



Profile of Energy Consumption Levels, Protein, Infectious Diseases, and Nutritional Status of Toddlers at Abepura Community Health Center, Kota Baru Urban Village

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ABSTRACT

Nutritional status is a measure of the success of fulfilling nutrition in children which is shown through the achievement of weight for age. The nutritional status of toddlers is very significant as a starting point for physical certainty in adulthood. This research method is quantitative research using a descriptive approach. The research involved a population of 420 toddlers and 111 samples of toddlers at the Abepura Community Health Center, Kota Baru Urban Village, taken using the purposive sampling method. The research results showed that the dominant level of energy consumption among respondents was in the good category, 80 respondents (72.1%), while in the poor category there were 31 (27.9%).

INTRODUCTION

Indonesia as a developing country faces greater challenges entering the era of globalization because it has to compete with other countries in various fields. To face these challenges it requires quality human resources. There are many factors that must be considered in creating quality human resources, one of which is the health aspect (Hou et al., 2015; Hassan, 2023).

Nutritional problems are essentially a public health problem, but overcoming them cannot be done with a medical approach and health services alone. The causes of nutritional problems are multifactorial, therefore the management approach must involve various related sectors (Hulst et al., 2022). One of the health indicators that is assessed for successful achievement of the SDGs is nutritional status (Indriyastuti & Kartono, 2022; Chen, Chaudhary, & Mathys, 2022). Nutritional status is measured based on age (A), body weight (BW), and body height (BH). The BW and BH variables are presented in the form of three anthropometric indicators, namely Body Weight according to Age (BB/U), Body Height according to Age (BH/A) and Body Weight according to Height (BW/BH) (Balter et al., 2022).

Toddlers are children under five years of age (0-5). This age is a period of growth that requires special attention from parents. The parent who plays the most role in a child's growth and development is the mother, especially in terms of food so that the nutritional intake given to toddlers can be balanced (Paul & Saha, 2022; Laksono et al. 2022). This is because toddlers are an age that is vulnerable to nutrition and needs special monitoring of nutritional problems so that they are able to grow and develop optimally (De Cianni et al., 2023).

Protein energy consumption for mountain and coastal communities still has not reached the recommended nutritional adequacy level. This is indicated by the consumption level which has not reached 100 percent of the nutritional value and the occurrence of infectious diseases in toddlers 1-5 years old at the Abepura Health Center.

Nutritional problems can be experienced by all age groups. The selection of toddler groups is based on the fact that toddler groups are vulnerable to change. At this age there is very rapid growth and development towards the perfection of the body's organs. Disorders and development in toddlers will affect physical resilience and intelligence so that they can have an impact on life in the future. It was also explained that there is concern that if nutritional problems among children under five are not addressed, it will lead to a lost generation, which is a situation that is dangerous for the survival of a nation. Therefore, it is important to study the growth of children under five and the various factors that cause it, including improving nutrition starting from the family level (Wulandari et al., 2022; Andueza et al., 2022).

Food consumption influences the nutritional status of toddlers. Good nutritional status or optimal nutritional status occurs when the body obtains enough nutrients that are used efficiently, thus enabling physical growth, brain development, ability to work and general health at the highest possible level (Knobl et al., 2022). Malnutrition status occurs when the body experiences a deficiency of one or more essential nutrients. Over nutritional status occurs

when the body obtains excessive amounts of nutrients, causing toxic or dangerous effects (Flynn et al., 2022; Almatier, 2006). Protein Energy Deficiency/Protein-energy malnutrition (PEM) is still one of the main nutritional problems in Indonesia (Elisanti, 2017). Protein energy deficiency (PEM) itself is grouped into two, namely undernutrition (if body weight for age is below 2 SD), and malnutrition (if body weight for age is below 3 SD).

According to UNICEF data (2020), data on malnutrition in the toddler group, namely stunting, wasting and low body weight, continues to be high. The eating rate in Indonesia is the fifth highest in the world, while for stunting Indonesia is in the fourth highest position. Riskesdas 2018 data published that 30.8% of children experienced stunting, the prevalence of wasting was 10.2% and excess body weight was 8.0% (Riskesdas, 2018).

Nutritional status is a measure of success in meeting children's nutritional needs as demonstrated by achieving weight for age. Nutritional status in toddlers is very significant as a starting point for physical capacity in adulthood (Cheikh et al., 2022; Djoumessi, 2022; Samosir et al., 2023). The factors that most influence the nutritional status of children under five can be studied and then formulated into recommendations that can be presented as the best guidelines for the community (Sulistyawati, 2019).

World Health Organization (WHO) in 2018 more than half of under-five deaths were caused by diseases that could be prevented and treated through simple and affordable interventions. Malnourished children, especially those with acute malnutrition, have a higher risk of death (Sturgeon et al., 2023). Nutrition-related factors contribute to approximately 45% of deaths in children under 5 years of age (WHO, 2018).

In Indonesia, the problem of nutritional development is an issue that must be handled seriously. Based on data in Indonesia, there has been no reduction in nutritional status problems for babies aged 0-59 months based on nutritional status with the BW/U index in Indonesia: poor nutrition 3.90%, undernutrition 13.80%, good nutrition 79.20%, overnutrition 3.10% (Indonesian Health Profile, 2020). Based on data obtained from the Papua Province Health Office (2021), nutritional status data in Papua can be seen from the assessment of the BB/U index, 9.4% of children suffer from malnutrition and 1.9% of children suffer from malnutrition. The national percentage of undernutrition is 14.4% and malnutrition is 3.4%. The percentage of malnourished children in Papua is reported to be 11.9% and malnourished at 3.2%. Based on data obtained from the Abepura Community Health Center (2022), of 18,668 toddlers, it was found that the prevalence of good nutritional status was 3.9%, malnutrition was 37% and obesity was 84%.

From the description above, it is known that toddlers are an age group that is vulnerable to health problems that impact the nutritional status of toddlers, where malnutrition is still the main problem found in Indonesia and has not been resolved specifically in Papua. Malnutrition and poor nutritional status during infancy will have an impact on the quality of individuals as adults, which will further determine the quality of Indonesia's human development. Thus, studies regarding the multifactorial causes of under

nutrition in toddlers need to be carried out to further provide recommendations for treatment, namely intervention and prevention of under nutrition for toddlers in Papua in particular and Indonesia in general. Thus, this research was conducted to determine the profile of energy and protein intake, infectious diseases and nutritional status of toddlers at the Abepura Community Health Center, Kota Baru Papua.

THEORETICAL REVIEW

Energy Definition

Energy is one of the results of carbohydrate, protein and fat metabolism. Energy functions as a power substance for metabolism, growth, temperature regulation and physical activity. The average energy adequacy figure for Indonesian people is 2100 kilo calories per person per day at the consumption level. Excess energy is stored in the form of glycogen as a short-term energy reserve and in the form of fat as a long-term reserve (Repository poltekkes Denpasar, 2018).

Proteins

Proteins are polypeptide macromolecules composed of a number of L-amino acids linked by peptide bonds. A protein molecule is composed of a number of amino acids in a certain and derivative order. Protein is one of the macronutrients that is important for human life besides carbohydrates and fat. The word protein comes from the Greek "protos" which means ultimate. Proteins are associated with various forms of life, one of which is enzymes made from proteins (Repository Poltekkes Denpasar, 2018).

There is no life without enzymes which are found in various types and with different functions in the human body (Damayanti, in Repository Poltekkes Denpasar, 2018), in general, proteins function for growth, formation of structural components, transport and storage of nutrients, enzymes, formation of antibodies, and energy sources.

Infectious Diseases

According to the World Health Organization (WHO), disease infection or infectious disease is a disease caused by pathogenic microorganisms, such as viruses, bacteria, fungi, or parasites. This disease can spread directly or indirectly from one person to another. The symptoms caused by each infectious disease and the treatment steps vary depending on the microorganism that triggers it (Noya, 2017).

Nutritional Status of Toddlers

Referring to Sari, (2017) The nutritional status of toddlers is the condition of the body as a result of food consumption and use of nutritional substances. Nutrition is important to support the growth and development of toddlers. If a toddler's nutritional status is inadequate, complications can occur in his health. For example, children become tired quickly due to lack of energy, brain problems and so on. If this happens continuously it will become a serious problem, especially in the nutritional status of toddlers.

Nutritional status of children under five according to Santoso and Ranti (in Gusrianti et al., 2020) describes the condition of the child's body which is closely related to consumption, absorption and utilization of nutrients contained in food as well as his health condition. The nutritional status of children under five can be used as an indicator of the nutritional status of the community and can be determined through the nutritional prevalence of children aged 1-5 years, because this age group is most vulnerable to nutritional disorders and is very dependent on the food given to them.

METHODOLOGY

To conduct research, a method is required to be used. Of course, the method used must be in line with the main problem that is occurring researched (Ilham et al., 2020; Ilham et al., 2022). This research is an observational study with a quantitative approach, the research design used is cross sectional. The research was carried out in December-January 2023 at the Abepura Community Health Center, Kota Baru Urban Village, Jayapura Papua. The population in this study was all toddlers in Kota Baru Urban Village, totaling 420 toddlers. The samples involved were 111 which were taken using the purposive sampling method, namely a sampling method carried out with certain aims and objectives determined by the research (Phillips et al., 2021).

Data collected includes energy and protein intake, infectious diseases, and nutritional status. Energy intake was obtained using the 24 hour food recall form. Data regarding infectious diseases was obtained using an infectious disease questionnaire. Nutritional status is obtained by measuring anthropometry, namely body weight, height and asking for data on age and gender. Height was measured using a microtoise to measure height with an accuracy of 0.1 cm, while body weight was measured using a step scale with an accuracy of 0.1 kg.

After the data is collected, it is then processed by converting household measurements into body weight measurements (grams), analyzing food ingredients into nutrients using a computer device with the Nutri Survey program, then the results obtained are compared with the Nutritional Adequacy Rate. Nutritional status data obtained through weighing and measuring body height is calculated using the Z-score formula, then compared with the classification of nutritional status according to WHO-NCHS.

Univariate analysis was used to obtain an overview of each research variable, including the profile variables of energy consumption, protein, infectious diseases and nutritional status of toddlers. After the data is processed and analyzed, it is then presented in table form accompanied by an explanation. Multivariate analysis is used to test the relationship between variables.

RESULTS

Characteristics of Mothers of Toddler Respondents

The characteristics of mothers of toddlers are data collected in this research. The information collected is age, occupation, income and education of the mother. The details are presented in the table below.

Table 1. Frequency Distribution of Respondents Based on Characteristics of Mothers of Toddlers

Characteristics of Mothers of Toddlers	n(111)	(%)
Level of education		
elementary school	8	7.3%
Junior High School	55	50.3%
Senior High School	39	35.5%
S1	9	7.4%
Mother's Age		
20- 35	84	76.4 %
>35	27	32.7 %
Mother's Income		
Enough	8	6.4%
Not enough	103	93.6%
Total	111	100.0

(Primary Data Source, 2022)

Based on table 1, it is known that the frequency distribution of respondents according to mother's education is dominantly junior high school education with 55 respondents (50.3%), high school education with 39 respondents (35.5%), elementary school education with 8 respondents (8.3%), and S1 education as many as 9 respondents (7.4%). Based on the mother's age, it is known that the majority of mothers are in the productive age range of 20-35 years, namely 84 respondents (76.4%), while the productive age group is 36 years as many as 27 respondents (32.6%). Based on mother's income, income in the sufficient category was 8 respondents (6.4%), while insufficient was 103 respondents (93.6%).

Toddler Characteristics

Table 2 Frequency Distribution of Respondents by Age and Gender of Toddlers

Age characteristics of toddlers	n(111)	(%)
Age		
12-35 months	20	18.1%
36-47 months	49	44.1%
48-59 months	42	37.8%
Gender		
Woman	55	43.5 %
Man	56	59.5.%
Total	111	100.0%

(Primary Data Source, 2022)

Table 2 shows the frequency distribution of respondents according to age group and gender. The results show that the majority of toddlers are aged 36-47 months (44.1%), and the toddler age group is 48-59 months as many as 42 toddlers (44.1%) while the toddlers are in the 12-35 month age group (18.1%). Based on gender, male respondents dominated the sample, namely 56 toddlers (59.5%) while female respondents were 55 toddlers (43.5%).

Energy consumption rate

The energy consumption level of children aged 1-5 years was obtained from interviews with respondents from mothers of toddlers using the 2 x 24 hour Food Recall form, the average consumption of food sources of energy eaten. Next, the results obtained are compared with the sample's Nutritional Adequacy Rate (RDA) which is seen through body weight and age group in the RDA table.

Table 3 Frequency Distribution of Toddler Energy Intake

Number of Energy Levels	(n)	(%)
Good (80-99% RDA)	80	72.1%
Less (70-80% RDA)	31	27.9%
Total	111	100.0

(Primary Data Source, 2022)

Based on table 3, it shows that the frequency distribution of energy levels in toddlers is adequate at 80 toddlers (72.1%) while the energy level is insufficient at 31 toddlers (27.9%).

Protein consumption rate

Table 4 Frequency Distribution of Toddlers' Protein Intake

Protein consumption rate	(n)	%
Good	80	72.1%
Not enough	31	27.9%
Total	111	100

(Primary Data Source 2022)

Based on table 4, it shows that the frequency distribution of protein levels in toddlers is adequate at 80 toddlers (72.1%), while the energy level is insufficient at 31 toddlers (27.9%).

Infectious disease

Table 5 Frequency Distribution of Infectious Diseases

Infectious disease	(n)	(%)
Sick	33	29.7%
Painless	78	70.3%
Total	111	100.0

(Primary Data Source, 2022)

Based on table 5, it shows that the frequency distribution of respondents according to the history of infectious diseases in undernourished toddlers, namely the ISPA category, was 33 toddlers (29.7%), while those who were not infected with ISPA were 78 toddlers (70.3%).

Nutritional status of toddlers

Table 6 Frequency Distribution of Nutritional Status at the Abepura Community Health Center, Kota Baru Urban Village

Nutritional status	(n)	(%)
Good	77	69.4%
Not enough	34	30.6%

Total	111	100.0
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(Primary Data Source, 2022)

Based on table 6, it shows that the frequency distribution of respondents according to the good nutritional status of toddlers is 77 toddlers (69.4%), while the number of under-nourished toddlers is 34 toddlers (30.6%).

Multivariate Test

The multivariate test used is the multiple regression test. This test was carried out to determine whether there was a relationship between energy intake, protein, infection and nutritional status of toddlers. Detailed test results are presented in the following table.

Table 7 Multivariate multiple regression analysis test results

Variable	Regression coefficient	tcount	Sig.
Constant	1,451		
X ₁	0.140	2,475	0.015
X ₂	0.387	3,321	0.001
X ₃	-0.478	-4,536	0,000
F count = 327,537			0,000
R square = 0.902			

(Primary Data Source, 2022)

Table 7 shows the results of the regression test obtained. The calculated F value was 327.537, with an R square of 0.902 with a significance value of 0.000. This means that there is a significant relationship between energy intake, protein intake and infectious diseases with the nutritional status of toddlers.

DISCUSSION

The aim of this research is to determine energy intake, protein intake, infectious diseases and nutritional status of toddlers at the Abepura Community Health Center, Kota Baru Urban Village. The research results generally show that the majority of toddlers have good energy and protein intake. Infectious diseases are found in toddlers and it is known that the majority of toddlers have good nutritional status, but there are still toddlers with poor nutritional status (30.6%). In detail, the research results will be discussed below based on the UNICEF Conceptual Framework on Maternal and Child Nutrition (Figure 1.).

Based on the research results in table 6, it is known that the nutritional status of toddlers is in the good category at 69.4%, while the nutritional status is 30.6%. Nutritional status is a measure of body condition that can be seen from the food consumed and the use of substances in the body (Boah et al., 2019). Nutritional status is divided into three categories, namely good nutritional status, less nutritional status, more nutritional status (Aprilia et al., 2019; Siti Zulaikhah, 2010). Poor nutritional status is also found in toddlers whose parents have sufficient income (Fitri, 2022). According to Soetjningsih (2013), factors that influence growth (nutritional status and height) are income,

education, employment, gender and intake. According to the UNICEF Conceptual Framework on the Determinants of Maternal and Child Nutrition (2021), income, education, employment are part of the enabling determinants or roots of child nutrition problems. Furthermore, gender is related to socio-cultural factors which are enabling determinants.

Low parental income is considered a risk factor for malnutrition in toddlers. Table 1 shows that the majority of parents of toddlers' income is still unstable (93.6%) or insufficient. According to Casando et al. (2022) parental education is an important factor in the growth of toddlers because with education parents can receive information from outside about how to care for toddlers well and how to maintain the health of toddlers. Education formats and information are expected to increase knowledge in an effort to regulate and know the importance of food intake. including nutritional needs for family members, especially toddlers.

The results of the research show that the age of mothers of toddlers is known to be in the range of 20-35 years. Notoadmojo (2012) stated that an individual's age, which is calculated from birth to birthday, will influence a person's ability to grasp and think about the information provided. Age is also a determining factor in the level of knowledge, experience, beliefs and motivation, so that age influences a person's behavior towards certain objects.

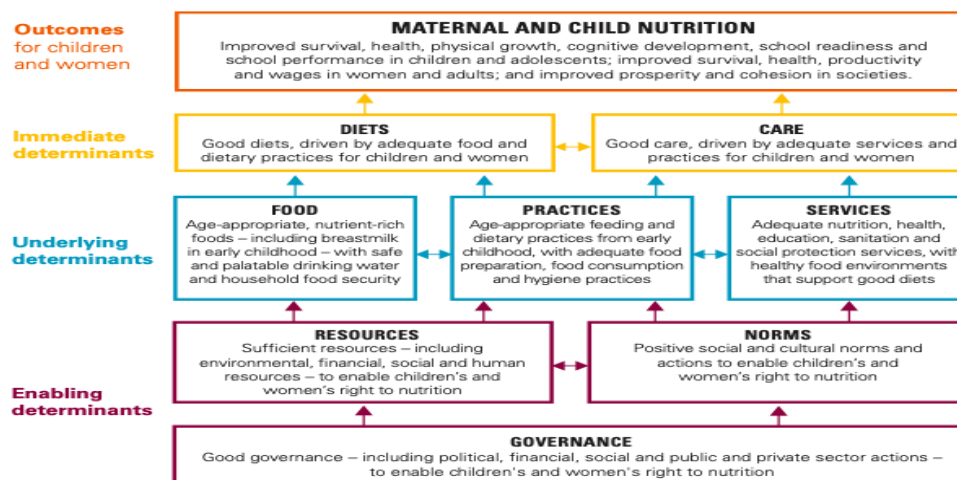


Figure 1. UNICEF Conceptual Framework on the Determinants of Maternal and Child Nutrition, 2020

The results in table 1 show that the majority of mothers of toddlers in this study had lower middle school education (50.3%), even though their parents' education was of junior high school but the mother's knowledge was still low due to the lack of information and counseling regarding the nutritional status of toddlers received by the mothers. toddlers at posyandu (Integrated Services Post) and at community health centers (Anwar, 2022).

Energy Intake

Food intake in the conceptual framework of causes of child malnutrition is a direct and indirect cause. Toddlers' energy intake is determined by the

family's food intake (Sisha, 2020). Parenting patterns and maternal education are determining factors in the nutritional status of toddlers (Dewi et al., 2022). Parenting patterns contribute to children's intake, toddlers with sufficient energy intake have good nutritional status (Choirunnisa et al., 2022).

The results of univariate analysis showed that 27.1% of toddlers had poor energy intake, while 72.9% of toddlers had good energy intake. Adequate carbohydrate intake affects overall energy intake because it is based on recommendations that 60% of energy needs come from carbohydrate sources (Puspasari & Andriani, 2017). If a toddler lacks carbohydrates, it can cause a lack of energy and as a result, the toddler's weight will decrease, thus affecting the toddler's nutritional status (weight/age) and experiencing stunted growth.

From the results of interviews conducted through food recall questionnaires 2x24 hours in a row, most toddlers consume carbohydrate sources, especially rice, 4-5 teaspoons at a time so that some toddlers' carbohydrate intake is less. Sources of carbohydrates that are often consumed are rice, porridge and biscuits. Energy as a nutrient is the name of a group of organic substances that have different molecular structures, even though there are similarities in terms of chemistry and function. Sources of carbohydrates are grains or cereals, tubers, dried beans and sugar. The processed products of these ingredients are vermicelli, noodles, bread, flour, jam, syrup and others. Sources of carbohydrates that are widely eaten as staple foods in Indonesia are rice, corn, sweet potatoes, cassava, taro and sago (Mayunita, 2023).

The main source of carbohydrates in food comes from plants, and only a small amount includes animal foods. In plants, carbohydrates have two main functions, namely as energy stores and mainly found in the form of starch (amylum) and sugars (mono and disaccharides). The main function of carbohydrates is to provide energy for the body, apart from that, it also provides a sweet taste to food, saves protein, regulates fat metabolism, and helps excrete feces. Carbohydrates are also part of the cell structure in the form of glycoproteins. Cellular receptors found on the surface of cell membranes are glycoproteins and among them are receptors for hormones. Energy stores in the muscles and liver are found as glycogen, a form of carbohydrate that is easily mobilized when the body needs a lot of energy. These carbohydrate reserves are not very large, so they quickly become depleted (Irmayanti, 2023).

Protein Intake

The results of univariate analysis of poor protein intake in toddlers at the Abepura Community Health Center, Kota Baru Urban Village was 27.1%, while the good energy level was 72.9%. Protein is a macronutrient that plays an important role in the formation of biomolecules. Proteins are macromolecules that make up more than half of cells. Protein determines the size and structure of cells, the main component of enzymes, namely biocatalysts for various metabolic reactions in the body. Fulfilling recommended protein needs will support children's growth (Soliman et al., 2021).

From the results of interviews conducted through food recall questionnaires 2x24 hours in a row, the sources of animal protein or side dishes

that are most consumed by most toddlers are omelettes or fried eggs, while the most common vegetable proteins are spinach, tofu and tempeh. Protein intake tends to be less diverse and in less quantity. Toddlers usually only consume rice and vegetables, which also tend to be small in quantity.

Protein as an energy source provides 4 kcal per gram. The total amount of body protein is about 19% of the weight of meat, 45% of this protein is muscle. The protein requirement for an adult is 1 gram for every kilogram of body weight every day. For growing children, more protein is needed, namely 3 grams per kilogram of body weight. To ensure that the body actually gets sufficient amounts and types of amino acids, it is recommended that for adults one-fifth of the protein required should be protein of animal origin, while for children one-third of the required amount of protein (Manary et al., 2020).

The function of protein is as a source of energy, growth and maintenance, forming essential bonds in the body, regulating water balance, maintaining body neutrality, forming antibodies, and transporting nutrients. Protein is divided into animal protein and vegetable protein. Protein that comes from animals such as meat, fish, chicken, eggs, milk, etc. is called animal, while protein that comes from plants such as nuts, tempeh and tofu is called vegetable protein. Low protein intake in children contributes to the incidence of stunting (Rahayu et al., 2020).

Infectious disease

The results of univariate analysis of infectious diseases in toddlers at the Abepura Community Health Center, Kota Baru Urban Village, were that 29.7% of toddlers were infected with the disease. The presence of infection is another factor that causes toddlers to become malnourished. Toddlers are easily infected with diseases due to very active activities in unclean places, complete immunization and nutritional intake (Lea, 2022). Even though food intake is sufficient and nutritious, if a toddler is sick, he or she will be more vulnerable to malnutrition (Ariati, 2019). Infectious diseases that attack children cause malnutrition and if not treated properly can be dangerous. Infectious diseases and nutrition play an important role in understanding the situation of malnutrition, as long as an infection occurs, the nutritional status of children under five will decrease.

Nutritional status

The results of the univariate analysis of nutritional status at the Abepura Community Health Center, Kota Baru Urban Village, showed that 69.4% of toddlers had good nutritional status, while 30.6% of toddlers had poor nutritional status. Toddlers who experience poor nutritional status because they have no appetite, there are also toddlers who are sick so that the intake that enters the toddler's body is reduced. Infection is grouped as a direct cause of malnutrition (UNICEF, 2021). According to research conducted by Afriani et al., (2022), nutritional status is related to the problem of nutritional intake in the body, growth is related to the problem of changes in physical size and development is related to the body's physical ability or the individual's ability to learn some of the necessary skills. Food is one of the factors that influences

the nutritional status of toddlers where the nutritional intake received by the body must be maintained and starting with providing appropriate food is one of the determinations of nutritional status in toddlers (Komalasari et al., 2020).

CONCLUSIONS AND RECOMMENDATIONS

From the results of this study it can be concluded that although the majority of toddlers' energy and protein intake is good, there are toddlers with low energy intake at the Abepura Community Health Center. As many as 29.7% of toddlers suffer from infectious diseases and 30.6% of toddlers have malnutrition status at the Abepura Community Health Center. Energy, protein and infectious disease intake were significantly related to nutritional status. Education by health workers regarding a varied and balanced diet, sufficient energy and high protein for mothers/caregivers of toddlers needs to be carried out so that the nutritional needs of toddlers can be met. Future research needs to involve variables such as infection history, birth weight, genetic and socio-cultural factors.

FURTHER STUDY

This study was only carried out in one community health center, in this case the Abepura Community Health Center, Kota Baru Urban Village. Therefore, similar studies are needed in other health centers, especially in Jayapura City, Papua.

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