Assessing food security post-earthquake in Majene, Indonesia: An analysis of food availability, consumption patterns, and dietary quality

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Abstract
This study examines food security in Majene, West Sulawesi, following the 2021 earthquake, focusing on food availability, consumption, and dietary patterns. The research utilizes a descriptive qualitative approach and relies on secondary data from the Food Security Service Office of the Majene Regency. The data are supplemented by information from the Central Statistics Agency and interviews with informants. The findings reveal that the primary nutritional parameters—energy, protein, and fat—are adequately met. The availability of energy from vegetable sources exceeds the recommended 984 kcal/capita/day. Protein availability, mainly from animal sources, meets the 63 grams/capita/day guideline. Fat availability, primarily from vegetable fats, also aligns with the recommended 72.17 grams/capita/day. During the earthquake, food supplies, which included 11 staple types, were sufficient, evidenced by available quantities surpassing consumption levels. For instance, rice availability stood at 29,277 tons against a consumption level of 20,084.70 tons. The study also assesses dietary patterns, finding that grains, oils, fats, oily fruits/seeds, sugars, and vegetables meet desirable dietary scores, while tubers, animal products, and legumes fall short.

INTRODUCTION

Food originates from biological sources, encompassing processed and unprocessed items designed for human consumption as nourishment and beverages. This category includes supplementary foodstuffs, raw materials, and other elements in preparing, processing, and producing food and beverages. According to Regulation No. 68 of 2002 by the Government of the Republic of Indonesia, as referenced in Banita (2013), human beings require specific materials for survival. Food invariably serves as a source of nutrients, offering essential carbohydrates, fats, proteins, vitamins, minerals, and water. Its purpose is to facilitate health and well-being throughout the human life cycle. The food and nutrition system's objective is to enhance and sustain optimal community nutritional status, comprising four critical components: 1) food supply, involving production, post-harvest treatment, and trade; 2) food distribution, including

transportation, storage, processing, packaging, and marketing; 3) food consumption, covering purchased food, cooking, family distribution, and individual eating habits; 4) food utilization, which entails digestion, absorption, metabolism, and nutrition.

Food security is a multifaceted issue, as Suryana (2014) observes. The challenge of food security is not exclusive to Indonesia; it is a global concern. The Food and Agriculture Organization (FAO) continuously updates information on food conditions worldwide and assists in developing government and community capacities to tackle food and nutrition security challenges (Berek, 2018). According to Law Number 7 of 1996, a region must ensure safe, equitable, and affordable food for all citizens to achieve regional food security (Indonesia, 1996).

Food availability entails sourcing food from plants, livestock, and fisheries at various levels, from national to household. Factors influencing a region's food availability include local production, land availability, inter-island distribution facilities and infrastructure, and food marketing. Effective distribution is vital, ensuring that regional households can meet their food consumption needs in quantity, quality, and affordability (Rahmadanih et al., 2010).

The Majene region in West Sulawesi Province experienced an earthquake in 2021, severely disrupting food distribution. This event highlighted the urgency of addressing food consumption needs and the importance of stakeholder involvement in determining food availability and consumption levels in Majene. Such efforts are crucial for supporting regional food security, ensuring adequate food consumption (Hapsari and Rudiarto, 2017).

Earthquakes can lead to long-term food insecurity due to agricultural land damage and degradation. Food insecurity is a critical issue in achieving Sustainable Development Goals (SDGs), particularly in poor and developing countries, where a significant portion of household income is allocated for food (FAO of The United Nations, 2020). Earthquake disasters exacerbate food access and purchase difficulties, reducing agricultural productivity, particularly in food crops (Norfahmi et al., 2019).

Since food consumption addresses biological, psychological, and social needs, food availability in post-earthquake Majene warrants serious attention. Disasters can lead to food insecurity or hunger, with distribution delays and supply disruptions contributing factors. Understanding food availability in Majene and the community's food needs is essential. This knowledge enables the government and stakeholders to formulate effective policies to ensure food security in the Majene area post-earthquake.

METHODS

This research took place from May to September 2022 in Majene Regency. The selection of the location was based on the consideration that Majene is one of the areas affected by the earthquake in 2021, so there is a possibility of disturbed food supply and consumption. This type of research is descriptive qualitative research through secondary data obtained from the documents of the Majene Regency Food Security Service, which is supported by data from the Central Statistics Agency related to food supply data, food consumption data, and desirable dietary pattern data as well as direct interviews with primary source informants.

RESULT AND DISCUSSION

The research provided a more comprehensive understanding of the local food security situation post-earthquake related to food availability, especially in various food staples such as grains, fruits, vegetables, beef, egg, fish, cooking oil, and sugar for energy, protein, and fat. Moreover, it is also preserved for food consumption, dietary desirable patterns and food availability.

Food availability

This section analyzes food availability in Majene based on the Food Materials Balance of 2021. The primary food items include rice, peanuts, onions, red chillies, cayenne peppers, garlic, beef, broiler chicken, eggs, sugar, and cooking oil. The assessment of food availability in Majene Regency considers three primary sources: energy/calories, protein, and fat, measured in kcal/capita/day.

Table 1 presents the data for 2021, showing the availability of various basic food items in terms of energy, protein, and fat content per capita per day. The data indicates that grains contribute the most to energy intake, while fish and kinds of beef are significant protein sources. Cooking oil/fat is a major source of fat content.

Table 1. Availability of food in Majene based on the balance of food materials, 2021

No	Kind of basic foods	Energy/calories (Kcal/capita/day)	Protein (Kcal/capita/day)	Fat (Kcal/capita/day)
1	Grains	3,101	68.27	30.14
2	Fruits	121	1.34	0.40
3	Vegetables	30	1.26	0.40
4	Kinds of beef	90	5.83	7.28
5	Eggs	28	2.28	1.98
6	Fish	81	15.41	2.13
7	Cooking oil/fat	336	0.08	29.90
8	Sugar	99	0.11	0.50

Source: Food Security Service of Majene Regency, 2021

In 2021, the energy availability level was 3,984 kcal/cap/day, surpassing Indonesia's National Food and Nutrition Standard's Energy Adequacy Ratio. Vegetables provided the highest energy supply. The protein availability also met the national recommended adequacy rate, with animal protein constituting the majority. However, there was a decrease in total fat consumption compared to 2020.

Table 2 details the food availability and needs in Majene for 2021. It compares the availability of various food products with the local demand, indicating whether there is a surplus or deficit for each item.

Table 2. Comparison of food availability and food needs in Majene Regency, 2021

No	Food products	Food availability (ton)	Food needs (ton)	Balance sheet (surplus/deficit)
1	Rice	29,277	20,084.70	9,192.30
2	Peanut	86	61.03	24.97
3	Onion	873	344.65	528.35
4	Red chilli	643	260.28	382.72
5	Cayenne pepper	1,202	278.23	923.77
6	Garlic	334	195.88	138.12
7	Beef	405	113.09	291.91
8	Chicken meat	2,894	215.40	2,678.60
9	Egg	1,502	709.04	792.96
10	Sugar	1,545	1,321.15	223.85
11	Cooking oil	1,951	1,030.35	920.65

Source: Secondary data after processing, 2022

Majene, strategically located near food-producing centres, does not face significant challenges overcoming food stock shortages. Supplies of rice, meat, eggs, and vegetables are sourced from neighbouring regencies, while Majene produces fish and some fruits. This strategic position ensures effective handling of food availability issues.

Majene is one of the regencies that does not experience problems in overcoming the shortage of food stock because of the supply from several neighbouring regencies. The food supply for rice comes from Polewali Mandar Regency and Pinrang Regency, the meat and egg supply comes from Sidrap Regency, and the vegetable supply comes from Enrekang Regency. Majene Regency itself produces the fish and some of the fruits. Food-producing centres flank Majene's strategic position and become a trade route so that the problem of food availability can be handled properly.

In 2021, rice supply exceeded demand, ensuring basic food needs were met during the earthquake, even resulting in a surplus. This surplus was partly due to Bulog's stock reserve and social assistance from the central government. The earthquake phase saw the release of stocks to affected locations, supplemented by aid from various regions, ensuring sufficient food availability and distribution (Guiomar et al., 2021).

Food distribution during disasters is crucial and can be implemented through emergency energy-dense food distribution, mass distribution of cooked food via community kitchens, and dry ration distribution for self-cooking by the affected community when the situation stabilizes. This approach to food distribution is essential for addressing increased demands and distribution disruptions during disasters (Jafri et al., 2021; Gupta, 2017).

Availability of energy, protein and fat in the Grains

The availability of energy, protein, and fat in Majene Regency comes from rice, dry corn, and wet corn. Although other grain sources contain energy, protein, and fat, in Majene, only these three types are available.
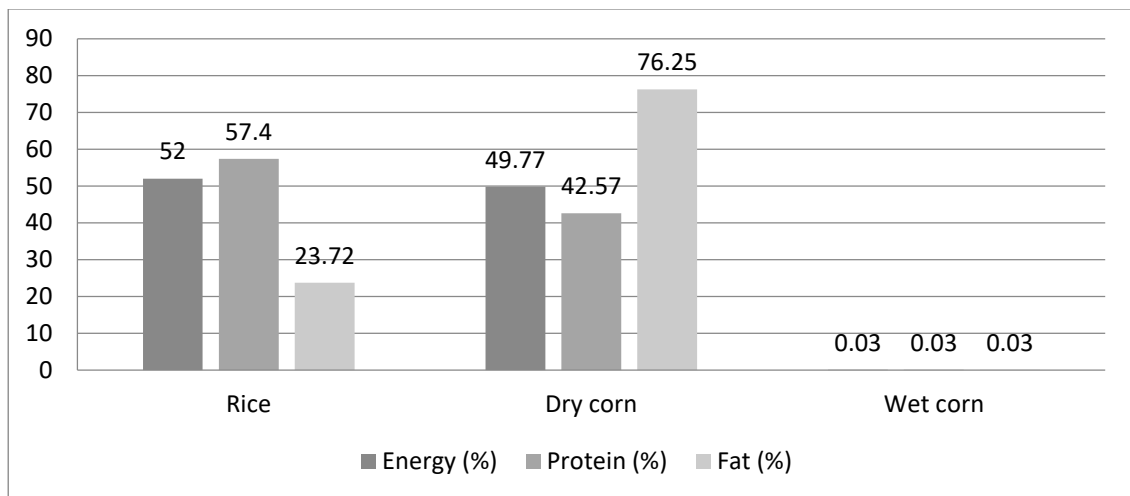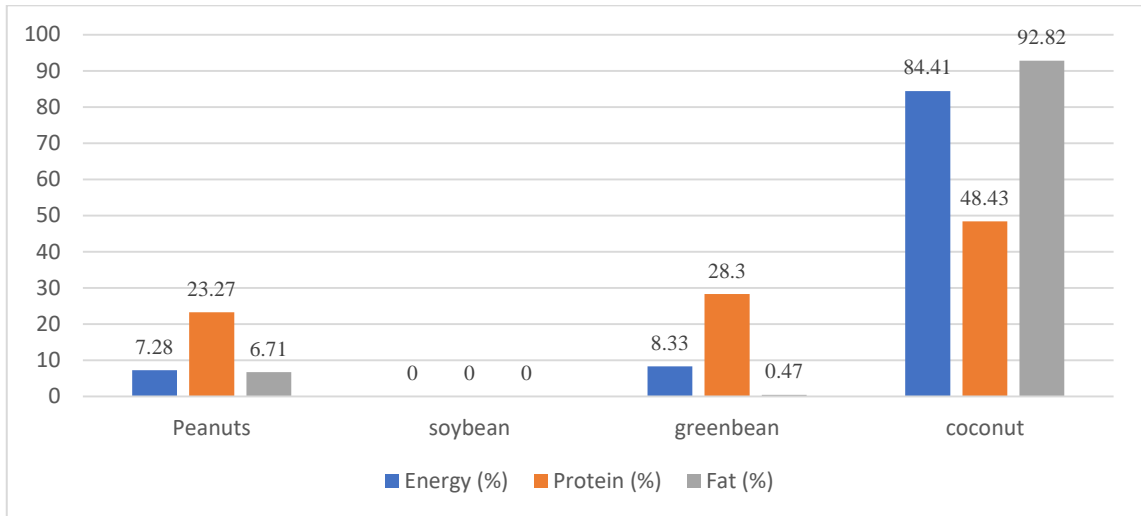

Figure 1. Availability of energy, protein, and fat in Grains in Majene Regency, 2021

From this data, we can infer that rice provides more calories and protein than corn but has a lower fat content. Conversely, corn, specifically dry corn, is particularly rich in fat. This aligns with the nutritional profiles cited by Mazmanyan (2020), where its high carbohydrate and caloric content characterizes rice, whereas corn is noted for its protein and sugar content. The sugar content in corn is significantly higher than that in rice, indicating a distinct nutritional profile between these two grains.

Availability of energy, protein, and fat in the Oily Fruits

The availability of energy, protein, and fat from oily fruits in Majene Regency indicates the distinct nutritional contributions of peanuts, green beans, and coconuts. Peanuts offer a moderate energy and protein supply, with a comparatively lower proportion of fat (Figure 2). Green beans, while contributing modestly to energy availability, are a more significant source of protein and have a low fat content.

Coconuts, in contrast, provide substantial quantities of all three macronutrients, particularly fat.
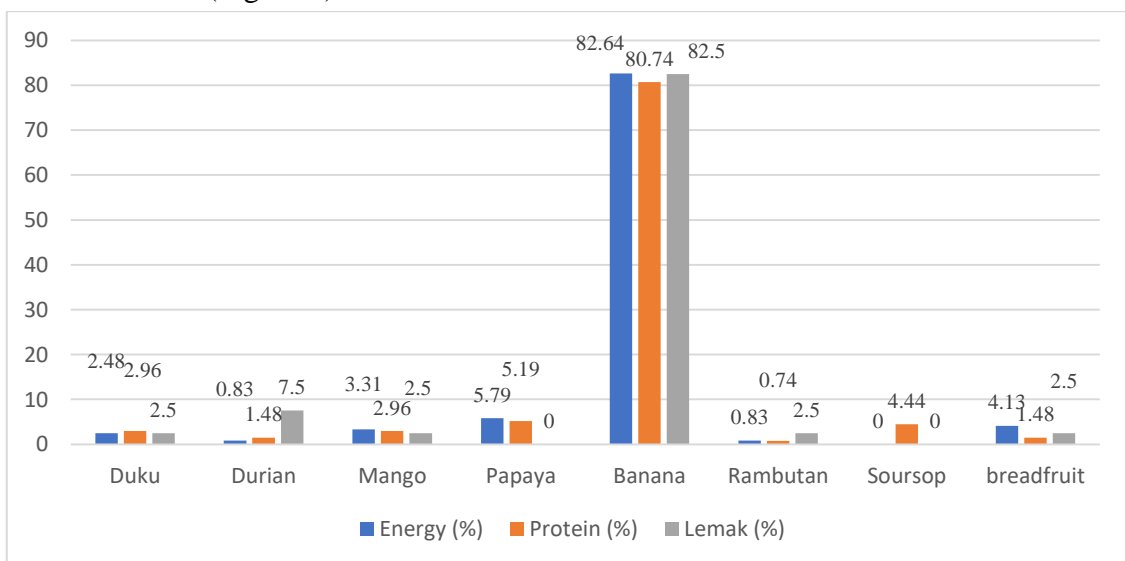

Figure 2. Availability of energy, protein, and fat in Oily Fruits in Majene Regency, 2021

Figure 2 illustrates the availability of energy, protein, and fat in oily fruits, with data highlighting that coconuts consist of 92.82% fat. This aligns with research from the School of Public Health (2022), which notes that coconut oil is composed entirely of fat, predominantly saturated fat, ranging between 80 – 90%. Moreover, a survey by Quealy and Sanger-Katz (2016) revealed a discrepancy in perceptions about coconut oil's health benefits, with 72% of Americans considering it healthy, while only 37% of nutrition experts concurred. Unlike peanuts, soybeans, and green beans, coconuts are a principal agricultural product in Majene, thriving in the region and available in greater abundance than other oily fruits.

Availability of energy, protein and fat in the fruit categories

The data concerning the availability of energy, protein, and fat within the fruit category in Majene Regency highlights the contributions of various fruits, including duku, durian, mango, papaya, banana, rambutan, soursop, and breadfruit. These fruits are integral to the local diet, each providing varying amounts of essential macronutrients (Figure 3).

Figure 3. Availability of energy, protein, and fat in fruit categories in Majene Regency, 2021

Figure 3 elucidates these fruit categories' comparative energy, protein, and fat availability. Bananas, readily cultivated in Majene and have year-round production, are predominant in all nutritional categories, with their contributions to energy, protein, and fat intake surpassing 80%. The prominence of bananas is contrasted with other fruits such as duku, durian, and mango, which make modest contributions to these nutritional categories, with no marked dominance in any specific nutrient.

Papaya is distinguished by its significant protein content yet lacks fat contribution. The lowest percentages in all categories characterize rambutan. Soursop, intriguingly, offers protein but does not significantly contribute to energy or fat. Breadfruit presents a balanced profile, albeit with lower overall percentages than bananas and papaya.

The data presented indicates a global trend of low fruit consumption, attributed partly to affordability issues. Policies should thus focus on enhancing the affordability and availability of fruits (Miller et al., 2016). The increased consumption of fruits is vital to improving population health and diet quality, which, according to studies, is currently below target levels (Miller et al., 2016; Hall et al., 2009; Murphy et al., 2014; Gobbo et al., 2015). The nutritional significance of fruits, alongside their varied availability, underscores the necessity for strategies that support increased fruit intake as part of a healthy lifestyle.

Availability of energy, protein and fat in the vegetable categories

The assortment of vegetables available in Majene Regency includes onions, long beans, tomatoes, chilli, cayenne chilli, eggplant, water spinach, and garlic, each contributing varying energy, protein, and fat levels to the diet (Figure 4).
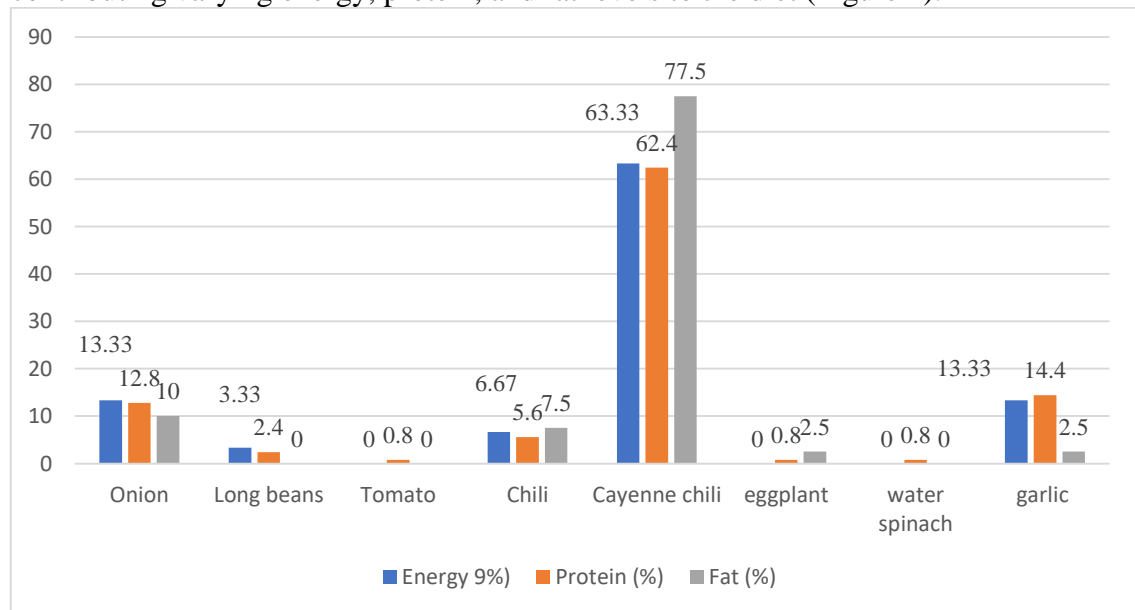
Figure 4. Availability of energy, protein, and fat in vegetable categories in Majene Regency, 2021

Figure 4 delineates energy, protein, and fat availability within these vegetable categories. Onions and garlic are prominent for their energy and protein contributions among the listed vegetables. Cayenne chilli is particularly noteworthy, offering the highest levels of all three macronutrients—energy, protein, and fat—underscoring its dense nutritional value.

Long beans and chillies provide moderate nutrients, with long beans notably absent in fat contribution. While offering minimal energy and fat, tomatoes and water spinach contribute to protein intake. Eggplants, on the other hand, present a minimal

addition to energy levels but offer some protein and fat, which may be valuable for specific nutritional needs rather than as primary energy sources.

Current nutritional guidelines advocate for a minimum of three servings of vegetables daily to maintain health (WHO, 2003; WHO, 2002). However, the high cost of food can impact accessibility, especially for those who allocate a substantial portion of their income to food expenses (Brinkman et al., 2010; Gustafson, 2013). One practical approach to overcoming this challenge is cultivating vegetables in household gardens, aligning with the concept of food security at the domestic level. This strategy not only provides nutritional benefits but also enhances the self-sufficiency of households in Majene Regency.

Availability of energy, protein, and fat in the beef categories

The availability of energy, protein, and fat from the meat categories in Majene encompasses beef, lamb, and chicken meat. The data illustrates that beef provides a balanced contribution of these essential nutrients. Conversely, lamb is represented minimally, with a scant contribution to protein and fat and no discernible contribution to energy. Chicken meat, however, stands out with a substantial provision of protein and fat, establishing it as the predominant source of these macronutrients among the meats assessed.

Figure 5 displays the nutritional contributions of these meats, highlighting the preference for chicken meat in Majene due to its significant role in supplying protein and fat. Based on the data, beef is a moderate source, but lamb is not a significant nutritional source within this regional context.
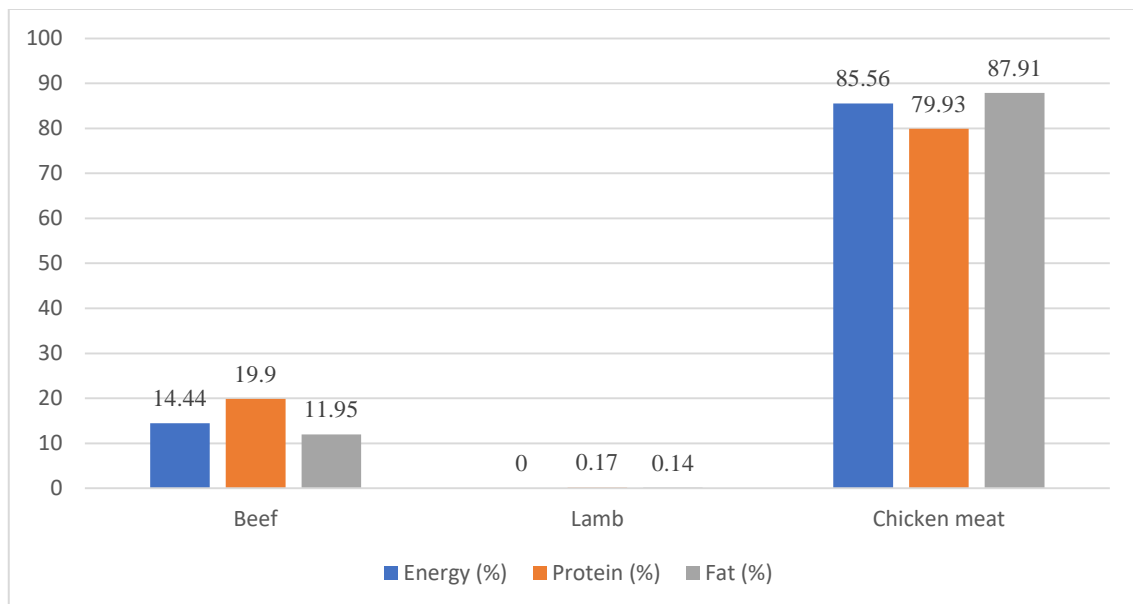
Figure 5. Availability of energy, protein, and fat in meat categories in Majene Regency, 2021

In Majene, the selection of meats is limited to beef, lamb, and chicken, with chicken meat availability surpassing that of beef and lamb. Several regional chicken farms and additional supplies from neighbouring areas such as Polewali Mandar and Sidrap support this.

Meat consumption is quantified in thousands of tonnes of carcass weight—for poultry, as ready-to-cook weight—and kilograms of retail weight per capita. Conversion factors from carcass weight to retail weight are 0.7 for beef and veal and 0.88 for sheep and poultry meat, as reported in the FAO Agriculture Outlook (2021). Meat is a vital component of a balanced diet for many individuals, being rich in protein with an

optimal amino acid profile, as well as abundant in various minerals and vitamins that are crucial for metabolic processes and are more readily absorbed from meat than from other food sources (Wood, 2017).

Availability of energy, protein and fat in the fish categories

The range of fish available in Majene includes tuna, snapper, mackerel, milkfish, tilapia, goldfish, catfish, shrimp, parrotfish, and other types. Majene's potential as a marine resource hub yields a variety of fish that are significant energy, protein, and fat sources. Notable marine species such as tuna, skipjack, flying fish, redfish, and squid are harvested from Majene waters (Badan Pusat Statistik, 2021), ensuring that fish and seafood are available in ample quantities to satisfy the nutritional needs of the population (Figure 6).
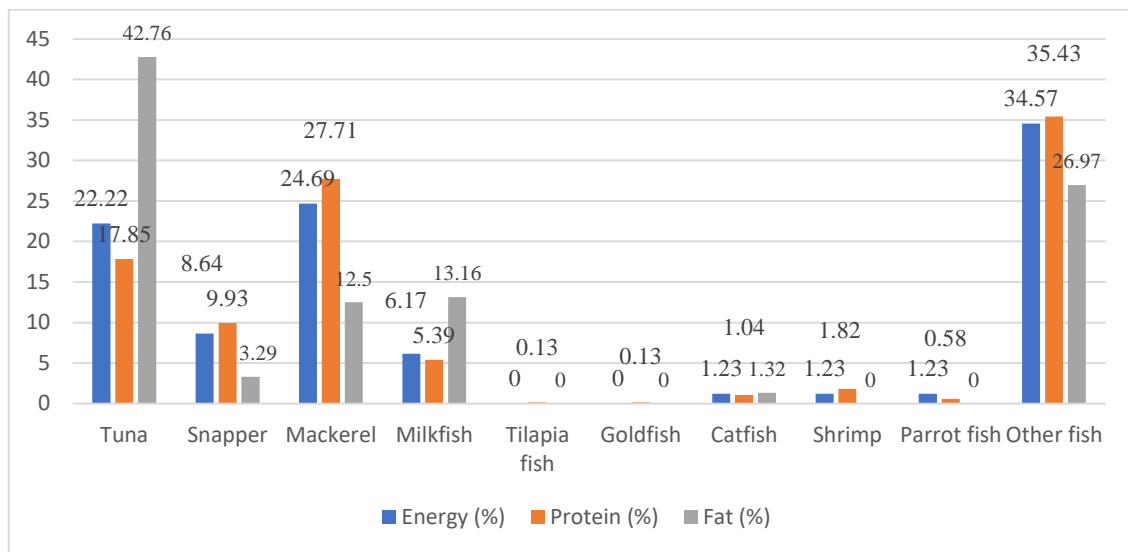
Figure 6. Availability of energy, protein, and fat in fish categories in Majene Regency, 2021

Figure 6 depicts these fish's energy, protein, and fat availability contributions. Tuna and mackerel are particularly important, with tuna contributing a high-fat content and mackerel being a robust source of protein. Snapper and milkfish provide moderate nutritional contributions, while tilapia, goldfish, and parrotfish have less impact on the nutritional metrics.

An aggregate category labelled "Other fish" might be shown to contribute significantly across all nutritional parameters, implying the collective nutritional importance of various fish species that are not itemized individually. This group likely encompasses a broad array of fish that together contribute importantly to the diet.

In Majene, with its abundance of marine life, a variety of fish are relied upon to meet dietary requirements. The high fish and seafood intake is highlighted as beneficial and potentially pivotal in ensuring food security and preventing chronic diseases. The data emphasizes the diversity of fish in the diet of Majene's residents and their significant role in nutritional intake.

Availability of energy, protein and fat in the oil and fat categories

The oils and fats available in Majene include peanut, coconut, palm, and fats from beef and lamb. The data would show that coconut oil is the preeminent source of nutrients within this category, reflecting the region's natural abundance of coconut plants. Palm oil follows, with Mamuju and Central Mamuju being prominent areas for palm oil development (Figure 7).
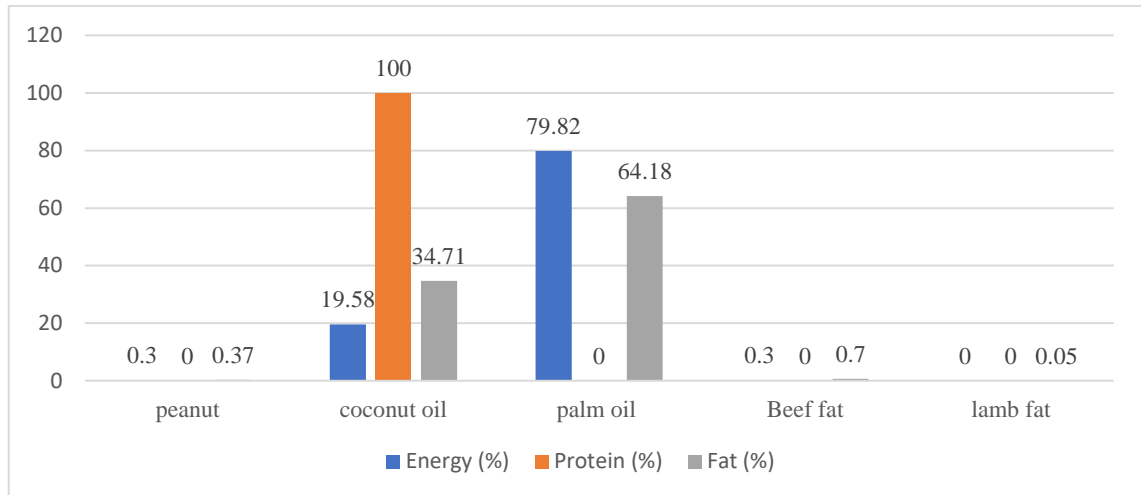
Figure 7. Availability of energy, protein, and fat in oil and fat categories in Majene Regency, 2021

Figure 7 might illustrate the distribution of energy, protein, and fat among these sources. Coconut oil is unique in its contribution, particularly to fat content, while palm oil is a leading source of energy and fat. The contributions of peanut oil and animal fats, such as those from beef and lamb, appear relatively minor in comparison.

There appears to be a discrepancy with the protein content attributed to coconut oil, which is typically not recognized as a protein source. This could indicate an error in the dataset or mislabeling within the graphical representation.

The prevalence of coconut and palm oils is higher than other fats and oils. Locally produced coconut oil is a common fixture in traditional markets in Majene, whereas palm oil, often industrially produced, is typically available in supermarkets and food stores.

Food consumption

Food is key to people's health (Janssen et al., 2021) and has considerable environmental effects (Rockstrom et al., 2009). The pattern of food consumption directs national food utilization, aiming to meet quality, nutritional content, and diversity standards and to use food ingredients efficiently. Furthermore, these consumption patterns aim to enhance food utility in the human body by fostering an awareness of the importance of balanced nutrition, encompassing energy, protein, fat, vitamins, and minerals (SPM Food Security, 2011; Pramono, 2020).

Table 3. Consumption and Strategic Food Needs in Majene Regency, 2021

No	Food Products	Consumption (ton)	Consumption Per Capita				Need/Consumption (kg/capita/year)
			kg/year	gr/hr	Energi (kcal/hr)	Protein (gr/hr)	
1	Rice	20,084.70	163.10	446.85	1,613	39.19	111.89
2	Peanut	61.03	0.48	1.32	7	0.37	0.34
3	Onion	344.65	4.86	13.33	4	0.16	1.92
4	Red chilli	260.28	3.58	9.81	2	0.07	1.45
5	Cayenne Pepper	278.23	6.70	18.35	18	0.78	1.55
6	Garlic	195.88	1.86	5.09	3.75	0.18	1.09
7	Beef	113.09	2.26	6.18	13	1.16	0.63
8	Chicken meat	215.40	16.12	44.17	77	4.66	1.2
9	Egg	709.04	8.37	22.92	28	2.28	3.95
10	Sugar	1,321.15	9.91	27.15	99	0.11	7.36
11	Cooking oil	1,030.34	13.66	37.42	335	0.08	5.74

Source: Food Security Service of Majene Regency, 2021

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The 2021 data from the Food Security Service of Majene Regency indicates that rice is the primary staple, with the highest per capita consumption, highlighting its pivotal role in the local diet. The consumption data for other products like peanuts, onions, and various spices reflects a dietary diversity, though these items are consumed in significantly lesser quantities than rice.

The contrast in consumption rates between rice and other foods underscores rice's central importance in the diets of Majene's residents and more widely across Indonesia. This reliance on rice is also reflected in national consumption and stock levels, sometimes necessitating rice imports to satisfy demand.

During crises such as earthquakes, government intervention to ensure food availability and price stability becomes critical, underlining the importance of food security measures. The strategic approach to addressing food needs in Majene, which mirrors broader Indonesian trends, strongly emphasizes rice due to its substantial consumption per capita, thereby becoming a focal point of food policy and import strategies (FAO, 2002; Karim et al., 2021).

Comparison of desirable dietary patterns with food availability in Majene

A Desirable Dietary Pattern (DDP) is an array of various foods or food groups organized according to their energy contribution to the total energy of basic food groups. A DDP is characterized by a composition of food amounts across nine food groups, aligned with energy contribution targets that satisfy nutritional requirements in quantity, quality, and diversity while also considering social, economic, cultural, religious, and taste factors. The DDP score reflects the nutritional quality of food consumption and the diversity of food intake. Foods are categorized into three groups based on their nutritional function: energy sources, body-building foods, and regulatory foods. Daily consumption should meet all these food functions by consuming a variety of foods in sufficient and balanced quantities (Pramono, 2020).

Table 4. Comparison of desirable dietary patterns and food availability in Majene Regency, 2021

No	Food Categories	Energy (Kcal)	%	Weight	Rill Score	Maximal Score	DDP Score
	I	J= (I/2400) x 100	K	K	L=JxK	M	N
1	Grains	3,101	129.2	0.5	64.61	25	25
2	Tubers	2	0.1	0.5	0.04	2.5	0.04
3	Animal food	200	8.3	2.0	16.64	24	16.64
4	Oil & fat	337	14	0.5	7.02	5	5
5	Oily fruits	82	3.4	0.5	1.70	1	1
6	Nuts	15	0.6	2.0	1.23	10	1.23
7	Sugar	99	4.1	0.5	2.07	2.5	2.07
8	Vegetable & fruit	151	6.3	5.0	31.42	30	30
9	Other foods	0	0	0	0	0	0

Source: Food Security Service of Majene Regency, 2021

The Expected Food Pattern Score (PPH) is a parameter indicative of the diversity and nutritional quality of food consumption, measured through its contribution to the Energy Adequacy Rate (AKE). With a scale of 0-100, a higher PPH denotes superior nutritional quality in dietary intake (Ministry of Health, 2019).

For the grains group, the energy availability in 2021 stood at 3,101 kcal/capita/day, surpassing the optimal figure of 1,200 kcal/capita/day outlined in the 2012 WNPG. A food quality score of 64.61 exceeded the ideal score of 25, fulfilling the standard.

In contrast, the tubers group recorded an energy availability of merely 2 kcal/capita/day, starkly below the 144 kcal/capita/day target. Its food quality score of 0.04 significantly fell short of the desired 2.5. The animal food group's energy availability was 200 kcal/capita/day, less than the ideal of 288 kcal/capita/day, with a quality score of 16.64 below the targeted 24.

The oil and fat group, with an energy availability of 337 kcal/capita/day, exceeded the ideal figure of 240 kcal/capita/day, indicating an overconsumption. Similarly, the oily fruit/seed group's energy availability of 82 kcal/capita/day surpassed the ideal of 15 kcal/capita/day, with a quality score of 1.70 outstripping the ideal of 1.0.

The legume group presented an energy availability of 15 kcal/capita/day, significantly below the ideal 120 kcal/capita/day, and its quality score of 1.23 did not meet the ideal of 10.0. The sugar group's energy availability stood at 92 kcal/capita/day, beneath the ideal 120 kcal/capita/day, with a quality score of 2.07 below the ideal of 2.5. The vegetable and fruit group's energy availability of 155 kcal/capita/day exceeded the ideal of 144 kcal/capita/day; however, its quality score of 31.42 was only marginally above the ideal of 30, indicating a slight overabundance.

Majene's vulnerability to food insecurity can be partly attributed to its inconsistent food production capabilities. Recurring natural disasters like earthquakes, landslides, and floods exacerbate this issue. Mirroring the challenges faced by Small Island Developing States (SDIS), 58 countries and territories globally confront food-related difficulties, including vulnerability to natural disasters, inadequate local food system infrastructure, limited domestic food production, and heavy reliance on food imports, leading to deficits in food availability (Hickey et al., 2020; Baghtani et al., 2022). Consequently, the imperative for each region lies in devising policies and strategies that guarantee access to sufficient, affordable, and nutritious food and in promoting local food production to diminish reliance on imports.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The level of energy availability in Majene exceeds the recommended nutritional adequacy standard of 984 kcal/cap/day, with the highest energy supply deriving predominantly from vegetables. Protein availability also meets the recommended rate of 63 grams/capita/day, largely sourced from animal proteins. At 72.17 grams/capita/day, fat availability aligns with the nutritional adequacy rate, with vegetable fats contributing the most.

The availability of basic foodstuffs in Majene for 11 staple foods is sufficient to prevent food shortages, even during the 2021 earthquake. This sufficiency is due to food availability surpassing consumption needs, as exemplified by rice, with an availability of 29,277 tons against a need of 20,084.70 tons.

Assessing the desirable dietary pattern scores reveals that grains, oils, fats, oily fruits/seeds, sugars, vegetables, and fruits meet the desirable dietary score. However, tubers, animal foods, and legumes fail to achieve the desirable dietary pattern score.

Recommendations

Majene, with its limited food production capacity and vulnerability to natural disasters like earthquakes, requires a food management policy that emphasizes maximizing internal food production in food-producing areas.

Diversifying staple foods by incorporating options such as barley is crucial to reducing the high dependency on rice. Furthermore, developing local rice varieties in

Majene, which are currently underutilized, could serve as a buffer for local food security.

Exploring potential food sources and developing new agricultural areas for rice and other primary foods is recommended. This strategy would promote food self-sufficiency and reduce reliance on external food supplies.

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