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# QUANTITY AND QUALITY OF BREAKFAST OF CHILDREN AGED 2.0 TO 12.9 YEARS IN INDONESIA

## *Kuantitas dan Kualitas Sarapan Anak Usia 2,0 – 12,9 Tahun di Indonesia*

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**ABSTRAK**

**Gerakan sarapan pada anak-anak menjadi perhatian dalam bidang kesehatan, seperti terlihat pada salah satu pesan gizi seimbang yaitu 'biasakan sarapan'. Tujuan dari analisis ini adalah untuk menentukan kuantitas dan kualitas asupan sarapan pada anak Indonesia menurut karakteristik anak dan orang tua, serta status gizi anak. Subjek adalah 2629 anak yang berusia 2,0 – 12,9 tahun dari *South East Asian Nutrition Study* (SEANUTS). Kuantitas sarapan dikategorikan menjadi sangat tidak cukup yaitu < 15 persen, tidak cukup yaitu 15 sampai < 25 persen, atau cukup yaitu ≥ 25 persen dari Angka Kecukupan Gizi (AKG). Kualitas sarapan dikategorikan tidak baik yaitu sarapan tidak mengandung salah satu dari makanan sumber energi, protein atau vitamin/mineral, dan baik jika sarapan terdiri sumber energi, protein dan/atau vitamin/mineral. Prevalensi anak dengan kuantitas sarapan cukup adalah 31,6 persen dan yang mempunyai kualitas sarapan yang baik adalah 21,6 persen. Prevalensi anak dengan kuantitas sarapan yang cukup dan kualitas yang baik hanya 9,2 persen. Kecukupan sarapan berbeda menurut umur, jenis kelamin, tempat tinggal, karakteristik orang tua dan status gizi, namun hanya umur yang berhubungan dengan kualitas sarapan ($p<0,05$). Edukasi tentang sarapan yang baik perlu dilakukan dalam program sekolah, tersedia kantin dengan makanan yang baik, serta kampanye tentang Pedoman Gizi Seimbang (PUGS) nomor 1 'sarapan pagi setiap hari' perlu ditingkatkan.**

**Kata kunci: asupan sarapan, kuantitas sarapan, kualitas sarapan, anak Indonesia**

**ABSTRACT**

**Doing breakfast among children is a public health concern as seen at one of the messages in 'Indonesian balanced nutrition which state 'breakfast every day'. The aim of this analysis is to determine the quantity and quality of Indonesian children's breakfast based on children and parent characteristics, as well as nutritional status. Subjects were 2629 children, aged 2.0–12.9 years, included in the Southeast Asian Nutrition Study. The amount of the breakfast is categorized as very inadequate if <15 percent; inadequate if 15 to < 25 percent; or adequate if ≥ 25 percent of the Indonesian RDA. The quality of breakfast was categorized as 'not good', if the breakfast skips one or more components of energy, protein and/or vitamins/minerals, or 'good' if the breakfast provides energy, protein and vitamins/minerals. The results indicated that on average only 31.6 percent of the children were categorized as having adequate breakfast consumption and 21.6 percent having good quality breakfast. Only 9.2 percent of children have adequate and good quality breakfast. Adequacy of breakfast differed between children, parent characteristics, and nutritional status, but only age has an association with the quality of breakfast ($p<0.05$). The nutrition education about good breakfast should be included as the part of curriculum, and school canteens provided a good food, as well as a campaign about Indonesian balanced nutrition slogan number 1 'have breakfast every day' should be socialized.**

**Keywords: breakfast intake, breakfast quality, breakfast quantity, Indonesian children**

## INTRODUCTION

Eating habits are important behaviors that can affect nutritional status. This is because the quantity and quality of food consumed will affect nutritional status, which in turn can affect the health of individuals and society. 'Breakfast every day' is one of ten messages in 'Indonesian balanced nutrition'. The 10 messages are grateful and enjoy a variety of foods, eat lots of vegetables and fruits, consume side dishes that contain high protein, eat a variety of staple foods, limit consumption of sweet, salt, and fat, eat breakfast everyday, drink clean and safe water as required, read the nutrition label of food products produced, wash your hands with soap and clean water flowing, practice regular physical activity to maintain a normal body weight.[1]

Breakfast is defined as eating and drinking activities from rising in the morning to 09:00 am and it should meet about 15 to 30% of RDA to promote a healthy active and productive living.[1] A good breakfast consists of staple food as carbohydrate source, some side dishes or milk as protein sources, vegetables or fruits as vitamin and/or mineral sources and drinks.[1]

Research conducted in Indonesia showed that the proportion of children who had breakfast ranges from 77.6-82.8 percent.[2,3] The National Basic Health Research 2010 showed that 45.7 percent of the children aged 3 – 12 years had an energy intake of 10-20% RDA and 14.3 percent had breakfast energy intakes of 20-26% RDA. Also in this study revealed that around 80% of children did not have a good breakfast as defined by the Indonesian Balanced Nutrition.[4] Study in Chinese school adolescent found that 61,4 percent had breakfast daily, in Dortmund (Germany) children and adolescent was higher 78,0%.[5,6]

The time span between the consumption of the last meal of the day (dinner or supper) and breakfast the next morning is generally longer compared to the time intervals between other meals such as breakfast and lunch or lunch and dinner. The long-time interval may result in metabolic states that interfere with cognitive function and school performance. Breakfast can improve intellectual performance, learning concentration and endurance, or physical activity of children at school. [7-8] On the other side, a not adequate breakfast or skipping breakfast can be an influential factor for lower daily energy intake, appetite, underweight or obesity.[7,9-11]

The aim of current paper will analyze the quantity and quality of breakfast intake of children, aged 2.0 to 12.9 years by children and parent characteristics, and nutritional status using nationwide Indonesian children data from the South East Asia Nutrition Study (SEANUTS).

## METHODS

For in total 2672 out of all 2981 2.0 to 12.9 years old Indonesian children in SEANUTS, breakfast data were available. Children not having breakfast (n=24, 0.8%), or not having time for breakfast (n=285, 9.5%) were not included in this analysis. Data that analyzed were 2629 out of 2672 children due to incomplete data of parent characteristics and anthropometry. Separate analysis (results not shown) showed that there was no difference in socio-demographic characteristics between the excluded and included children. The data in this analysis can be regarded as representative for Indonesian children of that age. The sampling procedures, variables collected, methods of data collection in the four SEANUTS countries are described in details elsewhere.[12] The study was conducted following the guidelines of the Helsinki declaration. Ethical clearance for the study was granted from the Ethics Committee of the National Institute of Health Research and Development (NIHRD), Indonesia (LB.03.02/KE/6430/2010) and the study was registered in the Netherlands Trial Registry, number NTR 2462. Written informed consent was obtained from parents or caretakers prior to participation of the prospective selected children in the study.

### Dietary assessment

Food consumption data were collected using 24-hour recall method. A combination of household measures (cup, spoon, rice ladle) and food models were used to estimate the weight of reported food consumed. Mother, caregiver or the child was asked about the meals that were consumed in the previous 24-hour. For younger children who did not attend school yet, the mother or child caregiver were

askedon the child food intake in the previous day. For older children who attended school, the information of food intakes from both the mother or caregiver and the children to get information of food consumed from school or outside their home. Dietary recall was done by 18 trained nutritionist divided into 4 teams who had experience collected food consumption before the study conducted. The results of the 24- hour recall were converted into nutrient intakes, using the Nutrisoft Program developed by the Centre for Research and Development of Food and Nutrition.[13-14]

**Definition of breakfast**

Generally in Indonesia, school starts between 7:00 and 7:30 a.m. In addition, the Muslim prayer time in the early morning is about 4:00-5:00 a.m. so that usually the older children (7 years or above) from Muslim families, the majority of Indonesian families, have already woken-up and after that they might did breakfast. For younger children time to take breakfast was not limited due to school time. Based on these lifestyle patterns, breakfast in this study was defined as all food and drinks the children consumed between 5:00 – 9:00 a.m.

Based on the breakfast energy intake compared to local RDA, the quantity of the intake was grouped into 1) very inadequate: <15% RDA, 2) inadequate: 15 to 25% of the RDA, and 3) adequate:≥ 25% of the RDA[15,16]. The Indonesian Dietary Guidelines (IDG) were used to assess the quality of breakfast.[1] The IDG recommends staple food, side dish, vegetable, fruit and water for each meal. Staple food can be rice, cassava, sago, corn, potato, noodle, or bread as energy sources. Side dishes can be egg, milk, fish, meat, tempeh (fermented soy), tofu (soybean curd), peanut, etc. as protein sources. Vegetable and fruit are the vitamin and mineral sources. The quality of breakfast was grouped into 1) not good: if the breakfast missed either one or more components of energy, protein and/or vitamins/minerals sources, and 2) good: if the breakfast consisted of energy, protein and vitamins/minerals.

**Nutritional status**

Height was measured bare-footed to the nearest 0.1 cm using a wall mounted stadiometer. Weight was measured to the nearest 0.1 Kg in light indoor clothing using a calibrated digital weighing scale. Body mass index, (BMI, Kg/m2) was calculated as weight divided by height squared. BMI for age (BAZ) scores and height for age (HAZ) were calculated using the WHO software.[17] Children with HAZ) ≤ -2 were classified as stunted. The children were categorized as thin if BAZ <-2 SD, normal weight if -2 ≤ BAZ ≤ 2, or as overweight/obese if BAZ > 2 for children aged below five years old. The children were categorized as thin if BAZ <-2 SD, normal weight if -2 ≤ BAZ ≤ 1, or as overweight/obese if BAZ > 1 for children aged five years old and above.[18]

**Socio- economic status**

Socio-economic and demographic data were collected using a structured questionnaires. Income level data were aggregated from household valuable possessions (e.g. house, cars, motorcycles, internet, etc.) and monthly expenditure, savings accounts, and jewelry. Income was categorized into quintiles in the total SEANUTS sample and listed as very low, low, moderate, high and very high.[19]

**Data analyses**

Data were analyzed using the Statistical Package for Social Sciences (SPSS) v. 17.0. Data were weighted using weight factors based on the population census 2010.[20] Distribution of continuous variables is expressed as mean and standard error (SE). Categorical variables are expressed as frequencies (%), and significance was tested by Chi-square. Analysis of covariance (ANCOVA) was used with age, sex, residence, HAZ and BAZ as confounding variables if indicated. Significance was set at $p<0.05$.

## RESULTS

Table 1 shows the socio demographic characteristic of the children whereas Table 2 shows some physical characteristics. The proportion of boys and girls was almost equal but more children lived in rural areas. Most children had mother with a low education level and belonged to the low-middle socio-economic class. Of the children 33.6 percent were

stunted, 7.8 percent were thin (based on BAZ), and 6.0 percent were overweight or obese. Average total energy intake was 75.8% of RDA, and breakfast provided on average 21.6% of RDA (Table 2).

Table 1
Socio Demographic Variables and Nutritional Status of The Children

| Variables | n | % |
|---|---|---|
| Sex | 2629 | |
| – Boys | 1293 | 49.2 |
| – Girls | 1336 | 50.8 |
| Area of residence | 2629 | |
| – Urban | 1153 | 43.9 |
| – Rural | 1476 | 56.1 |
| Father's occupation* | 2629 | |
| – Permanent job | 477 | 18.1 |
| – Temporary job | 2152 | 81.9 |
| Mother's education | 2629 | |
| – High school or above | 679 | 25.8 |
| – Junior high school or below | 1950 | 74.2 |
| Socio-economic status | 2629 | |
| – Very low | 665 | 25.3 |
| – Low | 490 | 18.6 |
| – Moderate | 539 | 20.5 |
| – High | 477 | 18.1 |
| – Very high | 458 | 17.4 |
| HAZ | 2629 | |
| – Normal | 1747 | 66.4 |
| – Stunted | 882 | 33.6 |
| BAZ | 2629 | |
| – Thin | 204 | 7.8 |
| – Normal weight | 2267 | 86.3 |
| – Overweight/obese | 157 | 6.0 |

Table 2
Physical Characteristics and Energy Intake of The Children

| Physical characteristics | n | Mean | SE |
|---|---|---|---|
| Age (years) | 2629 | 6.6 | 0.05 |
| HAZ | 2629 | -1.53 | 0.02 |
| BAZ | 2629 | -0.46 | 0.02 |
| Total energy intake (kcal) | 2629 | 1135 | 8.6 |
| Total energy intake (% RDA ) | 2629 | 75.8 | 0.6 |
| Energy intake of breakfast (kcal) | 2629 | 323 | 3.1 |
| Energy intake of breakfast (% RDA ) | 2629 | 21.6 | 0.2 |

HAZ: height for age Z-score; BAZ: body mass index for age Z-score

The average absolute of daily intake and the % RDA by children characteristics are presented in Table 3. Absolute intakes of daily energy intake and protein were different by sex, area of residence, age group, father's occupation, mother's education, SES, nutritional status and quality of food. Boy had energy intake was much more than girl. Child who lived in urban area, child with permanent job father, child with senior high school and above mother had energy, protein, vitamin C, iron and calcium intake was higher than child who lived in rural area, child with temporary job father, child with junior high school and below mother. Oldest group age (9.0–12.9 years) children had nutrient intake highest than others group. Stunted child had nutrient intake was lower than normal stature child. Overweight child had nutrient intake highest than normal weight or thin child.

Energy, protein, vitamin C, iron, and calcium from breakfast were 21.6%, 30.0%, 6.8%, 20%, 20.4% of RDA respectively. Boy had %RDA intake of energy and iron from breakfast higher than girl. Child who lived in urban area had nutrient intakes higher than who lived in urban areas. The %RDA from breakfast was contrary with absolute daily intake by aged group. The lowest energy and protein intake was the oldest age group vice versa. Child of permanent job father had %RDA nutrient intake from breakfast higher than child of temporary job father. Child of low education mother had lower protein, vitamin C and calcium %RDA intake from breakfast than child of high mother education. The %RDA nutrient intake of breakfast of highest SES was the highest than other group on the. Stunted child had energy, protein, iron and calcium intake from breakfast lower than normal stature child. Overweight child had the highest nutrient intake from breakfast than normal or thin children. Child who consumed a good quality of food had nutrient intake was much more than child who consumed a not good quality of food.

Table 4 shows the quantity and quality of consumed breakfasts by the children. Only 9.2 percent of children had a quantitative adequate and good quality breakfast whereas in 56.1 percent of the children (30.3% plus 25.8%) the breakfast was both inadequate in terms or quantity (energy) while it was poor in quality. All six categories were different from each other.

Table 5 presents the quantity and quality of breakfast by children characteristics. Overall, children that had a quantitative adequate breakfast was 31.6 percent. The oldest children (age 9.0–12.9 years) had the lowest proportion (17.3%) of quantitative adequate breakfast. More boys and urban children had a quantitative adequate breakfast and less stunted children compared to normal height children and thin children had a quantitative adequate breakfast. Breakfast quantitative adequacy was also related to mother's education, job and SES.

A good quality breakfast that contained staple food, side dish and/or milk, vegetable and/or fruit was only taken by 21.6 percent (overall), was dependent on age, but did not differ between other socio-economic variables or nutritional status.

The breakfast that the majority (54.8%) of the children consumed was staple food and side dish or milk. Main staple food was rice (80.8%) followed by noodle (12.9%) and bread/biscuit (11.6%). Side dishes were egg (29.8%), tempeh/tofu (24.6%), meat (13.1%), or fish (10.9%). Most commonly consumed vegetable at breakfast was spinach/carrot (12.3%). Fruit was only consumed by 3.0 % of the children, banana being the most common fruit (63.2%).

Milk (fresh milk, powder milk or condensed milk) was consumed during breakfast by 15.5 percent of the children. By age group, the highest to the lowest proportion of milk consumed was 3.0 – 5.9 years (41.9%), 6.0 – 8.9 years (24.2%), 1.0 – 2.9 years (21.3%), and 9.0 – 12.9 years (12.6%). The proportion of stunting was less (27.8%) in children that consumed milk compared to non-consumers (34.8%).

Table 3
Absolute Intake and Intake as % RDA by Children Characteristics

| Children characteristics | | | Absolute of daily intake | | | | | | | | | | Breakfast intake as % RDA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Energy (Kcal) | | Protein (g) | | Vitamin C (mg) | | Iron (mg) | | Ca (mg) | | Energy (Kcal) | | Protein (g) | | Vitamin C (mg) | | Iron (mg) | | Ca (mg) | |
| | | | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| Sex | – | Boys | 1162[a] | 12 | 40.6[a] | 0.5 | 16.3[a] | 0.6 | 6.6[a] | 1.0 | 422.9[a] | 7.8 | 22.1[a] | 0.3 | 30.6[a] | 0.5 | 7.2[a] | 0.4 | 20.0[a] | 0.4 | 20.8[a] | 0.4 |
| | – | Girls | 1111[b] | 12 | 39.3[b] | 0.5 | 16.6[a] | 0.6 | 6.4[a] | 1.0 | 406.3[a] | 7.8 | 21.0[b] | 0.3 | 29.4[a] | 0.5 | 6.4[a] | 0.4 | 18.0[b] | 0.4 | 19.9[a] | 0.4 |
| Area of residence | – | Urban | 1287[a] | 12 | 44.0[a] | 0.5 | 19.3[a] | 0.6 | 7.3[a] | 0.1 | 476.7[a] | 8.3 | 23.0[a] | 0.3 | 33.6[a] | 0.5 | 8.1[a] | 0.4 | 21.2[a] | 0.4 | 22.6[a] | 0.5 |
| | – | Rural | 1064[b] | 11 | 36.7[b] | 0.4 | 14.2[b] | 0.6 | 5.8[b] | 0.1 | 365.4[b] | 7.4 | 20.5[b] | 0.3 | 27.1[b] | 0.5 | 5.8 [b] | 0.3 | 17.2[b] | 0.3 | 18.76[b] | 0.4 |
| Age (years) | – | 2.0 – 2.9 | 964[a] | 23 | 33.9[a] | 0.9 | 21.7[a] | 1.2 | 6.7[a] | 0.2 | 495.9[a] | 15.7 | 27.6[a] | 0.6 | 38.6[a] | 1.0 | 9.9[a] | 0.8 | 23.3[a] | 0.7 | 25.0[a] | 0.9 |
| | – | 3.0 – 5.9 | 1049[b] | 15 | 37.1[b] | 0.6 | 17.7[b] | 0.8 | 6.1[b] | 0.1 | 422.6[b] | 10.1 | 23.6[b] | 0.4 | 33.2[b] | 0.6 | 7.5[b] | 0.5 | 20.1[b] | 0.5 | 23.6[a] | 0.6 |
| | – | 6.0 – 8.9 | 1214[c] | 14 | 42.5[c] | 0.5 | 14.9[c] | 0.7 | 6.7[a] | 0.1 | 394.9[c] | 9.4 | 20.1[c] | 0.4 | 27.3[c] | 0.6 | 6.3[b] | 0.4 | 19.5[b] | 0.4 | 20.0[b] | 0.5 |
| | – | 9.0 – 12.9 | 1225[c] | 17 | 43.3[c] | 0.7 | 14.3[c] | 0.9 | 6.6[a] | 0.1 | 389.9[c] | 11.6 | 17.8[d] | 0.4 | 25.3[d] | 0.7 | 4.8[c] | 0.6 | 14.4[c] | 0.5 | 14.0[c] | 0.7 |
| Father's occupation | – | Permanent job | 1236[a] | 20 | 43.9[a] | 0.8 | 19.4[a] | 1.0 | 7.3[a] | 0.2 | 483.6[a] | 13.5 | 23.0[a] | 0.5 | 33.0[a] | 0.9 | 7.9[a] | 0.7 | 20.5[a] | 0.6 | 22.4[a] | 0.8 |
| | – | Temporary job | 1115[b] | 9 | 39.1[b] | 0.4 | 15.8[b] | 0.5 | 6.3[b] | 0.1 | 399.9[b] | 6.1 | 21.3[b] | 0.2 | 29.4[b] | 0.4 | 6.6[a] | 0.3 | 18.7[b] | 0.3 | 19.9[b] | 0.3 |
| Mother's education | – | High school or above | 1240[a] | 17 | 45.7[a] | 0.7 | 23.3[a] | 0.9 | 7.7[a] | 0.1 | 523.6[a] | 11.2 | 21.8 | 0.4 | 32.5[a] | 0.7 | 9.9[a] | 0.5 | 21.1 | 0.5 | 24.0[a] | 0.6 |
| | – | Junior high school or below | 1101[b] | 9 | 38.0[b] | 0.4 | 14.2[b] | 0.5 | 6.1[b] | 0.1 | 378[b] | 6.3 | 21.5 | 0.2 | 29.2[b] | 0.4 | 5.7[b] | 0.3 | 18.3 | 0.3 | 19.1[b] | 0.4 |
| SES | – | Very low | 1045[a] | 17 | 35.7[a] | 0.7 | 10.6[a] | 0.9 | 5.68[a] | 0.14 | 334.7[a] | 11.5 | 21.6[a] | 0.5 | 28.5[a] | 0.7 | 5.9[a] | 0.6 | 18.7[a] | 0.5 | 17.7[a] | 0.7 |
| | – | Low | 1102[b] | 19 | 37.2[a] | 0.7 | 13.4[b] | 1.0 | 5.88[a] | 0.15 | 378.0[b] | 12.4 | 20.6[a] | 0.5 | 27.6[b] | 0.8 | 5.6[a] | 0.6 | 17.1[a] | 0.6 | 18.7[a] | 0.7 |
| | – | Moderate | 1132[b] | 18 | 40.0[b] | 0.7 | 15.9[b] | 0.9 | 6.41[b] | 0.14 | 404.7[b] | 11.7 | 21.5[a] | 0.5 | 30.5[c] | 0.8 | 6.8[a] | 0.6 | 18.8[a] | 0.6 | 20.6[a] | 0.7 |
| | – | High | 1190[c] | 19 | 42.1[c] | 0.8 | 20.7[c] | 1.0 | 7.00[c] | 0.16 | 458.7[c] | 12.9 | 21.9[a] | 0.5 | 30.9[d] | 0.8 | 7.0 [a] | 0.6 | 20.0[b] | 0.6 | 22.0[b] | 0.7 |
| | – | Very high | 1253[d] | 20 | 47.0[d] | 0.8 | 24.6[d] | 1.0 | 7.92[d] | 0.17 | 537.8[d] | 13.5 | 22.3[b] | 0.5 | 33.4[e] | 0.9 | 9.1[b] | 0.7 | 20.7b | 0.6 | 24.0[c] | 0.8 |
| HAZ | – | Normal | 1163[a] | 10 | 41.2[a] | 0.4 | 17.6[a] | 0.5 | 6.8[a] | 0.1 | 434.8[a] | 6.8 | 21.9[a] | 0.3 | 30.8[a] | 0.4 | 6.7[a] | 0.3 | 19.7[a] | 0.3 | 20.9[a] | 0.4 |
| | – | Stunted | 1083[b] | 14 | 37.6[b] | 0.6 | 14.1[b] | 0.7 | 6.0[b] | 0.1 | 374.1[b] | 9.6 | 20.9[b] | 0.4 | 28.4[b] | 0.6 | 7.1[a] | 0.5 | 17.5[b] | 0.4 | 19.3[b] | 0.5 |
| BAZ | – | Thin | 1033[a] | 29 | 10.3[a] | 0.4 | 16.3[a] | 1.6 | 6.0[a] | 0.2 | 393.4[a] | 20.0 | 20.0[a] | 0.8 | 28.1[a] | 1.3 | 5.2[a] | 1.0 | 17.1[a] | 0.9 | 17.8[a] | 1.1 |
| | – | Normal weight | 1129[b] | 9 | 11.1[a] | 0.1 | 16.3[a] | 0.5 | 6.4[a] | 0.1 | 409.7[a] | 6.0 | 21.5[a] | 0.2 | 29.7[a] | 0.4 | 7.0[a] | 0.3 | 19.0[b] | 0.3 | 20.5[b] | 0.3 |
| | – | Overweight | 1382[c] | 34 | 14.0[b] | 0.5 | 19.4[b] | 1.8 | 7.8[b] | 0.3 | 515.1[b] | 23.2 | 25.5[b] | 0.9 | 37.6[b] | 1.5 | 6.3[a] | 1.1 | 21.0[b] | 1.1 | 21.5[b] | 1.3 |
| Quality of breakfast | – | Good | 1211[a] | 17 | 43.2[a] | 0.7 | 21.5[a] | 0.9 | 7.5[a] | 0.1 | 480.3[a] | 11.7 | 25.5[a] | 0.4 | 37.4[a] | 0.7 | 15.4[a] | 0.5 | 25.9[a] | 0.5 | 26.8[a] | 0.7 |
| | – | Not good | 1115[b] | 9 | 39.0[b] | 0.4 | 15.0[b] | 0.5 | 6.2[b] | 0.1 | 395.9[b] | 6.2 | 20.5[b] | 0.2 | 27.9[b] | 0.4 | 4.3[b] | 0.3 | 17.0[b] | 0.3 | 18.5[b] | 0.3 |

HAZ: height for age Z-score; BAZ: body mass index for age Z-score; stunted: HAZ ≤ -2, thin: BAZ <-2, overweight/obese: BAZ >1; Values with different superscripts are significantly different; Analysis of covariance (ANCOVA) was used with age, sex, residence, HAZ and BAZ as confounding variable if it was not the dependent

Table 4
Quantity and quality of breakfast

| Quantity and Quality of breakfast | 2629 | % |
|---|---|---|
| Adequate and good | 242 | 9.2 |
| Adequate and not good | 590 | 22.4 |
| Inadequate and good | 237 | 9.0 |
| Inadequate and not good | 795 | 30.3 |
| Very inadequate and good | 88 | 3.4 |
| Very inadequate and not good | 677 | 25.8 |

a) adequate:≥ 25%RDA; inadequate: between 15 and 25% RDA; very inadequate ≤15% RDA; b) not good: if the breakfast didn't contain energy, protein and vitamin/mineral sources; good: if the breakfast consisted of energy, protein and vitamins/minerals $\chi^2 = 74.219$, $p<0.05$

Table 5
Quantity and Quality of Breakfast (%) by Children Characteristics

| Characteristics | Quantity[a)] | | | Quality[b)] | |
|---|---|---|---|---|---|
| | Adequate | Inadequate | Very inadequate | Good | Not good |
| Sex | | | | | |
| − Boys | 35.0* | 37.4 | 27.6 | 21.8 | 78.2 |
| − Girls | 28.3 | 41.1 | 30.6 | 21.3 | 78.7 |
| Area of residence | | | | | |
| − Urban | 36.8* | 38.2 | 25.0 | 21.4 | 78.6 |
| − Rural | 27.6 | 40.1 | 32.3 | 21.6 | 78.4 |
| Age (years) | | | | | |
| − 2.0 – 2.9 | 56.8* | 25.7 | 18.3 | 26.6* | 73.4 |
| − 3.0 – 5.9 | 39.3 | 35.4 | 25.2 | 22.2 | 77.8 |
| − 6.0 – 8.9 | 25.3 | 45.4 | 29.3 | 18.8 | 81.2 |
| − 9.0 – 12.9 | 17.3 | 42.7 | 40.0 | 22.1 | 77.9 |
| Father's occupation | | | | | |
| − Permanent job | 38.4* | 38.2 | 23.4 | 20.8 | 79.2 |
| − Temporary job | 30.1 | 39.5 | 30.4 | 21.7 | 78.3 |
| Mother's education | | | | | |
| − High school or above | 38.9* | 36.2 | 24.9 | 23.4 | 76.6 |
| − Junior high school or below | 29.1 | 40.4 | 30.5 | 20.9 | 79.1 |
| Socio-economic status | | | | | |
| − Very low | 30.2* | 36.1 | 33.7 | 22.7 | 77.3 |
| − Low | 25.1 | 44.1 | 30.8 | 20.2 | 79.8 |
| − Moderate | 29.1 | 43.4 | 27.5 | 18.2 | 81.8 |
| − High | 37.2 | 36.1 | 26.7 | 22.9 | 77.1 |
| − Very high | 37.6 | 37.1 | 25.3 | 24.0 | 76.0 |
| HAZ | | | | | |
| − Normal | 34.5* | 37.8 | 27.7 | 20.9 | 79.1 |
| − Stunted | 26.0 | 42.2 | 31.8 | 22.9 | 77.1 |
| BAZ | | | | | |
| − Thin | 20.6* | 42.2 | 37.2 | 19.1 | 80.9 |
| − Normal weight | 32.1 | 39.1 | 28.8 | 21.4 | 78.6 |
| − Overweight | 39.5 | 38.2 | 22.3 | 26.1 | 73.9 |

HAZ: height for age Z-score; BAZ: body mass index for age Z-score ; a) adequate:≥ 25%RDA; inadequate: between 15 and 25% RDA; very inadequate ≤15% RDA; b) not good: if the breakfast didn't consist of energy, protein and vitamin as well as mineral sources; good: if the breakfast consisted of energy, protein and vitamins/minerals * $p<0.05$

## DISCUSSIONS

Breakfast consumption in the current study showed that the average RDA for energy intake from breakfast in school children (> 6 years) was around 17.8 – 20.1 percent, and the proportion of children that had an adequate breakfast intake was 17.3 – 25.3 percent. This is almost similar to results from the National Basic Health Research 2010, which showed that the RDA of energy intake of children aged 6 -12 years was 18.0 percent and the proportion of children that had energy intake ≥ 25 % of RDA was 19.3 percent.[21] Breakfast should deliver 25 percent of the total daily energy for a person that also have snacks during the day, and should be around 30 percent if only 3 main meals are consumed.[1,15] The proportion of adequate breakfast was higher in boy, child who lives in urban area, child whose father had a permanent job, mother had a high education, or was from a high SES than girl, child who live in rural area, child whose father had a temporary job, child whose mother had a low education, or was from low SES.

The food pattern that commonly occurred in Indonesian people who lived in rural area did not vary because of market day that may lead to the availability of food and less ability to purchase food because of economy factor. It was easy to record them because it was not many food items consumed. Therefore, 24-hour recall method could be used to gather the information in relation to consumption. In urban area usually people consumed as habitual food prepared. Only in special day or week end, the family normally served a special meal. This study covered all days in a week in rural and urban as average pictures of individual profile as representative of Indonesian children.

Education, SES or employment opportunity is the basic problem on nutrition intake that affects nutritional status.[22]The higher the mother's educational level, expected knowledge or information about nutrition might be better. In the family, the mother usually acts as a gatekeeper that decides about the kind of food consumed by the family[23] so that children with higher educated mothers generally will have a better nutritional intake than lower education level families. A higher economic status will also contribute to food availability in the family as better food is more affordable to them.

Stunted and thin children had a higher proportion of inadequate breakfast compared to their counterparts with lower %RDA energy and protein. Previous studies have shown that breakfast consumption was associated with higher energy and nutrient intakes, and that a better overall nutrient intake profile appears among those who consume breakfast. An inadequate energy intake was reflected in a high prevalence of malnutrition in both boys and girls: 40.3 percent of the boys and 32.1 percent of the girls studied were found to be underweight.[24,25]

Most of the children (78.7%) in this study did not have a good quality breakfast. Results from another Indonesian study also showed that 80.2 percent of children had a poor nutritional quality of breakfast.[4] The proportion of children that had both adequate quantity and good quality breakfast was less than 10 percent. The intakes of all nutrients of a good quality breakfast were higher than not good quality breakfast. This finding suggests that food variety of the breakfast could improve the quantity and/or quality of breakfast. Study showed that breakfast consumption and breakfast quality has been shown to contribute in the performance of school children,[9] highlighting the importance of a good nutritional start every day.

The type of food commonly eaten at breakfast in Indonesia is a staple food and side-dishes. The current study found that the main staple food was rice and the side dish was eggs, which is comparable to results from a study of Soedibyoet al[2], in which most of the breakfast menu was reported as rice and side dishes (52.6%). Also Perdana[4] reported that most consumed foods during breakfast were rice, spinach, egg, fish, tempeh, instant noodles, tofu, bread, chicken, and biscuits. Rice is the main staple food in Indonesia. Eggs are commonly used because it is easy and fast to cook in the morning, cheaper than others animal protein and can be bought per piece and stored without refrigerator.

The current study showed that it is unusual for children to eat vegetables and fruit at breakfast. Because most families do not have refrigerator to store food at home, mothers usually buy and cook food side dishes and

vegetable for daily needs at the market in the morning after the older children has gone to school. This might also partly explain why the quality of breakfast of younger children was better than of the older children. Fruit is also not commonly consumed in the morning because it is believed that it might cause abdominal pain. If consumed, fruit most eaten by the children was banana, probably due to its availability and sweet taste.

Milk was not commonly consumed by the children: only 15.5 percent of the children and mainly in the younger age groups. Another Indonesian study reported that the type of drink that was consumed at breakfast was water, tea, milk, coffee and syrup. They also found that milk consumption was low: only 8.4 percent in children 6 to 12 year old.[4]

Remarkable was that the proportion of stunting was lower in the children that consumed milk but not in children who consumed egg at breakfast (results not shown). A previous study has shown that children consuming fortified milk were less likely to be stunted and based on their findings the authors concluded, that multi micronutrient composition might play a role.[26,27]

It is commonly argued that 24-hour recall used in this study may not reflect the actual dietary intakes. In order to minimize error and get better estimate of dietary intakes, the study team provided trained nutritionists as emunerators with food models, fund to buy local and commonly consumed foods of the children, and food weighing scale. Furthermore, food intake was categorized into groups (below or above RDA) in the analysis, not as continuous data.

Adequate breakfast consumption is still a big problem in Indonesia. The problem seems not only the low nutritional intake or the quantity but also the quality of the food consumed during breakfast. With long term inadequate breakfast intakes the ability of concentration or physical endurance of children could be affected.[7-11] Feeling hungry during the morning might also increase the consumption of snacks (junk food), possibly leading to overweight and obesity.[10,11]

The promotion of a good breakfast in educational programs should therefore aim to improve both the quality and the quality of breakfast. Alternative is to facilitate school canteens to provide good food and campaign the Indonesian slogan number 1 to 'have breakfast every day'. Studies have shown that information about eating habits and a healthy breakfast in the educational curriculum is effective in improving diet and healthy breakfast in primary school age children.[28,29].

## CONCLUSION AND RECOMMENDATION

### Conclusion

The prevalence of adequate breakfast on children aged 2.0–12,9 years was 31.6 percent, 21.6 percent having good quality breakfast. Only 9.2 percent of children have adequate and good quality breakfast. Adequacy of breakfast differed between children and parent characteristics, as well as nutritional status, but only age has an associated with the quality of breakfast. The prevalence of adequate breakfast was higher in boy, child who lives in urban area, child whose father had a permanent job, mother had a high education, or was from a high SES than girl, child who live in rural area, child whose father had a temporary job, child whose mother had a low education, or was from low SES. The quality of breakfast consumption was different only by age, the proportion of children from the age group of 2.0-2.9 years had more of a good breakfast.

### Recommendation

Therefore, in order to improve quality and quantity of breakfast, the promotion and campaign to have a good breakfast every day need to be conducted. The impact of transient hunger due to inadequate breakfast on school performance is also warranted to investigate for future studies.

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**Declaration of conflicting Interest**

FrieslandCampina, the Netherlands had no influence on the outcome of the study. None of the authors or the research institute and PERSAGI had any conflict of interest.

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**Abbreviation:**

PERSAGI :*Persatuan Ahli Gizi Indonesia* (Indonesian Nutrition Association)
SEANUTS : South East Asian Nutrition Survey
AMEA : Asia Middle East Africa

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