

Original Article

Description of Energy Adequacy for Workers at PT. Indotec Tiga Putra Kupang City

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ABSTRACT

The minimum energy requirement for Indonesian people in the 2019 AKG is 2,100 kcal per person per day, so each person must have a minimum energy intake of 2,100 kcal per day. If the food intake is not sufficient for needs, it can result in disruption of the body's immunity, reduced body weight, reduced physical ability, work slowly and even decreased work productivity. This research aims to determine the description of energy adequacy of workers at PT. Indotec Tiga Putra Kupang City 2022. This type of research is quantitative research using a descriptive approach. This research used a total sampling of 24 workers. The research instruments used were 2x24 hour food recall, 2x24 hour physical activity recall, microtoise and digital scales, food photo books and nutrisurvey applications. The results showed that respondents with light physical activity (83.3%), adequate intake of breakfast (54.2%) and dinner (70.8%), lunch intake (62.5%), morning snack and afternoon (66.7%) which is less. The level of energy adequacy is in the poor category (58.3%). The results of this study also show an average energy expenditure of 3,521.6 kcal and energy income of 2,691.4 kcal. It is recommended that workers consume food sources of energy in sufficient quantities/portions.

Keywords: Energy, Physical Activity, Workers

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INTRODUCTION

The success of construction development projects cannot be separated from the important role of companies that provide consulting services. Consulting companies have the task of overseeing clients at the initial stage of the project, namely planning and design and at the construction stage by supervising the project as it progresses¹. The success of a consulting company is seen through the results of the company's performance. To achieve this success, a company must have quality workers who have good health conditions by paying attention to the nutrition of its workers².

Nutrition is one of the important aspects of occupational health which plays a

role in increasing work productivity². One way to fulfill the nutrition needed by the body is energy. Energy for the body is needed to help the process of growth and development, maintain body immunity, maintain body health and help in carrying out daily activities³.

The minimum energy requirement for Indonesian people in the 2019 AKG is 2,100 kcal per person per day, so each person must have a minimum energy intake of 2,100 kcal per day. Badan Pusat Statistik (BPS) noted that the average per capita consumption per day of calories is above the standard of adequate daily consumption based on the nutritional adequacy figures that have been determined. The average daily per capita calorie consumption of the Indonesian population in March 2021 was

2,143.21 kcal⁴.

Male workers in the age groups 16-18 years, 19-29 years and 30-49 years have an energy requirement of 2650 kcal⁵. The energy needs of workers differ from one another. Therefore, the energy intake consumed is adjusted to the worker's energy needs. If food intake exceeds requirements, it will be stored in the body as energy reserves in the form of fat and if this continues for a long time it will cause excess body weight and increase the risk of obesity. On the other hand, if the food intake is not sufficient for needs, it can result in impaired body immunity, reduced body weight, reduced physical abilities, working slowly and even decreasing work productivity³.

This is supported by research conducted by Astuti (2017) showing that there is a relationship between energy intake and work productivity where workers who have good energy intake (76.9%) have high productivity while workers with poor energy intake (54.2%) has low productivity⁶.

PT. Indotec Tiga Putra is a company that operates in the consulting services sector. The number of employees in the company is 24 people who have responsibilities according to their respective fields. Employees at PT. Indotec Tiga Putra is divided into workers who serve as planning consultants and workers who serve as supervisory consultants.

The company's experience in obtaining project work is classified into engineering supervision and architectural supervision with a total of 108 work packages received which are divided into engineering supervision with a total of 74 work packages carried out and 34 architectural supervision packages. The company's extensive experience has resulted in many companies accepting work packages which will require their workers to work optimally and require sufficient energy to work well.

Based on interviews that have been conducted, working hours start at 09.00-17.00 WITA and usually workers also do their work outside working hours (overtime) starting at 19.00-23.00 WITA. Of the 12 workers who were interviewed, most workers took time to eat breakfast, lunch and dinner. However, workers do not consume snacks.

During work, some workers feel tired, dizzy, have body aches, and have difficulty concentrating. The symptoms experienced by workers can be categorized as symptoms of

mild protein energy deficiency (PEM). The clinical symptoms of PEM are mild, namely decreased activity and concentration and mild anemia. Lack of protein in daily food consumption is one of the factors in a person experiencing anemia which can have effects such as feeling dizzy, tired and having difficulty concentrating well⁷.

This research aims to determine the description of energy adequacy of workers at PT. Indotec Tiga Putra Kupang City.

METHOD

This research is quantitative research using a descriptive approach. This research was conducted at PT. Indotec Tiga Putra Kupang City which is located on Jl. Sepadan RT/RW 010/003 Kayu Putih Village, Kec. Oebobo, Kupang City, East Nusa Tenggara and the research was conducted in June 2022. This research used a total sampling technique where the population and sample size were the same, namely 24 workers at PT. Indotec Tiga Putra Kupang City. The research instruments used were 2x24 hour food recall, 2x24 hour physical activity recall, microtoise and digital scales, food photo books and nutrisurvey applications.

The physical activity variable was measured using a 2x24 hour physical activity recall form which was categorized as light if $1.4 \leq \text{PAL} \leq 1.69$, moderate if $1.7 \leq \text{PAL} \leq 1.99$, and heavy if $2 \leq \text{PAL} \leq 2.430$. Body weight was measured using a digital scale and height was measured using a microtoise.

Food intake for breakfast and dinner is categorized as sufficient if you consume 20% of the total calories in a day and is categorized as insufficient if you consume <20% of the total calories in a day. Food intake for lunch is categorized as sufficient if you consume 30% of the total calories in a day and is categorized as insufficient if you consume <30% of the total calories in a day. Meanwhile, food intake for morning and afternoon snacks is categorized as sufficient if you consume 10% of the total calories in a day and categorized as insufficient if you consume <10% of the total calories in a day.

Meanwhile, energy adequacy is measured using a 2x24 hour food recall form to determine the type and amount of food consumed which is categorized as more if > 110% of the RDA, good if 80-110% of the RDA, and less if < 80% of the RDA⁸ and photo

book food to convert household measurements to grams. Data obtained through the 2x24 hour food recall form is then processed using the nutrisurvey application.

Data analysis in this research uses univariate analysis to describe the phenomena studied which are then presented in table form with narrative. This research has passed ethical review with code No: 2022161 – KEPK issued by the Health Research Ethics Commission, Faculty of Public Health, Nusa Cendana University.

RESULTS

Based on table 1, it is known that the majority of respondents are 30-49 years old, 62.5%. Almost all respondents were male, 83.3%. Body size consisting of height, most respondents had a height in the range of 160-169 cm as much as 54.2% and a body weight \geq 70 kg as much as 45.8%. Table 2 shows that the frequency distribution of physical activity carried out by workers at PT. Indotec Tiga Putra Kupang City mostly carries out physical activity in the light category as much as 83.3%.

Table 1. Distribution of Research Respondent Characteristics

Respondent Characteristics	n	%
Age		
19-29 Years old	4	16.7
30-49 Years old	15	62.5
50-64 Years old	5	20.8
Gender		
Man	20	83.3
Women	4	16.7
Body Size		
Hight		
170-179 cm	5	20.8
160-169 cm	13	54.2
150-159 cm	6	25
< 150 cm	0	0
Weight		
\geq 70 kg	11	45.8
60-69 kg	8	33.3
50-59 kg	2	8.3
40-49 kg	3	12.5

Source : Primary Data, 2022

Table 2. Frequency Distribution of Physical Activity

Physical Activity	n	%
Light	20	83.3
Currently	4	16.7

Source : Primary Data, 2022

Table 3 shows that 54.2% of respondents consumed sufficient breakfast

intake and 45.8% consumed insufficient breakfast intake. As many as 33.3% consumed sufficient morning and afternoon snacks and 66.7% consumed insufficient morning and afternoon snacks. As many as 37.5% consumed sufficient lunch intake and as many as 62.5% consumed insufficient lunch intake. As many as 70.8% consumed sufficient dinner intake and as many as 29.2% consumed insufficient dinner intake.

Table 3. Frequency Distribution of Food Intake

Food Supply	Enought		Not Enought	
	n	%	n	%
Breakfast	13	54.2	11	45.8
Morning Interlude	8	33.3	16	66.7
Have Lunch	9	37.5	15	62.5
Afternoon Interlude	8	33.3	16	66.7
Dinner	17	70.8	7	29.2

Source : Primary Data, 2022

Table 4 shows that the frequency of energy adequacy among workers at PT. Indotec Tiga Putra is in the deficient category at 58.3%.

Table 4. Frequency Distribution of Energy Adequacy

Energy Adequacy	n	%
More, if > 110% RDA	1	4.2
Good, if 80-110% of RDA	9	37.5
Insufficient, if < 80% RDA	14	58.3

Source : Primary Data, 2022

Table 5. Distribution of Average Energy Expenditure, Intake and Adequacy

Energy	Mean
Energy Expenditure (kcal)	3,521.6 kkal
Intake (kcal)	2,691.4 kkal
Adequacy Rate (%)	75.8 %

Source : Primary Data, 2022

Table 5 shows that the average energy expenditure, energy intake and energy adequacy level are 3,521.6 kcal, 2,691.4 kcal and 75.8%.

DISCUSSION

Overview of Physical Activity in Workers at PT. Indotec Tiga Putra Kupang City

According to WHO (2010) in Sri

(2011) all body movements carried out and expended energy are called physical activity⁹. A person's activities by sitting still or sleeping are included in physical activity. The activities carried out have different activity factors from one another, called the physical activity ratio (PAR)¹⁰.

The research results show that the workers at PT. The majority of Indotec Tiga Putra have light physical activity. Most of the activities carried out by workers are sedentary activities. Sedentary activities are activities with minimal body movement¹¹. Sedentary activities include lying, sleeping, standing, working on a computer, writing, reading, watching TV, chatting, playing on a cellphone, etc. They also do sports activities such as sports without using equipment, for example sit ups, pull ups and push ups, running, playing tennis, soccer and playing golf.

In this research, what differentiates workers who have light activity and moderate activity is the PAR value of the activity and the duration of carrying out an activity in accordance with Irianto's (2015) statement that the energy expended depends on the time/duration and intensity of work¹² and also the statement from Titi and Roosita (2022) that the higher the PAR value, the greater the activities carried out¹⁰.

Workers who have light activity carry out activities for a shorter duration compared to workers who have moderate activity. Likewise, the PAR value for workers with light physical activity is lower than that of workers who have moderate activity. For example, workers who carry out sports activities without equipment with a PAR value according to FAO/WHO/UNU (2001) namely 5.44¹³ and are carried out for a duration of 30 minutes have a different PAL value to workers who carry out sports without equipment for a duration of 1 hour so that they can affect the level of physical activity.

The results of this research are in line with research conducted by Pasaribu (2020) which was carried out in the administration section of USU Hospital which showed that respondents with light physical activity (83.3%) were greater than respondents who had moderate physical activity (16.7%). The activities carried out by respondents are mostly sedentary activities¹⁴.

Overview of Food Intake Among Workers at PT Indotec Tiga Putra in Kupang City

Food intake is everything that is consumed, whether in the form of drinks or in the form of food¹⁵.

1. Breakfast

Breakfast or eating and drinking in the morning is an activity carried out to consume food and drink in the morning with the aim of meeting daily nutritional needs for maintaining a healthy body and carrying out activities actively¹⁶. Breakfast is also needed as fuel so that energy needs can be met throughout the day¹⁷.

The research results showed that the majority of workers had sufficient breakfast intake, 13 people (54.2%). This data shows that the majority of workers have met 20% of their total energy needs in a day, in accordance with the statement by Nurramadhani, (2020) that breakfast is an activity of consuming food and drink that fulfills 20-25% of calories. of total energy needs in a day¹⁶. This is also in accordance with recommendations from the Indonesian Ministry of Health which recommends that the composition of food for breakfast be 20% a day¹⁸.

Breakfast provides carbohydrates which are important for the body because they can increase blood sugar levels. Normal blood sugar levels in the body can increase enthusiasm and enthusiasm for work and also increase concentration in carrying out daily activities¹⁴. This is also related to their work demands which involve spending more time in front of laptops/computers so they need to think and concentrate well. The breakfast habit is also included in the PUGS (General Message on Balanced Nutrition) created by the Ministry of Health in 2002, namely in the 8th message which states "Make breakfast a habit to maintain physical endurance and increase work productivity" ¹⁷.

Most of the workers who have sufficient breakfast intake are married and every morning food is provided by their wives before leaving for work. The food provided is also varied and not monotonous, making it interesting to consume. Consuming a varied breakfast can maintain and maintain body fitness and increase productivity at work¹⁶. The types of food consumed include white rice, corn rice, potato cakes, fried eggs, fried tempeh, fried tofu, spinach, kale, chicken soup, long bean vegetables, fruits such as bananas, apples and

watermelon while the types of drinks consumed they consume water, tea and coffee. Workers who have less breakfast intake are because they do not eat heavy food at breakfast but rather often consume small amounts of light food such as cakes, bread or they only consume tea and coffee before going to work.

2. Snacks (Morning and Afternoon)

Snacks are foods that are needed to help eliminate hunger and provide additional energy to carry out activities¹⁹.

The research results showed that 16 people (66.7%) consumed insufficient morning and afternoon snacks. This data shows that the majority of workers have not met their morning and afternoon snack intake based on the recommendation of the Indonesian Ministry of Health, namely 10% of their total daily energy needs¹⁸. This is because the office location is far from food stalls/places so that workers are lazy to leave their rooms to buy food and they prefer to eat at the same time at lunch time. The majority of workers also consume water more often during break times than consuming snacks such as lempeng, spring rolls, dumplings, chips, chitato and so on.

3. Have Lunch

Lunch is food consumed in the middle of the day at 12.00-13.00. The activities carried out by workers start in the morning until the afternoon. Therefore, they need sufficient energy to be able to replenish the energy that has been used since the morning so that workers can carry out their activities well.

The research results showed that the majority of workers had insufficient lunch intake, as many as 15 people (62.5%). This data shows that the majority of workers have not met 30% of their total energy needs in a day based on recommendations from the Indonesian Ministry of Health¹⁸.

During break time at 12.00-13.00, workers use the break time for lunch. Organizing lunches that are not provided by the office means that workers have to buy food from food stalls/eating places around the office. At lunch, they usually just eat in moderation without paying attention to the food intake they will consume so that the calories they consume are not sufficient for the recommended amount of 30% so the results of this study found that 15 workers (62.5%) had lunch intake that was less than 30%.

4. Dinner

Dinner is from 7 pm to 8 pm. At dinner, consumption of foods that are high in calories should be reduced. This is because at night our body only releases a little energy unlike in the morning and during the day and the body's metabolic processes slow down at night²⁰. Dinner is also needed to contribute energy during sleep because when we sleep our body continues to carry out its metabolic functions.

The research results showed that the majority of workers had sufficient dinner intake, 17 people (70.8%). This data shows that the majority of workers have met 20% of their total energy needs in a day in accordance with recommendations from the Indonesian Ministry of Health which recommends that the composition of food for dinner be 20% in a day¹³. Workers with sufficient dinner intake have a good meal time, namely between 18.00-20.00. This is because after working from morning to evening the body needs additional energy to replace the energy that was expended in the morning. Therefore workers will feel hungry more quickly.

Consuming food at night is not recommended if it is past 8 pm. The digestive phase in the body occurs from 12 noon to 8 pm, during which time if you consume a lot of calories it is not a problem because the body's digestive phase is still running. On the other hand, if you consume food after 8 pm, when the food absorption phase occurs and the digestive system becomes slow, it will cause fat accumulation, especially in the stomach area²¹.

Overview of Energy Adequacy for Workers at PT. Indotec Tiga Putra Kupang City

One component of the body that has an important role in life is energy. Energy that enters the body is obtained through daily food consumption, namely at breakfast, lunch, dinner and snacks. One person's energy needs differ from one another. Energy needs are used for basal metabolism and are needed to carry out body functions such as digesting, processing and absorbing food, as well as for moving, walking, working and other activities^{22, 23}. The largest energy use in the body is generally used for basal metabolic processes²⁴.

The energy adequacy figure recommended by the AKG in the 2019 Minister of Health Regulation has been adjusted according to age group, gender, body weight, ht, namely men in the age group 19-29 years, 30-

49 years, 50-64 years have an energy adequacy of 2650 kcal, 2550 kcal and 2150 kcal. Meanwhile, women in the age groups 19-29 years, 30-49 years, 50-64 years have energy requirements of 2250 kcal, 2150 kcal and 1800 kcal. Energy for physical activity is calculated using a physical activity factor that has been adjusted for each age group, namely the 4-64 year age group has a physical activity factor of 1.26.

The research results show that the majority of workers have a low level of energy sufficiency, 14 people (58.3%). This data shows that the majority of workers at PT. Indotec Tiga Putra does not have a good energy balance. Good energy balance occurs when the energy needed is the same as the energy intake consumed¹⁵.

The dominant lack of energy adequacy is caused by them skipping meals at breakfast time and during the day they tend to eat small amounts/portions. This is in accordance with the statement by Adriani and Wirjatmadi (2012) that insufficient energy adequacy is caused by the energy intake consumed from food. source of power/energy producer in quantities less than requirements²⁵. Organizing lunches that are not provided by the office is also one of the reasons why the majority of workers have insufficient energy. The demands of their work also require them to sit down to make plans and reports, making them too busy completing them so that sometimes they forget and have no appetite. This causes some workers to sometimes feel dizzy, tired and unenthusiastic when working.

According to Astuti (2017) humans who have less energy intake will experience bad impacts such as reduced body endurance, carrying out activities without enthusiasm/weakness and weak thinking power due to the lack of nutrients received. body so that less energy is produced⁶. Lack of energy intake from sufficient energy requirements will also result in energy reserves in the body stored in the muscles being used and if it lasts for a long time it can result in weight loss which can affect nutritional statu²⁶.

Workers with adequate energy, they eat at main meal times, namely breakfast, lunch and dinner, consuming sufficient amounts of food according to their needs, even though snacks are not fully sufficient because the function of snacks is to eliminate hunger before the main meal. and as an energy enhancer for the body¹⁹. On the other hand, greater energy adequacy is

due to the consumption of food sources of energy in large quantities which makes the incoming energy intake exceed the individual's energy needs so that unused energy will be stored in the form of fat. Excess energy is also caused by minimal activity. If this continues, the energy stored in the form of fat will accumulate over time, which can result in weight gain or obesity and will increase the risk of suffering from obesity.

The results of this research are in line with research by Rahmawati et al., (2019) which was conducted on 75 employees of Pandeglang District Hospital where almost all of the research subjects had a low level of energy adequacy (48%) because energy consumption intake was in the low category, namely 1500 kcal/day²⁷.

A Comparative Overview of Energy Expenditure and Energy Entry Among Workers at PT Indotec Tiga Putra in Kupang City.

One factor that can increase energy needs/energy expenditure is physical activity²⁸. The heavier the activity, the greater the energy requirement needed to replace the energy expended during the activity²⁹.

Average energy expenditure of workers at PT. Indotec Tiga Putra Kupang City amounted to 3,521.6 kcal while energy income from food consumption amounted to 2,691.4 kcal. This data shows that workers' energy expenditure is greater than workers' energy intake consumed from food.

This greater energy expenditure is due to the majority of workers at PT. Indotec Tiga Putra Kupang City has a height in the range of 160-169 cm with a body weight \geq 70kg where a person's larger body size indicates greater energy expenditure also because they have larger internal organs³⁰.

Apart from that, the majority of workers also carry out physical activity in the light category because they spend more time in the office sitting working on planning and monitoring reports. They also usually spend time after work doing a little sports activity. Even though the physical activity they do is in the light category, the work they do by relying on their brains to think hard in making creative plans and completing monitoring reports can drain a lot of energy. This is in accordance with research conducted by Raichle et al (2001) who found that although the brain only represents

2% of a person's total body weight, the brain uses 20% of the body's energy³¹. This indicates that a person is able to expend 320 kcal just by doing thinking activities. Meanwhile, energy intake from consumption of food intake is not commensurate with the energy expenditure of workers' physical activity due to the consumption of food sources of energy in small quantities/portions and not paying attention to the nutrients that will be consumed.

Energy expenditure that is greater than energy intake will cause the energy in the body to become unbalanced. This can cause a lack of energy which can result in a person becoming thin³². Energy in the body is said to be balanced if the amount of energy entering the body obtained from food intake is close to ($\pm 10\%$) the amount of energy released by the body in the form of activities carried out.

Pengeluaran energi yang lebih besar dibandingkan pemasukan energi akan menyebabkan energi dalam tubuh menjadi tidak seimbang. Hal ini dapat menyebabkan kekurangan energi yang dapat mengakibatkan seseorang menjadi kurus³². Energi dalam tubuh dikatakan seimbang jika jumlah energi yang masuk dalam tubuh yang diperoleh dari asupan makanan mendekati ($\pm 10\%$) jumlah energi yang dikeluarkan tubuh berupa aktivitas yang dilakukan.

CONCLUSIONS

From the results of this research, it can be concluded that the majority of workers at PT. Indotec Tiga Putra Kupang City tends to have characteristics of age 30-49 years, male gender, height 160-169 cm, and weight ≥ 70 kg. Most workers' physical activity is classified as light activity. Although most workers have sufficient dinner intake, the findings show that there is a lack of energy intake in the majority of workers, with average energy expenditure exceeding energy intake.

These findings highlight the importance of paying attention to workers' diets, especially morning and afternoon snacks, as well as lunch. Conditions of insufficient energy intake can have a negative impact on worker welfare and productivity. Therefore, steps are needed to increase awareness and healthy eating behavior in this work environment.

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