



Energy Adequacy and Nutritional Status for Physical Activity and Fitness of Cadets of Palembang River, Lake and Crossing Transportation Polytechnic

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Abstract. A Cadet of SDP Palembang Transportation Polytechnic must have a prime level of health and fitness. In order to form these physical characteristics, energy sufficiency and nutritional status as well as physical activity must always be guaranteed to be at an optimal level. The study was conducted using a case study approach to 111 first-year cadets, namely Class XXXIV. Energy sufficiency was measured using the 3x24-hour food recall method which was then calculated and categorized according to AKG. The results of the study revealed that the level of energy sufficiency of respondents was in the insufficient category, namely 103 people (92.8%) and the category of sufficient energy intake was 8 people (7.2%). Most cadets (88%) had normal nutritional status based on Body Mass Index (BMI). The level of physical activity of cadets was in the moderate category based on the daily activities of cadets on the SDP Palembang Transportation Polytechnic Campus.

Keywords: Energy sufficiency, nutritional status, physical activity, cadets

1. Introduction

Adequate energy and good nutritional status are important factors in maintaining health and improving a person's performance. Cadets of the Palembang River, Lake and Ferry Transportation Polytechnic need to undergo physical activity as part of their training and education in order to form and improve physical and mental fitness. According to research by Wahid Redo (2022), a healthy diet not only provides benefits for the body physically but also plays an important role in a person's mental health. Cadets of the Palembang River, Lake and Ferry Transportation Polytechnic have a busy activity schedule with all the provisions of dormitory-based life and fixed daily regulations. Therefore, understanding a healthy diet and energy needs that are in accordance with their activities is important to support long-term health. Educational institutions, such as the River, Lake and Ferry Transportation Polytechnic, have a responsibility to support the well-being of their cadets. This study was conducted with the aim of understanding its impact on their health and performance considering that there are still cadets of the River, Lake and Ferry Transportation Polytechnic who have a non-ideal Weight Mass Index (BMI). For cadets, the results of this study not only provide information about their health conditions, but also provide recommendations for improvement, including changes in diet or fitness programs. Thus, this study has a positive impact on cadets of the Palembang River, Lake and Ferry Transportation Polytechnic.

2. Literature Review

2.1 Energy Adequacy and Nutritional Status

Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019, the Recommended Nutritional Adequacy Intake (AKG) for the Indonesian People is a value that indicates the average daily requirement for certain nutrients that must be met for almost everyone with certain characteristics including age, gender, level of physical activity, and physiological conditions, to live healthily.

Table 1
Recommended Adequate Intake of Energy, Protein, Fat, Carbohydrate, Fiber and Water.

Age Group	Weight (kg)	Height (cm)	Energy (kcal)	Protein (g)	Fat (g)			Carbohydrate (g)	Fiber (g)	Water (ml)
					Total	Omega 3	Omega 6			
Male										
16 –18 years	60	168	2650	75	85	1.6	16	400	37	2300
19 -29 years	60	168	2650	65	75	1.6	17	430	37	2500
Female										
16 –18 years	52	159	2100	65	70	1.1	11	300	29	2150
19 –29 years	55	159	2250	60	65	1.1	12	360	32	2350

2.2 Physical Activities of Cadets

Cadets of Palembang Transportation Polytechnic have daily activities that have been set in PHST (Permaleent Daily Regulations). These daily regulations regulate the discipline of cadets from waking up in the morning until going to bed for a night's rest. The following table shows the daily activities of cadets as follows:

TIME	ACTIVITY
04.00 – 04.45	Wake up early and pray the morning prayer (all cadets are required to perform worship in their respective places of worship and no cadets are allowed to stay in the dormitory)
15 minutes	The cadets were given time to prepare and line up neatly beside the green field before the morning exercise bell rang.
05.00 – 05.30	Morning exercise (stretching/warming up), cleaning/arranging the room/dormitory environment (all cadets are required to attend morning exercise roll call according to the schedule set by the regiment)
05.30 – 06.00	All cadets are given time to prepare for the dining room. Cadets are required to line up in front of the dining room before 06.15.
06.15 – 07.00	Breakfast 1. All cadets are required to attend breakfast, including guard cadets. 2. After breakfast, the cadets left the dining room in an orderly malener and lined up neatly by class towards the green field via the Cendrawasih route, and no one returned to the dormitory. 3. Cadets line up neatly beside the green field waiting for the morning assembly bell to ring 4. The cadets entered the green field neatly and orderly.
07.00 – 07.30	Morning parade 1. All cadets are required to attend morning assembly, no cadets may be late or fail to attend morning assembly 2. Cadets are required to listen and follow the directions given during morning assembly. 3. The cadets returned to the dormitory to get their lecture equipment and went straight to their respective classes.
07.30 – 12.00	Lecture activities 1. All cadets are required to attend class lectures 2. No cadets stay in the dormitory during lectures

	- PJH is required to take absences from the study program and contact the lecturer who teaches - If the lecturer is unable to attend, the teaching assistant is obliged to contact the lecturer assistant concerned - Cadets are not allowed to bring food into class
12.00 – 13.30	Ishoma - All cadets who do not have lecture activities are required to worship at their respective places of worship. - After the service, all the cadets lined up neatly beside the green field before the afternoon assembly bell rang. - The bell rings and the cadets enter the red field in orderly order according to class. - All cadets are required to attend the afternoon assembly - Classes that are still carrying out learning activities are required to request a letter stating that they are not attending the roll call and notify the cadets on that day. - All cadets listened and followed the directions of the afternoon assembly - The cadets headed to the dining room neatly and lined up in front of the dining room. - Cadets are required to attend lunch - After lunch, the cadets went straight to class and no one returned to the dormitory.
13.30 – 15.00	Lecture activities - All cadets continue learning activities in class - For classes where there is no learning, they must do independent learning and are not allowed to return to the dormitory.
15.00 – 15.30	Asr prayer - All cadets are required to perform worship at their respective places of worship. - The cadets line up next to the green field and when the bell rings the cadets enter the red field neatly and orderly. - All cadets are required to attend the afternoon assembly - Classes that are still carrying out learning activities are required to request a letter stating that they are not attending the roll call and notify the cadets on that day. - All cadets listened and followed the directions of the afternoon assembly
15.30 – 17.30	Extracurricular Activities (cadets carry out extracurricular activities according to their respective interests and talents)
17.30 – 18.00	Preparation for lowering the Red and White Flag and dinner - Cadets on guard duty carry out preparations for lowering the flag - The cadets lined up neatly in front of the dining room and entered the dining room after the lunch bell rang.
18.00 – 18.30	Lowering of the Red and White Flag and Night Prayer - Cadets who will be on guard duty are required to follow the lowering of the flag on time. - All cadets are required to perform evening prayers at their respective places of worship.
18.30 - 19.00	Dinner - All cadets are required to attend dinner, including guard cadets. - The cadets on guard during dinner time must take turns so that the guard post is not empty.

	3. After eating, the cadets went straight to their respective places of worship, they were not allowed to return to the barracks.
19.00 – 19.30	Evening prayer (all cadets are required to perform evening prayers at their respective places of worship)
19.30 – 21.00	Night study 1. Cadets are required to attend evening lessons according to the schedule set by the regiment. 2. At 20.30 the cadets were already neatly lined up beside the red field
21.00 – 21.30	Evening parade 1. All cadets are required to attend the evening roll call 2. All cadets listened and followed the directions of the evening roll call 3. Exit the red field in an orderly and neat manner
21.30 – 22.00	Preparation for a night's rest (cadets are prohibited from going to their senior/junior dormitories)
22.00 – 04.00	Night rest 1. All cadets are required to turn off the lights and rest at night 2. Cadets are prohibited from using laptops/gadgets 3. sleep wearing modest clothing

2.3 Physical Fitness

Based on the Regulation of the Head of the Transportation Humale Resources Development Agency Number KP 48 BPSDMP of 2024, it explains that Daily Activities are activities carried out by each cadet after entering training and while undergoing activities in the dormitory. These daily activities are carried out twice a day, namely morning and evening. In the morning, physical fitness activities are carried out for ± 45 minutes. While in the afternoon, physical fitness activities are carried out for ± 2 hours.

The following is an example of a training program that can be given to cadets at the Transportation Training Institute within the BPSDM Transportation environment.

Table 2

Daily Morning Activities for Physical Fitness Development for Cadets at the Transportation Training Institute in the BPSDM Transportation environment

No	Activity	Time	Duration	Target heart rate(HR)	Information
1	Warm up a.Low Intense Isolation & Stretching up-Low Body i. Upper Body ➤ Neck muscles, shoulder muscles, and side muscles ➤ Neck, shoulder and waist joints ii. Lower Body ➤ Thigh muscles (front and back), calf muscles ➤ Hip, knee and ankle joints	05.00-05.10	10 minutes	80-110 times/minute	220-age = DNM(60%-75%) Conditioning cycle (min 120-148 times/minute)
2	Core exercises a. Aerobic System	05.11-05.30	20 minutes	120-148 times/minute	

	➤ Fast walking, jogging, fitness exercises, small games, etc. b. Anaerobic system ➤ Weight Training (Isometric & Isotonic)				
3	Cooling Down ➤ Medium Intense Stretching Up & Lower Body	05.31-05.40	10 minutes		

Table 3
Daily Afternoon Activities for Physical Fitness Development for Cadets at the Transportation Training Institute in the BPSDM Transportation environment

No	Activity	Time	Duration	Target heart rate(HR)	Information
1	Warm up a.Low Intense Isolation & Stretching up- Low Body i. Upper Body ➤ Neck muscles, shoulder muscles, and side muscles ➤ Neck, shoulder and waist joints ii. Lower Body ➤ Thigh muscles (front and back), calf muscles ➤ Hip, knee and ankle joints	16.30-16.40	10 minutes	80-110 times/ minute	220-age = DNM((75%-90%) Competition cycle (min 150- max 177 times/minute
2	Core exercises a.Cardiovascular Treatment ➤ Aerobic System (Running and fitness gymnastics) b. Specialization training ➤ Mastery of basic skills (techniques and tactics) ➤ Anaerobic system Weight Training (Isometric & Isotonic)	16.40-18.10	100 Minutes	150-177 times/minute	
3	Cooling Down ➤ Medium Intense Stretching Up & Lower Body	18.10-18.20	10 minutes	90-110 times/minute	

According to Suharjana (2008), the factors that influence a person's physical fitness are as follows:

1. Age

Each age level has a different level of physical fitness and can be improved at almost any age. Children's physical fitness increases to a maximum at the age of 25-30 years. Furthermore, there will be a decrease in the functional capacity of all body organs of approximately 0.81 - 1%. However, with diligent exercise, the rate of decline can be slowed down to half or half.

2. Gender

The level of physical fitness of boys is usually better when compared to the level of physical fitness of girls. This is because the physical activities carried out by boys are more when compared to girls. Until puberty, male physical fitness is usually almost the same as female. After reaching or passing puberty, male usually have much greater physical fitness values.

3. Food

Balanced nutritional intake (12% protein, 50% carbohydrates, and 38% fat) will greatly affect a person's physical fitness. With balanced nutrition, it is expected that the body's nutritional needs will be met. In addition to balanced nutrition, food is also greatly influenced by the quality of food ingredients. What is meant by quality food ingredients is food ingredients that contain as few pollutants as possible. The way food ingredients are processed also greatly affects the quality of food consumed.

4. Sleep and Rest

Rest is very necessary for the body to rebuild muscles after training as much as the training needs in the stimulation of muscle growth. Adequate rest is very necessary for the mind with food and water.

5. Physical Activities and Sports

Physical activity, if carried out in accordance with the principles of exercise, the correct amount of exercise and the correct exercise method, will produce positive results, such as preventing the occurrence of atrophy which is caused by the body not being given activity.

2.4 Physical Fitness Evaluation

The implementation of the physical fitness evaluation/test is intended to determine the level of fitness possessed by cadets at the Transportation Training Institute within the BPSDMP environment. The implementation of the physical fitness test is divided into groups, which are carried out every 6 months. Before the implementation of the physical fitness test, cadets must be ensured to be in good health by the Health Service Unit of the Palembang River, Lake and Ferry Transportation Polytechnic. The criteria for physical assessment are as follows:

- a. Physical Fitness Test A: 12 Minute Run
- b. Fitness Test B: Sit Up, Push Up, and Shuttle Run
- c. Final Assessment of Cadet Fitness

The calculation of cadet fitness is calculated from the combined average value of fitness test A (12-minute running test) plus the average value of fitness B which consists of sit ups, push ups, shuttle run.

$$\text{Final Value} = \frac{\text{Score A} + \text{rata-rata Score B}}{2}$$

The final fitness test score criteria are as follows:

KS (Less than Once)	: Value < 20
K (Less)	: Score 21-40
C (Enough)	: Score 41-60
B (Good)	: Score 61-80
BS (Very Good)	: Score 81-100

3. Research Methods

This study uses a quantitative study method of primary data analysis with a cross-sectional design approach where the measurement of dependent variables (criteria) and independent variables (predictors) are studied at the same time. Measurements on respondents were carried out during the study on the food menu of Poltektrans SDP Palembang Cadets. The relationship studied is the relationship between numerical data on the independent variables (energy adequacy, nutritional status, Body Mass Index of cadets) on the activities of Poltektrans SDP Palembang cadets.

4. Results and Discussion

4.1 Respondent Characteristics

From the results of the research conducted, 111 respondents were obtained from level I cadets. The characteristics of the respondents in question include:

1. Respondent gender

Table 4
Respondent Characteristics by Gender

Gender	N	%
Male	59	53.2
Female	52	46.8
Total	111	100

Based on data on the number of first-year cadets, 53.2% of the respondents sampled in this study were male and 46.8% were female.

2. Age of respondents

Table 5
Respondent Characteristics by Age

Age	N	%
18	19	17.1
19	39	35.1
20	32	28.8
21	12	10.8
22	7	6.3
23	2	1.8
Total	111	100

Respondent characteristics based on age show that the largest proportion of respondents is aged 19 years, namely 39 people (35.1%), and the age group of 23 years is the smallest proportion, namely 2 people (1.8%).

4.2 Nutritional Status of Cadets

- Descriptive statistics of Respondents' Weight, Height, and Body Mass Index are presented in the following table:

Table 6
Descriptive Statistics of Respondents' Weight, Height, and Body Mass Index

	n	Minimum	Maximum	Average	Standard Deviation
Body Weight (kg)	111	14.5	82.2	58.36	7.42
Height (m)	111	1.55	1.88	1.66	0.06
Body Mass Index (kg/m ²)	111	16.2	25.5	21.11	1,984

The average respondent's BB was 58.36 ± 7.42 kg, the average respondent's TB was 1.66 ± 0.06 and the average BMI was 21.11 ± 1.984 .

- Descriptive statistics of respondents' weight, height, and BMI based on gender are presented in the following table:

Table 7
Descriptive Statistics of Respondents' Weight, Height, and Body Mass Index Based on Gender

	n	Minimum	Maximum	Average	Standard Deviation
Male Weight (kg)	59	44.6	82.2	61.5	7.0820

Female Body Weight (kg)	52	44.5	67.7	54.77	6.0898
Male Height (m)	59	1.61	1.88	1.69	0.0530
Female Height (m)	52	1.55	1.71	1.61	0.0422
Male Body Mass Index	59	16.2	25.3	21.2	2.0498
Female Body Mass Index	52	17.2	25.5	20.91	1.9068

The average weight of male respondents (kg $\pm$) is greater than the average weight of female respondents (kg $\pm$). The average BMI of male respondents ($\pm$) is greater than the BMI of female respondents ($\pm$).

- The nutritional status of cadets is determined by BMI. Based on the table, most of the samples have normal nutritional status, namely 99 respondents with a percentage of 89.2%, 1 respondent in the thin category 0.9%, 9 respondents are slightly thin 8.1% and 2 respondents are obese 1.8%. The distribution of nutritional status of respondents based on BMI can be seen in the following table.

Table 8
Distribution of Respondents' Nutritional Status Based on Body Mass Index

Nutritional status	N	%
Thin	1	0.9
A bit thin	8	7.2
Normal	98	88.2
Fat	4	3.6
Total	111	100

4.3 Physical Activity & Physical Fitness of Cadets

Based on the research results, all cadets have moderate physical activity considering that their daily activities are the same every day. For physical fitness evaluation, it is assessed from the results of the Semester II Fitness Test, namely the Good (B) category with a value of 61-80.

4.4 Energy Intake for Cadets

Energy intake is the total amount of energy sourced from food consumed. The average energy intake of respondents was taken from food recall from day 1 until day 3, which was 1710.04 Cal, as seen in the following table.

Table 9
Distribution of Respondents' Energy Intake

Energy Intake (kcal)	n	Minimum	Maximum	Average	Standard Deviation
Day 1	111	1691.0	2609.8	1954.8	158.89
Day 2	111	1244.9	2005.9	1568.4	137.87
Day 3	111	1227.4	2010.0	1606.9	169.83
Average	111	1421.10	1962.07	1710.04	121.35

Table 10
Distribution of Respondents' Energy Intake Based on Gender

Energy Intake (kcal)	n	Minimum	Maximum	Average	Standard Deviation
Day 1 male	59	1691.0	2609.8	2012.06	171.2431
Day 1 female	52	1702.5	2192.5	1880.77	114.0258
Day 2 male	59	1310.7	2005.9	1615.48	138.6945

Day 2 female	52	1244.9	1874.7	1514.91	116.8012
Day 3 male	59	1227.4	2010.0	1674.40	175.2298
Female's Day	52	1263.0	1833.4	1528.22	124.0786
Average male	59	1441.50	1962.07	1767.98	112.6587
Average female	52	1421.10	1874.33	1644.30	95.0628

The table above shows the results that:

- The average energy intake of male cadets/respondents was 1,767.98 kcal, still below the AKG for male in the 19-29 year age group, which is 2650 kcal.
- The average energy intake of female cadets/respondents was 1,644.30 kcal, still below the AKG for female in the 19-29 year age group, which is 2250 kcal.
- The percentage of overall energy intake of male/female cadets can be seen in the following table.

Table 11
Energy Intake Overview

Energy Adequacy (%)	n	Minimum (%)	Maximum (%)	Average (%)	Standard Deviation (%)
Day 1	111	63.81	99.80	80.4919	7.77610
Day 2	111	49.46	89.27	64.6003	6.89749
Day 3	111	46.32	87.30	66.1298	7.46634
Average	111	54.40	89.25	70.4073	6.25316

The table above shows that the average energy intake of respondents was 70.417%, with a total of 111 respondents.

According to WNPB 2014, daily intake categories are divided into three categories, namely:

- 1) Deficient: below 80% of daily nutritional requirements.
- 2) Good: meets 80-110% of daily nutritional needs.
- 3) More: above 110% of daily nutritional requirements

The results of the average energy intake of respondents were included in the insufficient category.

The percentage of respondents' energy intake based on category can be seen in the following table.

Table 12
Frequency Distribution of Respondents' Energy Intake Categories

Energy Intake Category	N	%
Day 1 less	56	50.5
Enough	55	49.5
Day 2 less	107	96.4
Enough	4	3.6
Day 3 less	106	95.5
Enough	5	4.5
Average less	103	92.8
Enough	8	7.2

Based on the data above, it was found that there were no respondents in the high category. Respondents with the category of insufficient energy intake numbered 103 people (92.8%) and the category of sufficient energy intake numbered 8 people (7.2%).

The energy intake of Level I Cadets at Poltektrans SDP Palembang is still largely in the insufficient category, this will have an impact on the daily activities carried out and the physical fitness of the cadets themselves. This needs to be increased for daily energy intake to reach 80-110% of the nutritional needs achieved.

5. Conclusion and Suggestions

5.1 Conclusion

Based on the results of the research discussion, the following conclusions can be drawn:

- a. The average energy intake of male cadets is 1,767.98 kcal and the average energy intake of female cadets is 1,644.30 kcal, which is still below the AKG for male and female groups aged 19-29 years.
- b. The level of energy intake adequacy of male/female cadets in the insufficient category is 103 people (92.8%) and the sufficient energy intake category is 8 people (7.2%). This is not yet able to support the daily activities of cadets (moderate category) on the SDP Palembang Transportation Polytechnic campus.
- c. The nutritional status of the cadets of the SDP Palembang Transportation Polytechnic is good, as male as 88.2% have normal nutritional status, as male as 0.9% have thin nutritional status, and 7.2% have slightly thin nutritional status, 3.6% have obese nutritional status.

5.2 Suggestions

Things that can be suggested based on the conclusions obtained from the results of this study are:

- a. The level of energy sufficiency in the category of still sufficient and lacking, it is necessary to conduct an evaluation related to the food menu and the addition of food portions taken from the cadets.
- b. The availability of nutritious snacks as additional energy intake for cadets in the morning and afternoon.
- c. For cadets with nutritional status that is not yet in the normal category, they can adjust their meal portions and daily physical activity.

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