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Factors Associated with Expenditure on Animal Protein among Indonesian Households

Faktor-Faktor yang Berhubungan dengan Pengeluaran Pangan Hewani pada Rumah Tangga Indonesia

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ABSTRACT

Background: Eating animal protein (AP) can prevent stunting in children under five, which currently is still 21.5%. Due to scarce resources, households had trouble distributing the cost and frequently had to choose between it and other food expenses.
Objectives: This study aimed to examine the relationship between various food expenditures and expenditure on AP among Indonesian households.
Methods: This was a cross-sectional study using secondary data. Data on household food expenditures on AP, prepared food and beverage, cereals, instant noodles, fruits, cooking oil, cigarette, and sugar, total expenditure, household size, and age and education of household head from 97,467 household samples with children under five were obtained from the National Socioeconomic Survey (Susenas) March 2018. Susenas data were collected through interviews using a structured questionnaire. Using IBM SPSS Version 22, a multiple linear regression was carried out, adjusted for household socioeconomic factors.
Results: The average per-capita household expenditure on AP was IDR 24,912, contributing 4.72% to total food expenditure. This expenditure was higher than that on cereals (3.77%) but lower than that on prepared foods and beverages (6.15%). There was a positive association ($p<0.001$) between fruits, instant noodles, cooking oil, sugar, and beans and nuts expenditure and AP expenditure. Contrarily, there was an inverse relationship between prepared food and beverage ($p<0.001$), cereals ($p=0.004$), and cigarette expenditure ($p<0.001$) and animal protein expenditure.
Conclusions: The amount spent on animal proteins was positively correlated with other food. It is possible that the consumption of animal proteins would increase if household funds were diverted from cigarettes and prepared food and beverage.

INTRODUCTION

Stunting in children under five is still a problem in many countries, including Indonesia. Currently, a reduction in stunting prevalence has been made. However, the latest data on stunting showed that the prevalence was still 21.5%, which was categorized as high[1,2].

It has long been known that a variety of factors contribute to stunting. The odds of stunting rose noticeably for children living in households with three or more children under five years old, for households with five to seven members, for boys, for children aged twelve to twenty-three months, for children whose mothers attended fewer than four antenatal care services during their pregnancies, and for children weighing less than 2,500 grams at birth[3–5]. The odds also increased noticeably when the household wealth index decreased[3]. Other factors included children living in rural areas, children from low-income, illiterate, and female-headed households, as well as those who improved infant and young feeding practices[4,6]. Stunting is associated with moms who have never attended school and babies who are born with their mothers believing them to be little or ordinary in size[5]. Finally, the combination of unimproved latrines and untreated drinking water was linked to elevated odds of stunting in Indonesia[5,7]. Socioeconomic status indicators, including mother's education, occupation, and household income, as well as sanitation, were among the factors directly associated with stunting. Concurrent stunting is influenced by maternal and household factors, including maternal height, age, and education, large household size, and lower socioeconomic status[6]. The proportion of household food expenditure, proportion of fruits and vegetables, and protein adequacy were significantly associated with stunting prevalence[8].

More and more research indicate that eating animal protein can prevent stunting in children under five. An analysis of 130,432 children aged 6–23 months

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from 49 countries discovered substantial correlations between stunting and animal-sourced food consumption, including dairy, meat/fish, and eggs[9]. Similarly, a systematic review found an association between intake of animal-source food and stunting among children 6-60 months in low- and middle-income countries[10]. Dairy protein has been shown to specifically stimulate linear growth, according to convincing evidence[11]. The result is similar to a study in Indonesia held in 2013-2014 shows that drinking growing-up milk minimum of 300 mL per day helped prevent stunting among toddlers[12]. A cross-sectional study in Bogor, Indonesia, also shows that, unlike normal toddlers, stunted toddlers consumed less milk quantity and frequency[13]. Even, the benefit of animal proteins can be seen in older children. For children above 60 months of age in Nepal, milk consumption is associated with higher height for age z-scores[14]. A nested case-control study in Iran also found that low animal protein in the diet was associated with a higher prevalence of stunting in children 6-7 years old[15].

Animal proteins are a good source of fat-soluble vitamins and essential fatty acids since they are nutrient-dense in terms of several highly accessible micronutrients than plant-based meals. Moreover, they are the sole source of vitamin B12. Therefore, they are associated with linear growth[16]. Moreover, it is better to consume a variety of animal proteins than just one since they have a stronger impact[9].

Owing to a lack of income, people usually had to pick between paying for animal food and other food expenses. Socioeconomically disadvantaged individuals frequently choose foods with lesser nutritional content and consume meals of inferior quality[17]. At very low incomes households may consume largely basic staples[18].

Price was frequently the primary obstacle for low-income households to consume meals from animal sources[19,20]. Households consumed more animal protein as income rose[18,21]. However, the increase may vary by household income class. According to one study, households with lower incomes consume more eggs and fish, those with middle-class incomes consume more chicken and milk, and households with higher incomes consume more beef[21]. In a different study, households in the lowest quintiles saw a significant increase in their spending on meat and poultry as their income improved, whereas all households experienced only a small increase in their spending on eggs and fish[18].

Nonetheless, there is still limited data available regarding the relationship between the expenditure of animal protein and the expense of other foods. This research aimed to examine the link between various food expenditures and expenditures on animal protein.

METHODS

The design of this study was cross-sectional using secondary data obtained from the National Socioeconomic Survey (Susenas) March 2018 collected by BPS-Statistics Indonesia. From all households in Indonesia a population comprising about 67 million, in total, Susenas collected 295,155 samples which were selected using multi-stage cluster sampling from all districts/cities in 34 provinces[22]. The inclusion criteria for Susenas are ordinary households, while the exclusion criteria are specific households. A person or a group of people who share a physical residence, such as a census building, and who prepare food and other necessities of life collectively are referred to as an ordinary household. On the other hand, a specific household consists of (1) individuals who live in dorms, barracks, orphanages, prisons, jails, or other facilities where a foundation or other institution is in charge of providing basic necessities; and (2) individuals who live in boarding houses with ten or more boarders. Finally, this study analyzed data from 97,467 households with inclusion criteria of having children under five and exclusion criteria of having incomplete data on households' characteristics and expenditures.

Overall, this study collected data on household total and food expenditures, household size, age of household head, and education of household head. Data on food expenditures were obtained by asking the household head, spouse, or other household member who was able to answer the questions in the structured questionnaires on food expenditure in the past week[22]. Further, data on weekly food expenditure in each household was divided by 7 to obtain daily expenditure and then multiplied by 30 to get monthly expenditure. Finally, after being divided by household size, data on per-capita monthly expenditure were obtained. Animal proteins included fish/shrimp/squid/clams (fresh and preserved), meat (fresh, preserved, and innards), eggs (chicken egg, duck egg, and others), and milk (liquid, powder, and sweetened condensed milk). Using IBM SPSS Version 22, a multiple linear regression was carried out, adjusted for socioeconomic factors of the household (household total expenditure, household size, age of household head, and education of household head). Statistical significance was defined as a p-value less than 0.05.

RESULTS AND DISCUSSION

The mean age of household head was 41.89 years with the biggest proportion of them being elementary school graduates. The mean household size was 5 persons with a total expenditure of IDR 916,816 per capita per month. The mean proportion of food expenditure was 59.1%. When categorized based on cut-off for food security, most households were categorized as having a proportion of food expenditure of 65% or below and, therefore were considered as not poor[23].

Table 1. Characteristics of households (n=97,467)

Household Characteristics	Mean (SD)
Age of household head (year)	41.89 (12.09)
Education of household head, n (%)	
Elementary school	43,079 (44.2)
Junior high school	17,091 (17.5)

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Household Characteristics	Mean (SD)
Senior high school	27,330 (28.0)
Higher education	9,967 (10.2)
Household size	5.14 (1.84)
Total expenditure (IDR/capita/month)	916,816 (790,346)
% food expenditure	59.1 (12.87)
% food expenditure >65, n (%)	
Yes	34,237 (35.1)
No	63,230 (64.9)

IDR/capita/month = Indonesian Rupiah per capita per month

The mean per-capita household expenditure on animal protein was IDR 24,912, contributing 4.72% to total food expenditure. This expenditure was higher than that on cereals but lower than that on prepared foods and beverages, which were 3.77% and 6.15%, respectively. Expenditure on cigarettes was more than half of animal protein expenditure, which was 2.48%. Even though lower than expenditure on prepared food and beverage, animal proteins, and cereals, expenditure on cigarette was higher than expenditure on fruits, cooking oil, sugar, beans and nuts, and instant noodles (Table 2).

Table 2. Household food expenditures (n=97,467)

Household Food Expenditures (IDR/capita/month)	Mean (%)
Animal protein	24,912 (4.72)
Cereals	14,945 (3.77)
Beans and nuts	1,924 (0.43)
Fruits	5,449 (1.00)
Instant noodles	1,576 (0.35)
Cooking oil	2,257 (0.52)
Sugar	1,737 (0.43)
Prepared food and beverage	32,510 (6.15)
Cigarette	12,693 (2.48)

IDR/capita/month = Indonesian Rupiah per capita per month

Overall, as presented in Table 3, expenditure on beans and nuts, fruits, instant noodles, cooking oil, and sugar were positively correlated with expenditure on animal protein. On the other hand, there was a negative correlation between expenditure on cereals and expenditure on animal protein. Similar patterns were also seen between prepared food and beverage and expenditure on animal protein and between cigarettes and expenditure on animal protein. More than half (52.5%) of the variation in animal protein expenditure can be explained by the respective variables.

The most elastic food complementing animal protein expenditure was cooking oil. In detail, the increase in cooking oil expenditure by 10% was associated with an increase in animal protein expenditure by 15.35%. In Indonesia, deep-frying is one of the most popular ways to prepare food[24–26]. The rapid growth of international food service businesses, like fast food, has significantly changed Indonesians' eating patterns because of globalization. Fried chicken is the main dish offered by this quick-service restaurant[26].

Another food complementing animal protein was sugar. An increase in sugar expenditure by 10% was associated with increased animal protein expenditure by 7.45%. Both traditional and contemporary food is usually cooked using the frying cooking method, which is packed with sugar[27]. Moreover, it is also common that sugar is found as spices that are used as seasonings to flavor food[26].

In this study, beans and nuts were found to be complementary to animal protein. This can be seen from the result of the analysis showing that an increase in beans and nuts expenditure by 10% was associated with an increase in animal protein expenditure by 3.26%. As sources of plant protein, beans and nuts are also prepared with animal protein and seasonings to enhance the flavor of food[26].

As much as a 10% decrease in cereals expenditure was associated with a 0.21% increase in animal protein expenditure. Cereals, including rice, are the staple food for Indonesians, acting as the main source of carbohydrates. In households with low resources, cereals frequently act as a source of protein rather than animal protein[17,18].

Nevertheless, other forms of energy and carbohydrate sources, namely instant noodles, had different results. The increase in instant noodles expenditure by 10% was associated with an increased animal protein expenditure of 2.69%. Instant noodles contain monosodium glutamate (MSG). According to a study, when paired with protein, MSG has been demonstrated to improve satiety. This explains why instant noodles have become a popular comfort food and get along well with animal protein. In addition, when MSG was added, the energy consumed in the high-energy protein-rich condition was better compensated for, indicating that the addition of these taste enhancers improved energy control even more than just giving a high-protein source[28].

An increase in fruit expenditure of 10% was correlated with an increase in animal protein expenditure by 3.55%. Fruits are frequently used as desserts. Therefore, fruits are used in the dishes to create more

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healthy dishes that balance animal protein. Furthermore, as fruits are generally considered to be very tasty, their addition to main meals that contain animal protein does not affect the flavor of the meal[29].

The 10% increase in prepared food and beverage was linked to a 0.59 percent decrease in the expenditure of animal protein. Prepared food and beverage are food and drinks obtained far away from home, which is commonly available in public eateries, fast-food restaurants, cafeterias, and small vendors or kiosks[20]. As found in this study, the proportion of prepared food and beverage is higher than cereals which were previously known as staple food. The consumer chooses prepared food and beverages since they have limited time to prepare food. Moreover, nowadays, individuals may easily order food from their cellphones, and it will be delivered right away to the location of the order[30].

A 10% reduction in cigarette spending will result in a 0.89% rise in spending on animal proteins. This is consistent with earlier research that found smoking has a negative effect on protein intake[31]. Another study also reports reduced budget allocations for eggs, milk, and meat due to increased cigarette use[32]. In other words, because of redistributing household expenses, dietary composition changes and protein intake decline.

Table 3. Factors associated with expenditure on animal protein

Food Expenditure	B	SE	β	p
Cereals	-0.021	0.007	-0.008	0.004*
Beans and nuts	0.326	0.028	0.028	<0.001**
Fruits	0.355	0.008	0.109	<0.001**
Instant noodles	0.269	0.027	0.023	<0.001**
Cooking oil	1.535	0.035	0.108	<0.001**
Sugar	0.745	0.042	0.044	<0.001**
Prepared food and beverage	-0.059	0.002	-0.080	<0.001**
Cigarette	-0.089	0.004	-0.058	<0.001**

Multiple linear regression, adjusted r-squared 0.525, *p<0.005, **p<0.001
This model was adjusted for total household expenditure, household size, age of household head, education of household head.

The utilization of data from a national survey, Susenas, which covers all districts in Indonesia, is the study's main strength. This allows for a more thorough analysis. Moreover, the study analyzed Susenas March 2018 data, which is quite recent. However, not all food expenditures are included, despite the study's attempt to consider all expenses associated with animal protein that were discovered in the earlier studies.

CONCLUSIONS

Expenditure of animal proteins was strongly correlated with other food expenditures. The expense of animal protein had a positive association with the expenses of fruits, instant noodles, beans and nuts, sugar, and cooking oil. On the other side, there was a negative association between spending on cereal and spending on animal protein, as well as between spending on prepared food and drink and spending on animal protein, and between spending on cigarettes and spending on animal protein. Shifting funds from cigarettes and prepared food and beverage may increase the consumption of animal proteins. Further research may be done by including expenditures on more food items.

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