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Nutritional Status and it's relation to menarche of yunior high school students in Manokwari West Papua, Indonesia

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Abstract: Menarche is the occurrence of the first menstruation in girls naturally. The nutritional status of girls influences age at menarche. Nutritional status has a role in the formation of hormones that affect the occurrence of menarche and a person's nutritional status can reflect the condition of his body. This study aims to investigate the relationship between nutritional status and menarche age in junior high school students in Manokwari, West Papua. The design of this study uses a descriptive method with data collection techniques with purposive sampling and a cross-sectional approach. Nutritional status measurement is carried out through the measurement of Body Mass Index (BMI) The age of menarche is taken based on the age of the first menstruation. The relationship between nutritional status and age at menarche was analyzed through a chi-square test. This study prove that the nutritional status of junior high school students in Manokwari was mostly normal category (80.9%). The overnutrition category was quite high (19% overweight and 10% obese). The average age at menarche was 12.51 years, of which 91% of junior high school students have experienced menarche. Statistical analysis proved that there was no significant relationship between nutritional status and age at menarche with a p-value 0.132.

Keywords: Age at menarche; Body mass index; Junior high school students; Manokwari; Menarche; Nutritional status.

Introduction

Adolescence is a period of change from children to adults, with rapid changes, the development of secondary sexual reproductive organs, and changes in psychology and cognition. The World Health Organization (WHO) defines an adolescent as someone aged 10-19. Approximately 44 million adolescents are currently aged 10 to 19 years. This shows they are the largest age group in Indonesia because they are influenced by the high birth rate (BPS, 2019). The number of adolescents aged 10-19 years reaches around 43,5 million or around 18% of Indonesia's population according to the results of the 2018 census (Rumiatun et al., 2023).

One of the important biological trait phenotypes during adolescence is menarche. This event indicates a woman's sexual maturity. Age at menarche, which marks the onset of a woman's menstrual period, usually occurs between the ages of 12 and 14 (Hidayah & Palila, 2018). Menarche is an important event that marks the entry of a girl into the adult phase stage, the age at menarche among the population varies, because of genetic and environmental factors. Some environmental factors affecting the age at menarche include Body Mass Index, maternal education, mother age at menarche, urban and rural, media exposure, and lifestyle (Tehrani et al., 2014; Kawulur et al., 2012).

A person's nutritional status can reflect whether the condition of the body is fulfilled or not, the type of food consumed can meet the needs of the body. Changes in

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the current diet and types of fast food may be unhealthy (Winerungan et al., 2018). Nutrients obtained from food intake are important in influencing the process of sexual maturity, specifically the occurrence of menstruation. Nutritional status assessment includes measuring body weight (BB), body height (TB), and Body Mass Index at age (BMI/U) (Indriyani et al., 2022). Adolescent girls with high BMI tend to experience early menstruation because BMI reflects the amount of fat in the body and affects hormone production. Optimal nutritional intake is very important for the development of reproductive organs in adolescents, but the consumption of high-fat foods can increase levels of the hormone leptin, which is a hormone that affects the release of reproductive hormones (Barros et al., 2019).

Research on the age of menarche is important because it can have an impact on girls' health. Previous research conducted by Siahaan (2017) found that the age of menarche for adolescent girls in Urban Manokwari was 12.2 years. However, these studies did not show how it relates to nutritional status. Several studies regarding the age at menarche in girls from several indigenous tribes in Papua reveal the fact that there is an adaptive response to environmental conditions, resulting in a relatively younger age at menarche (Kawulur et al., 2012); (*Rumayauw et al. 2024*). The people who live in rural areas tend to face the challenges enviroment like malnutrition, death threats by disease, and overload activity, therefore strategies for survival are important for them by changing body size and younger age at sexual maturation (Walker et al., 2006). These conditions differ with the people who live in urban areas, which might be don't face the challenges environmental. Therefore, the purpose of this study is to assess the nutritional status of menarche age that occurs in girls in Manokwari.

Method

The research was designed purposive sampling method with a cross-sectional approach. Research location was conducted in 3 State Junior High Schools, namely SMPN 1 Manokwari, SMPN 2 Manokwari and SMPN 6 in Manokwari. Data collection in January-April 2024. The respondents were 7th and 8th grade students with total number of 437 girls.

Respondents must sign an informed consent before collecting data. The interview process was carried out using a questionnaire for collecting data of demographic, socioeconomic status, and menache event. Anthropometric measurements are carried out to assessment of nutritional status. Calculation of body mass index by dividing the respondent's weight by the respondent's height squared (kg/m2). To determine the classification of nutritional status, an analysis can be carried out based on the Z-score value of the body mass index by age (BMI/U) and then categorized into 4, namely normal (if the Z-score value: -2 SD to +1 SD), thinness (if the Z-score value: -3 SD to <- 2 SD), overweight (if the Z-score value: +1 SD to +2 SD) and obese (if the Z-score value: > + 2SD) (Kemenkes,2020).

Age at menarche is categorized into fast menarche if age <11 years, normal category if age between 11-13 years and late menarche if age> 13 years (Adam et al., 2022). The data was analyzed using the chi-square test with a p-value = 0.05 to understand the relationship between nutritional status and the age at menarche.

Result and Discussion

The study was conducted on 437 junior high school students consisting of 397 respondents who had experienced menarche and 40 students who had not experienced menarche. Figure 1 shows the high level of father education was high school (SMA) 183 people (46%) and undergraduate (S1) 142 people (36%), then the lowest level was postgraduate (S2) 4 people (1%). Other low percentages of education were junior high school (24 people (6%), elementary 18 people (4%), and there are around 24 people (7%) without information.

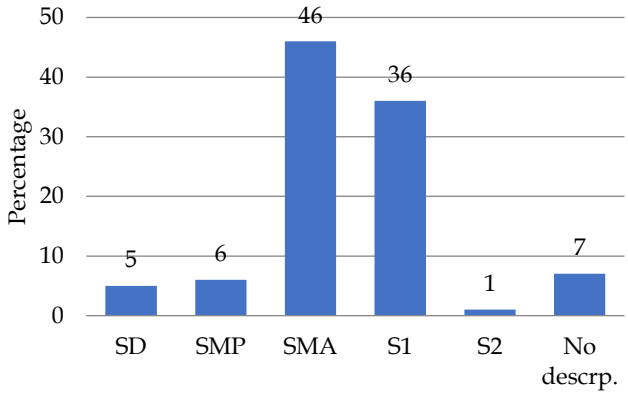

Figure 1. Education of Father of Junior High School Students in Manokwari

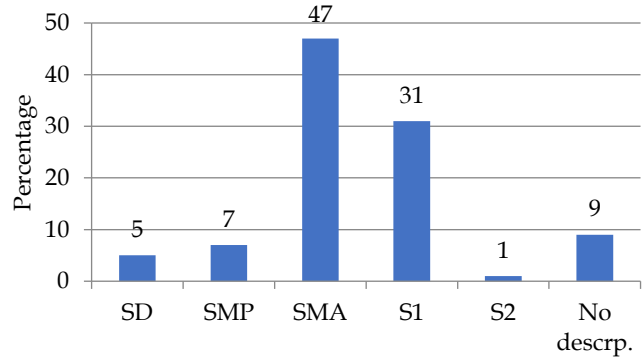

Figure 2. Mother education of Junior High School Students in Manokwari

Figure 2 shows that the high percentage of mothers' educations were the high school (SMA) 187 people (47%) and undergraduate (S1) 123 people (31%), while the lowest percentage was postgraduate (S2) 2 people (1%). Other levels of education that as junior high school (SMP) and elementary school (SD) have low percentages below 10%

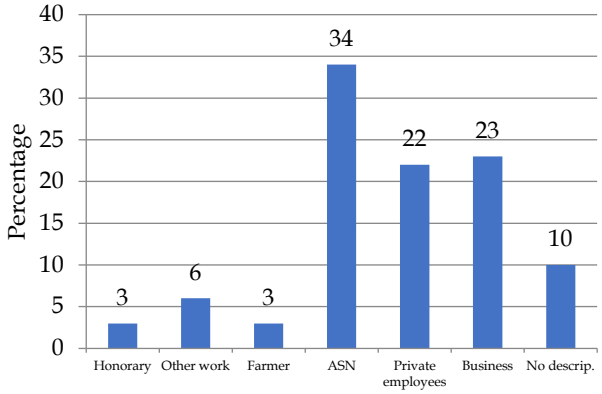

Figure 3. Father occupation of Junior High School Student's Father in Manokwari

Figure 3 shows the percentage of fathers' occupation. Most of them were state civil servants (ASN) with the number of 134 people (34%), entrepreneurs 93 people (23%), private employees 86 people (22%), farmers 10 people (3%), other jobs (mechanics, drivers, motorcycle taxis, lecturers, fishermen and lecturers) 22 people (6%) and 41 people (10%) without information.

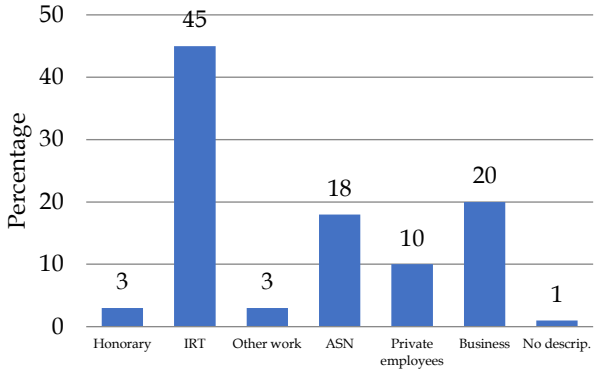

Figure 4. Mother occupation of Junior High School Students in Manokwari

Based on the percentage of mothers' occupations (Figure 4), mostly their jobs as housewives (IRT) 177 people (45%), state civil servants (ASN) 134 people (18%), dan entrepreneurs of 93 people (20%). Other jobs with low percentages were private employees 86 people (10%), honorary employees 11 people (3%), other work (teachers, drivers, pastors, retirees) of 13 people (3%) and there were 5 people (1%) who have not information.

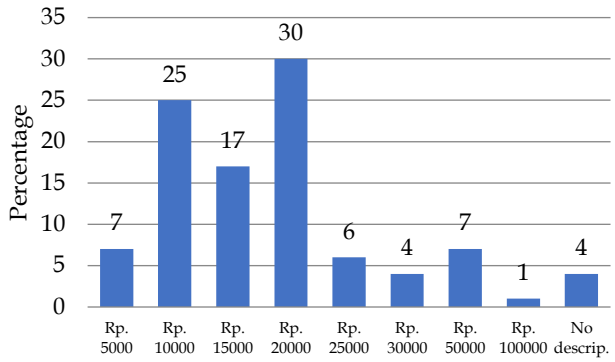

Figure 5. Pocket Money for Junior High School Students in Manokwari

Figure 5 shows that the pocket money varies for each respondent. The maximum amount of pocket money was IDR. 20,000, with a percentage of 30%, then 99 people (25%) pocket money of IDR. 10,000, and others have pocket money of IDR 5.000, IDR 25.000, IDR 30.000, IDR 50.000 and IDR 100.000.

Nutritional Status

The nutritional status category can be seen in Figure 6. Most of the respondents have normal nutritional status 270 people (68%). The percentage of thinness status is relatively low 11 people (3%), while others overweight 77 people (19%) and obese 39 people (10%).

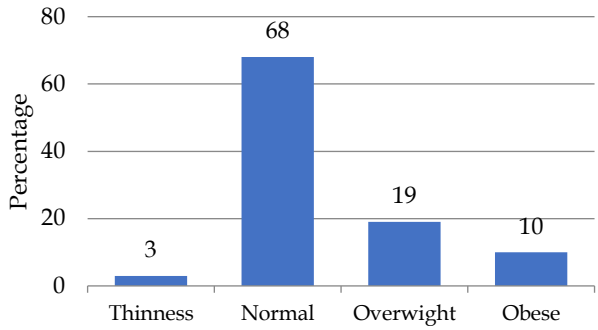

Figure 6. Nutritional Status Categories of Junior High School Students in Manokwari

Age at Menarche

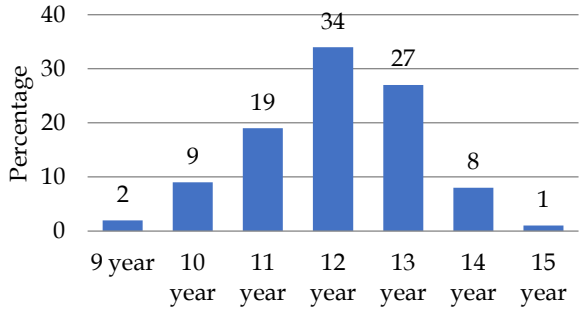

Figure 7. Age at Menarche of Junior High School students at Manokwari

Figure 7 shows the age at menarche of junior high school students in Manokwari at 12 years with 138 people (34%). This age at menarche was in the normal category. Respondents with the least menarche at age more than 15 years were 2 people (1%). The average age at menarche of junior high school students in Manokwari was 12.51 years old, with an age range of 8.89 years – 15.92 years.

Based on the age grouping of menarche, namely fast menarche, normal menarche and late menarche, the respondents who experienced normal menarche were 321 people (80.9%) who had experienced menarche at the age of 11-13 years, fast menarche 42 people (10.6%) those who experienced menarche at the age <11 years and late menarche 34 people (8.6%), those who had experienced menarche > the age of 13 years. The age category of menarche can be seen in Figure 8.

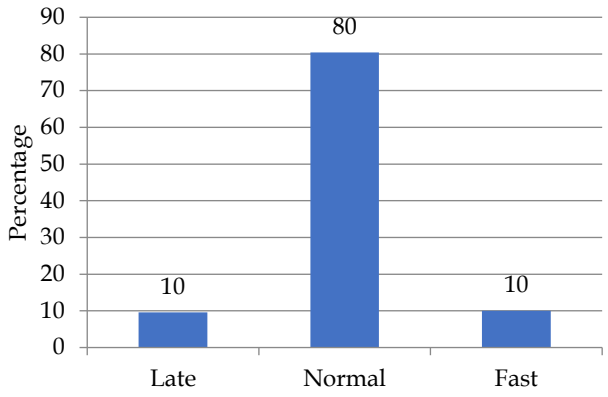

Figure 8. Age at Menarche Categories

The Chi-Square test analysed the relationship between nutritional status and age at menarche, which showed a not significant relationship between nutritional status and age at menarche in junior high school students in Manokwari (*p-value* of 0.13).

Research on nutritional status and it's relation with age at menarche provides valuable insights into the important factors that precede the initial onset of menstruation in women. Understanding the role of nutritional status on the age of menarche is essential for promoting the health of adolescent girls.

Menarche, which marks the beginning of reproductive maturity in adolescent girls, is an important beginning in their reproductive life. The age at the start and end of menstruation is very important because it is related to the reproductive ageing process. A study by Kawulur et al., (2023) found that younger age at menarche accelerates senescence of age at menopause of the women in Oransbari, and also showed a short reproduction period when compared with other populations (Rumayauw et al. 2024.).

Nutritional status in this case has an important role in the growth and development of adolescents as a whole, including the beginning of menarche. Adequate nutritional needs are essential to achieve optimal weight or body fat. The critical point of fat accumulation is needed to trigger the menstruation event. BMI can be used as an indicator in assessing the accumulation of fat. In Arfak girls, an average BMI of 21,9 kg/m^2 was the critical value at the time of their menarche (Kawulur et al. 2012). Overnutrition and early menarche of girls in this study were quite high. Freedman et al., (2002) state that obese fat girls tend to experience early menstruation. The lifestyle of urban people who tend to consume food with high fat and sugar can cause the high of overnutrition.

The nutritional status of students in Manokwari was the most normal status with a percentage of 68%. This study is in line with some research at SMP Negeri 29 Samarinda (50.7%), SMP Mardi Yuana (63.2%) and MTs Darul Abror Brebes (83.3%).

Nutritional status can be influenced by food intake, level of education, food availability and socioeconomic (Adam et al., 2022), as well as developmental and cultural factors (Hastuti & Norazizah, 2016). According to Elyagizi et al., (2023) and Sahdina et al., (2023), education and family income can affect the nutritional status of children.

The good nutritional status of junior high school in Manokwari can be supported by the occupation and education of their parents. Their father's and mother's education is mostly high school (46% and 47%) respectively. Most of the fathers' occupations of junior high school students in Manokwari were mostly civil servants (34%) and mothers' occupations were housewives (43%), so the father's income can be used to buy groceries for family needs and his mother cooks food.

Nutritional status is also associated with food intake. If dietary needs are optimal, the nutritional status is good and impacts the growth of reproductive organs. This statement has been following research from Lestari et al., (2022) which states that the consumption of high protein from animals and plants has a relationship with nutritional status and menarche.

The average age of menarche in junior high school in Manokwari city was 12.51 years (81%) with an age range of 8.89-15.92 years, which shows an increase compared to the previous study conducted in 2017, which was at the age of 12.2 years with age range between 9-16 years old (Siahaan et al, 2017). Rahmananda & Sari, (2020) study showed the age at menarche of students also ranges between 12-13 years. However, the age at menarche is still in normal age, the same as the results of this study, including normal menarche (11-13 years).

Several factors influence the incidence of menarche in female students. One of which is the family's economic ability. Students with family backgrounds with higher economic status such as good parental jobs and large family incomes can buy children's needs in fulfilling nutrition, so students will have a good nutritional status. Another economic factor is pocket money, where this allows parents to give more pocket money, thereby increasing the likelihood of female students consuming other foods (Rahmadhani et al., 2024). Parents whocan buy good nutrition and healthy food for their children because they have a good and stable job. We can also see the ability to fulfil children's pocket money that parents usually give to their children (Hartatik et al., 2022). Meanwhile, parents with lower jobs will find it difficult to meet the needs of their children in terms of nutrients consumed (Kadri, 2018). In addition to the nutrition at home that has been fulfilled by parents, the level of students in consuming food outside the home will also affect the level of nutrients in the body. Getting a lot of pocket money has the potential for students to buy food outside. The existence of different diets affects the condition of the body. The work of parents on the father's side a state civil servants who are known to have a very sufficient income, even more in meeting the needs of the family, although most of the work of the respondents' mothers is housewives (IRT) who can process the right food for the nutritional needs of their children.

Another factor is the level of education and knowledge of parents in choosing food, providing food intake and the use of health facilities (Fadare et al., 2019). According to research by Aljohani & Aljohani, (2020), the lack of parental education can be a risk factor for malnutrition. Our study showed that the education of most parents was at the bachelor's and high school levels. This is considered capable of providing good information and knowledge for children about nutritional status and their readiness to face menarche. The level of parental education can help girls in preparing themselves for menarche. Girls will be better prepared if their parents provide information about the beginning of menarche (Putri et al., 2024).

Based on the chi-square test with *a p-value* of 0.13, there was no significant relationship between nutritional status and age at menarche in junior high school students in Manokwari. The same results from Enggar et al., (2022) showed a not significant relationship between body mass index and age at menarche. Research by Wulandari & Ungsianik (2013), Monica & Herdiman, (2023), Fitriany et al., (2018) and Maulidya et al., (2018) also showed that there is no significant relationship between nutritional status and menarche. Although other factors such as genetics and socioeconomic status play a role in determining the occurrence of menarche.

Conclusion

The nutritional status of junior high school students in Manokwari has a significant effect on the age of menarche. The average age of women when experiencing menarche at a normal age was 12.51 years with a range of 8.89 years to 15.92 years and they mostly have good nutrition. Overnutrition of girls was relatively quite high which describes the optimal nutrition intake for supporting the most age at menarche in the category of normal and early.

Author Contributions

PF contributed to writing original draf preparation, administration, and data analysis; EIJJK and FD contributed in formal analysis, data curation, interpretation of data, editing, and finalization the manuscript.

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Conflicts of Interest

The authors declared no conflic of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results

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