Correlation of overweight and academic achievement at grade 1-3 pupil at school of highscope Indonesia 2018

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Abstrak

Latar belakang: *Berdasarkan data WHO pada tahun 2011 menunjukkan 1 dari 10 anak di dunia mengalami obesitas (WHO, 2011). Data status gizi pada anak usia 5-12 tahun di DKI Jakarta menunjukkan underweight 14,0% dan overweight 6,8%. Data secara spesifik untuk wilayah Jakarta Selatan adalah underweight 7,4% dan overweight 7,3%. Permasalahan gizi merupakan salah satu faktor penting yang berpengaruh terhadap prestasi akademik siswa. Tujuan dari penelitian: mengetahui pengaruh status gizi terhadap prestasi akademik siswa kelas 1-3 sekolah dasar.*

Metode: *desain yang digunakan adalah cohort restrospective dengan melihat hubungan antara hasil School Wide Assessment (SWA) dengan status gizi anak pada 9 bulan sebelumnya. Populasi dalam penelitian ini adalah siswa kelas 1-3 sekolah dasar di Sekolah HighScope Indonesia dengan total sampling yaitu berjumlah 480 anak.*

Hasil: *Hasil penelitian ini menunjukkan bahwa terdapat hubungan signifikan antara variabel status gizi terhadap prestasi akademik 6:29 RR (95% CI 3,82-10,35). Dalam analisis regresi cox menunjukkan status gizi yang baik memiliki RR pada 3,17 (95% CI 2,404 hingga 4,204) dan signifikan pada nilai p-value 0,000. Artinya, siswa yang memiliki kelebihan berat badan memiliki risiko kinerja akademik yang buruk. Sedangkan variabel lainnya menunjukkan bahwa tidak ada hubungan yang signifikan dengan risiko memiliki kinerja akademik yang buruk. Pada model akhir analisis regresi cox pada variabel status gizi pada prestasi juga menunjukkan nilai RR sebesar 3,09 (95% CI 2,365 hingga 4,053) p-value 0,000.*

Kesimpulan: *Anak-anak dengan kelebihan berat badan berisiko untuk memiliki prestasi akademik yang buruk sebesar 6.3 kali.* ***(Health Science Journal of Indonesia 2019;10(1):32-40)***

Kata kunci: *Status gizi, prestasi belajar, faktor risiko, cohort retrospective*

Abstract

Background: Based on WHO data in 2011, 1 in 10 children in the world are obese (WHO, 2011). Nutritional status data in children aged 5-12 years in DKI Jakarta shows 14.0% underweight and overweight 6.8%. Data specifically for the South Jakarta region is 7.4% underweight and 7.3% overweight. Nutritional problems are one of the important factors that influence student academic achievement. The purpose of the study: to determine the effect of nutritional status on academic achievement of students in grades 1-3 in elementary school.

Methods: the design used was a retrospective cohort by looking at the relationship between the School Wide Assessment (SWA) score and the nutritional status of children in the previous 9 months. The population in this study were students in grades 1-3 at HighScope Indonesia School with a total sampling of 480 children.

Results: The results of this study indicate that there is a significant relationship between variables of nutritional status on academic achievement 6:29 RR (95% CI 3.82-10.35). In the cox regression analysis showed good nutritional status had RR at 3.17 (95% CI 2.404 to 4.204) and was significant at p-value 0.000. While other variables indicate that there is no significant relationship with the risk of having poor academic performance. In the final model cox regression analysis on variable nutritional status on achievement also showed RR values of 3.09 (95% CI 2.365 to 4,053) p-value 0,000.

Conclusion: Children who are overweight are at risk for having bad academic achievement of 6.3 times. ***(Health Science Journal of Indonesia 2019;10(1):32-40)***

Keywords: Nutritional status, academic achievement, risk factors, retrospective cohort

Nutritional status for children measuring by body mass index that calculate with weight and height of children.[1, 2] The definition of obesity according to the World Health Organization (WHO) is the abnormal accumulation of body fat that will increased healthy risks,[1,2] in 2007 reported that there were 95.2 million children, or approximately 14.3% having prevalence of underweight in children's nutritional status in the world[3], While based on data from the WHO in 2011 stated that 1 in 10 children in the world are overweight. Research of Bier (2007) also showed that more than 9 million children aged 6 years and over are overweight[12], In fact, since 1970, obesity problems in children tends to increase. These numbers tend to be doubled at children aged 2-5 year in 2007, and threefold in children aged 16-11 years.[11, 12]

The nutritional status in Indonesia, according to Riskesdas data 2013 on children aged 5-12 years, the prevalence of underweight is 11.2%, consisting of 4% of severe and malnutrition status 7.2%[4], and also showed that obesity problems in children in Indonesia were quite high, with prevalence of 18.8% comprising 10.8% obese and very obese (obesity) as much as 8.8%. Likewise for stunting prevalence is as much as 30.7%, which is composed of 12.3% malnutrition and 18.4% severe nutrition status.[4]

The nutritional status of school children aged 5-12 years in Jakarta shows 3.2% is a very thin, 6.1%, underweight, 4.0% stunting and 10.0% wasting[4]. While in DKI Jakarta the nutrition data showed that 14.0% underweight, 22.7% stunting, 9.9% wasting and 6.8%. In South Jakarta showed 7.4% underweight, 17.8% stunting, 6.3% wasting and 7.3% overweight. These data showed of the nutritional problems that occurred in Jakarta.[4]

The nutritional status of children will be having impacts on improving the quality of human resources. Chronic malnutrition or stunting is closely linked to getting lower in academic achievement school.[5,6] Nutritional problems also have an impact on child development. Nutrition is one of important factor in contributing to the quality of education achievements[7]. However, the nutritional problems actually just not only malnutrition but children who are overweight actually also having nutritional problems.[11, 13] The prevalence of stunting, underweight and wasting were 27.5% (95% CI 23.2–31.9%), 20.4% (95% CI 16.5–24.3%) and 8.7% (95% CI 6.2–11.5%), correspondingly. Previous studies conducted in different areas have shown that under nutrition is common among school-age children; it was reported in the form of stunting range from 11 to 48.7% and underweight from 7.2 to 59.7%.[12] A study conducted in eastern Ethiopia reported that the prevalence of stunting was 8.9%, of which, 2% had severe stunted among school-aged children.[12] Though evidence about the prevalence of malnutrition is well studied in Ethiopia, there is insufficient evidence regarding nutritional status allied with academic performance among school-age children.[12]

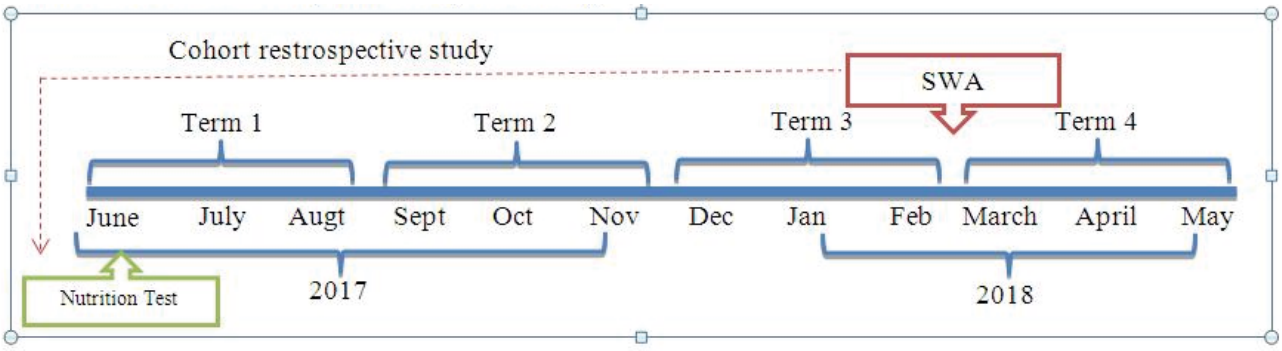
The low level of educational performance was significantly higher ($p < 0.05$) among the stunted, underweight and wasted children than that of the normal children. In multivariable logistic regression, age of the child (Adjusted Odds Ratio (AOR) = 0.177, 95% CI 0.07, 0.4), monthly income less < 1000.00 birr (AOR = 0.05, 95% Cl 0.02, 0.15), stunted children (AOR = 0.21, 95% CI 0.10, 0.43) and under-weight (AOR = 0.63, 95% CI 0.26, 0.84) were associated with academic performance. This study revealed that indicators of undernutrition were prevalent among school-age children. Thus, collaboration between the health and education sectors is required to alleviate the problem.[11,12]

The purpose of this study is to determine the relationship of nutritional status with the cumulative academic achievement in grades 1-3 elementary school students in the HighScope Indonesia in 2018.

METHODS

This is a quantitative research with a retrospective cohort study aimed to look at the relationship between nutritional status and academic achievement. The data consist of dependent and independent variables. Taken from secondary data obtained from the recapitulation of the evaluation of student learning examination called School Wide Assessment (SWA) on the 3rd quarter of 2017/2018 school year its mean at March 2018. While the nutritional status data obtained from the health monitoring conducted by the school clinic at 9 months earlier, at June 2017.

This is how these restropective study conducting :



So, this research comparing between the SWA score and the nutritional status of the students for the past 9 months. It means that, th-is research is determining the relationship between the students' academic achievement with their nutritional status in the past(9 months earlier).

The study population is grade 1 until 3 primary school students in HighScope Indonesia with total 480 students. The inclusion criteria were boys and girls, age between 7-9 years who are elementary school students grades 1-3 in HighScope Indonesia who were at least already 1 year went enrolment; having normal child development, not experience physical disability and obtain written permission from parents (informed concent) to participate in the study. While the exclusion criteria were if respondents refused to participate in the research process, HighScope special needs students that have a neurological problems which is including autism, ADHD, learning disability, down syndrome, cerebral palsy, intellectual disablility, low vision or others.

The study was conducted at the HighScope Indonesia in South Jakarta. The research using Kelsey formula to determinate the sampling and base on that these research will need 341 students as a minimal sampling. So, the researcher determined that all of the grades 1-3 be used as total sampling. Data collection tools are questionnaire to determine the nutritional status and students academic achievement.

The number of samples is calculated by the minimum number of samples using the Kelsey formula for retrospective cohort studies, here are the results of the calculation:

$$N = \frac{(Z_{\frac{2}{2}}^{\alpha} + Z\beta)^2 \, x \, \rho \, x \, (1 - \rho) \, x \, (r + 1}{(d *)^2 r}$$

N = Minimum sample size
P1 = Proportion of outcomes for those at risk
P2 = Proportion of outcomes for those who are not at risk
P = Average P1 and P2 or (P1 + P2) / 2

Based on academic achievement of HighScope Indonesia students in 2016 where the number of students who have a bellows level is 33.3% with RR is 1.5, the results of the calculation are as follows:
P1 = (RR) P2 = 1.5 (0.333) = 0.499
p = (p1 + p2)/2 = (0.585 +0.39)/2 = 0.416
d * = p1-p2 = 0.585-0.39 = 0.166
Kelsey Sample Calculation Formula

$$= \frac{7.849 \text{ x } 0{,}416 \text{ x } 0{,}584 \text{ x } 2}{(0{,}166)^2 \text{ x } 1}$$

$$= \frac{3{,}813}{0{,}027}$$

= 141.24 "rounded up to 142, this is the number of 1 group. So that if 2 groups become = 142x 2 = 284. To anticipate a lost to follow-up or incomplete data, 20% is added to become = 341 samples.

The data was analyzed for statistical correlation and conducted with SPSS 24 serial to determine the relationship between the dependent and independent variables and also used logistic regression to determine the greatest affect between the variabels. Undernutrition in young children is often determined through measurement of height, weight, skin-fold thickness and age. The commonly derived indices from these measurements are: stunting - low height for age (HAZ), wasting - low weight for height (WHZ), underweight - low weight for age (WAZ) and BMI-for-age z-score.

Stunting is an indicator of chronic undernutrition, the result of prolonged food deprivation and/ or disease or illness; wasting is an indicator of acute undernutrition, the result of more recent food deprivation or illness; underweight is used as a composite indicator to reflect both acute and chronic undernutrition although it cannot distinguish between them.

These indices are compared against an international reference population developed from anthropometric

data collected in the United States by the National Center for Health Statistics (NCHS). Children whose measurements fall below –2 z-scores of the reference population median are considered undernourished, i.e. to have stunting, wasting or to be under-weight. Those children with measurements below –3 z-scores are considered to be severely undernourished.

Ethical Declaration

This study has been approved by Universitas Indonesia Public Health Ethics Committe with 420/UN2.F10/PPM.00.02/2018 as ethical number registered.

RESULTS

Respondents characteristics

Table 1. The Distribution Respondents Characteristics

Respondent's characteristics		n	%
Age	7 years	163	34.9
	8 years	165	34.4
	9 years	152	31.7
	Total	480	100
Number of siblings	≤ 2	336	70.0
	> 2	114	30.0
	Total	480	100
Order in family	elder	254	52.9
	second	215	44.8
	third	8	1.7
	fourth	3	0.6
	Total	480	100
Gender	Man	240	50.0
	woman	240	50.0
	Total	480	100
birth weight	Low`	16	3.3
	Normal	464	96.7
	Total	480	100
Birth termination	preterm	14	2.9
	aterm	466	97.1
	Total	480	100
Mother's education	S1	192	40.0
	S2	224	46.7
	S3	64	13.3
	Total	480	100
Father's education	S1	64	13.3
	S2	272	56.7
	S3	144	30.0
	Total	480	100

Respondents in this study were 480 students with aged 7 years are 163 children (34.9%), aged 8 years are 165 children (34.4%) and aged 9 years old are 152 children (31.7%). There were 16 (3.3%) subjects had a history of low birth weight and 14 (2.9%) of the children had a history of premature birth. The nutritional status of underweight are 12 (2.5%), and children who having overweight categori are 112 (23.3%) and obese children are 131 (27.3%) children.

Nutritional Status of Respondents

Based on height, weight and age data of the respondents conducted by the school clinic in June 2017, the researcher calculating nutritional status using WHO Anthro-plus applications:

Calculating WAZ, HAZ and BAZ using data of the height, weight and age of the respondents. The result are:

Table 2. WAZ, HAZ and BAZ

Variables	mean	Std. Error	Std. deviation	Min	Max
WAZ	0.29	0,026	.570	-1.88	2.39
HAZ	0.30	0,019	.463	-0.76	1.88
BAZ	0.73	0,027	0,597	-2.71	2,66

After calculating the value of WAZ, HAZ and BAZ then the next step is referring to the Z-Score as shown in Table 1.2, so we will get the nutritional status of respondents into five categories as follows:

Then the nutritional status of respondents categorized into 3 categories: (1) Normal, (2) Underweight, (3) Overweight. The results were as follows:

Table 3. Nutritional Status 3 Category

Variables	Category	Frequency (n)	Percentage (%)
Nutritional status	Normal	354	47.3
	Underweight	2	2.5
	Overweight	124	50.2
Total		480	100

Counting and categorizing nutritional status is conducted in order to do bivariate and multivariate analysis to determine the influence of nutritional status on academic achievement.

Cumulative academic achievement based on school test's scores using the School Wide Assessment (SWA) are 69.05 as the average value and the lowest score on the math and English are 56. While 95 is the highest score in English and Bahasa Indonesia.

Respondents Academic Achievement

Table 4. Cumulative Academic Achievement

Variables	mean	Std.Error	Std. deviation	Min	Max
English	73.23	0.49	1.07	56	95
Indonesian	73.27	0.43	9.425	60	95
Mathematics	74.62	0.433	9.50	56	91
Science	72.01	0.39	8.54	60	90
Cumulative Academic Achievement	69.05	0.41	8.98	56	95

Formulation to calculating into cumulative academic achievement is as follows:

Cumulative Academic Performance Score = (Bahasa Indonesia x 35%) + (English x 35%) + (Mathematics x 15%) + (Science x 15%). After that will be defined into 3 categories : (1) Proficiency if the score are 80-100, (2) Progressing if the score are 60-79 and (3) Bellow level if the score are under 30-59.

So based on the formulation of the results obtained cumulative value of academic achievement as follows:

Table 4. Cumulative Frequency Distribution of Academic Achievement

Academic achievement	n	(%)
Cumulative Academic Achievement		
Proficiency	128	26.7
Progressing	141	29.4
bellow level	211	44.0

The frequency distribution of cumulative academic achievement in grade 1-3 are 128 students (26.7%) reach the proficiency level of, 141 students (29.4) is still progressing and 211 students (44.0%) is still on bellows levels.

Factors that Influence Nutritional Status

Nutritional status is the primary independent variable in this study, and would be analyze the effect of nutritional status on achievement is cumulative and will also be seen in greater depth effect on achievement in each subject. Due to the nutritional status of respondents divided into four categories: underweight, normal, overweight and obese then to the category bivariate analysis performed by dividing into two groups: good nutrition category and malnutrition. Good nutrition category contains respondents who have underweight and normal nutritional status. Category skinny inserted into good nutrition category because the respondents have a nutritional status at the level which is approaching the upper limit of normal category. While nutrition overweight and obese categories into malnutritional groups.

Next will be the analysis of the effect of nutritional status on cumulative academic achievement which is a cumulative value of the four subjects above. Here are the results:

Table 5. Relationship of Nutritional Status and Achievement Cumulative

Variables	Category	Good Nutrition		Malnutrition		Total		RR	95% CI	p-value
		n	%	n	%	n	%			
Nutritional status	Good Nutrition	253	71.0	103	29.0	356	100	1	The reference	The reference
	overweight	14	11.3	110	88.7	124	100	6:29	3.82-10.35	0000

On a cumulative academic achievement category, there were 253 children (71%) who are on good nutrition group, who has good academic achievement, and there were 103 children (29%) who had no good academic achievement. While the respondents have overweight there are 14 children (11.3%) who have a good academic achievement and 110 children (88.7%) who had no good academic achievement. Statistical analysis showed that the nutritional status of the respondents have a significant effect on student achievement with value RR of 6.29 (95% CI 3.82 to 10.35) and p value of 0.000. From the table we can see that children with better nutritional status have a greater risk up to 6.3 times to having poor academic performance.

Based on the analysis above it can be concluded that nutritional status has a significant effect on cumulative academic achievement even statistically proven to have a greater impact if compared with achievement in each subject.

Multivariate analysis

Multivariate analysis were performed to examine the relationship of dependent variables (nutrition status) and the independent variables together with covariate variables that can be estimated relationship between independent variables and the dependent variable after being controlled by other covariates. The results of the multivariate analysis between academics achievement and the nutritional status are mentioned in table 6. In Cox regression analysis showed good nutritional status has a RR at 3.17 (95% CI 2.404 to 4.204) and significant at p value = 0.000. Its mean that the students who have overweight having a risk for poor academic performance. While the other variables showed that no significant relationship to the risk of having poor academic performance.

The result of confounding variables test, found that there is no confounder of father's education, mother's education, gender, number of siblings, birth weight status, prematurity or pre-term birth, extracurricular and age. The final model of the analysis mentioned at table 7.

Table 6. Cox Regression Analysis Between Nutritional Status and Other Variables Cumulative Against Academic Achievement

Variable	RR	95% CI	P-value
Nutritional status			
Good nutrition	(Ref)		
Overweight	3.17	2.404 to 4.204	0,000
What order are you in the family			
Child to 1	(Ref)		
2nd child	1.10	0.327 to 3.736	.871
3rd child	1.13	0.328 to 3.904	0,844
All 4 Kids	1.35	0.291 to 6.273	0,700
Number of siblings			
≤ 2	(Ref)		
> 2	1.08	0.779 to 1.517	0,624
Gender			
Man	(Ref)		
Woman	0.95	0.694 to 1.320	.790
LBW			
Normal	(Ref)		
Low	0.93	0.556 to 1.569	0.797
Type of preterm birth			
Normal	(Ref)		
premature	0.90	0.170 to 4.869	0.911
Education level of mother			
S1	(Ref)		
S2	1.04	0.665 to 1.644	0,848
S3	0.93	0.588 to 1.483	.770
Education level of father			
S1	(Ref)		
S2	1.14	0.679 to 1.917	.620
S3	1.11	0.742 to 1.676	0.599
extracurricular			
Mixed	(Ref)		
Physical	1.16	0.433 to 3.147	.760
Art	1.33	0.611 to 2.905	.471
IQ			
Superior	(Ref)		
Normal Birght	0.75	0.468 to 1.205	0.236
Average	1.01	0.666 to 1.537	0.955

Table 7. Results of Final Model Assessment of Nutritional Status Among the confounding Influence on Academic Achievement

Variable	RR	95% CI	P-value
Nutritional status			
good nutrition	(Ref)		
overweight	3.09	2.365 to 4.053	0,000

In the final model of the cox regression analysis on the nutritional status variables on achievement also demonstrates the value of RR of 3.09 (95% CI 2.365 to 4.053) p-value 0.000 so that it can be concluded that the nutritional status are variables that can have an influence on the risk of achievement poor academic in students.

DISCUSSION

The prevalence of nutrional status in this research are 2.5% underweight, and children who having overweight categori are 23.3% and obese children are 27.3%. In contrast, this finding of overweight children was higher as compared to other previous studies conducted in Brazil was found (14.9% stunted and 9.7% wasted)[12], in Kenya (24% stunted, 14.9% underweight, 9.7% wasted)[17], in Nicaragua (5% wasted).[18,19] The reason for this observed discrepancy might be due to sociodemographic characteristics, area of sampling and study period.

Our analysis found a significant relationship between nutritional status and cumulative academic achievement. Children with overweight are at risk in not good cumulative academic achievement at 6.2 times when compared with children who are well-nourished. After multivariate analysis using cox regression to the variables studied are obtained variables that had a significant influence are nutrition status.

Previous study revealed that age and income were significant factors for academic performance among primary school children. This finding was consistent with a systematic review and meta-analysis showed that there is a strong association between academic performance and socio-economic status including age.[20] Compromised socio-economic status of a family was statistically associated with poor academic performance in children.[21] Similarly, other studies done in Southeast Ethiopia[22] and in Malaysia[23] reported that minimum wealth indexed score of the family were a positive association with poor academic performance. This might be due to a balanced nutritional intake for adequate biological functioning lead to the cognitive processes and the outcome of academic performance.[23,14]

Research limitations

The limitations of this study are: (1) Potentially the lack of validity of secondary data is used both data about PSG and SWA. (2) Tend potential for the occurrence of selection bias and information bias due to the use of secondary data. (3) Limitations in the analysis of the other factors that influence academic achievement possible. (4) The result was a relative risk. (5) The sample used may be less representative of the population.

Data Quality

This study took a secondary data is data regarding school health monitoring are routinely conducted by the school clinic. The nutritional status periodicly conducted by schools every two months, however, the research only used nutritional data on June 2017. Secondary data related to nutritional status is mainly about their weight and height measurements made by nurses served in the school clinic so that in this case the validity of the data on weight and height can be properly accounted for. However, researchers did not perform the calibration of the equipment and tools used to measure weight and height, so it is possible the potential for misclassification bias.

While the data on academic achievement is taken from the data tabulation of the value of the School Wide Assessment (SWA) where it is the form of the exam schools for students who are exclusively designed by Teacher & Research Department (TRD) to measure the achievement of teaching and learning activities as well as one component used by schools to evaluate the education system applied in Indonesia HighScope school. Validity of School Wide Assessment (SWA) which is compiled by the Teaching and Research Department (TRD) though drafted by a team that is also responsible for the development of educational curriculum in schools HighScope Indonesia but have never tested the validity and reliability test. One of the things that can lessen its validity by researchers is that form of matter from the School Wide Assessment (SWA) is based on a paper and pencil test, while the system of teaching and learning in schools HighScope Indonesia using active learning and also Project Based Learning (PBL). It is possible there is a student's academic potential that may not be measured with a model question paper and pencil test. Nevertheless indeed

the School Wide Assessment (SWA) has been implemented by the School HighScope since 2014 with development efforts are continued until 2018. pencil test, while the system of teaching and learning in schools HighScope Indonesia using active learning and also Project Based Learning (PBL). It is possible there is a student's academic potential that may not be measured with a model question paper and pencil test. Nevertheless indeed the School Wide Assessment (SWA) has been implemented by the School HighScope since 2014 with development efforts are continued until 2018. pencil test, while the system of teaching and learning in schools HighScope Indonesia using active learning and also Project Based Learning (PBL). It is possible there is a student's academic potential that may not be measured with a model question paper and pencil test. Nevertheless indeed the School Wide Assessment (SWA) has been implemented by the School HighScope since 2014 with development efforts are continued until 2018.

The use of secondary data in this study is made of the limited data obtained by researchers because it is based only on data available to other factors which may affect the nutritional status can not be identified with more depth, while the primary data conducted by researchers only be complementary if No respondents have data that is incomplete, for example in terms of birth history data, birth weight and other data.

Respondents were used in this study was grade 1-3 elementary school, although the total sampling was taken and no respondents were lost to follow-up and yet there is still potential for selection bias because it can not represent the entire elementary school students from grades 1-6 where possible have different characteristics primarily related to age and nutritional status wherein the multivariate analysis both variables are variables that give large influence on achievement.

Validity Research

Exclusion and inclusion criteria set out in the sample selection is expected to minimize selection bias. The use of total sampling as a technique of sampling is also an effort to anticipate the existence of selection bias. However, the direct election of the site and the respondents used in this study could potentially lead to selection bias because it may not represent the general population of elementary school students in grade 1-3.

Outcome and risk factors in this study have also been the case in the past however, a lack of accuracy the validity of the measurement may still be occurs namely in terms of the measurement of nutritional status, the researchers do not know exactly the measurement process and the use of the measuring instrument, but due to the measurements performed by professional nurses, the potential for misclassification bias can be minimized. While in terms of the outcome measurement tools namely School Wide Assessment (SWA), made possible bias which has never done any test the validity of the test forms or types of questions used in the School Wide Assessment (SWA) is. Although determining the location and sample directly, but the number of samples used in this study have exceeded the minimum sample size, this study can be generalized to the general population. If the population have different types of schools with the School HighScope Indonesia.

In conclusion, the results of this research is nutritional status in the 1-3 grade elementary school students in the HighScope Indonesia Elementary School in 2018 divided into three categories: underweight, normal and overweight. There is a significant relationship between the variables of nutritional status on cumulative academic achievement. children with overweight were at risk in poor cumulative academic achievement compared to children who are well-nutritioned. Better nutritional status or children with overweight have a greater risk up to 6.3 times to having poor academic performance. Base on cox regression analysis, this study finded that the nutritional status are variables that can have an influence on the risk of achievement poor academic in students.

Educational activities to parents with effective communication which contains information about the importance of nutritional status of children, especially awareness of nutritional problems both nutrition and undernourishment. So that not only the child, thin and very thin are considered to have nutritional problems, but also on overweight should also get attention too. The parents also need to be aware of the influence of nutritional status and age to academic achievement so it would be more wise in choosing the food intake and type of school or training appropriate to the child's age.

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REFERENCES

1. Sartika RAD. The risk factors of obesity in children 5-15 years in Indonesia. Makara Health. 2011; 15(1):37-43.
2. WHO. Waist circumference and waist-hip ratio: report of a WHO expert consultation. Geneva; 2011.
3. WHO. Height for girls age 5 to 19 (Zscore). Development of a strategy towards promoting optimal fetalgrowth. Geneva; 2007.
4. Riskesdas. Basic Health Research in 2017. Agency for Health Care Research and Development of the Ministry of Health of RI. Jakarta; 2017.
5. Santrock JW, JW Santrock. The second edition of Educational Psychology. Jakarta: Kencana Prenada Media Group; 2007.
6. Agustini CC, Malonda NS, Purba RB. The relationship between nutritional status of children with learning achievement of grade 4 and 5 at the village elementary school Maasing kecamatan Tuminting kota Manado. Manado: MoH Poltekkes Journal; 2013.
7. Yaumil Fitri M. Relationship between physical activity with nutrition status in school age children SD Bopkri Gondolaju Yogyakarta: STIKES General Achmad Yani Yogyakarta; 2017.
8. Supariasa IDN, Bakri B, Dawn I. Assessment of nutritional status. Jakarta: EGC; 2002. p. 48-9.
9. Almatsier S. Principles of Nutritional Sciences. Jakarta: PT Gramedia Pustaka Utama; 2005.
10. Adriani, Wirjatmadi, B. Role of Nutrition in the Life Cycle. 2013.
11. Anuar MLC, Low W, Harun F. Effects of nutritional status on academic performance of Malaysian primary school children. Asia Pac J Public Health. 2005;17:7–81.
12. Asmare B, Taddelle M et all. Nutritional status and correlation with academic performance among primary school children, Northwest Ethiopia. BMC; 2018.
13. AW Conservation, Jalal F, Madanijah S, Briawan D. Determinants kids Stunting baduta: Riskesdas 2010 Data Analysis. Jakarta; 2014.
14. Corballis MC. Left brain, right brain: facts and fantasies. PLoS biology. 2014; 12 (1): e1001767.
15. Ramji S. Disease of the newborn infant. In: Sirvastava RN, Kabra SK, editors. Pediatrics: a concise text. New Delhi: Elsevier; 2011. p. 44.
16. Rachatapantanakorn O, Tongkumchum P, Chaisuksant Y. Factors associated with birth asphyxia in Pattani Hospital, Thailand. Songklanagarind Medical J. 2010;23:17-27.
17. Sarma MSWD, Sivananthawerl T. The effects of nutritional status on educational performance of primary school children in the plantation sector in Nuwara Eliya Educational Zone. Trop Agric Res. 2013;24(3):14–203.
18. National Institute of Health Research and Development. [Final report of national basic health research 20013]. Jakarta: The Institute; 2013. Indonesian.
19. Galal OHJ. The relationship between nutrition and children's educational performance. Br J Nutr. 2003;25:11–20.Google Scholar
20. Shariff ZMBJ, Johnson NE. Nutrition and educational achievement of urban primary school children in Malaysia. Asia Pac J Clin Nutr. 2000;9(4):73–264. View ArticleGoogle Scholar
21. Mendez MA, Adair LS. Severity and timing of stunting in the first two years of life affect performance on cognitive tests in late childhood. J Nutr. 1999;129(8):1555–62.View ArticleGoogle Scholar
22. al GMe: Iodine deficiency, anthropometric status cognitive function of school age children in Hawassa town, Southern Ethiopia. Awassa: Hawassa University; 2009.Google Scholar
23. Herrador Z. Cross-sectional study of malnutrition and associated factors among school aged children in rural and urban settings of Fogera and LiboKemkem Districts. Ethiopia. PLoS ONE. 2014;9:9.Google Scholar