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Mothers' Perception regarding Snacks in Children under Two Years as a Component of Complementary Feeding Practices

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Background: Snacks are an important part of modern diets. The high consumption of snack products raises concerns about their nutritional quality and contribution to the daily diet. **Purpose:** To identify the consumption profile of snack products intended for children aged 1-3 years (SIFC) and their nutritional intake in children under 2 years of age, as well as mothers' perceptions of snacking in Depok City, Indonesia. **Materials and Methods**: A cross-sectional study was conducted among mothers of children aged 6-23 months in October-December 2022. Data were obtained through interviews with 110 mothers. The total daily consumption and nutrient intake of each child were calculated based on data obtained from a semi-quantitative Food Frequency Questionnaire. **Results:** SIFCs were consumed by children aged 6-11 months (48.65%) and 12-23 months (58.90%). The average daily intake and contribution of energy, total fat, protein, total carbohydrate, sugar and sodium from SIFC were relatively low. However, high intakes were found in some children in both age groups. Carbohydrates are the main source of energy from SIFC. Most mothers knew that complementary foods and SIFC were different, but surprisingly 73.64% stated that snack, including SIFC, was important for increasing nutritional intake. **Conclusions:** It is feared that a high intake of SIFC will satiate the child, thereby reducing the intake of breast milk and complementary foods that have a more complete macro and micronutrient content. Managing the schedule and portion of snacks is important to ensure they do not interfere with complementary feeding. Maternal education about snacking is needed.

Keywords: Children under 2 years, Complementary food, Mothers' perception, Nutrient intake, Snacking

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Introduction

It is undeniable that snacks are an important part of modern diets. Snacks are defined as food given to children between meals, which can be either home-prepared or commercially produced Several studies have been conducted on the consumption of snack products in children under 2 years of age, which have shown high consumption levels.[1,2] The high consumption of snack products raises concerns about the nutritional quality of snack products and their contribution to total energy intake and overall diet quality.[3] Previous research showed that consumption of snack products in children aged 12-24 months contributed to the intake of carbohydrates, fat, and protein by 17%, 9%, and 4% of total energy intake, respectively.[4] A systematic review also stated that the average total energy intake derived from snacks and sugar-sweetened beverages in children under 23 months of age ranged from 13-38%.[5]

The snack products mentioned above are general snack products intended for general consumers (SGC). In addition to these SGCs, currently on the Indonesian market, there are also snack products that are labelled as snacks intended specifically for children aged 1-3 years (SIFC). SIFCs do not belong to the complementary food group or SGC. Although SIFCs are intended for children, the nutritional content of SIFCs is not as strictly regulated as complementary food products.[6] Therefore, SIFC accommodates products that are unable to meet the requirements of complementary foods, such as fruit/vegetable puree, noodles, snack puffs, certain biscuits, etc.

In terms of labelling, SIFC products often have similar packaging designs to complementary food products and some do not include information that SIFCs are not complementary food as required by the Indonesian FDA. SIFCs are often placed on the same display shelves as complementary food products and are often advertised as complementary foods on digital platforms. These problems, coupled with the low awareness of consumers to read food labels, potentially lead to consumers not being able to distinguish between complementary food products and SIFCs properly. These conditions are feared to confuse consumers and potentially disrupt the complementary foods feeding practice.

To our knowledge, research focused on SIFC products has never been done before. Therefore, this study was conducted to identify the consumption profile of SIFCs and their nutritional intake in children under two years of age, as well as mothers' perceptions of snacking. The results of the study could be a consideration/recommendation for the government in formulating policies, either in terms of regulating the standard or consumer education.

Materials and Method

This cross-sectional study was conducted among mothers in October-December 2022 and took place in Depok City, West Java, Indonesia. A total of 110 mothers participated in this study with several inclusion criteria, namely mothers who have children aged 6-23 months, lived in Depok City, and were willing to participate in the study. The minimum number of participants of 100 people was calculated using the Slovin Formula based on the total female population aged 20-44 years in Depok City of 544,634 people,[7] with a 90% confidence level.

Data were obtained by completing a questionnaire through interviews. The questionnaire consisted of 3 sections, namely characteristics of subjects (age, education level, occupation, and the amount of household expenditure per month), consumption profile, and mothers' perception towards snacking. SIFC consumption profiles were obtained using a semi-FFQ questionnaire that included questions on consumption frequency and portion size. The consumption data in question refers to the SIFC consumed during the last two months. To avoid mistakes regarding the snack products in question, the participants were shown a list of SIFC products with product images and variants.

The questionnaire also included questions on the timing of SIFC consumption (during mealtime or between meals), age at first SIFC administration, and SGC consumption (if any).

The section on mothers' perceptions towards snacking includes the following aspects: (1) differences between complementary food products and SIFC; (2) perceptions of the importance of snacking for children; and (3) potential disruption of complementary feeding practices due to snacking.

The questionnaire has been tested through a validity test on 30 respondents using Pearson Product Moment (p-value <0.05) and a reliability test using Cronbach's Alpha (alpha value of 0.722).

The amount of SIFC consumption was obtained by multiplying the portion and frequency of consumption, then dividing by the consumption interval (day=1; week=7; month=30).[8]

The total daily consumption of SIFC per child per day was calculated as the sum of all types of SIFC consumed. Nutrient intakes including energy, total fat, protein, total carbohydrate, sodium and sugar were calculated for each child per group (6-11 months and 12-23 months) and analyzed based on the nutrient content data of the consumed products as stated on the product label. The nutrient contribution of the SIFC was calculated against the daily requirement based on the Indonesian Recommended Daily Allowance (RDA) value.[9]

Bivariate analysis using Pearson Correlation and Spearman Rank Correlation was performed using IBM SPSS Statistics version 26.

The informed consent form was signed by each subject. Previously, subjects were given an explanation of this study, such as the purpose of the study, the treatment provided, the benefits for participants, data confidentiality, the right to withdraw, and incentives for participants.

The research has been approved by the IPB University Ethics Commission for Research Involving Human Subjects Number 776/IT3.KEPMSM-IPB/SK/2022.

Results

Demographic characteristics

A total 110 subjects participated in this study. More than 80% of the subjects were within the age range of 20-35 years.

For education level, subjects were predominantly high school graduates (41.82%) and undergraduates (29.09%). Subjects were mostly housewives. Furthermore, more than 70% of respondents have expenditures of up to IDR 5 million, where most respondents have an amount of expenditure between IDR 2-3 million.

Detailed demographic data are presented in Table 1.

Table 1. Demographic characteristics of the subjects (N=110)

Characteristics		N	%
Age (year)	20 - 25	12	10,91
	26 - 30	42	38,18
	31 - 35	35	31,82
	36 - 40	16	14,55
	> 40	5	4,55
Education level	Elementary school	4	3.64
	Junior high school	17	15.45
	Senior high school	46	41.82
	Diploma	9	8.18
	Undergraduates	32	29.09
	Master degree	2	1.82
Occupation	Housewife	86	78.18
	Private employee	14	12.73
	Government employee	1	0.91
	Others	9	8.18
Household expenditure per month	≤IDR 2 million	25	22.73
	>IDR 2–5 million	59	53.64
	>IDR 5–10 million	20	18.18
	>IDR 10 million	6	5.45

Children's consumption profile of SIFC and SGC

Table 2 shows the children's consumption profile of SIFC and SGC. Only 55.45% of respondents offered SIFC to their children. By age group, it was found that the number of children consuming SIFCs increased with age. Children in the 6-11 months age group also consumed fewer types of SIFC than those in the 12-23 months group. The types of SIFC consumed by all children in this study were only 7 types of products available, namely snack puffs, biscuits, fruit/vegetable purees and pastes, porridge, noodles, pasta, and rice crackers.

Table 2. Children's consumption profile of SIFC and SGC

Variables	Number of children (N(%))		
	6-11 months	12-23 months	Total
SIFC consumption	18 (48.65)	43 (58.90)	61 (55.45)
SGC consumption	18 (48.65)	65 (89.04)	83 (75.45)
Feeding time			
Between meals	30 (81.08)	63 (86.30)	93 (84.55)
During mealtimes	1 (2.70)	4 (5.48)	5 (4.55)
Uncertain times	2 (5.41)	5 (6.85)	7 (6.36)
Have not been given SIFC or SGC	4 (10.81)	1 (1.37)	5 (4.55)
Age at first SIFC or SGC administration			
< 12 months	33 (89.19)	51 (69.86)	84 (76.36)
> 12 months	0 (0)	21 (28.77)	21 (19.09)
Have not been given SIFC or SGC	4 (10.81)	1 (1.37)	5 (4.55)

Besides consuming SIFC, 48.65% of children aged 6-11 months and 89.04% of children aged 12-23 months were also known to consume SGC. The most consumed SGCs included biscuits, wafers, yoghurt, extruded snacks, and fermented milk drinks. Some mothers also reported giving products with high sugar content, such as chocolate, candy, ice cream, tea and jelly drinks. A total of 84.55% of the subjects gave SIFC and/or SGC between meals, while 76.36% of mothers stated that they offered these products when their children were under 1 year old. The daily consumption of SIFC products fell within a wide range of 0-157.54 g/day (mean±SD of 10.39±24.13). A daily consumption of 0 g/day indicates a child who did not consume any SIFC products, while a high daily consumption is generally obtained from the consumption of various types of SIFC.

Children's nutrient intake of SIFC

There were no children in the 6-11 months age group who obtained energy intake exceeding 200 kcal/day as regulated by the Indonesian FDA. However, there were 6 children aged 12 - 23 months who obtained energy from SIFC that exceeded the maximum limit, with the highest intake reaching 501.43 kcal/day.

Table 3. Daily contribution of energy and nutrients by age group

Nutrient	Daily contribution* (Number of children (N (%))					
	6-11 months			12-23 months		
	<20% of RDA	>20-30% of RDA	>30% of RDA	<20% of RDA	>20-30% of RDA	>30% of RDA
Energy	17 (94.44)	1 (5.56)	0 (0)	38 (88.37)	4 (9.30)	1 (2.33)
Total fat	18 (100)	0 (0)	0 (0)	39 (90.70)	2 (4.65)	2 (4.65)
Protein	17 (94.44)	1 (5.56)	0 (0)	38 (88.37)	3 (6.98)	2 (4.65)
Total carbohydrate	16 (88.89)	2 (11.11)	0 (0)	38 (88.37)	4 (9.30)	1 (2.33)
	<5% of RDA	>5-10% of RDA	>10% of RDA	<5% of RDA	>5-10% of RDA	>10% of RDA
Sugar**	18 (100.00)	0 (0)	0 (0)	43 (100.00)	0 (0)	0 (0)
Sodium	16 (88.89)	1 (5.56)	1 (5.56)	31 (72.09)	7 (16.28)	5 (11.63)

*Based on Indonesian RDA; **Daily contribution of sugar is calculated based on total energy intake (RDA for energy)

In general, the energy, total fat, protein, and total carbohydrate intake of SIFC was below 30% of the RDA, while it was below 10% of the RDA for sugar and sodium (Table 3). In more detail, Table 4 shows that the average energy and nutrient intake of SIFC was relatively low in both age groups.

Table 4. Average daily intake and contribution of energy and other nutrients per day by age group

Nutrient	6 – 11 months		12 – 23 months	
	Intake*	Contribution (% RDA)	Intake*	Contribution (% RDA)
Energy (kcal)	44.81±51.12	5.60	79.78±116.24	5.91
Total fat (g)	1.39±1.76	3.96	2.51±3.94	5.58
Protein (g)	0.66±1.01	4.40	1.55±2.36	7.74
Total carbohydrate (g)	7.70±8.68	7.33	13.26±19.61	6.17
Sodium (mg)	7.13±10.29	1.93	37.46±53.25	4.68
Sugar (g)	1.58±1.88	0.20**	3.08±4.92	0.23**

*Intake data are presented as mean±Standard Deviation (SD); **Daily contribution of sugar is calculated based on total energy intake (RDA for energy)

Mothers' Perception Towards Snacking

Most mothers knew that complementary foods and SIFC are different products, including their nutritional content (Table 5). A total of 73.64% of mothers also stated that snacking is important for their children, and surprisingly, the most frequently mentioned reason was that snacks are used to increase nutritional intake. Regarding the potential disruption of complementary feeding practices due to snack administration, 62.73% of subjects expressed disagreement. The most common reason given was that the feeding schedules of complementary food and SIFC were different, so they were not considered to interfere with each other. In line with this, subjects who agreed also reasoned that children become unwilling to eat complementary food if the feeding schedule is not managed and the portion of SIFC given is too much.

Table 5. Mothers' Perception Towards Snacking

Statement	Answer (N(%))			
	Strongly agree	Agree	Disagree	Strongly disagree
SIFCs are not complementary foods	31 (28.18)	40 (36.36)	34 (30.91)	5 (4.55)
The nutritional content of SIFC and complementary foods are the same	5 (4.55)	14 (12.73)	57 (51.82)	34 (30.91)
Complementary feeding practices were disrupted due to snacks administration	10 (9.09)	31 (28.18)	58 (52.73)	11 (10.00)
	Very important	Important	Not really important	Not important
The importance of giving snacks to children	13 (11.82)	68 (61.82)	29 (26.36)	0 (0.00)

Relationship between subject profile with the amount of snack consumption and mothers' perception

There was no significant correlation between age, mothers' education level and household expenditure per month with the amount of SIFC consumption (P 0.169, 0.703, and 0.912, respectively). A significant correlation was found between mothers' education level and : (1) perception of the difference between complementary food and SIFC (P 0.035); and (2) perception of the importance of snacks for children (P 0.028)~~)~~ (Table 6).

Table 6. Relationship between subject profile with the amount of snack consumption and mothers' perception

Variable	SIFC consumption (p-value)	Mothers' perception (p-value)		
		Perception 1**	Perception 2**	Perception 3**
Age	0.169	0.493	0.893	0.352
Education level	0.703	0.035*	0.028*	0.708
Household expenditure per month	0.912	0.965	0.562	0.267

*Statistically significant (p<0.05); Perception 1: Difference between complementary food and SIFC, 2: Importance of snacking for children, 3: Potential disruption of complementary feeding practices

Discussion

This study showed that SIFC consumption increased with the age of the child, both in terms of quantity and product types. This may be explained by the fact that children aged 13-22 months are more ready to accept textured foods than younger children due to more eating experience.[10] Further interviews confirmed the reasons why subjects did not provide SIFC, including: (1) a preference not to provide commercial products and rather provide snacks made at home; (2) children dislike eating snacks; (3) high prices; (4) unfamiliarity with the product; and (5) difficult access to the product. The types of SIFC consumed by children in this study were consistent with previous research which identified that the products that children prefer as snacks include fruit products, biscuits and salty/savoury flavoured snack products.[4, 12]

Furthermore, this study found that the consumption of SGCs in children under two years old was also quite high, which is in line with previous studies in Nepal and Indonesia.[1,2] SGCs are general snacks that may contain food additives that are not Suitable for children under 2 years old and may also be higher in sugar, salt and fat than SIFCs. This needs to be a concern, as some of the SGCs consumed are included in the group of foods that should not be marketed to children or products with strict restrictions (total fat, saturated fat, total sugar, added sugar, sweeteners, salt and/or energy content) as recommended by the WHO nutrient profile model.[12]

Children's intake of snack products could be influenced by parenting behaviors.[13] Many factors are barriers to providing healthy snacks to children, including misperceptions about healthy products, children already having preferences that are difficult to change, modelling from other family members, relatively higher prices for healthy snacks, and easy access to unhealthy snacks.[14] More massive nutrition education is needed for mothers to limit the consumption of SGC.

Most mothers gave SIFC and/or SGC as a snack between meals. This result is consistent with previous research which states that snack products are consumed more between meals than at mealtime.[15] However, the presence of children consuming SIFC and/or SGC during meals raises concern. Increased consumption of snack products and sugary drinks may substitute for nutritious food consumption, especially when dietary patterns do not meet nutritional needs.[5]

In this study, most mothers administered SIFC or SGC for the first time before the child was one year old, where SIFC should be given to children over one-year-old and SGC to children over three years old. This is not following the recommendations of the Indonesian FDA. Feeding SIFC and/or SGC snacks that tend to be sweet at an early age may impact children's health. Research showed that infants aged 7-9 months and 10-12 months who consumed sweet foods >2 times/day had a higher weight-for-height/length z-scores index than infants who never consumed, contributing to the risk of obesity during infancy.[16]

The inappropriate use of products may be caused by various factors, including unclear label information, low consumer awareness to read labels and lack of consumer knowledge. Information on the age designation of SIFC products is listed on the product label. However, with low consumer awareness of reading labels, it is possible that this information

May not be read. The most widely read label attributes are limited to the product brand, expiration date and product type.[17] These are strong reasons why socialization on the consumption of SGC and SIFC products is necessary.

The highest energy intake from SIFC of 501.43 kcal/day in children aged 12-23 months was very high compared to a study conducted on children aged 12-24 months in the US, where it was found that the highest energy intake from snack products was 334 kcal/day.[4] Similar results were found for energy, total fat, protein, and total carbohydrate intake in this age group. The high intake may be due to (1) the portion consumed for one meal exceeded the serving size listed on the label; (2) the frequency of consumption exceeded the recommendation; and/or (3) children consumed multiple types of SICF which contributed to the accumulation of energy and nutrients consumed per day. It is feared that excessive intake may satiate the child and reduce the intake of breastmilk and complementary foods, which have more complete macro- and micronutrient content.

The finding of a relatively low average daily contribution of energy from SIFCs in this study is in contrast to the energy intake from snack products found in several other studies, which reached 29% in Canada and 19.5% in Nepal.[11,15] The average intake of total fat and protein derived from SIFC per day was lower than carbohydrates. It confirmed that carbohydrates were the main energy source of the snack products.[4] Moreover, some types of SIFC are also known to contain no fat and protein, such as puffs and fruit/vegetable puree products. Previous research also stated that snack products are generally energy-dense and have low nutritional content.[5]

The average daily contribution of sugar and sodium intake from SIFC is considered relatively low for both age groups. The sugar intake in this study is in line with the recommendation to reduce sugar intake to <5%,[18] while for sodium WHO has not issued recommendations to reduce its intake for children under two years specifically. Higher sugar and sodium intake from snack products was seen in a study in children aged 3-5 years which reached 39.9% and 22.6%.[11] This difference may be due to the higher frequency of consumption and portion size of snack products in older children

As well as the higher sugar and sodium content in the products.

This study focused on estimating nutrient intake from SIFC products and did not take into account nutrient intake from all snack products consumed by children, including SGCs. The total nutrient intake of children may be higher if the intake from SGC is included. Therefore, further research is needed on the total nutrient intake from SIFC and SGC products.

This research found surprising results that mothers considered providing snacks to increase children's nutritional intake. This is in contrast to the previous findings in the UK which stated that snacking is not intended to increase nutritional intake, but rather to help children develop motor skills and learn to feed themselves safely.[19] Other studies have also found that the purpose of snacking in children was dominated by reasons to control children's behavior, such as child requests, as a reward, and to keep children calm.[21, 22] Differences in maternal perceptions may be influenced by differences in maternal knowledge and concerns when children are reluctant to consume complementary foods.

Mothers' perceptions regarding the importance of SIFC for improving children's nutritional intake led to the perception that mothers would still tend to buy SIFC for their children even though it was expensive. This is also supported by the results of bivariate analysis. Differences in mothers' perceptions of snacks also affected their behavior. Some mothers in South Africa stated that snack products are only given to their children if they are affordable, arguing that snack products are only for pleasure and not to fulfil nutritional needs.[22]

In this study, price does not seem to affect SIFC consumption. This is also in line with the other research which states that low prices are not included in the factors that encourage snack giving in children aged 12-23 months.[1] Contrary results were found in research on adolescents and adults, where price is one of the main determinants in product purchases.[23,24] The selection of commercial baby food products is influenced by three main factors, namely taste, goodness, and "the truth" (such as whether the product contains allergens, preservatives, colourings and salt).[25]

Most mothers believe that providing snacks does not interfere with complementary

Feeding practices. However, it was noted that there should be a clear feeding schedule for them and a limit on the portion of snacks given. Thus, it can be concluded that managing the schedule and portion of snacks is an important aspect that needs to be considered. Socialization and nutrition education for mothers are important in supporting successful child-feeding practices. The research found that nutrition education interventions were effective in improving maternal knowledge.[26,27]. Furthermore, various nutrition intervention programs including improving maternal knowledge, could reduce stunting rates in children under two years of age by up to 7%.[28]

Conclusions

This study showed that snacks product was also consumed by children under one-year-old. These products were mostly given between meals. The average daily intake and contribution of energy, total fat, protein, total carbohydrate, sugar and sodium from SIFC were relatively low. However, some children aged 6-11 months and 12-23 months were found to have high intakes of energy, total fat, protein, total carbohydrates and sodium. Carbohydrate is the main energy source of SIFC. High intake of SIFC is feared to satiate the child, thus reducing the intake of breast milk and complementary foods that have a more complete macro and micronutrient content.

Most mothers knew that complementary foods and SIFC were different and most of them thought that the main purpose of providing snacks, including SIFC, was to increase nutrient intake. Managing the feeding schedule and portions of snacks is an important aspect to ensure that snacks do not interfere with complementary feeding practices. Maternal education about snacking is needed.

Author's contributions: Sekardani NI, Astawan M, and Prangdimurti E designed research; Sekardani NI conducted research and analyzed data; and Sekardani NI, Astawan M, and Prangdimurti E wrote the paper. All authors read and approved the final manuscript.

What does this study add to existing knowledge?

Existing research is only limited to snack products in general, and has not specifically investigated SIFC products. In addition, this study also explores The relationship between snack products and complementary foods.

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