

## Original Article

# Processed and ultraprocessed food consumption pattern in the Jakarta Individual Food Consumption Survey 2014

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**Background and Objectives:** Dietary patterns are undergoing a major shift worldwide. This study analysed the consumption of processed and ultraprocessed foods in Jakarta and its contribution to the energy and nutrient intake based on the Individual Food Consumption Survey 2014. **Methods and Study Design:** Food consumption data were based on 24-hour dietary recall. Foods were grouped into four food groups: nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods and subsequently categorised according to the Indonesian Food Category System. Energy and nutrient intake were calculated using Nutrisurvey 2007 software. **Results:** Nonprocessed food, processed ingredient, processed food, and ultraprocessed food consumption contributed to 57.2%, 21.6%, 1.7%, and 19.5% of total weight consumption, respectively. Ultraprocessed foods contributed to 15.7%, 16.7%, 14.2%, 12.6%, 18.4%, and 31.3% of daily energy, carbohydrate, protein, fat, sodium, and sucrose intake, respectively, and the respective contributions of nonprocessed foods were 52.2%, 58.7%, 65.8%, 32.6%, 7.9%, and 11.1%; of processed ingredients were 30.0%, 22.7%, 16.4%, 53.6%, 68.9%, and 57.6%; and of processed foods were 2.1%, 2.0%, 3.6%, 1.2%, 4.8%, and 0%. Linear regression analysis between the amount of food consumption and nutrient intake showed that at the same weight consumption, processed ingredients provided a higher intake of energy, fat, sodium, and sucrose than the other food groups. **Conclusions:** Processed and ultraprocessed foods still have a lower contribution to energy and nutrient intake in Jakarta than nonprocessed foods and processed ingredients.

**Key Words:** Individual Food Consumption Survey, nutrient intake, processed foods, processed ingredients, ultraprocessed foods

## INTRODUCTION

Increasing global population has resulted in the development of techniques involving the processing, preservation, packaging, and distribution of foods. Processed and ultraprocessed foods are highly convenient, easy to prepare, and provide an increased range of choices. The development of food processing technologies, such as refrigeration, freezing, irradiation, extrusion, and sterilisation as well as microwave use have contributed to the development of processed and ultraprocessed foods.<sup>1</sup>

Ultraprocessed foods account for 61% (Spain) to 78%–79% (the Netherlands and Germany) of mean energy intake in Europe and 57% in the United States.<sup>2,3</sup> In addition, processed and ultraprocessed foods have a higher contribution to the intake of sodium, added sugars, iron, dietary fibres, and folate in the United States.<sup>3</sup> Ultraprocessed foods tend to contain high levels of fat, sugar, and salt to enhance their palatability, which can cause energy overconsumption and consequently increase the risk of obesity.<sup>4</sup> The consumption of ultraprocessed foods, such as biscuits, bread, potato chips, sugar-sweetened beverages, and processed meats, contributes to weight gain in the adult population of the United States.<sup>5</sup> Indonesia Basic

Health Research 2007 and 2013 revealed that the prevalence of various noncommunicable diseases, such as diabetes, hypertension, and stroke, has increased. This may be associated with changes in the food consumption patterns of Indonesian society.<sup>6</sup>

Processed and ultraprocessed foods have become a part of the daily dietary intake in Indonesia. However, only a few studies have investigated food consumption levels and their contribution to daily nutrient intake. Data on food consumption levels can provide important information that may facilitate determining consumption trends and characteristics, as well as risk factors for various diseases. Furthermore, food consumption data are crucial for risk assessment, particularly for exposure to chemical substances such as food additives and contami-

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nants.<sup>7</sup> In a study on food additive exposure, the exposure values were calculated on the basis of the food consumption data and food additive levels of foods. These exposure values were compared with the Acceptable Daily Intake values of food additives to determine the level of risk of such food additives.<sup>8</sup>

The objectives of this study were to analyse processed and ultraprocessed food consumption in Jakarta, classify the foods consumed based on the extent of their processing and their categories, calculate their contribution to the energy and nutrient intake, and analyse the association between the amount of food consumption and nutrient intake.

## METHODS

### *Study population*

This study was conducted using data from the Individual Food Consumption Survey (IFCS) 2014 for Jakarta province, which is a part of the National IFCS 2014. The IFCS 2014 is a cross-sectional survey and the first nationally representative dietary survey of the Indonesian population conducted by the Ministry of Health, in which data on the items and quantities of food consumed by individuals were obtained through the 24-hour dietary recall method. The sample size was based on a national sampling frame that included 2,072 sample blocks of 45,802 households and 145,360 individuals. The population surveyed in the Jakarta IFCS 2014 included households representing six districts in Jakarta (Central Jakarta, East Jakarta, North Jakarta, South Jakarta, West Jakarta, and Thousand Islands) covering 30 census blocks. The total number of survey participants was 1,722 individuals from 504 households. Data cleaning was performed on the basis of variables such as individual information, the suitability of food item codes, ingredient weights, and food weight conversion. Finally, data from 1,605 individuals were included for analysis. Individuals were classified in accordance with the National IFCS age grouping into the following age groups: 0–4, 5–12, 13–18, 19–55, and >55 years.<sup>6</sup>

### *Food groups*

Foods were categorised as nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods. The nonprocessed food group included fresh foods, unprocessed foods, raw materials used in household or restaurant food preparation processes, and breast milk. The processed ingredient group included substances that are extracted and purified from nonprocessed foods but cannot be directly consumed and are used either in homes or restaurants or during the industrial processing of processed foods. Nonprocessed foods that are processed in food industries to extend their shelf life and foods that can be prepared by adding few ingredients were included in the processed food group. The ultraprocessed food group included foods processed in food industries by the addition of many ingredients, and most of these foods are ready-to-eat or only require simple preparation before consumption. The NOVA system was used as a reference for grouping foods on the basis of processing type, with the different names of the food groups complying with the corresponding Indonesian terms. The NOVA system

was first published in 2009 and used by the Brazilian Government for the development of the Dietary Guidelines for the Brazilian Population. In addition, studies in several countries, such as the United States, Canada, and Chile, have used this system.<sup>9,10</sup> The NOVA system classifies foods into four groups: Group 1, unprocessed or minimally-processed foods; Group 2, processed culinary ingredients; Group 3, processed foods; and Group 4, ultraprocessed foods.

Foods were then categorised on the basis of the Indonesia Food Category System, which categorises foods based on their characteristics using 16 categories, namely milk and milk products (powders and beverages); fats and oils; edible ices; fruits, vegetables, seaweeds, nuts, and seeds; confectionaries; cereal and cereal products; bakery wares; meat and meat products, including chicken meat; fish and fish products; egg and egg products; sweeteners, including honey; salts, spices, soups, sauces, salads, and protein products; foodstuffs for particular nutritional uses; beverages, including powders and concentrates; ready-to-eat savouries; and prepared foods.<sup>11</sup> Foods in solid and liquid forms, such as milk and coffee, were categorised by adding an 'a' to the number-based category for foods with liquid forms. Furthermore, foods that could not be categorised into any of the 16 categories, such as breast milk and food additives, were listed under the miscellaneous category numbered as 17.0.

### *Assessing energy and nutrient contents*

Energy and nutrient intake were calculated using Nutri-survey 2007 software to assess energy, carbohydrate, protein, fat, sodium, and sucrose intake.

### *Data analysis*

Food consumption and nutrient intake are presented as mean per capita consumption. Regression analysis of food consumption and the energy, carbohydrate, protein, fat, sodium, and sucrose intake of each age group was performed to obtain scatter plots, correlation coefficients (*r*), and regression equations. The correlation coefficients of 0.60–0.79 and 0.80–1.00 indicate strong and very strong correlation levels, respectively.<sup>12</sup> The value of slope (*b*) was obtained from the regression equation:  $y = bx + a$ , where *x* is the amount of food consumption and *y* is the nutrient intake. The higher the slope value, the higher the contribution of *x* to *y*.

## RESULTS

Of 1,605 individuals, 796 were men (49.6%) and 809 were women (50.4%). The 0–4, 5–12, 13–18, 19–55, and >55 age groups had 105 (6.5%), 227 (14.1%), 184 (11.5%), 882 (55.0%), and 207 (12.9%) individuals, respectively.

A total of 701 food items were consumed by the Jakarta population. Table 1 presents the food groups.

The total daily food consumption of nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods were 491 g (57.2% of total weight), 185 g (21.6% of total weight), 15.0 g (1.7% of total weight), and 167 g (19.5%), respectively. Table 2 shows the consumption of each food group across the five age groups. The percentage of ultraprocessed food consump-

**Table 1.** Grouping of foods in the Jakarta IFCS 2014

Food groups	Food items	Food item (%)
Nonprocessed foods	Fresh milk, fresh vegetables, fresh fruits, peanuts, corn, fresh meat, chicken fillet, fresh fish, egg, ginger, rice, etc	295 (42)
Processed ingredients	Milk cream, vegetable oil, margarine, flours, starches, pasta, jelly powder, cocoa powder, noodles, tempe, tofu, white sugar, brown sugar, condiments, food additives, salt, etc	84 (12)
Processed foods	Cheese, breads, canned fish, smoked beef, salted fish, salted egg, etc	32 (5)
Ultraprocessed foods	Milk powder, milk beverages, ice cream, jam, chocolates, candies, instant noodles, biscuits, wafers, sausage, ketchup, sauces, baby food, coffee beverages, carbonated drinks, isotonic drinks, tea beverages, etc	290 (41)

**Table 2.** Nonprocessed food, processed ingredient, processed food, and ultraprocessed food consumption according to age groups in Jakarta IFCS 2014

Age groups (years)	Food groups									
	Nonprocessed foods		Processed ingredients		Processed foods		Ultraprocessed foods		Total	
	Mean ( $\pm$ SE) g/day	%	Mean ( $\pm$ SE) g/day	%	Mean ( $\pm$ SE) g/day	%	Mean ( $\pm$ SE) g/day	%	Mean ( $\pm$ SE) g/day	%
0-4 (n=105)	243 ( $\pm$ 15.1)	46.2	58.8 ( $\pm$ 7.19)	11.2	6.34 ( $\pm$ 1.53)	1.2	218 ( $\pm$ 19.2)	41.4	526 ( $\pm$ 27.6)	100
5-12 (n=227)	433 ( $\pm$ 14.6)	52.7	139 ( $\pm$ 6.87)	16.9	11.4 ( $\pm$ 2.14)	1.4	239 ( $\pm$ 12.4)	29.0	822 ( $\pm$ 18.8)	100
13-18 (n=184)	440 ( $\pm$ 17.3)	50.0	180 ( $\pm$ 10.1)	20.5	15.1 ( $\pm$ 2.71)	1.7	245 ( $\pm$ 18.5)	27.8	880 ( $\pm$ 26.2)	100
19-55 (n=882)	548 ( $\pm$ 9.15)	59.0	215 ( $\pm$ 5.14)	23.2	16.1 ( $\pm$ 1.26)	1.7	149 ( $\pm$ 6.95)	16.1	928 ( $\pm$ 12.7)	100
>55 (n=207)	486 ( $\pm$ 18.1)	64.8	178 ( $\pm$ 8.50)	23.7	18.7 ( $\pm$ 2.75)	2.5	67.7 ( $\pm$ 8.44)	9.0	750 ( $\pm$ 23.6)	100
All (n=1605)	491 ( $\pm$ 6.62)	57.2	185 ( $\pm$ 3.58)	21.6	15.0 ( $\pm$ 0.90)	1.7	167 ( $\pm$ 5.18)	19.5	858 ( $\pm$ 9.17)	100

tion decreased with increasing age. Nonprocessed foods predominantly included cereals, with food items such as rice. Processed ingredients were dominated by cereals and cereal products, with food items such as flour, starch, and pasta. The most consumed food category in the processed food group was bakery wares and the most consumed food items in the processed food group were white bread, canned fish, and salted eggs. For the ultraprocessed food group, the most consumed food category was beverages, with food items including tea and coffee beverages, isotonic drinks, and carbonated drinks. Table 3 lists the consumption of each food category.

The contribution of nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods to the daily energy intake were 52.2%, 30.0%, 2.1%, and 15.7%, respectively. In each age group, processed foods contributed least to energy intake compared with the other food groups. Ultraprocessed foods dominated the energy intake of the 0–4 age group, accounting for 42.6%, followed by nonprocessed foods (38.8%), processed ingredients (17.0%), and processed foods (1.6%; Table 4). The energy intake from ultraprocessed foods in the 1–4 age group was mainly derived from the consumption of dairy-based food products of the 01.00 or 13.00 category. In the other age groups, ultraprocessed foods contributed to the least energy intake compared with the nonprocessed foods and processed ingredients.

Carbohydrate intake mainly entailed consumption of nonprocessed foods, accounting for 58.7%, followed by processed ingredients (22.7%), ultraprocessed foods (16.7%), and processed foods (2.0%). Rice was the main source of carbohydrates in nonprocessed foods. In addition, protein intake was mainly contributed by nonprocessed foods, particularly chicken meat. Nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods contributed to 65.8%, 16.4%, 3.6%, and 14.2% of protein intake, respectively.

Processed ingredients (53.6%) were the main contributors to fat intake, followed by nonprocessed foods (32.6%), ultraprocessed foods (12.6%), and processed foods (1.2%). Vegetable oil was the main source of fat in processed ingredients. Sodium intake was also dominated by the processed ingredients (68.9%), followed by ultraprocessed foods (18.4%), nonprocessed foods (7.9%), and processed foods (4.8%). Salt used at home preparation or in restaurants was the main source of sodium in processed ingredients. Furthermore, processed ingredients had the highest contribution (57.6%) to sucrose intake, followed by ultraprocessed foods (31.3%) and nonprocessed foods (11.1%). Granulated sugar was the main source of sucrose in processed ingredients.

Regression analysis was performed to determine the correlation between the amount of food consumption and nutrient intake. Correlation coefficients, regression equations, and scatter plots were obtained on the basis of the food consumption and the energy and nutrient intake of the five age groups (0–4, 5–12, 13–18, 19–55, and >55 years; Figure 1). According to the scatter plot (Figure 1), the consumption of the four food groups was positively correlated with the intake of energy, carbohydrate, protein, fat, sodium, and sucrose. The slope of each scatter plot indicates the influence of total food consumption on nu-

trient intake. Regression equations indicated that, for the same quantity of each food group, processed ingredients had a higher contribution to the intake of energy, fat, sodium, and sucrose than the other food groups.

## DISCUSSION

Jakarta was selected as the research location because of it has a highly heterogeneous population owing to the number of migrants from other provinces. In addition, Jakarta is thought to provide higher accessibility to various food types.

Food consumption levels indicate that processed or ultraprocessed foods have not yet dominated food consumption in Jakarta, and that nonprocessed foods are the main source of food consumption. The amount of ultraprocessed food consumption in the daily diet decreased with increasing age (Table 2). This result is in accordance with a cohort study conducted in the United Kingdom on 1,253 persons aged 36, 43, and 53 years that showed that the amount of consumption of lettuce, green vegetables, fruits, and fruit juice increased with increasing age, whereas the amount of consumption of milk, bread, biscuits, butter, and meat decreased with increasing age.<sup>13</sup>

A study on 2,174 adults (age >18 years) in the United Kingdom showed that ultraprocessed foods (53%) were the highest contributors to energy intake, followed by nonprocessed foods (28%) and processed ingredients (13%).<sup>14</sup> Furthermore, a study on 9,317 persons in the United States showed that ultraprocessed foods contributed to 57.9% of energy intake.<sup>15</sup> The aforementioned findings differ from those of this study, demonstrating that ultraprocessed food consumption in Jakarta is not as high as that in the United States and United Kingdom. Ultraprocessed foods are highly convenient; however, this study showed that ultraprocessed foods accounted for less than one-fifth of total energy intake. The present results are in accordance with some studies in developing countries such as Brazil, where ultraprocessed food accounted for 15.4%–39.4% of energy intake.<sup>16</sup>

The different energy intake patterns in the 0–4 age group, which were dominated by ultraprocessed foods, were similar to those reported in a study on 204 children aged 2–10 years in Brazil, which indicated that ultraprocessed foods accounted for 47.0% of the energy intake.<sup>17</sup>

Rice is the staple food in Indonesia, supporting our finding that rice is the main source of carbohydrates in all age groups. The high protein intake from nonprocessed foods, particularly from chicken meat, is in accordance with the 2014 data that showed chicken meat production reached 63.0% of total meat production in Indonesia.<sup>18</sup> The high fat intake from vegetable oils is consistent with the data from the Indonesia Palm Oil Association, which stated that, in addition to being one of the largest palm oil producers, Indonesia is one of the largest palm oil consumers in the world.<sup>19</sup>

The high sodium intake from processed ingredients was attributed to the use of salt in cooking processes. However, this finding is different from a study in developed countries such as the United States, which reported that 75% of the salt intake was contributed by ultraprocessed foods, followed by household cooking pro-

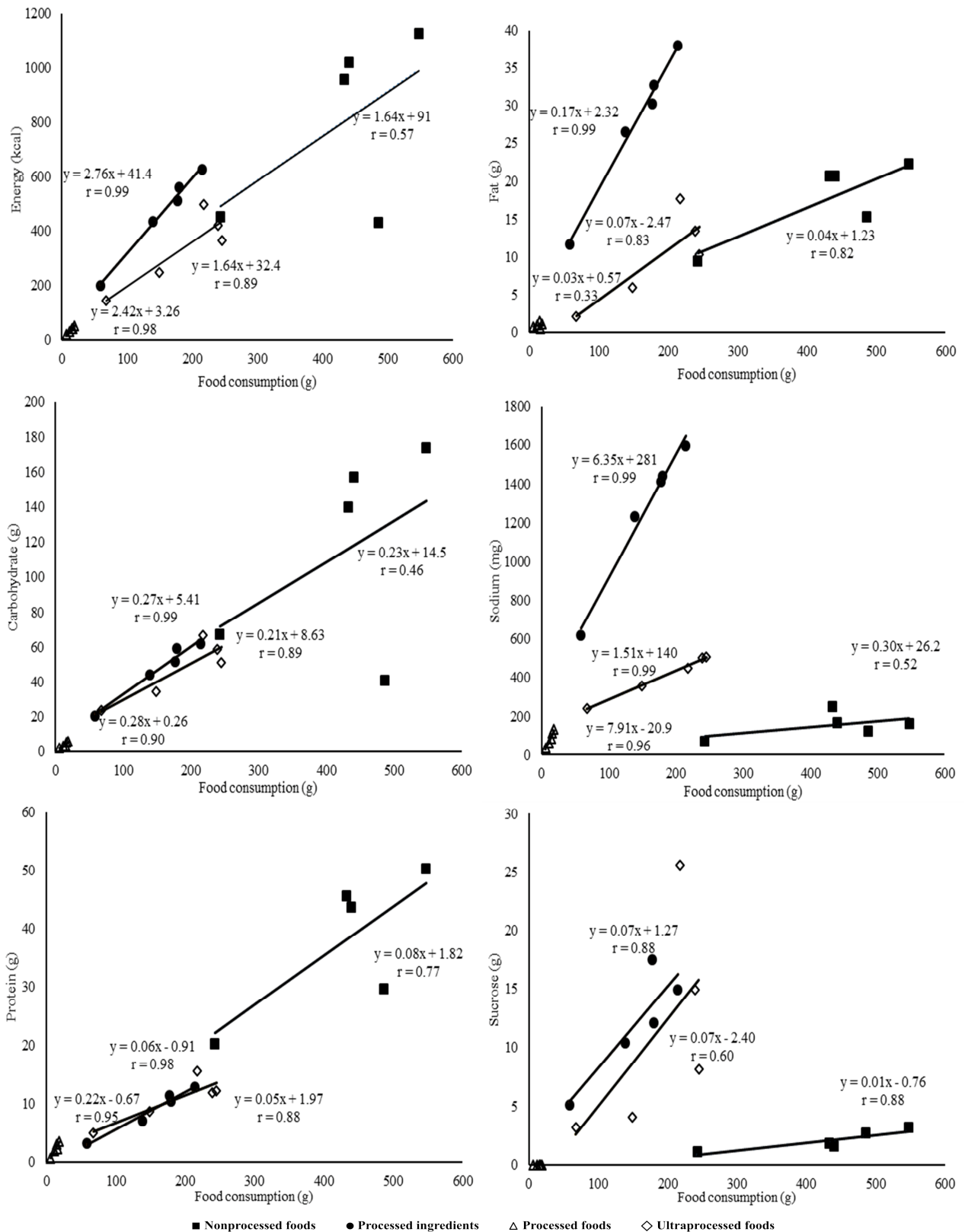
**Table 3.** Food consumption based on food categories of nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods

Category number <sup>†</sup>	Food category	Nonprocessed foods			Processed ingredients			Processed foods			Ultraprocessed foods			Total		
		Consumption (g/day)		% of total	Consumption (g/day)		% of total	Consumption (g/day)		% of total	Consumption (g/day)		% of total	Consumption (g/day)		% of total
		Mean (±SE)	P95		Mean (±SE)	P95		Mean (±SE)	P95		Mean (±SE)	P95		Mean (±SE)	P95	
01.0	Milk and milk products (powder)	0.00 (±0.00)	0.00	0.0	0.01 (±0.01)	0.00	0.0	0.60 (±0.08)	2.40	0.1	8.18 (±0.65)	60.0	1.0	8.78 (±0.65)	60.0	1.0
01.0a	Milk and milk beverages	2.05 (±0.64)	0.00	0.2	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	11.8 (±1.40)	99.0	1.4	13.9 (±1.54)	125	1.6
02.0	Fats and oils	0.00 (±0.00)	0.00	0.0	25.6 (±0.46)	60.3	3.0	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	25.6 (±0.46)	60.3	3.0
04.0	Fruits, vegetables, seaweeds, nuts and seeds	137 (±4.06)	404	15.9	33.2 (±1.55)	160	3.9	0.95 (±0.31)	0.00	0.1	2.17 (±0.46)	0.00	0.3	173.3 (±4.46)	477	20.2
05.0	Confectionery	0.00 (±0.00)	0.00	0.0	0.06 (±0.02)	0.00	0.0	0.00 (±0.00)	0.00	0.0	2.44 (±0.27)	14.0	0.3	2.50 (±0.27)	14.0	0.3
06.0	Cereal and cereal products	173 (±2.53)	366	20.2	103 (±2.61)	315	12.0	0.49 (±0.15)	0.00	0.1	37.1 (±2.03)	212	4.3	314 (±4.16)	599	36.6
06.0a	Cereal and cereal products (liquid form)	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	0.68 (±0.33)	0.00	0.1	0.68 (±0.33)	0.00	0.1
07.0	Bakery wares	0.00 (±0.00)	0.00	0.0	0.18 (±0.04)	0.00	0.0	7.35 (±0.63)	67.2	0.9	9.49 (±0.58)	60.0	1.1	17.0 (±0.84)	84.0	2.0
08.0	Meat and meat products, including chicken meat	70.1 (±2.51)	256	8.2	0.00 (±0.00)	0.0	0.0	0.06 (±0.04)	0.00	0.0	13.9 (±0.88)	85.4	1.6	84.1 (±2.65)	284	9.8
09.0	Fish and fish products	52.6 (±2.53)	274	6.1	0.21 (±0.03)	1.11	0.0	4.55 (±0.50)	24.2	0.5	0.08 (±0.04)	0.00	0.0	57.4 (±2.55)	276	6.6
10.0	Eggs and egg products	32.4 (±1.04)	115	3.8	0.00 (±0.00)	0.00	0.0	0.41 (±0.13)	0.00	0.0	0.00 (±0.00)	0.00	0.0	32.9 (±1.05)	116	3.8
11.0	Sweeteners, including honey	0.00 (±0.00)	0.00	0.0	14.5 (±0.55)	51.9	1.7	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	14.5 (±0.55)	51.9	1.7
12.0	Salts, spices, soups, sauces, salads and protein products	15.5 (±0.47)	50.7	1.8	7.63 (±0.49)	19.1	0.9	0.00 (±0.00)	0.00	0.0	6.06 (±0.25)	26.0	0.7	29.2 (±0.77)	84.1	3.4
13.0	Foodstuffs intended for particular nutritional uses	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	5.17 (±0.83)	25.5	0.6	5.17 (±0.83)	25.5	0.6
14.0	Powdered and concentrate beverages	1.67 (±0.62)	6.00	0.2	0.00 (±0.00)	0.00	0.0	0.59 (±0.11)	0.00	0.1	10.5 (±0.65)	50.0	1.2	12.8 (±0.71)	52.0	1.5
14.0a	Beverages	2.43 (±0.62)	0.00	0.3	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	53.7 (±3.77)	350	6.2	56.1 (±3.83)	350	6.5
15.0	Ready to eat savouries	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	5.64 (±0.45)	35.8	0.7	5.64 (±0.45)	35.8	0.7
16.0	Prepared foods	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	0.00 (±0.00)	0.00	0.0	0.06 (±0.06)	0.00	0.0	0.06 (±0.06)	0.00	0.0
17.0	Others	4.24 (±0.79)	0.00	0.5	0.43 (±0.03)	2.03	0.0	0.0 (±0.00)	0.0	0.0	0.00 (±0.00)	0.00	0.0	4.67 (±0.80)	3.33	0.5

<sup>†</sup>No data found for foods that fall under food category 03.0 Edible ice in the Jakarta IFCS 2014.

**Table 4.** Contribution of nonprocessed foods, processed ingredients, processed foods, and ultraprocessed foods to the intake of energy, carbohydrate, protein, fat, sodium, and sucrose based on Jakarta IFCS 2014

Age groups (years)	Food groups	Energy		Carbohydrate		Protein		Fat		Sodium		Sucrose	
		Mean (±SE) kcal	(%)	Mean (±SE) g	(%)	Mean (±SE) g	(%)	Mean (±SE) g	(%)	Mean (±SE) mg	(%)	Mean (±SE) g	(%)
0-4 (n=105)	Nonprocessed foods	452 (±29.0)	38.8	67.0 (±4.62)	42.8	20.3 (±2.39)	50.9	9.40 (±0.94)	23.8	69.6 (±7.28)	5.91	1.10 (±0.27)	3.5
	Processed ingredients	198 (±21.7)	17.0	20.7 (±3.16)	13.2	3.20 (±0.56)	8.0	11.7 (±1.23)	29.6	619 (±64.6)	52.6	5.10 (±0.97)	16.0
	Processed foods	19.0 (±4.69)	1.6	2.30 (±0.68)	1.5	0.70 (±0.17)	1.8	0.70 (±0.20)	1.8	36.8 (±8.67)	3.1	0.00 (±0.00)	0.0
	Ultraprocessed foods	497 (±32.5)	42.6	66.7 (±4.44)	42.6	15.7 (±1.34)	39.3	17.7 (±1.52)	44.8	452 (±43.2)	38.3	25.6 (±2.35)	80.5
5-12 (n=227)	Nonprocessed foods	956 (±28.4)	51.9	140 (±4.69)	56.8	45.6 (±1.92)	68.5	20.7 (±1.31)	33.7	249 (±47.4)	12.2	1.80 (±0.23)	6.6
	Processed ingredients	436 (±17.5)	23.7	44.3 (±2.56)	18.0	7.1 (±0.52)	10.7	26.5 (±1.08)	43.1	1228 (±69.7)	60.2	10.4 (±1.09)	38.4
	Processed foods	30.5 (±5.80)	1.7	3.40 (±0.75)	1.4	1.90 (±0.48)	2.9	0.90 (±0.28)	1.5	59.2 (±11.1)	2.9	0.00 (±0.00)	0.0
	Ultraprocessed foods	419 (±21.3)	22.8	58.7 (±3.21)	23.8	12.0 (±0.84)	18.0	13.4 (±1.14)	21.8	504 (±33.9)	24.7	14.9 (±1.31)	55.0
13-18 (n=184)	Nonprocessed foods	1021 (±40.8)	51.4	157 (±6.68)	57.9	43.7 (±2.28)	62.9	20.6 (±1.70)	31.6	163 (±8.91)	7.4	1.60 (±0.52)	7.3
	Processed ingredients	560 (±26.6)	28.2	59.3 (±4.16)	21.9	10.5 (±0.86)	15.1	32.7 (±1.57)	50.2	1441 (±83.8)	65.5	12.1 (±1.13)	55.3
	Processed foods	41.5 (±7.52)	2.1	3.40 (±0.86)	1.3	3.00 (±0.70)	4.3	1.50 (±0.46)	2.3	85.7 (±18.2)	3.9	0.00 (±0.00)	0.0
	Ultraprocessed foods	363 (±23.7)	18.3	51.2 (±3.61)	18.9	12.3 (±1.23)	17.7	10.3 (±1.05)	15.8	509 (±60.1)	23.2	8.20 (±1.08)	37.4
19-55 (n=882)	Nonprocessed foods	1126 (±17.9)	55.3	174 (±2.88)	63.0	50.3 (±1.13)	67.8	22.2 (±0.70)	33.4	163 (±8.91)	7.3	3.20 (±0.19)	14.4
	Processed ingredients	626 (±13.3)	30.7	62.1 (±1.84)	22.5	13.0 (±0.46)	17.4	37.9 (±0.81)	57.0	1596 (±39.8)	71.6	14.9 (±0.74)	67.1
	Processed foods	38.6 (±3.07)	1.9	5.40 (±0.55)	2.0	2.30 (±0.23)	3.1	0.50 (±0.07)	0.7	116 (±10.5)	5.2	0.00 (±0.00)	0.00
	Ultraprocessed foods	247 (±8.37)	12.1	34.6 (±1.32)	12.5	8.70 (±0.37)	11.7	5.90 (±0.42)	8.9	355 (±15.8)	15.9	4.10 (±0.34)	18.5
>55 (n=207)	Nonprocessed foods	430 (±22.9)	37.9	41.0 (±3.18)	33.5	29.6 (±1.77)	59.7	15.3 (±1.13)	31.4	123 (±9.26)	6.5	2.70 (±0.34)	11.5
	Processed ingredients	511 (±21.9)	45.1	51.8 (±3.23)	42.4	11.5 (±0.86)	23.2	30.2 (±1.33)	62.0	1411 (±74.2)	74.0	17.5 (±1.71)	74.7
	Processed foods	50.1 (±7.78)	4.4	5.90 (±0.98)	4.8	3.60 (±0.61)	7.2	1.10 (±0.38)	2.3	133 (±20.3)	6.9	0.00 (±0.00)	0.0
	Ultraprocessed foods	143 (±13.1)	12.6	23.5 (±2.48)	19.2	4.92 (±0.51)	9.9	2.12 (±0.39)	4.3	240 (±30.1)	12.6	3.22 (±0.58)	13.7
All (n=1605)	Nonprocessed foods	956 (±13.8)	52.2	143 (±2.28)	58.7	44.3 (±0.81)	65.8	20.1 (±0.50)	32.6	164 (±9.07)	7.9	2.62 (±0.13)	11.1
	Processed ingredients	547 (±9.32)	30.0	55.2 (±1.29)	22.7	11.1 (±0.31)	16.4	33.0 (±0.57)	53.6	1439 (±28.6)	68.9	13.6 (±0.51)	57.6
	Processed foods	38.0 (±2.32)	2.1	4.75 (±0.36)	2.0	2.39 (±0.18)	3.6	0.76 (±0.09)	1.2	101 (±6.92)	4.8	0.00 (±0.00)	0.0
	Ultraprocessed foods	288 (±7.12)	15.7	40.6 (±1.09)	16.7	9.55 (±0.30)	14.2	7.75 (±0.34)	12.6	385 (±13.1)	18.4	7.39 (±0.37)	31.3



**Figure 1.** Scatter plot between food consumption of each age group and intake of energy (A), carbohydrate (B), protein (C), fat (D), sodium (E), and sucrose (F)

cesses (15%) and natural salts in foods (10%).<sup>20</sup> The high sucrose intake from processed ingredients was due to sugar and should be of particular concern. When sugar is added to beverages that have a lower energy density than solid food, it will not cause a feeling of fullness. However, beverages with high sugar contents can provide high lev-

els of energy, resulting in excessive energy intake and weight gain.<sup>21</sup>

The substantial effect of processed ingredients demonstrated that the producers of processed ingredients have an important role in influencing nutrient intake. The food industry plays a major role in maintaining the nutritional

contents of raw materials and processed foods and in producing products with good nutrient profiles.<sup>22</sup> Furthermore, further food preparation processes at home or in restaurants are important in determining nutrient intake because specific food compositions are used in home- or restaurant-based food processing techniques.

### Conclusions

Food consumption in Jakarta is not dominated by processed and ultra-processed foods. Nonprocessed foods remain the main source of the energy intake. For the same amount of each food group, processed ingredients provide higher energy, fat, sodium, and sucrose intake than the other food groups. Furthermore, apart from the food industry, the use of processed ingredients at home or in restaurants has a substantial role in determining nutrient intake.

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### AUTHOR DISCLOSURES

The authors declare that they have no competing financial interests and that their freedom to design, conduct, interpret, and publish research is not compromised by any controlling sponsor.

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