,1	19	10.2	ρ=0.23
	Sufficient	30	16.1	57	30.6	87	46,8	
	Proper	13	7	67	36	80	43	
	Totally	47	25.3	139	74.7	186	100	

There is a relationship between demographic characteristics based on age, number of births, pregnancy spacing, and occupation with the incidence of Chronic Energy Deficiency (CED); but there is no relationship with age, education, and family income.

Based on Table 2, it shows that   122 respondents (65.6%) have a good level of knowledge. The analysis shows ρ count (0.015) <α (0.05) which means that there is a relationship between knowledge and the incidence of Chronic Energy Deficiency (CED) in pregnant women. Most of the respondents, as many as 87 people (46.2%), have sufficient social support. Analysis using the Chi-Square statistical test showed ρ count (0.023) <α (0.05), which means that H1 was accepted and H0 was rejected with the statement that there was a relationship between social support and the incidence of Chronic Energy Deficiency (CED) in pregnant women

IV. DISCUSSION

There is a relationship between demographic characteristics based on age, number of births, pregnancy spacing, and occupation with the incidence of Chronic Energy Deficiency (CED); and there is no relationship between demographic characteristics based on education and family income with CED. The majority of pregnant women were aged 20-35 years, although some are <20 years old and > 35 years old. Pregnancies less than 20 years are not biologically optimal, emotions tend to be unstable, and mentally immature so that there is lack of attention to the fulfilment of nutritional needs during pregnancy, while pregnancy at the age of more than 35 years is associated with decreased body resistance to disease [4], [15]. According to Anggraini (2016), pregnant women with CED mostly occur at maternal age <20 years [16]. Pregnant women who become pregnant and give birth at an unsafe age of < 20 years or > 35 years and CED tend to give birth to

low birthweight babies [1], [17]. The age of a woman during pregnancy should not be too young and not too old. Age less than 20 years or more than 35 years has high risk for childbirth.

Most respondents had a history of giving birth ≤3 times. There is a relationship between the number of birth history with the occurrence of CED. The number of births affects the nutritional status of pregnant women because it can influence the optimization of both mother and fetus. High parity will increase the risk to the fetus [3], [5]. Some pregnant women are at risk because their number of births > 3 time; the high number of births affects various health problems both for pregnant women and the fetus. Most respondents had a pregnancy interval of > 2 years; there is a relationship between the distance of pregnancy with CED. Pregnant women will experience various risks ranging from bleeding to death [1]. Pregnancy distance ≥ 2 years is the safe distance for pregnancy for pregnant and childbirth women because the reproductive organs are functioning optimally.

Most respondents were housewives. There is a relationship between work and CED. Angraini (2016) states that there is an influence of work with the CED events [16]. Heavy work directly increases energy needs and nutrition intake [18]. Most of the respondents' education level is high school. There is no relationship between the level of education with the incidence of CED in pregnant women. The incidence of CED in pregnant women is not only based on the low level of education, but other factors, such as the availability of sufficient information resources about CED and nutrition in pregnancy, previous pregnancy experiences, and social support[4], [19].

The majority of the family income of pregnant women < city wage. The amount of income does not affect financial behavior because of someone with different income level and different number of dependents, so that each head of the family is allocating their finances according to their needs [17]. If families with low incomes can manage nutritious food with simple and inexpensive ingredients, it can prevent the CED occurrence.

There is a relationship between knowledge and the incidence of CED. Pregnant women with good knowledge will try to meet their nutritional needs during pregnancy [2]. Most respondents having good level of knowledge had not experienced CED. Highly knowledgeable people tend to be obedient to check their pregnancy, so knowledge about the concept of CED events can shape health behavior in the form of compliance with antenatal care to prevent the occurrence of CED[15], [20].

Most respondents had a good level of knowledge about CED prevention and were well-informed about understanding and impact. Pregnant women who check their pregnancy can be said to have a fairly good level of knowledge. The better one's knowledge, the better the attitude that will be formed toward obedience to creating action [21], [22]. There is a significant relationship between knowledge and the incidence of CED in pregnant women. Knowledge influences someone in healthy behavior and can influence someone in taking health actions. The better the level of knowledge of pregnant women, the better the nutritional status to prevent the occurrence of CED [23]. The highest value of understanding comes with a sufficient level of knowledge and the lowest regarding prevention with an insufficient level of knowledge. Less knowledge from pregnant women can be increased by asking for information from health workers and reading books. The environment contributes greatly to pregnant women in receiving correct information so that pregnant women also get information about pregnancy through those closest to them.

As many as 24 respondents had good knowledge about the concept of CED but had experienced CED; it can be caused by the compliance behavior of pregnant women in checking and maintaining health. Respondents were unable to apply the concept to real situations to prevent the CED event. Pregnant women cannot meet their nutritional needs if they do not consider the nutritional value of everyday important meals. The better the knowledge of pregnant women, the

better behavior will be in maintaining the health of their pregnancy.

There is a relationship between social support and the incidence of CED. The higher the social support provided by the husband, the higher the adaptation of women to maintain health [24], [25]. Some respondents had very less social support in the aspect of award support. Award support involves expressions in the form of statements of agreement and positive evaluations of the ideas, feelings, and performance of others [3], [26]. A woman will feel calm and comfortable with the support and attention of those closest.

Most respondents had good social support for informational support and emotional support. The highest score was on informational support. Informational support includes giving advice, notifying, reminding, and seeking information, whereas emotional support involves empathy and concern for the individual, so that the individual feels comfortable, loved and cared [23], [27]. Informational support can also be obtained by pregnant women from health workers when having pregnancy check-up. Adequate knowledge and skills enable health workers to improve the quality of work against antenatal care service standards[4].

Most pregnant women have sufficient social support for instrumental support. Instrumental support can be in the form of helping, preparing, assisting, and contributing to maintaining the pregnancy process. Most pregnant women are accompanied by their husbands when doing antenatal care. Social support involves meaningful social relations so that it can have a positive influence on the recipient[25]. The most important social support for pregnant women is from a partner, the husband can provide support in the form of enthusiasm and attention to his wife. Social support for pregnant women is also obtained from other family members, friends and neighbors. Advice on becoming a good prospective parent and how to deal with pregnancy complaints can be obtained from parents who have previous experience [2], [17]. Social support from the closest person can encourage the mother to look after her pregnancy, including fulfilling nutritional needs, antenatal care, as well as information related to pregnancy issues so that a healthy and safe pregnancy is obtained and problems avoided.

V. CONCLUSION

Demographic characteristics based on age, number of births, pregnancy spacing, and occupation are related to the incidence of Chronic Energy Deficiency (CED) in pregnant women, but the level of education and family income does not contribute directly to CED in pregnant women. The higher the level of mother's knowledge, the better the mother's behavior to maintain the health of her pregnancy. The better social support received by pregnant women, the better the motivation of pregnant women in maintaining pregnancy. There is need to do further research by comparing the anthropometric, biochemical nutritional status indicators and clinical features of pregnant women.

CONFLIC OF INTEREST

The authors declare the absence of conflict of interest

REFERENCES
[1]   L. L. Rubina Shaheen, "Quality of life among pregnant women with chronic energy deficiency in rural

Bangladesh," *Health Policy (New. York).*, vol. 78, no. 2–3, pp. 128–134, 2016.

[2]   J. H. Blondin and J. A. LoGiudice, "Pregnant women's knowledge and awareness of nutrition," *Appl. Nurs. Res.*, vol. 39, no. October 2017, pp. 167–174, 2018.

[3]   Z. Muhamad and S. Sumarmi, "Factors affecting the incidence of chronic energy deficiency among pregnant women attending the Pulubala community health centre," *Indian J. Public Heal. Res. Dev.*, vol. 9, no. 11, pp. 1734–1738, 2018.

[4]   M. J. Hindin, "Women's input into household decisions and their nutritional status in three resource-constrained settings," *Public Health Nutr.*, vol. 9, no. 4, pp. 485–493, 2006.

[5]   M. S. Nurdin, V. Hadju, Ansariadi, A. Zulkifli, and A. I. Arundhana, "Determinants of anaemia among pregnant women in jeneponto regency," *Pakistan J. Med. Heal. Sci.*, vol. 12, no. 1, pp. 429–434, 2018.

[6]   Kementrian Kesehatan RI, *Laporan Riset Kesehatan Dasar 2018*. Jakarta, 2018.

[7]   Pj Kusuma, "Status Gizi pada Ibu Hamil sebagai Faktor Risiko Kejadian Berat Bayi Lahir Rendah," *J. Kesehat. Masy.*, vol. 3, pp. 286–294, 2015.

[8]   and V. C. Mija-tesse Ververs, Annick Antierens,*Anita Sackl, Nelly Staderini, "Which Anthropometric Indicators Identify a Pregnant Woman as Acutely Malnourished and Predict Adverse Birth Outcomes in the Humanitarian Context?," *PLos Curr.*, vol. 7, no. 5, 2013.

[9]   N. Wibowo, S. Bardosono, R. Irwinda, I. Syafitri, A. S. Putri, and N. Prameswari, "Assessment of the nutrient intake and micronutrient status in the first trimester of pregnant women in Jakarta," *Med. J. Indones.*, vol. 26, no. 2, pp. 109–115, 2017.

[10]   P. Singh *et al.*, "Effect of maternal dietary supplementation on complications of pregnancy and infancy and metabolic syndrome in later adult life," *World Heart J.*, vol. 7, no. 3, pp. 131–139, 2015.

[11]   A. Winkvist, D. S. Nurdiati, H. Stenlund, and M. Hakimi, "Predicting under- and overnutrition among women of reproductive age: A population-based study in central Java, Indonesia," *Public Health Nutr.*, vol. 3, no. 2, pp. 193–200, 2000.

[12]   M. Picàri, "The metabolic approach: The must of our age," *Trends Med.*, vol. 11, no. 3, pp. 93–109, 2011.

[13]   L. S. Ani, N. W. A. Utami, I. W. Weta, I. G. A. S. Darmayani, and K. Suwiyoga, "Anemia in preconception women in Sidemen Sub District Karangasem Regency, Bali-Indonesia," *Gineco.eu*, vol. 14, no. 4, pp. 131–134, 2018.

[14]   Monika, S. Chishty, and N. Singh, "Nutritional status of tribal women (Saharia and Meena), Baran district of Rajasthan, India," *Nutr. Food Sci.*, vol. 48, no. 6, pp. 922–939, 2018.

[15]   K. Krishnaswamy, "Perspectives on Nutrition Needs for the New Millennium for South Asian Regions," *Biomed. Environ. Sci.*, vol. 14, no. 1–2, pp. 66–74, 2001.

[16]   Y Anggraini, "Pengaruh Demografi dan Sosioekonomi pada Kejadian Kekurangan Energi Kronik Ibu Hamil di Kota Metro Provinsi Lampung," *J. Kesehat.*, vol. 4, no. 2, pp. 401–408, 2016.

[17]   A. Lee, M. Newton, J. Radcliffe, and R. Belski, "Pregnancy nutrition knowledge and experiences of pregnant women and antenatal care clinicians: A mixed methods approach," *Women and Birth*, vol. 31, no. 4, pp. 269–277, 2018.

[18]   P. A. Nehme, F. Amaral, A. Lowden, D. J. Skene, J. Cipolla-Neto, and C. R. C. Moreno, "Reduced melatonin synthesis in pregnant night workers: Metabolic implications for offspring," *Med. Hypotheses*, vol. 132, no. October 2018, pp. 1–5, 2019.

[19]   P. Winichagoon, "Thailand nutrition in transition: Situation and challenges of maternal and child nutrition," *Asia Pac. J. Clin. Nutr.*, vol. 22, no. 1, pp. 6–15, 2013.

[20]   K. Bookari, H. Yeatman, and M. Williamson, "Falling short of dietary guidelines – What do Australian pregnant women really know? A cross sectional study," *Women and Birth*, vol. 30, no. 1, pp. 9–17, 2017.

[21]   M. Triharini, N. K. A. Armini, and A. A. Nastiti, "Effect of Educational Intervention on Family Support for Pregnant Women in Preventing Anemia," *Belitung Nurs. J.*, vol. 4, no. 3, pp. 304–311, 2018.

[22]   A. K. Cohen *et al.*, "Educational Attainment and Gestational Weight Gain among U.S. Mothers," *Women's Heal. Issues*, vol. 26, no. 4, pp. 460–467, 2016.

[23]   G. D. Fekadu Beyene, "Assessment of Knowledge of Pregnant Mothers on Maternal Nutrition and Associated Factors in Guto Gida Woreda, East Wollega Zone, Ethiopia," *J. Nutr. Disord. Ther.*, vol. 04, no. 01, 2013.

[24]   C. Hamel *et al.*, "Childhood malnutrition is associated with maternal care during pregnancy and childbirth: A cross-sectional study in Bauchi and cross river states, Nigeria," *J. Public health Res.*, vol. 4, no. 1, pp. 58–64, 2015.

[25]   N. K. Alit Armini, R. D. Tristiana, and A. Ose Tokan, "Husband's Support is Needed to Prevent Postpartum Depression," vol. 3, no. Inc, pp. 4–7, 2017.

[26]   B. J. P. Giesbrecht, Gerald F. PhD; Poole, Julia C. BA; Letourneau, Nicole PhD; Campbell, Tavis PhD; Kaplan, "The Buffering Effect of Social Support on Hypothalamic-Pituitary-Adrenal Axis Function During Pregnancy," *Psychosom. Med.*, vol. 75, no. 9, pp. 856–862, 2013.

[27]   M. Triharini and N. K. A. Armini, "Commitment for anaemia prevention is associated with adherence to iron supplementation and iron intake among pregnant women," *Indian J. Public Heal. Res. Dev.*, vol. 10, no. 8, pp. 2719–2723, 2019.