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Portrait of the Three Pillars of Food Security in Riau Province

Potret Tiga Pilar Keamanan Pangan di Provinsi Riau

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Abstract

This article will analyze the three pillars of food security in Riau Province and the factors that influence the fulfillment or non-fulfillment of these pillars. It will also outline the impact on vulnerable groups such as women and children if food security is not met. This research employs a qualitative method with data collection through literature analysis and selected documents such as journals, annual reports, and official documents released by governmental or non-governmental agencies. Speaking of factors influencing food security, there are four determining factors: government, economic access, environment, and global/international conditions. However, for food security in Riau, poverty and the environment are the two determining factors and are the main priorities for analysis in this article, including how the Riau Provincial Government responds to these conditions. The article demonstrates that in the pillar of food availability, the quantity and consumption of food are determining factors that impact the occurrence of malnutrition, undernutrition, and even stunting in children. Poverty and the environment are the main determinants of unmet food security in the pillar of food access, with the environmental factors being influenced by deforestation and population growth. Meanwhile, in the pillar of food utilization, the amount of energy consumption is the determining element.

Keywords

Food Access; Food Availability; Food Security Pillars; Food Utilization; Riau.

Abstrak

Tulisan ini akan menganalisis tiga pilar keamanan pangan di Provinsi Riau dan faktor yang mempengaruhi terpenuhi atau tidaknya tiga pilar yang dimaksud. Tulisan ini juga akan memaparkan bagaimana dampak yang ditimbulkan bagi kelompok rentan seperti perempuan dan anak-anak jika tiga pilar keamanan tersebut tidak dapat dipenuhi. Penelitian ini menggunakan metode kualitatif dengan pengumpulan data dilakukan melalui analisis literatur dan dokumen-dokumen terpilih seperti jurnal, laporan tahunan, dan dokumen resmi yang dirilis oleh lembaga atau instansi resmi baik dari pemerintah maupun non pemerintah. Berbicara mengenai faktor yang mempengaruhi tiga pilar keamanan pangan, ada empat faktor sesungguhnya yang menentukannya yaitu pemerintah, akses ekonomi, lingkungan, dan kondisi global/internasional, namun untuk terpenuhi atau tidaknya keamanan pangan di Riau, kemiskinan, dan lingkungan menjadi dua faktor penentu dan menjadi prioritas utama untuk dianalisis dalam tulisan ini sekaligus menjabarkan bagaimana pemerintah Provinsi Riau merespons dua kondisi tersebut. Tulisan ini menunjukkan bahwa dalam pilar ketersediaan pangan, kuantitas dan konsumsi pangan menjadi faktor penentunya yang berdampak pada terjadinya gizi buruk, kurang gizi, bahkan stunting pada anak-anak. Kemiskinan dan lingkungan menjadi penentu utama tidak terpenuhi keamanan pangan dalam pilar akses pangan, faktor Lingkungan dalam hal ini ditentukan oleh deforestasi dan pertambahan populasi. Sementara dalam pilar pemanfaatan pangan, jumlah konsumsi energi menjadi elemen penentunya.

Kata Kunci

Pilar Keamanan Pangan; Ketersediaan Pangan; Akses Pangan; Pemanfaatan Pangan; Riau.

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1. Introduction

Many questions arise regarding food security and insecurity. Some frequently asked questions include why do people experience food insecurity? Why do women and children become vulnerable communities with insufficient nutritional intake? Why do children under five years old in many countries have below normal weight? (Pritchard et al., 2017) revealed that hunger and malnutrition are massively present where more than one billion people, almost all of whom are in developing countries, lack access to food and nutrition. This condition is closely related to poverty, as poverty and food insecurity are intertwined (Harris, 2006). The poorer a person is, the more food insecure they will be because they lack stable employment, have low-quality health and education, and have very few economic opportunities. This article focuses on how these issues are directly related to food consumption security (Harrison, 2015).

Food security encompasses three key elements: the presence of enough food, the ability to obtain it, and its effective utilization, which involves considerations of nutrition and susceptibility (Beretta et al., 2017). While the Riau Provincial Government has endeavored to fulfill these aspects, particularly in tackling hunger and malnutrition, there is a necessity for strategies to confront the intricate challenges associated with this endeavor. A comprehensive understanding of crucial issues related to food insecurity is essential. The causes of food insecurity vary in each region, for cases in Riau, food insecurity generally occurs due to economic factors, deforestation, population growth, quantity and quality of food consumption, and energy consumption that are interrelated.

Fundamentally, food security is closely related to population growth. Food production must keep up with the increasing population (Gooch, 2010). At the same time, income will greatly affect the ability to purchase the necessary food intake. Income is also a factor related to access to food. The better someone's income, the better the quality of their food intake. The poorer someone is, the more likely they will buy food based on the cheapest price rather than its quality. With more money, there will be the ability to buy fruits, vegetables, meat, milk, and eggs. Meeting these food needs certainly requires a considerable cost.

In some cases, people cannot meet their food needs because supplies run out in markets that usually provide them. But more often, they simply cannot afford to buy available food or cannot utilize it. This factor contributes to the occurrence of food insecurity. Nonetheless, the primary cause of food insecurity is poverty, coupled with the impact of environmental conditions that pose challenges to vulnerable populations, impeding their ability to meet the three pillars of food security.

2. Methods

This article analyzes the three pillars of food security in Riau Province, focusing on poverty and environmental challenges. Using a qualitative approach, this study draws on literature and official documents to examine the impacts of these factors on vulnerable groups, including women and children. The findings reveal that poverty and environmental degradation are critical in determining food access and availability, leading to malnutrition and stunting among children. The study underscores the need for coordinated government responses to address these challenges. This article also adopts a qualitative approach to gather comprehensive and in-depth data. The data collection process involves literature analysis, encompassing the exploration of relevant information sources such as scientific journals, annual reports, and official documents published by governmental and non-governmental institutions. Moreover, during the data collection phase, the critical emphasis is on meticulously selecting pertinent and meaningful documents to lay robust groundwork for analysis and research. By employing a thorough and

detailed method in sourcing these data, it is expected that the resultant findings and conclusions will offer a substantial contribution to comprehending food security concerns, especially within the Riau context.

3. Results and Discussion

3.1. The Pillar of Food Availability: Quality and Quantity of Food Consumption

According to the Nizmi et al. (2024), food security is characterized by the fulfillment of food needs at various levels, from national to individual, demonstrated by the presence of adequate, safe, diverse, and nutritious food that is accessible, affordable, and aligns with the cultural and religious values of the community. This fosters healthy, active, and sustainable lifestyles. Achieving food security and nutrition involves a systematic approach across multiple sectors, aiming to ensure sufficient food availability through domestic production and trade, stability in food availability at both large and small scales, and enhancing the quality and quantity of food consumption through infrastructure enhancements. To realize these goals, support from macroeconomic policies is crucial to attain economic stability, ensuring the stability of food supply and prices.

The Food Security Index (FSI) serves as a metric to gauge the level of food security within a region, taking into account its defining factors and subsystems. In the case of Riau Province, the average growth of the FSI across its districts and cities from 2018 to 2022 displays positive trends, except for Rokan Hulu District, which experienced a negative growth rate of -1.20. This decline can be attributed to persistently low food availability, particularly in the production of staple crops like rice, corn, sweet potatoes, and cassava. Furthermore, there remains a significant proportion of households lacking access to clean drinking water, further exacerbating the challenges to food security in the region. Districts that experienced a significant increase in growth are Kepulauan Meranti, supported by sago production which has been included in food availability calculations. The detailed development of the Food Security Index (FSI) of Districts/Cities can be seen in the data below.

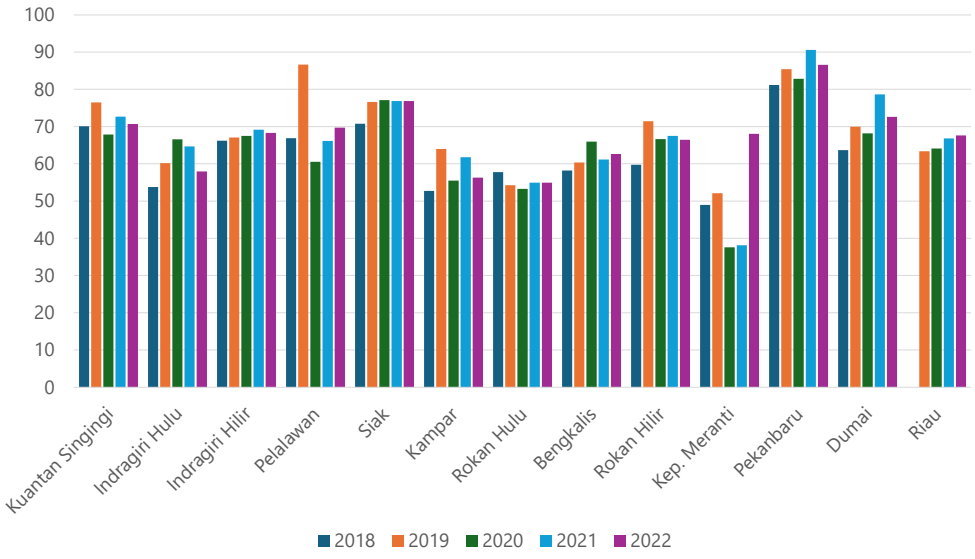


Figure 1. Development of Food Security Index at District/City Level (Percentage)

Source: Badan Pangan Indonesia (2022). Data is processed (2022)

If a region fails to meet the standards for food quality and consumption, it can lead to malnutrition and stunting, posing a significant threat to future health.

Research by Cameron et al. (2021) highlights the extensive impact of stunting on health, productivity, and income in the long term. Research by Fogel (1997) and Deaton (2007) delved into the relationship between stunting and shifts in height, income, and economic development. Judge and Cable (2004) proposed that societal perceptions favoring taller individuals, their capacity for physical labor, enhanced health during growth phases, and cognitive abilities contribute to observed trends. Lynn (1990) suggested that improved nutrition leading to increased height, head circumference, and brain size could lead to broader enhancements in intelligence. Additionally, Eppig et al. (2010) and Deaton (2007) highlighted the impact of nutritional intake on population dynamics, with variations influenced by changes in disease patterns and environmental factors affecting nutrition.

Stunting is primarily caused by insufficient nutritional intake over an extended period, resulting in a mismatch between actual and required nutrition levels, ultimately leading to stunting. The Ministry of Health of the Republic of Indonesia (Dinkes Riau, 2022) defines malnutrition as a severe undernutrition condition in children, indicated by a body mass index for age (BMI/A) < -3 SD or clinical signs of marasmus, kwashiorkor, and marasmus-kwashiorkor. Malnutrition, particularly in young children, can hinder child development, reduce cognitive abilities, and impact intelligence. The graph below illustrates the prevalence of malnutrition among toddlers in Riau Province.

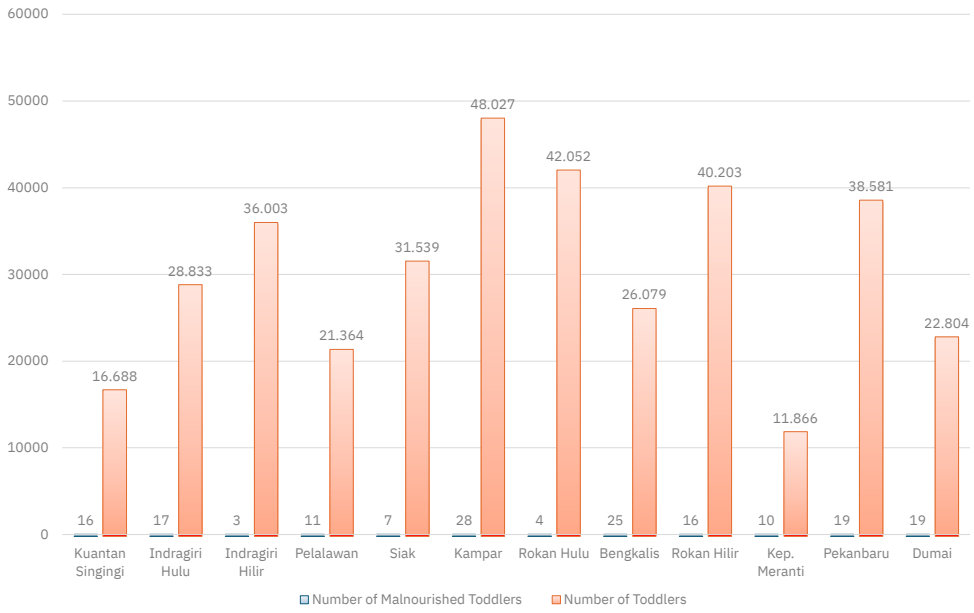


Figure 1. Prevalence of Malnourished Toddlers in Districts/Cities in Riau Province

Source: Dinkes Riau (2022). Data is processed (2022)

The data provided above showcases the prevalence of malnutrition across districts and cities in Riau Province. Examination of the graph data highlights that Kuantan Singing, Indragiri Hulu, Kampar, Bengkalis, Kepulauan Meranti, and Dumai are regions where instances of malnourished young children surpass the average malnutrition rate of 0.05 percent in Riau Province in 2022. This observation serves as a pivotal point for future initiatives aimed at addressing malnutrition in Riau Province.

In a similar vein to malnutrition, insufficient consumption of nutrition suitable for their age is the primary cause of undernutrition in toddlers. Failing to promptly rectify this nutritional shortfall can result in malnutrition concerns among children. The prevalence of undernutrition in Riau Province from 2018 to 2022 demonstrates

a declining pattern, commencing at 10.7 percent in 2018 and decreasing to 1.18 percent in 2022. The specific details regarding the prevalence of undernutrition in Riau Province are outlined in Table 1.

Table 1. Prevalence of Undernourished Toddlers in Riau Province from 2018 to 2022

No.	Description	2018	2019	2020	2021	2022	Growth per Year (%)
1	Number of Undernourished Toddlers	14,286	9,863	12,785	14,909	4,310	-0.14
2	Total Number of Toddlers	133,930	149,280	348,340	352,428	364,039	0.37
3	Prevalence of Undernourished Toddlers	10.7	6.61	3.7	4.2	1.18	-0.35

Source: Dinkes Riau (2022). Data is processed (2022)

In response to the conditions outlined earlier, the Provincial Government of Riau must continue to make sustained efforts to improve the health of toddlers in the future. Following the guidelines set forth by the World Health Organization (WHO), addressing the status of malnutrition in toddlers involves improving the intake of macro and micronutrients through the gradual provision of supplements and therapeutic foods, treating concurrent diseases, and managing severe acute malnutrition through both inpatient and outpatient care for uncomplicated cases, to address stunting and severe acute malnutrition (Nizmi et al., 2024).

Based on the statistical data above, it is evident that this is a persistent issue requiring immediate attention and targeted interventions to improve the nutritional status of children in the region. The declining trend in the prevalence of undernutrition from 2018 to 2022 is a positive sign, yet more comprehensive efforts are needed to effectively address the nutritional issues (Donelan, 2019). By adhering to the recommendations of the World Health Organization and implementing strategies to enhance nutritional intake and provide appropriate medical care, the Provincial Government of Riau can work towards reducing the incidence of severe acute malnutrition and ensuring the well-being of the youngest population in the region. Addressing these challenges will not only improve the health of children specifically but also contribute to the overall development and prosperity of the province.

3.2. Pillar of Food Access: Poverty, and Economic Aspects

Access to food constitutes one of the fundamental pillars of food security. It encompasses the household's capacity to acquire a sufficient quantity of food through various means such as self-production, reserves, purchases, exchange, donations, loans, or food assistance. Ringen (1985) emphasized that poverty stands as the primary driver of hunger and chronic malnutrition globally. Despite the availability of food in local markets, many impoverished households still encounter challenges in accessing it. The presence of hunger and malnutrition often coexists even in regions with surplus food. The impoverished not only grapple with meeting their nutritional requirements but also frequently lack access to essential resources like land, clean water, seeds, technology, and other necessities vital for food production for themselves and their families.

Ishak et al. (2021) revealed that poverty is a situation where there is minimal access to necessities such as food, clothing, shelter, drinking water, and electricity, all of which are closely related to quality of life. Typically, the impoverished segment of the population comprises individuals with average per capita monthly

expenditure falling below the poverty line. This poverty threshold denotes the minimal monetary requirement necessary to fulfill basic food needs, equivalent to approximately 2100 kilocalories per capita per day, alongside other essential non-food necessities. Food acquired due to poverty tends to be of inferior quality, lacking vital vitamins, minerals, and other micronutrients crucial for good health. Given that impoverished communities allocate a greater proportion of their income toward food consumption compared to affluent counterparts, any rises in prices will disproportionately affect them.

Adams (2020) elucidates the interconnectedness of poverty and hunger, wherein poverty often precipitates hunger by impeding the capacity to afford or generate an adequate food supply. Conversely, hunger exacerbates poverty by constraining individuals' ability to work effectively and fulfill their nutritional requirements. A snapshot of the data illustrating the number of impoverished individuals in Riau Province is presented in Table 2.

Table 2. Number and Percentage of Population Living Below the Poverty Line per District/City

No.	District/City	Total Poor Population (Thousand)		Poverty Population Percentage	
		2020	2021	2020	2021
1	Kuantan Singingi	29.34	28.90	8.91	8.97
2	Indragiri Hulu	44.29	44.61	5.93	6.18
3	Indragiri Hilir	44.29	44.6`	5.93	6.18
4	Pelelawan	45.88	49.30	9.16	9.63
5	Siak	25.38	25.77	5.09	5.18
6	Kampar	65.30	68.74	7.38	7.82
7	Rokan Hulu	73.35	74.73	10.31	10.40
8	Bengkalis	36.96	37.66	6.40	6.64
9	Rokan Hilir	48.85	51.97	6.72	7.18
10	Kepulauan Meranti	47.10	48.50	25.28	25.68
11	Pekanbaru	30.40	32.73	2.62	2.83
12	Dumai	9.88	10.57	3.16	3.42
	Riau	483.39	500.81	6.82	7.12

Source: Statistics of Riau Province (2022). Data is processed (2022)

Poverty impacts access to food due to economic constraints in purchasing, producing, or providing for the food needs of families. In the Province of Riau, economic access to nutritious food stands as a critical factor influencing food security and nutrition. Despite the availability of food within the province, household poverty and elevated or volatile food prices can hinder access to food, particularly nutritious options. Nutrient-rich foods often command higher prices in the market, diminishing the purchasing power of the impoverished populace. Consequently, they may resort to purchasing relatively inexpensive staple foods that lack essential micronutrients, proteins, and fats, merely to satiate hunger. The susceptibility of households to poverty is largely determined by their livelihood strategies and the availability of employment opportunities at both regional and local levels. Livelihood strategies encompass the ability, household assets/capital (including natural, physical, human, economic, and social assets), and activities necessary to secure basic needs such as income, food, shelter, health, and education.

Poor communities also have limited access to electricity. Household access to electricity is a good indicator of economic well-being, improved livelihood

opportunities in a region, and the potential for better household living conditions. In Riau Province, within the Indragiri Hilir Regency, there are three districts—Mandah, Batang Tuaka, and Sungai Batang—where the proportion of households lacking access to electricity equals or exceeds 30%. However, according to data from 2021, on average, all districts across Riau Province exhibit a percentage of households without access to electricity below the 30% threshold.

Table 3. Percentage of Households Without Electricity Access in Riau Province

No.	District Name	Sub-District Name	Percentage of Households Without Electricity Access
1	Indragiri Hilir	Mandah	42.69
2	Indragiri Hilir	Batang Tuaka	34.44
3	Indragiri Hilir	Sungai Batang	33.72

Source: SAE (Small Area Estimation) (Statistics of Riau Province, 2022), Data is processed (2022)

Access to electricity plays a crucial role in determining the well-being of households in a community. The data presented highlights that in several regencies in Riau Province, where households have limited or no access to electricity, significant challenges exist that impact the economic well-being and quality of life of the population. Firstly, electricity access is essential for economic activities and livelihood opportunities. Without electricity, households may face limitations in engaging in income-generating activities, such as running small businesses, using modern agricultural equipment, or accessing online markets. The lack of access hinders economic growth and limits households' potential to improve their financial situation. Secondly, electricity is crucial for enhancing living conditions and overall quality of life. Access to electricity enables households to have lighting for studying or working at night, refrigeration for storing food and medications, and electronic devices for communication and entertainment. These facilities contribute to a safer, healthier, and more comfortable living environment for families.

Furthermore, access to electricity is closely related to education and skill development. With electricity, children can effectively study at night, access online educational resources, and develop digital literacy skills. Additionally, adults can participate in vocational training or online courses to enhance their skills and employability, ultimately leading to better job opportunities and higher income levels.

Therefore, this data underscores the importance of access to electricity in promoting economic well-being and improving the overall welfare of households. Addressing the limited access to electricity in several regencies in Riau Province is crucial to unlocking the full potential of households, fostering economic growth, and creating a more sustainable and prosperous society. Efforts to expand electricity infrastructure and ensure universal access to electricity are essential steps in empowering households and enhancing their well-being.

3.3. Pillar of Food Access and Environmental Influence: Population Growth and Deforestation of Forests

The disparity between population size and resource availability can contribute to food insecurity. The resources of a nation, such as its land, water, forests, and fisheries, might struggle to satisfy nutritional requirements as the population expands. Nations with large populations may find it challenging to fulfill the substantial requirements of their food supply systems. Notably, while population growth is on the rise, available resources are progressively diminishing.

In terms of population dynamics, the rate of population growth in each regency/city within Riau Province is notably robust. Migration primarily propels this

substantial population increase, overshadowing the relatively modest rise attributed to birth rates (around 1.5% annually). The surge in population aligns closely with the population density of a region. By 2023, the population density in Riau Province had surged to 74.73 individuals per square kilometer, marking a 2.68-person increase from the 2021 figure of 72.05 individuals per square kilometer. This heightened population density categorizes Riau Province as densely populated, a status that can significantly impact various aspects such as food availability, residential land demand, access to clean water, environmental considerations, and more (Statistics of Riau Province, 2022).

Table 4. The Number and Population Density by Regency/City in Riau Province in 2023

Regency/City	Area	Description		
		Number (Souls)	Share to Province (%)	Population Density (People/Km2)
Kuantan Singingi	5,272.74	351,786	5.22	66.72
Indragiri Hulu	7,978.17	475,002	7.05	59.54
Indragiri Hilir	13,465.89	663,248	98.5	49.25
Pelalawan	13,020.19	422,907	6.28	32.48
Siak	7,843.97	488,497	7.25	62.28
Kampar	10,897.22	898,840	13.35	82.48
Rokan Hulu	7,527.43	594,438	8.83	78.97
Bengkalis	8,520.44	592,390	8.8	69.53
Rokan Hilir	9,154.72	669,996	9.95	73.19
Kep. Meranti	3,636.79	217,607	3.23	59.83
Pekanbaru	633.40	1,020,308	15.15	1,610.84
Dumai	2,177.79	340,310	5.05	156.26
Riau	**90,128.76**	**6,735,329**	**100**	**74.74**

Source: Interim Population Projection Results 2020-2023 by the Central Bureau of Statistics of Riau Province. Data is processed (2024)

Aside from the issue of increasing population, Riau is also grappling with deforestation problems. While illegal logging activities play a part in deforestation, the majority of forest loss is due to the conversion of forested areas into agricultural land, residential areas, and other purposes. Forests are crucial ecosystems for sustaining food production, air purification, and water cycle regulation. As defined in the Indonesian Forestry Law No. 41 of 1999, a forest is an ecosystem comprising a land area with biological resources predominantly consisting of trees that are interconnected and inseparable within their natural environment. Forest areas are specific regions designated by the Government to maintain their status as permanent forests, ensuring legal certainty regarding their boundaries and extent.

As per Minister of Environment and Forestry Decree Number 903/MENLHK/SETJEN/PLA.2/12/2016, the forest area in Riau Province spans 5,406,492 hectares, which constitutes 60.69% of the province's total land area of 8,908,357 hectares (Satu Data Ditjen PHL, 2018). Forest areas in Riau Province are classified according to the Forestry Law into conservation forests, protected forests, Permanent Production Forests (HP), Limited Production Forests (HPT), and Production Forests eligible for conversion (HPK). The forest classification for Riau Province is depicted in Figure 3.

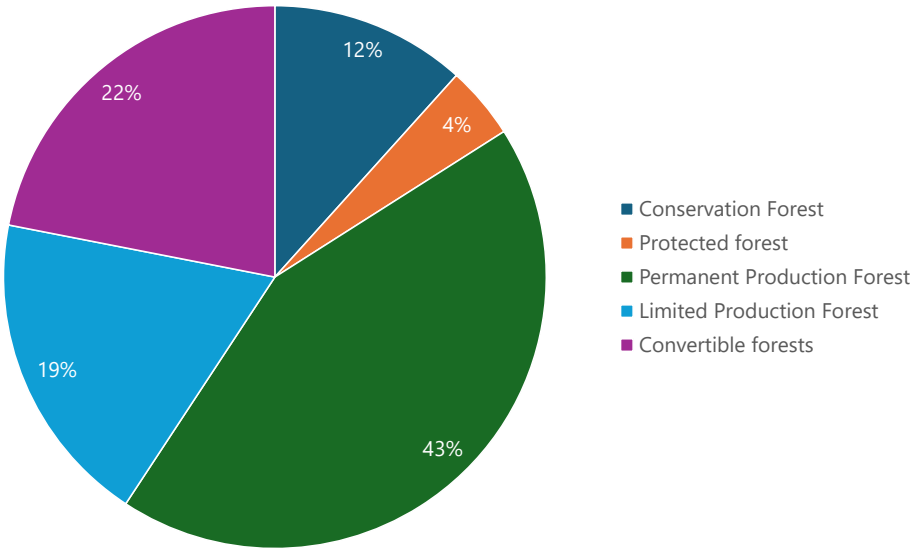


Figure 3. Forest Area of Riau Province

Source: Statistics of the Ministry of Environment and Forestry (Satu Data Ditjen PHL, 2018). Data is processed (2018)

The Permanent Production Forest is the largest forest group in Riau Province, covering 43.27%, followed by the Production Forest eligible for conversion at 21.92% and the Limited Production Forest at 18.81%. Meanwhile, the Conservation Forest and Protected Forest constitute the smallest forest groups, covering 11.67% and 4.33% respectively. The land/vegetation cover can be classified into two categories: forested and non-forested areas. Forested areas are further classified into three classes: primary forest, secondary forest, and plantation forest.

The land cover within and outside the forest areas in Riau Province in 2019 is depicted in the graph below. Based on the data in the graph, the forested areas of Riau Province cover 2,376,500 hectares (43.95%), while non-forested areas cover 3,030,500 hectares (56.05%). The forested land cover consists of 213,900 hectares of primary forest (3.95%), 1,273,900 hectares of secondary forest (23.56%), and 888,800 hectares of plantation forest (16.44%). This forest cover condition indicates the occurrence of degradation and deforestation in the forest areas of Riau Province.

Table 5. Area of Land Cover Inside and Outside Forest Areas in Riau Province in 2019 (000 Ha)

No.	Land Closure	Forest Area					CV	Quantity	%	Other Use Areas	Total	
		Permanent Forest									Quantity	%
		CF	PF	LPF	PPF	Quantity						
1	Forest	477.2	88	316.7	1,435.50	2,317.40	59	2,376.50	43.95	82.70	2,459.20	27.70
	Primary Forest	148	22.4	22.7	19.2	212.2	1.6	213.8	3.95	0.9	214.8	2.4
	Secondary Forest	310.5	63.8	240.1	612.5	1,226.90	47	1,273.80	23.56	50.60	1,324.50	14.90
	Plantation Forest	18.7	1.8	54	803.8	878.3	10.5	888.8	16.44	31.2	920	10.4
2	Non-Forest	153.5	149.9	700.6	904.10	1,904.10	1,126.40	3,030.50	56.05	3,393.10	6,423.60	72.30
	Total	**630.8**	**233.9**	**1,017.30**	**2,339.60**	**4,221.60**	**1,185.40**	**5,407.00**	**100.00**	**3,475.80**	**8,882.80**	**100.00**

Source: Directorate of Spatial Planning for Forest Area, Ministry of Environment and Forestry (Satu Data Ditjen PHL, 2018). Data is processed (2019)

The degradation of forest areas is identified by a reduction in both forest cover quantity and carbon stock over a defined period. Table 6 provides a comprehensive overview of forest area degradation between 2015 and 2019.

Table 6. Forest Area Degradation in the Years 2014-2019

No.	Forest Area/Forest Cover Type	Deforestation Area				
		2013-2014	2014-2015	2016-2017	2017-2018	2018-2019
1	**Conservation Forest**					
a	Primary Forest	103.1	2.3	6.0	45.8	76.6
	Primary Dryland Forest	103.1	2.3	6.0	45.8	76.6
	Primary Swamp Forest	0.0	0.0	0.0		0.0
	Primary Mangrove Forest	0.0	0.0	0.0	0.0	0.0
b	Secondary Forest	6,133.6	9,163.7	1,535.4	1,949.1	741.3
	Secondary Dryland Forest	3,137.4	8,747.6	1,526.5	1,869.7	455.9
	Secondary Swamp Forest	2,996.2	416.1	27.7	79.5	41.1
	Secondary Mangrove Forest	0.0	0.0	0.0	0.0	0.0
c	Plantation Forest	-324.9	309.7	9.4	2.8	451.3
	Amount 1	5,911.8	9,475.7	1,550.8	1,997.7	1,269.2
2	**Protected Forest**					
a	Primary Forest	0.0	108.5	19.1	19.2	82.2
	Primary Dryland Forest	0.0	108.5	19.1	19.2	82.2
	Primary Swamp Forest	0.0	0.0	0.0	0.0	0.0
	Primary Mangrove Forest	0.0	0.0	0.0	0.0	0.0
b	Secondary Forest	2,846.1	4,504.3	2,887.5	1,456.2	751.6
	Secondary Dryland Forest	1,915.4	4,374.1	2,887.5	1,456.2	741.6
	Secondary Swamp Forest	0.0	90.4	0.0	0.0	0.0
	Secondary Mangrove Forest	0.0	90.4	0.0	0.0	0.0
c	Plantation Forest	0.0	0.0	0.0	-742.9	12.9
	Amount 2	**2,846.10**		**2,906.60**	**732.5**	**846.7**
3	**Permanent Production Forest**					
a	Primary Forest	159.5	84.7	380.6	12.2	69.0
	Primary Dryland Forest	159.5	84.7	380.6	12.2	4.9
	Primary Swamp Forest	0.0	0.0	0.0	0.0	0.0
	Primary Mangrove Forest	0.0	0.0	0.0	0.0	64.1
b	Secondary Forest	24,720.8	9,599.5	7,961.2	5,604.4	5,823.3
	Secondary Dryland Forest	2,462.7	6,142.8	5,963.0	2,493.5	2,893.5
	Secondary Swamp Forest	22,044.7	3,220.7	2,360.3	3,053.7	188.2
	Secondary Mangrove Forest	213.4	235.9	-362.2	57.2	2,741.6
c	Plantation Forest	4,366.6	5,352.4	510.0	567.3	2,669.0
	Amount 3	**29,246.9**	**15,036.0**	**8,852.0**	**6,183.9**	**8,561.3**

4	**Production Forest**					
a	Primary Forest	857.9	268.6	0.0	1.4	0.0
	Primary Dryland Forest	0.0	0.0	0.0	0.0	0.0
	Primary Swamp Forest	857.9	268.6	0.0	1.4	0.0
	Primary Mangrove Forest	0.0	0.0	0.0	0.0	0.0

Source: Directorate of Spatial Planning for Forest Area, Ministry of Environment and Forestry (Satu Data Ditjen PHL, 2018). Data is processed (2019)

The data presented indicates a fluctuation in deforestation rates in forested areas between 2013 and 2019. Notably, there was a decrease from 180,786.5 ha in 2013-2014 to 8,120.6 ha in 2016-2017, followed by an increase to 23,672.3 ha in 2017-2018 and 136,998.3 ha in 2018-2019 (Satu Data Ditjen PHL, 2018). The degradation and loss of forest areas are attributed not only to illegal activities like logging, encroachment, and fires but also to conflicting land uses, such as conversion for mining, plantations, agriculture, and infrastructure development. These trends underscore the inadequate management of forest resources in Riau Province.

Deforestation can have profound repercussions on key aspects of food security, including the availability, accessibility, utilization, and stability of food resources. The diminishing forest cover hampers the ecosystem's capacity to support agricultural activities by disrupting essential functions like water regulation and soil fertility maintenance crucial for plant growth. Soil degradation, reduced water resources, and biodiversity loss resulting from deforestation can impede agricultural productivity and restrict food availability. Additionally, the transformation of forested areas into non-agricultural zones further reduces suitable land for food production, exacerbating the impact on food availability.

Moreover, deforestation can disrupt traditional farming methods and displace communities reliant on forests for sustenance, thereby impeding food access. Indigenous and local populations often depend on forests for food, medicine, and livelihoods. When forests are cleared for alternative uses, these communities may lose vital food sources, leading to food insecurity. Deforestation can also provoke land disputes and unequal resource distribution, compounding challenges in accessing food for vulnerable groups.

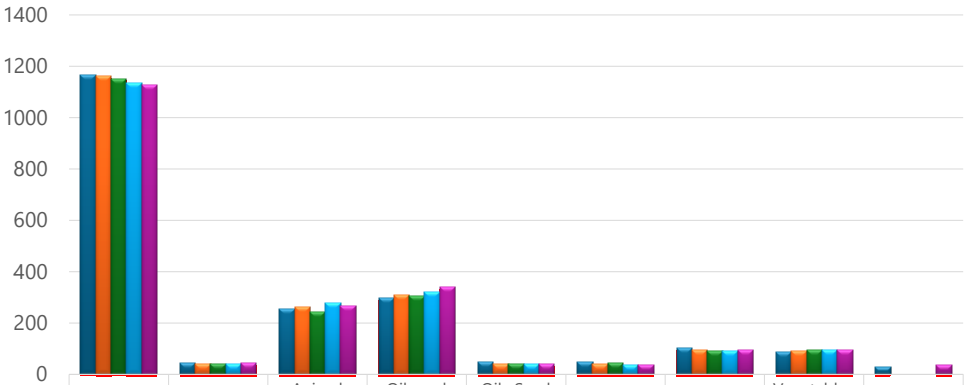
The ramifications of deforestation in food security are evident in compromised food quality and safety. The introduction of agricultural chemicals in deforested areas can contaminate water sources and agricultural products, posing health risks. Furthermore, deforestation-induced climate change can disrupt the prevalence and distribution of foodborne pathogens, endangering food safety. Changes in land use patterns due to deforestation can disturb traditional food processing and preservation techniques, impacting the nutritional value and safety of consumed food.

Therefore, deforestation significantly impacts the pillars of food security, affecting food availability, access, utilization, and stability. Addressing deforestation through sustainable land management practices, conservation efforts, and policy interventions is imperative to safeguarding food security and bolstering the resilience of food systems against environmental challenges.

3.4. Pillar of Food Utilization

In 2021, the daily energy consumption per individual in Riau Province was documented at 2,079.5 Kcal. This amount falls slightly below the National Nutritional Adequacy Rate (AKG) of 2,100 Kcal per capita per day. Conversely, the average daily protein consumption in Riau Province stood at 58.1 grams per capita

daily, meeting the national AKG standard of 57 grams per capita per day. Rice, a prevalent staple in the local diet, accounted for 1,127.3 Kcal per capita per day in total caloric intake. Following rice, oils, and fats contributed significantly with 339.1 Kcal per capita daily, while animal-based foods provided 266.4 Kcal per capita per day.



	Grains	Tubers	Animal Food	Oils and Fats	Oily Seed Fruit	Nuts	Sugar	Vegetables and fruits	etc
2017	1167	45	254	297	50	48	104	86	29
2018	1162	42	263	311	40	39	93	91	0
2019	1152	42	245	305	42	45	91	93	0
2020	1135.3	41.4	279.3	319.3	39.5	37.7	90.4	95.4	0
2021	1127.3	45.5	266.4	339.1	40.6	38	93.2	93.3	36

Figure 4. Energy Consumption, Dietary Diversity Score, and Protein Intake per Capita per Day, 2017-2021

Source: Food Security Sector of the Riau Province Food Security and Resilience Agency (Badan Pangan Indonesia, 2022). Data is processed (2022)

The share of energy derived from carbohydrates, such as rice, tubers, oils, fats, oily fruits/seeds, and sugar, has reached 79.13%, exceeding the Ministry of Agriculture's benchmark of 74%. In contrast, protein-based sources from animal products and legumes contribute 14.63% of the total energy intake, which falls short of the Ministry's target of 17%. Additionally, the intake of regulating sources like vitamins and minerals from vegetables and fruits stands at 4.4%, below the Ministry's guideline of 6%. These figures indicate that the consumption patterns in Riau Province do not align optimally with dietary recommendations. This contrast is further illustrated in Table 7.

Table 7. A Score of the Expected Food Pattern (PPH) Consumption by District/City in Riau Province 2017–2021

No.	District/City	Year				
		2017	2018	2019	2020	2021
1	Kuantan Singingi	82.61	81.2	84.9	82.0	84.10
2	Indragiri Hulu	82.65	86	88.7	83.3	84.20
3	Indragiri Hilir	82.60	81.5	86.4	81.9	82.00
4	Pelelawan	84.66	86.2	87.8	91.0	84.60
5	Siak	84.68	87.5	90.5	86.1	85.40
6	Kampar	82.68	85.5	86.1	83.5	84.80
7	Rokan Hulu	84.62	91.3	94.7	83.2	81.60
8	Bengkalis	84.14	79.7	82.4	82.5	84.10
9	Rokan Hilir	82.62	86.6	87.4	83.6	84.90
10	Kepulauan Meranti	85.14	83.5	77.2	78.0	77.70
11	Pekanbaru	84.64	85	87.2	84.7	81.80
12	Dumai	82.63	81.9	84.2	82.0	82.90
	Riau Province	**84.85**	**84.66**	**86.31**	**84.4**	**84.10**

Source: Food Security Sector DPTPH Riau Province (Satu Data Ditjen PHL, 2018). (2022)

The correlation between food utilization and achieving food security is vital and intricate. Food utilization encompasses the consumption, processing, and distribution of food among a population, considering elements such as food safety, quality, and nutritional content. Effective food utilization is paramount in ensuring that the community can access a diverse and ample food selection that fulfills their dietary requirements. Optimal food utilization plays a key role in enhancing food security by curbing food wastage, enhancing food accessibility, and encouraging a wider range of food options. Conversely, inefficient or insufficient food utilization can result in food insecurity, malnutrition, and various health issues within society. Hence, addressing concerns linked to food utilization is essential for realizing sustainable food security objectives and promoting the welfare of the community.

3.5. The Strategy of the Riau Government in Addressing Various Challenges to the Food Security Pillar

Poverty is the most significant factor contributing to the food security pillar. As an initial step to enhance synergy and concrete measures to combat poverty, the Riau Provincial Government has established the direction of poverty alleviation policies as a long-term strategy implemented through poverty alleviation programs, including in 2019 the Riau Provincial Social Service formed Joint Business Groups (Kelompok Usaha Bersama/KUBE) for the underprivileged based on the Integrated Database (BDT) to enable them to strive and prosper, and collaborated with the Cooperative Agency to provide entrepreneurship training to grow into cooperative business entities. Government policies and programs to reduce poverty need to focus on supporting facilities to strengthen the access of poor communities to microcredit (especially poor women and small and medium enterprises) with regionally appropriate mechanisms. The Riau Provincial Government continues to strive and commit to eradicating poverty through various programs and activities. Coordination between provincial and district/city governments is also necessary to support synergy and policy harmonization in poverty alleviation. This can be seen from the progress achieved by Riau Province in poverty alleviation, which aligns with the SDG's achievements, showing a significant decrease. Although the Riau Provincial Government has successfully reduced poverty over the past decade, it is important to note that the issue of poverty is not just about the number and percentage of the poor population but also considers other poverty indicators. The development of poverty indicators in Riau Province from 2018 to 2022 can be seen in Table 8.

Table 8. Development of Poverty Indicators in Riau Province from 2018 to 2022

Year	Population in Poverty (Individuals)	Poverty Rate (%)	Poverty Line (Rp/capita/ month)	Poverty Severity Index	Poverty Depth Index
2018	500,440	7.39	479,944	0.24	1.20
2019	490,720	6.90	500,612	0.25	1.13
2020	483,390	7.04	544,057	0.43	1.32
2021	500,810	7.00	586,062	0.28	1.09
2022	485,030	6.84	648,833	0.19	0.98

Source: Central Statistics Agency of Riau Province (Statistics of Riau Province, 2022). Data is processed (2023)

The government must prioritize fostering pro-poor economic growth to alleviate poverty rates effectively. Controlling inflation is paramount to safeguarding the purchasing power of impoverished populations, particularly concerning essential commodities like rice, corn, and tubers. It is imperative that all poverty reduction

initiatives are cohesive and inclusive, with active involvement from impoverished communities to bolster their capabilities. Mitigating the poverty rate and enhancing income distribution necessitates integrated approaches, including family-oriented social protection, community empowerment, and the expansion of economic prospects for low-income groups. These objectives pose significant challenges for the Riau Provincial Government.

4. Conclusion

Food security entails ensuring food availability at all levels, from national to individual, characterized by ample, safe, diverse, nutritious, evenly distributed, and affordable food that respects communities' religious and cultural norms, enabling them to lead healthy, active, and sustainable lives. Achieving food security and nutrition requires a coordinated effort across various sectors to ensure sufficient food availability through local production and trade, establish stability in food availability on both large and small scales, and ensure the quality and quantity of food consumption through infrastructure enhancements. This goal necessitates support from macroeconomic policies fostering economic stability to maintain food supply and prices.

Attaining food security requires a comprehensive approach encompassing various aspects of food production, distribution, and consumption. By prioritizing the provision of nutritious, safe, and culturally appropriate food for all, we can enhance health, well-being, and sustainable progress in society. It is vital to continue implementing comprehensive strategies involving collaboration across sectors to ensure a reliable and equitable food supply chain. This emphasis on equity ensures that no one is left behind in our pursuit of food security and nutrition. Additionally, integrating macroeconomic policies to bolster economic stability and regulate food prices is crucial for upholding food security and nutrition for both current and future generations. By adhering to these principles and working together towards common goals, we can strive for a more resilient and inclusive global food system that prioritizes individual welfare and fosters a healthier and more prosperous world.

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