Jurnal Gizi dan Dietetik Indonesia
(Indonesian Journal of Nutrition and Dietetics)
Vol. 9, No. 1, 2021: 11-18

Available *online* at: http://ejournal.almaata.ac.id/index.php/IJND

DOI : http://dx.doi.org/10.21927/ijnd.2021.8(3).11-18

The status of dietary diversity score among school-aged children between rural and urban areas

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ABSTRAK

Latar Belakang*: Bagi anak sekolah dasar (SD) status gizi yang cukup akan menunjang kemampuan akademiknya di sekolah. Akan tetapi, disaat pembatasan social berskala besar (PSBB) berlaku pengukuran status gizi tidak mungkin dilakukan karena dapat meningkatkan resiko penularan. Oleh karena itu, salah satu cara mengetahui status gizi anak sekolah dasar adalah menggunakan skor keberagaman makanan.*
Metode: *Metode cross sectional digunakan pada penelitian ini dengan mengikutsertakan 58 pasang ibu dan siswa SD di wilayah Banyumas. Pengambilan data keberagaman makanan dilakukan menggunakan kuesioner online melalui google form. Uji analisis yang digunakan adalah uji chi square.*
Hasil*: Rata-rata siswa SD di Kabupaten Banyumas mengonsumsi 6 kelompok makanan dalam sehari dimana kelompok makanan yang sangat jarang dikonsumsi adalah kelompok daging yaitu sebesar 17.2%. Tiga kelompok makanan yang paling sering dikonsumsi adalah kelompok susu (74.1%), telur (67.2%) dan kacang-kacangan (62.1%). Berdasarkan hasil analisis bivariat, tidak ada perbedaan yang signifikan antara keberagaman makanan siswa SD di wilayah perkotaan dan perdesaan. Namun ada kecenderungan siswa yang tinggal di wilayah perkotaan memiliki skor keberagaman yang lebih tinggi.*
Kesimpulan*: Tidak ada perbedaan antara keberagaman makanan antara wilayah perkotaan dan perdesaan di Kabupaten Banyumas. Namun ada kecenderungan bahwa siswa di wilayah SD lebih beragam.*

Kata Kunci: *keberagaman makanan; COVID 19; perdesaan dan perkotaan; siswa SD*

ABSTRACT

Background: *School-aged children should maintain a better nutritional status to ensure the quality of their academic performance. However, during pandemic COVID 19 the weight and height measurement could increase the risk of spreading the virus. Therefore, one of the indicators to see school-aged children's nutritional status was using dietary diversity score (DDS).*
Methods: *In total 58 pairs of mothers and children were included in a cross-sectional study. The data of dietary diversity was collected using an online questionnaire through a google form. The chi-square analysis was used to assess the significant differences.*
Results: *On average, school-aged children consumed six food groups a day. The three most consumed food groups were oil and fats, sweet and dark leafy vegetables, namely 51, 56, and 53 students respectively. There was a significant difference in the consumption of fresh meat and other fruits between urban and rural areas. Based on bivariate analysis, there was no significant difference in DDS within students' characteristics. However, there was a better DDS trend within fathers' occupation, mothers working status, and mothers' knowledge level.*
Conclusions: *There was a tendency that plant-based food was mostly consumed in rural areas and animal-based food was mostly consumed in urban areas. Furthermore, the study confirmed parental factors on students' food consumption.*

Keywords: *dietary diversity score; Covid 19; urban dan rural; school-aged children*

BACKGROUND

In order to ensure better academic performance and achievement at school, students need adequate intake accompanied by better hygiene practice (1–3) As one of the indicators of nutritional status among school-aged children, dietary diversity score (DDS) become a predictor of malnutrition problem particularly micronutrient deficiencies (4). Compared to the Indonesian dietary guidelines of my plate (in Indonesia *Piring Makanku*), around 71.6% of school-aged children have not yet fulfilled their dietary guidelines. According to the survey diet total, besides staple foods, around 67.3% consumed vegetables, 57.2% consumed legumes, 49.2% consumed animal protein and 28.4% consumed fruits (5). In other words, the DDS score of Indonesian school-aged children was low. Moreover, some studies showed that the malnutrition problem in rural areas was higher than in urban areas. However, specific information factors which influenced the differences were less explored (6–8).

As locus stunting, Banyumas District was chosen to maintain the sustainability of the stunting program among under-five children. Identification of the status of DDS could be important information to develop appropriate stunting prevention programs to cut off the vicious cycle of malnutrition. Therefore, this study aims to explore the DDS among school-aged children in urban and rural areas of the Banyumas District.

MATERIAL AND METHODS

The study used a cross-sectional approach to explore DDS among school-aged children in urban and rural areas of Banyumas District. The study was conducted from July to December 2020 when the pandemic of COVID 19occurred. Therefore, the data collection used the google form application to prevent the spread of coronavirus. In the process of filling out the google form questionnaire, enumerators assisted the participants through Whatsapp groups by using video tutorials and discussion sessions.

Seven elementary schools were chosen using multi-stage random sampling. Firstly, the village of urban and rural areas was randomly chosen. One village from locus stunting was purposely chosen while the other six were chosen randomly. Then from the selected village, seven elementary schools were chosen as the study site.

The participants were all students from fourth until six grades (10-12 years) and their parents. The inclusion criteria for students were not experiencing any illness during the last two weeks. The inclusion criteria for parents were mothers or female guardians who provided food daily.

Socio-demographic characteristics, mothers' knowledge on nutrition, and DDS questionnaire. Pre-testing of the knowledge questionnaire was done with the result of Cronbach alpha was 0.722. The DDS questionnaire for school-age children was adopted from household DDS which consisted of the questions on 16 food groups' consumption (9). The students filled out the questionnaire based on the food they consumed yesterday. In the analysis of DDS, several food groups were combined into one food group such as vitamin A-rich vegetable and tuber, dark leafy vegetables, and other vegetables were combined into the group of vegetables. In the end, 16 food groups become 12 food groups. The data analysis used a statistical software program with chi-square test (for 2x2 table) and Kolmogorov Smirnov test (for more than 2x2 table) were performed to see relationships within variables with the 95% significance and α=5%. Further explanation of the combination is explained in **Table 1**.

Tabel 1. Food Groups on DDS

No	Type of Foods	Food Group	DDS Item
1	Corn/maize, rice, wheat, sorghum, millet , or any other grains or foods made from these (e.g. Bread, noodles, porridge, or other grain products)	Cereals	Cereals
2	White potatoes, white yam, white cassava, or other foods made from roots	White roots And tubers	White tubers and roots
3	Pumpkin, carrot, squash, or sweet potato forms + locally available vitamin a rich	Vitamin A rich in vegetables	Vegetables
4	Dark green leafy vegetables, including wild leaves such as amaranth, cassava leaves, kale, spinach	Dark green Leafy	
5	Other vegetables (e.g. Tomato, onion, eggplant) + other locally available vegetables	Other vegetables	
6	Ripe mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach, and 100% fruit juice made from these + other locally available vitamins a rich fruits	Vitamin A rich fruits	Fruits
7	Other fruits, including wild fruits and 100% fruit juice made from these	Other fruits	
8	Liver, kidney, heart, or other organ meats or blood-based foods	Organ meat	Meat
9	Beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects	Flesh meats	
10	Eggs from chicken, duck, guinea fowl, or any other egg	Eggs	Eggs
11	Fresh or dried fish or shellfish	Fish and seafood	Fish and seafood
12	Dried beans, dried peas, lentils, nuts, seeds Or foods made from these (eg. Hummus, peanut butter)	Legumes, nuts, and seeds	Legumes, nuts, and seeds
13	Milk, cheese, yogurt, or other milk products	Milk and milk products	Milk and milk products
14	Oil, fats, or butter added to food or used for cooking	Oils and fats	Oils and fats
15	Sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies, and cakes	Sweets	Sweets
16	Spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages	Spices, condiment beverages	Spices, condiment beverages

Data collection was done after ethical clearance from The Ethical Committee of Faculty of Health Sciences with the number of response letters as 153/EC/KEPK/VII/2020. Firstly, informed consent from parents was collected then followed by informed assent for students.

RESULT AND DISCUSSION

In total 58 pairs of parents and students participated in the study with the participants from urban and rural areas respectively 29 participants. There was no significant difference in participants' characteristics between urban and rural areas. The detailed information about students' characteristics is explained in **Table 2**.

Tabel 2. Students Characteristics (n=58)

Student Characteristics	Rural n (%)	Urban n (%)	p-value
Sex			
Boys	15 (51.7)	14 (48.3)	0.73
Girls	14 (48.3)	15 (51.7)	
Mothers' educational level			
Lower than basic education	5 (17.2)	7 (24.1)	0.741
Basic education (ES and JHS)	7 (24.1)	9 (31.0)	
Middle education (SHS)	14 (48.3)	10 (41.7)	
Higher education	3 (10.3)	3 (5.2)	
Fathers' educational level			
Lower than basic education	9 (31.0)	10 (34.5)	0.739
Basic education (ES and JHS)	5 (17.2)	3 (10.3)	
Middle education (SHS)	13 (44.8)	12 (41.4)	
Higher education	2 (6.9)	4 (13.8)	
Fathers' occupation			
Farmers	4 (13.8)	1 (3.4)	0.503
Daytaller	9 (31.0)	13 (44.8)	
Salesman	4 (13.8)	3 (10.3)	
Entrepreneur	7 (24.1)	5 (17.2)	
Office worker	5 (17.2)	7 (24.1)	
Mother's working status			
Working	5 (17.2)	6 (20.7)	0.738
Not working	24 (82.8)	23 (79.3)	
Type of family			
Nuclear family	8 (42.1)	18 (46.2)	0.771
Extended family	11 (57.9)	21 (53.8)	
Mother's level of knowledge			
Higher knowledge level	15 (51.7)	20 (69.0)	0.180
Lower knowledge level	14 (48.3)	9 (31.0)	
DDS score, med (min,max)	6 (2,10)	6 (2,8)	0.969

In both rural and urban areas, more students lived in the extended family. More mothers in rural areas graduated from senior high school, namely 48.3%. Similar results were found in fathers' educational levels which showed more fathers had JHS and SHS educational levels, respectively around 17.2% dan 44.8%. Most of the fathers worked as day taller (urban: 44.8%; rural: 27.6%). Meanwhile, working mothers in urban areas were slightly higher (20.7%) than in rural areas. Other than that, in terms of the level of knowledge, around 48.3% of mothers in urban areas had better knowledge.

In terms of students' food consumption, around 90% consumed sweets (51 students), oil and fats, (56 students), and darl leafy vegetables (53 students). Organ meats were rarely consumed by students, namely 11 students. The detail of students' food consumption is explained in **Table 3**.

Tabel 3. Distribution of Students's Food Consumption

Food Groups	Rural n (%)	Urban n (%)	P-value
Cereals (n=35)	21 (60)	14 (40)	0.06
White roots and tubers (n=22)	10 (45.5)	12 (54.5)	0.58
Vegetables (n=22)	11 (50)	11 (50)	1.00
Vitamin A rich-vegetables (n=31)	17 (54.8)	14 (45.2)	0.43
Dark green Leafy (n=53)	27 (50.9)	26 (49.1)	1.00
Other vegetables (n=45)	21 (46.7)	24 (53.3)	0.35
Fruits (n=21)	10 (47.6)	11 (52.4)	0.78
Vitamin A rich-fruits (n=35)	21 (60.0)	14 (40.0)	0.06
Other fruits(n=32)	12 (37.5)	20 (62.5)	0.03
Meat (n=10)	5 (50)	5 (50)	1.00
Flesh meat (n=39)	15 (38.5)	24 (61.5)	0.01
Organ meat (n=11)	6 (54.5)	5 (45.5)	0.74
Eggs (n=49)	16 (41.0)	23 (59.0)	0.05
Fish and seafood (n=32)	11 (47.8)	12 (52.2)	0.79
Legumes, nuts and seeds (n=36)	20 (55.6)	16 (44.4)	0.28
Milk and milk proucts (n=43)	21 (48.8)	22 (51.2)	0.76
Oils and fats (n=56)	23 (50)	23 (50)	1.00
Sweet (n=51)	25 (49.0)	26 (51)	0.69

There was a significant difference in students' food consumption of flesh meat and other fruits between students in rural and urban areas with the p-value < 0.05. More students in urban areas consumed flesh meat and other fruits compared to students in rural areas. Other than that, the result found that students in rural areas tended to consume more plant-based food compare to students in urban areas, namely dark leafy vegetables (50.9%), vitamin A-rich vegetables (54.8%), Vitamin A-rich fruits (60%) then Legumes, nuts and seeds (55.6%). Meanwhile, more students in urban areas tended to consume animal-based foods. Such as flesh meats (61.5%), egg (59.0%), fish (52.2%) and milk (51.2%).

Tabel 4. DDS among School-Aged Children

Student Characteristics	Less varied n=19	Varied n =39	p-value
Sex			
Boys	11 (37.9)	18 (62.1)	0.401
Girls	8 (27.6)	21 (72.4)	
Type of family			
Nuclear family	8 (30.8)	18 (69.2)	0.771
Extended family	11 (34.4)	21 (65.6)	
Type of areas			
Rural areas	11 (37.9)	18 (62.1)	0.401
Urban areas	8 (27.6)	21 (72.4)	
Mothers' educational level			
Lower than basic education	5 (41.7)	7 (58.3)	0.590
Basic education (ES and JHS)	5 (31.3)	11 (68.8)	
Middle education (SHS)	6 (25.0)	18 (75.0)	
Higher education	3 (50.0)	3 (50.0)	

Student Characteristics	Less varied n=19	Varied n =39	p-value
Fathers' educational level			
Lower than basic education	6 (33.3)	13 (66.7)	0.486
Basic education (ES and JHS)	4 (50.0)	4 (50.0)	
Middle education (SHS)	6 (24.0)	19 (76.0)	
Higher education	3 (50.0)	3 (50.0)	
Fathers' occupation			
Farmers	1 (20.0)	4 (80.0)	0.161
Daytaller	8 (36.4)	14 (63.6)	
Salesman	1 (14.3)	6 (85.7)	
Entrepreneur	7 (58.3)	5 (41.7)	
Office worker	2 (16.7)	10 (83.3)	
Mother's working status			
Working	5 (45.5)	6 (54.5)	0.319
Not working	14 (29.8)	23 (70.2)	
Mother's level of knowledge			
Higher knowledge level	14 (40.0)	21 (60.0)	0.147
Lower knowledge level	5 (21.7)	18 (78.3)	

Based on Table 4, there was no significant difference between DDS with students' characteristics. However, the study found a tendency on fathers' occupation, mother working status, and mothers' knowledge level. Fathers who worked as salesmen, civil servants, and private employees had more students with better DDS. More students with non-working mothers had varied DDS compared to those who were working (70.2%). Furthermore, mothers with better knowledge levels had students with better DDS (78.3%)

The study found, most of the students in Banyumas District had better DDS. Better DDS which consumed more than four food groups became a good and fast predictor in the assessment of micronutrient deficiencies (10). In other words, the study indicated that 19 students were experiencing micronutrient deficiencies.

The result on the students' food consumption found that students in both areas had higher consumption of oil and fats, sweets, and dark leafy vegetables. Moreover, students in urban areas showed significant differences in consuming flesh meat and other fruits.

According to a total diet survey in 2015, among all ages after cereals, oil and fats then sugar-sweetened beverages (SSB) and sweet foods were consumed by 80-90% of people (5). Even though the proportion in ages 6-12 was lower than other age groups, consuming food high in fats and sugar from an early age increased the risk of childhood obesity and non-communicable diseases in adulthood (11).

Although there was no significant difference in plant-based and animal-based foods, the study found there was a trend between students in urban and rural areas. Students in rural areas tended to consume more plant-based food, while students in urban areas tended to eat more animal-plant-based foods. A similar result was also found between urban and rural populations, which showed animal-based food was more consumed by the urban population (8,12)

The trend between plant-based and animal-based food was also seen in DDS. Although there was no significant difference, students in urban areas had better DDS than students in rural areas. However, socio-demographic characteristics were not seen as the influencing factors of the trend. The possible cause was more to the food availability and access to food stores. Rural communities usually relied on their crops since the food vendors in the village rarely provided complete groceries. While in urban areas, the communities could easily get a variety of groceries (13,14).

In addition, the study showed trends among parents' occupation, mother working status, and mothers' knowledge level with DDS among school-

aged children. Although there was no significant difference, better fathers' occupations, non-working mothers, and better mothers' knowledge levels showed better status in DDS. In other words, the study confirmed the parental factors on students' food consumption. Parental factors such as educational level and parents' working status were related to parents' ability to develop children's healthy eating habits (15–17).

CONCLUSIONS

Student food consumption and the students' DDS between rural and urban areas were not significantly different. However, there is a significant difference in the proportion of students who consume meat and other fruits in the student group in urban areas compared to rural areas. In addition, it was found that there was a tendency that plant-based food was mostly consumed in rural areas while animal-based food was mostly consumed in urban areas. The study also found that mothers' working status and mothers' knowledge can influence DDS status among students.

In order to increase the DDS status for both students in rural and urban areas, particularly for plant-based and animal-based foods, school gardens or home gardens that are combined with fish farming (Fish Cultivation in Buckets; Budikdamber) were suitable interventions. In addition, developing of feeding guide for working parents was essential to equip the parents on building children healthy eating

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest. All authors were actively involved in the conceptualization of the study. First author conducted the data collection until data interpretation with assistance from KAS and WLR. First author drafted the first manuscript. All authors reviewed and approved the final manuscript.

ACKNOWLEDGMENT

This study was fully funded by the Institute for Research and Community Service at Universitas Jenderal Soedirman. The authors would like to thank the participation of all school communities involved in this study.

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