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An Online Cross-Sectional Survey: Changes in Food Group Consumption on Complementary Feeding during COVID-19 Pandemic in Indonesia

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ABSTRACT

This study aimed to assess the impact of COVID-19 pandemic on food group consumption of complementary feeding in Indonesia. Data were collected using online self-administered questionnaires on Indonesian mothers of children aged 6–23 months. The result showed that households with decreased ability to provide food during the COVID-19 pandemic tended to choose unhealthy food groups on complementary feeding. There were higher odds of unhealthy food consumption, such as sweetened beverages, including fruit juice (OR=3.181; 95% CI:1.788−5.657) and homemade drink with sweeteners (OR=1.652; 95% CI:1.034−2.641); sugar confection (OR=2.066; 95% CI:1.240−3.444); frozen treats (OR=2.270; 95% CI:1.400−3.681), baked or fried confection (OR=2.154; 95% CI:1.435−3.235); fried and salty foods (OR=1.633; 95% CI:1.059−2.517). Meanwhile, the odds of food group consumption which lower during COVID-19 pandemic mostly are animal source foods group, including yogurt (OR=0.297; 95% CI:0.161−0.548); yogurt drink (OR=0.253; 95% CI:0.138−0.464); cheese (OR=0.355; 95% CI:0.230−0.549); eggs (OR=0.675; 95% CI:0.461−0.991); fish or seafood (OR=0.409; 95% CI:0.279−0.600); organ meats (OR=0.304; 95% CI:0.180−0.512); meats (OR=0.339; 95% CI:0.225−0.511); and poultry (OR=0.339; 95% CI:0.225−0.511). However, effective strategy for enhancing complementary feeding quality during pandemic should be formulated.

Keywords: complementary feeding, COVID-19, food group, unhealthy food

INTRODUCTION

The COVID-19 pandemic was declared by WHO on March 2020 and has spread to many countries, including Indonesia in 2020. The spread of COVID-19 is very fast and is transmitted through droplets (Setiadi *et al.* 2022; WHO 2020). The rapid transmission of COVID-19 has led to government policies such as large-scale social restrictions, including stay-at-home regulations, school-from-home, and restrictions on public and private gatherings (Laborde *et al.* 2021; Picchioni *et al.* 2022). The large-scale social restrictions policy impacted the household economic, including the decrease in production, wage cuts, and termination of employment (Syafiq *et al.* 2022).

Child nutrition and health issues have been negatively affected by the COVID-19 pandemic (Ntambara & Chu 2021). Low household economic level due to COVID-19 pandemic lead to decreasing purchasing power for nutritious and varied food, as well as access to health facilities. Children with poor dietary practices are more susceptible to illness, and if it persists for a long time, it will lead to malnutrition. (Kundu *et al.* 2021). Providing complementary foods that are timely, appropriate (frequency, amount, and consistency), safe, and responsive feeding is one strategy to improve children's health. Infant and Young Child Feeding guidelines suggest that children aged 6–23 months should be provided various foods to ensure that nutrient needs are met (UNICEF 2020).

There were eight food groups should provide during complementary feeding, including grains, roots, tubers, and plantains; pulses; nuts and seeds; dairy products; flesh foods; eggs; vitamin-A rich fruits and vegetables; and other fruits and vegetables (Binns *et al.* 2020). On the other hand, it is crucial to limit the consumption of unhealthy food groups such as sugar-sweetened beverages, sweet food, and fried or salty food (WHO & UNICEF 2021).

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During the COVID-19 pandemic, the practice of providing complementary feeding was quite challenging, this was due to socioeconomic changes, including restrictions on social activities and decreased household income (Widyaningrum *et al.* 2021). Low household income influences the type and amount of food given to children (Lovelace & Rabiee-Khan 2015). Furthermore, socioeconomic changes impacted the choice of food group ingredients for complementary feeding (French *et al.* 2019).

Currently, there are limited studies analysing the complementary feeding practice in Indonesia during the COVID-19 pandemic. This study aimed to assess the impact of COVID-19 pandemic on household ability to provide adequate complementary feeding practice in Indonesia.

METHODS

Design, location, and time

The research used a cross-sectional study. This study was conducted through an online self-administered questionnaire from April−May 2022 during the COVID-19 pandemic in Indonesia. The ethical clearance was obtained from the ethical committee of the Faculty of Health Sciences, Universitas Alma Ata (with the number KE/ AA/ VI/ 10832/ EC/ 2022). Participants in this study gave their informed consent after filling out a voluntary consent form.

Sampling

The population for this study was mothers of child who had a healthy child aged 6 to 23 months and currently living in Indonesia. The sampling technique used was convenience sampling where participation was open to all mothers who had been introduced to solid foods to their child. For practical reasons, only participants with access to the internet and a computer or smartphone were invited to participate.

Data collection

For timing and clarity, the questionnaire was piloted with three researchers and two mothers. Minor changes were made following comments on the phrasing and flow. The survey was created on the online platform Google Form. An online survey was chosen as the format due to the pandemic situation and COVID-19 physical restrictions. Several target groups in Indonesia received links to the online survey through social media, including Instagram, Whatsapp, Line, Facebook, and Twitter. For a quick and effective way to reach respondents, data was gathered from nearby communities by *Asosiasi Ibu Menyusui Indonesia* (AIMI). Total 630 sample participate in this study. Of the total sample, we excluded 56 participants for incomplete data, resulting in 574 participants.

The self-administered questionnaire collects information related to sociodemographic data, food group consumption on complementary feeding, and the impact of the COVID-19 pandemic on household economic aspects. Sociodemographic data include area of residence, household income level (low or IDR <1,500,000, middle or IDR 1,500,000−2,500,000, high or IDR >2,500,000), child's age, child's gender, maternal educational status (low or junior high school and below, middle or senior high school, high or the college or above), maternal and father's occupation (formal worker like civil servants, army, police, private sectors, infomal worker like labourer, entrepreneur, farmers). Data related to the impact of the COVID-19 pandemic on household economic aspects include the impact on the household's ability to provide food, the impact on mother's employment status, and the impact on father's employment status.

Food group consumption in complementary feeding is defined as children 6−23 months who consumed each food group on the previous day. Food group recommendations based on Infant and Young Child Feeding from UNICEF and WHO 2021 guidelines (WHO & UNICEF 2021). The type of food group including (1) Breastmilk; (2) Grains; (3) Starchy tubers or starchy tuberous roots; (4) Legumes, nuts, and seeds etc.; (5) Infant formula; (6) Milk from animals, such as fresh, tinned, or powdered milk; (7) Yoghurt; (8) Yoghurt drink; (9) Cheese; (10) Eggs; (11) Fish, seafood, or shellfish; (12) Organ meats; (13) Meats; (14) Poultry; (15) Processed meats; (16) Vitamin A-rich deep yellow and orange fleshed vegetable; (17) Dark green leafy vegetables; (18) Vitamin A-rich fruits; (19) Any other vegetables; (20) Any other fruits.

Furthermore, the consumption of other types of food groups that are recommended to limit their consumption in complementary feeding are also analysed, including sweetened beverages

and unhealthy foods. Sweetened beverage group including (1) Commercially produced and packaged; (2) Fruit juice; (3) Homemade drinks added with any kind of sweeteners. Unhealthy food groups included (1) Sugar confections; (2) Frozen treats; (3) Baked or fried confections; (4) Sentinel fried and salty foods.

Data analysis

Food group consumption and sociodemographic data were analysed using a descriptive analysis for frequency distribution. Pearson's Chi-Square test ($p<0.05$) was used to conduct a bivariate analysis of food group consumption and the impact of COVID-19 pandemic on household ability to provide food. To determine the adjusted odds ratios and 95% confidence intervals for the association between sociodemographic factors and unhealthy food and beverage consumption, multinominal logistic regression analysis was employed for adjusted analyses. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) 26 Software.

RESULTS AND DISCUSSION

The total respondents of this study were 574 mothers of children aged 6–23 months. Majority of respondents are residents in Java 403 (70.21%), high-income level 229 (39.9%), the middle level of educational status 361 (62.89%), and unemployed/housewife 350 (60.98%). Most children were aged 12−17, and the child's gender was half boys and half girls. COVID-19 pandemic had an impact on household economic aspects, including decreased household ability to provide food 422 (73.52%) (Table 1).

Figure 1 reports the percentage of each food group's consumption on complementary feeding the previous day. Almost all children consumed grains such as rice 521 (90.77%) on their complementary feeding. The consumption of formula milk was higher 327 (56.97%) than breastmilk 327 (56.97%). Among all animal source food, organ meat was most consumed 419 (73.17%). Most children consumed any other fruits 324 (56.45%) and vegetables 206 (35.89%) rather than vitamin A rich fruits 175 (30.49%)and vegetables 111 (19.34%) Yogurt 460 (80.14%) was the most consumed dairy food group. Consumption of commercially produced and packaged food 507 (88.33%) and sugar confections 448 (78.05%) was high among the unhealthy food groups.

Table 2 shows the odds of healthy food groups consumption on complementary feeding were lower compared to unhealthy food groups if their household ability to provide food during COVID-19 pandemic had been affected. Healthy food group consumption that was statistically significant and lowering the odds during COVID-19 pandemic were dairy and animal source foods group. Dairy foods were significant, including yoghurt, yoghurt drink, and cheese. Animal source foods groups were significant including eggs, fish or seafood, organ meats, meats and poultry.

Meanwhile, the consumption of most plant-based food groups were higher in household that affected the ability to provide food during COVID-19 pandemic, including vitamin A-rich deep yellow and orange fleshed vegetable, dark green leafy vegetables, vitamin A-rich fruits any other vegetables, and any other fruits.

There were higher odds of unhealthy food groups consumption on complementary feeding shown in Table 3 on households that affected their ability to provide food during COVID-19 pandemic. Among sweetened beverage consumption, fruit juice and homemade drinks with sweeteners were high. Consumption of unhealthy food group were also have high odds, such as sugar confections, frozen treats, baked or fried confections, fried and salty foods.

The consumption of unhealthy food and sugar-sweetened beverages tended to have higher odds in households with a decreased ability to provide food. During the pandemic there was an increase in food prices on the market, generally healthy foods have a higher price than unhealthy food groups. This condition is related to consumer demand for healthy food due to panic buying behaviour during a pandemic (Sobaih & Moustafa 2022). As a result of these high food prices, there has been a shift in food choices, due to higher levels of stress, fewer resources, and less access to food (Laborde *et al.* 2021).

Household with food insecurity will tend to choose food with cheap sources of calories and generally non-perishable ingredients or food that can be stored on shelves to deal with food supply disruptions and social distancing policies and depend on high energy density for a longer

Table 1. Respondent characteristics

Characteristic	Frequency (n)	Percentage (%)
Area of residence		
Java	403	70.21
Outside Java	171	29.79
Income Level		
High	229	39.90
Middle	203	35.37
Low	142	24.73
Child's age (months)		
6−11	235	40.92
12−17	236	41.21
18−23	102	17.77
Child's gender		
Male	287	50.00
Female	287	50.00
Maternal educational status		
High	201	35.02
Middle	361	62.89
Low	12	2.09
Maternal employment status		
Housewife/Unemployed	350	60.98
Formal worker	102	17.77
Informal worker	122	21.25
Father's occupation		
Unemployed	5	0.87
Formal worker	179	31.18
Informal worker	390	67.95
COVID-19 pandemic impacts on the household ability to provide food		
Not affected	152	26.48
Decrease	422	73.52
COVID-19 pandemic impacts on mother's employment status		
No	319	55.57
Yes	255	44.43
COVID-19 pandemic impacts on father's employment status		
No	135	23.52
Yes	439	76.48

period of time (Adams *et al.* 2020). Compared to food-secure households, food-insecure households tend to choose higher intake of added sugar food and beverage which is also liked by children because of its taste (Landry *et al.* 2019). Based on this research, it is known that the types of unhealthy foods that are widely consumed in this study are long-shelf life foods, such as frozen food and other packaged snacks. As well as the majority of respondents in this study are domiciled in Java island (urban area), which is a location where many packaged food products are sold around the neighbourhood compared to outside Java island (rural areas).

Based on multivariate analysis (Table 4), it is known that the consumption of sugar-sweetened beverages were higher on older children, primarily aged 18−23 months (AOR=1.296;

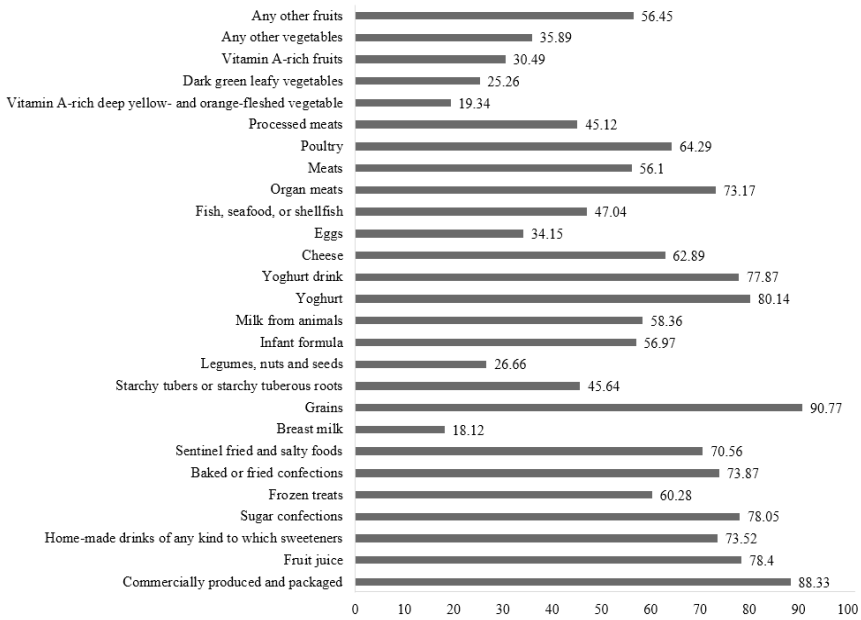

Figure 1. Consumption of several food groups on complementary feeding during the previous day

Table 2. Impacts COVID-19 pandemic related to household ability to provide food of several healthy food group consumption on complementary feeding

Variables	Food group consumption				OR	95% CI	*p*
	Yes		No				
	n	%	n	%			
Breast milk							
Decreased	73	17.3	349	82.7	0.816	0.511−1.304	0.396
Not affected	31	20.39	121	79.61	1		
Grains							
Decreased	379	89.81	43	10.19	1.611	0.788−3.292	0.191
Not affected	142	93.42	10	6.58	1		
Starchy tubers or starchy tuberous roots							
Decreased	160	37.91	262	62.09	0.299	0.202−0.443	<0.001
Not affected	102	67.11	50	32.89	1		
Legumes, nuts, and seeds							
Decreased	82	19.52	338	80.48	0.284	0.190−0.422	<0.001
Not affected	71	46.71	81	53.29	1		
Infant formula							
Decreased	250	59.24	172	40.76	0.816	0.511−1.304	0.396
Not affected	77	30.92	172	69.08	1		
Milk from animals							
Decreased	238	56.4	184	43.6	0.733	0.500−1.075	0.112
Not affected	97	63.82	55	36.18	1		
Yogurt							
Decreased	321	76.07	101	23.93	0.297	0.161−0.548	<0.001
Not affected	139	91.45	13	8.55	1		

Continue from Table 2

Variables	Food group consumption				OR	95% CI	*p*
	Yes		No				
	n	%	n	%			
Yogurt							
Decreased	321	76.07	101	23.93	0.297	0.161−0.548	<0.001*
Not affected	139	91.45	13	8.55	1		
Yogurt drink							
Decreased	308	72.99	114	27.01	0.253	0.138−0.464	<0.001*
Not affected	139	91.45	13	8.55	1		
Cheese							
Decreased	241	57.11	181	42.89	0.355	0.230−0.549	<0.001*
Not affected	120	78.95	32	21.05	1		
Eggs							
Decreased	134	31.75	288	68.25	0.675	0.461−0.991	0.045
Not affected	62	40.79	90	59.21	1		
Fish, seafood, or shellfish							
Decreased	174	41.23	248	58.77	0.409	0.279−0.600	<0.001*
Not affected	96	63.16	56	36.84	1		
Organ meats							
Decreased	287	68.01	135	31.99	0.304	0.180−0.512	<0.001*
Not affected	133	87.5	19	12.5	1		
Meats							
Decreased	209	49.53	213	50.47	0.339	0.225−0.511	<0.001*
Not affected	113	74.34	39	25.66	1		
Poultry							
Decreased	245	58.06	177	41.94	0.313	0.199-0.492	<0.001*
Not affected	124	81.58	28	18.42	1		
Processed meats							
Decreased	177	41.94	245	58.06	0.617	0.425-0.896	0.011*
Not affected	82	53.95	70	46.05	1		
Vitamin A-rich deep yellow and orange-fleshed vegetable							
Decreased	66	15.64	356	84.36	2.268	1.467−3.509	<0.001*
Not affected	45	29.61	107	70.39	1		
Dark green leafy vegetables							
Decreased	86	20.38	336	79.62	2.479	0.656−3.709	0.066
Not affected	59	38.82	93	61.18	1		
Vitamin A-rich fruits							
Decreased	109	25.83	313	74.17	2.204	0.495−3.248	0.121
Not affected	66	43.42	86	56.58	1		
Any other vegetables							
Decreased	120	28.44	302	71.56	3.275	2.233−4.815	<0.001*
Not affected	86	56.58	66	43.42	1		
Any other fruits							
Decreased	217	51.42	205	48.58	2.246	1.510−3.341	<0.001*
Not affected	107	70.39	45	29.61	1		

*Pearson's Chi-square Test, significant if p<0.05

95% CI:1.179−1.491) and children with working mothers (AOR=1.854; 95% CI:1.235−2.786). Meanwhile, the consumption of unhealthy food were also higher in older children, especially aged 18−23 months (AOR=1.235; 95% CI:1.140−1.393) and children who live in Java (AOR=1.708; 95% CI :1.486−1.830).

Consumption of sugar-sweetened beverages and unhealthy food or mostly defined as Ultra-Processed Food (UPF), both are influenced by the child's age, the odds of consumption increased in children aged 18−23 months. Consumption of ultra-processed food increases as children get older, this is associated with reduced breastfeeding as children get older, so parents provide other food on complementary feeding (Masztalerz-Kozubek *et al.* 2020). Furthermore, child preference and demand was a prominent factor in older children (Green *et al.* 2019).

Guidance regarding the selection of types of food in complementary feeding for parents is still needed, especially in relation to limiting added sugar consumption. Consumption of UPF in the first 2 years of life is not recommended due to high level of energy density, added sugar, fat, sodium and additives (Dunford & Popkin 2023; Murray 2017). UPF can also affect a child's future food preferences. Consumption of UPF is also associated with a higher prevalence of obesity, chronic disease, and nutritional deficiencies in the first years of life and may also interfere with child growth and development (Calcaterra *et al.* 2023).

Whereas in this study, the consumption of sugar sweetened beverages and unhealthy food were high accompanied by a low consumption of ASFs and dairy food. However, people will tend to reduce portions or even not consume ASFs due to economic reasons (Headey *et al.* 2018; Jafri *et al.* 2021). In general, the price of ASFs is quite expensive compared to other foodstuffs, especially during the pandemic due to the lockdown which caused problems in the food supply chain and also because of the

Table 3. Impacts COVID-19 pandemic related to household ability to provide food on sweetened beverage and unhealthy food consumption

Variables	Food group consumption				OR	95% CI	*p*
	Yes		No				
	n	%	n	%			
Commercially produced and packaged							
Decreased	367	86.97	55	13.03	0.572	0.297−1.00	0.094
Not affected	140	92.11	12	7.89	1		
Fruit juice							
Decreased	313	74.17	109	25.83	3.181	1.788−5.657	<0.001*
Not affected	137	90.13	15	9.87	1		
Homemade drinks added with sweeteners							
Decreased	311	71.33	125	28.67	1.652	1.034−2.641	0.032
Not affected	111	80.43	27	19.57	1		
Sugar confections							
Decreased	317	75.12	105	24.88	2.066	1.240−3.444	0.005
Not affected	131	86.18	21	13.82	1		
Frozen treats							
Decreased	235	55.69	187	44.31	2.27	1.400−3.681	0.001*
Not affected	111	73.03	41	26.97	1		
Baked or fried confections							
Decreased	296	70.14	126	29.86	2.154	1.435−3.235	<0.001*
Not affected	128	84.21	24	15.79	1		
Sentinel fried and salty foods							
Decreased	287	68.01	135	31. 99	1.633	1.059−2.517	0.026*
Not affected	118	77.63	34	22.37	1		

Pearson's Chi-square Test, significant if p<0.05

Table 4. Multivariable logistic regression of factors associated with sugar-sweetened beverages and unhealthy food consumption on complementary feeding during COVID-19 pandemic

Characteristic	Sugar sweetened beverage		Unhealthy food	
	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)
Area of residence				
Java	1.049 (0.700−1.571)		1.735 (1.499−1.820)	1.708* (1.486−1.830)
Outside Java	1		1	1
Income Level				
High	0.838 (0.469−1.496)		0.589 (0.314−1.104)	
Middle	0.809 (0.426−1.534)		0.728 (0.412−1.285)	
Low	1		1	
Child's age				
18−23 months	1.273 (1.163−1.457)	1.296* (1.179−1.491)	1.353 (1.240−1.520)	1.235* (1.140−1.393)
12−17 months	0.296 (0.195−0.450)	0.918 (0.574−1.470)	0.218 (0.129−0.369)	0.629 (0.373−1.059)
6−11 months	1	1	1	1
Child's gender				
Female	1.021 (0.711−1466)		1.124 (0.791−1.596)	
Male	1		1	
Maternal educational status				
Low	1.360 (0.381−4.862)		0.594 (0.177−1.992)	
Middle	1.037 (0.309−3.479)		0.838 (0.236−2.974)	
High	1		1	
Maternal employment status				
Work	1.960 (0.978−3.928)	1.854* (1.235−2.786)	1.180 (0.620−2.244)	
Housewife	1	1	1	
Father's occupation				
Unemployed	1.430 (0.906−2.256)		1.008 (0.650−1.562)	
Informal worker	1.027 (0.139−7.589)		1.762 (0.266−11.663)	
Formal worker	1		1	
COVID-19 pandemic impacts on the household ability to provide food				
Decrease	1.573 (1.055−2.344)		1.361 (1.112−1.975)	
Not affected	1		1	

*Pearson's Chi-square Test, significant if p<0.05

long production process (Rahimi *et al.* 2022). According to the study's findings, the proportion of ASFs consumed is higher when compared to other types of food and beverage, particularly sugar sweetened beverages and unhealthy foods. To ensure price stability for ASFs on the market, further policies are required. In order to meet the consumption of ASFs in CF, a safety net is

also required for families who experience food insecurity.

As a limitation of this study the we used convenience sampling, which may have been representative of the general population of Indonesian mothers of children aged 6–23 months. The respondents were recruited through social media and a community group, which that cause selection bias and affect the generalizability of the findings. The study relied on online self-administered questionnaires, which may be subject to recall bias, social desirability bias, and measurement error.

CONCLUSION

The result showed that households with decreased ability to provide food during the COVID-19 pandemic tended to choose unhealthy foods for complementary feeding. There was a higher odd of unhealthy food such as sweetened beverage consumption, including fruit juice and homemade drink with sweeteners. Meanwhile, the odds of food group consumption were low mostly are animal source foods and dairy. To improve nutritional quality on complementary feeding during pandemic, effective strategy for enhancing complementary feeding quality should be taken into account.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflicts of interest.

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