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DAM DEVELOPMENT AND FOOD SECURITY OF DIRECTLY AFFECTED HOUSEHOLDS: A CASE STUDY IN JATIGEDE DAM, SUMEDANG, WEST JAVA

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ABSTRACT

The Jatigede Dam construction project has caused many residents in the inundation area of the Jatigede reservoir to move to new areas. The affected households by the Jatigede Dam in new places must adapt to obtain sources of income for food and other necessities. This research aims to elucidate the agroecosystem production, off-farm jobs, and food adequacy and food security of the affected people of Jatigede Dam in Jatimekar Hamlet, Jemah Village. The research method used was a combination of qualitative and quantitative. The results revealed that the affected households of the Jatigede Dam Development Project who live in Jatimekar Hamlet, Jemaah Village, have less agricultural land ownership such as rice fields, mixed gardens and home gardens than before the Jatigede Dam existed. Consequently, some of the affected households of Jatigede Dam, they are also involved in various off-farm jobs. Based on food security, it shows that the affected people of Jatigede Dam in Jatimekar Hamlet, Jemah Village are in a vulnerable condition, due to low family income, and farming also faces various problems, such as water scarcity in the dry season and agricultural inputs, such as inorganic fertilizers, pesticides, and plant seeds have high price.

Keywords: *adaptation*, *agroecosystem*, *off-farm income*

BACKGROUND

Dam construction can have both positive and negative impacts on rural people (WLE, 2017; Kamil et al, 2019; Grebeyes et al, 2020; Oladimeji et al, 2020; Hayati et al., 2023). Various positive impacts, for example, to be able to avoid floods in the rainy season and drought in the dry season, generate electricity, fishery development, climate change adaptation, natural tourism development, and can increase agricultural production downstream of the dam (Sayektiningsih and Hayati, 2013; Boye and Vivo, 2016; Kamil et al., 2019; Castro-Diaz et al., 2023). Meanwhile, various negative impacts from the construction of the dam, among others, can cause disturbances to the ecology, socio-economic and culture of the rural people. For example, due to the inundation of the dam, it causes the loss of various landscapes and biodiversity, causes people's unrest, loses people's livelihoods and causes the rural household food insecurity (WLE, 217; Purnama 2015; Suwartapradja et al., 2019; Phami et al., 2020; Jima et al, 2022; Ty et al., 2023).

Based on ecological history, in 1998 the construction of the Jatigede Dam, Sumedang, West Java, was designed. However, construction of the Jatigede Dam building was only started in 2007 and was completed in 2015. At the end of 2015, the Jatigede Dam was inundated with water (Hayati

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Vol 8 (2): 541-553, June 2024

et al. 2023). Consequently, a total area of 4,896.22 hectares was inundated with water, and 5,686 households in 17 villages, 4 sub-districts namely Jatigede, Wado, Jatinunggal and Darmaraja Districts had to move outside the inundation area (Suwartapradja et al., 2018).

The construction of the Jatigede Dam besides providing various positive impacts, such as controlling floods in the rainy season and drought in the dry season, generating hydroelectric power, and tourism objects (Hayati et al, 2023). However, it also creates a variety of negative impacts, such as social problems and conflicts for the people, due to compensation for houses, buildings and land, reduced or lost livelihoods and incomes for the people, as well as causing very vulnerable food security for the affected households (OTD-*Orang Terkena Dampak)* (Purnama 2015; Suwartapradja et al., 2019).

Food security can be defined as a condition when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Thus, based on this definition, four food security dimensions have to be achieved: food availability, economic and physical access to food, food utilization, and stability over time (Asih and Klasen, 2017). Many factors, including the household size, food price, drought, shock, household income per month, number of laborers, gender of the household head, and farmland areas are important factors may have influenced for household food insecurity (Phami et al., 2020). Jatigede Dam development project may cause the insecurity food for the affected households (OTD) of Jatigede Dam duet to reducing or loss of agricultural lands and household incomes, and drought disaster (Suwartapradja et al., 2019). This study aims to elucidate the production of agroecosystem, off-farm jobs, and food consumption and food security of the affected household (OTD) which is caused by Jatigede Development Project, based on a case study in Jatimekar Hamlet, Jemah Village, Jatigede Sub-district, Sumedang.

RESEARCH METHODS

Study was conducted in Jatimekar hamlet, Jemah Village, Jatigede Sub-District, Sumedang District, West Java Province, Indonesia (Figure 1). Geographically, the Jatimekar is located 108^0 07' 07.2" East Longitude and 06^o 52' 25,4" South Latitude. In November 2015, Jemah village was firstly submerged by Jatigede inundation. Consequently, some villagers had to move to the upper bank of the Jatigede Reservoir in the Samiah Hamler area, which has now changed its name to Jatimekar Hamlet. Based on Village Statistical data (2019), population of Jatimekar Hamlet recoded 33 households with total population 106 individuals, consist of 53 males and 53 females (Figure 2). Most people of the Jatimekar hamlet, before their hamlet area was submerged by Jatigede Reservoir as farmers. After their hamlet were submerged by Jatigede inundation, the people of Jatimekar Hamlet have occupation as farmers, and various off-fam jobs, including laborer, trader, fishing netter, floating net cage farmer, raft tenant, and *ojeg* driver.

This study applied both primary and secondary data. The primary data was obtained through direct the field observation, semi-structure interview with informants, and structure interview with respondents. The secondary data was acquired through analyzing various secondary data, including statistical reports of village and sub-districts, research reports on Jatigede Dam, such as the Academic Leadership Grant (ALG) Program of Padjadjaran University reports.

Method used in this study was mixed-method qualitative and quantitative (Iskandar, 2018). While some field techniques, including observation, semi-structure interview, and structure interview

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Vol 8 (2): 541-553, June 2024

were applied in this study. Observation was conducted by direct observation of local environmental conditions, such as hamlet condition, agricultural condition, and people activities on agricultural cultivation as well as off-farm activities. Semi-structure interview was undertaken with competent informants which are purposively collected. The informants of this study were Village and Hamlet leader, farmers, and the field agricultural instructions. While the structure interviews were conducted with 33 respondents of all households of Jatimekar Hamlet.

The qualitative data was analyzed by several stages, namely cross-checking, summarizing, synthesizing, and built up a narrative account with descriptive analysis. While the quantitative data was analyzed by statistics of calculating the frequency, namely the percentage of respondents' answers. The statistical formula used to calculate the frequency of respondents' answers to the questions in the questionnaire is followed (Iskandar, 2018).

$$Fi = \frac{n_i}{N} = 100\%$$

Information:
Fi : Percentage of total respondents
ni : Frequency of respondents' answer
N : Total respondents

RESULT AND DISCUSSION

Change in Size of Cultivated Land

Before being inundated by the Jatigede Dam, the rural people of Jatimekar Hamlet, Jemah Village, had 3 types of agroecosystems, namely paddy field *(sawah*), mixed-garden (*kebun campuran*), and home garden (*pekarangan*), with the area of each type of agroecosystem being narrow. Then, after the inundation of the Jatigede Dam, the area of the 3 types of agro-ecosystems is getting narrower. For example, before the Jatigede Dam was inundated, the total area of Jatimekar Village's paddy fields was recorded at 6.28 hectares, with an average family ownership area of 1,900 m^2/household. Then, after the Jatigede Dam was inundated, the total area of rice fields in Jatimekar Hamlet became very small, only 0.96 hectares, with the average rice field ownership per family recorded at 300 m^2 per household (Table 1).

Table 1. Distribution of Cultivated Land Before & After Dam Inundated in Jatimekar Hamlet, 2019

Type of Cultivated Land	Before Inundated		After Inundated	
	Total Acreage (ha)	Average per Household (m^2)	Total Acreage (ha)	Average per Household (m^2)
Paddy field	6.28	1900	0.96	300
Mixed garden	3.03	900	3.12	900
Homegarden*	0.87	240	0.27	80
	10.18	3040	4.35	1280

Note:
* : Estimated

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Vol 8 (2): 541-553, June 2024

Table 1 shows that the area of the fields owned by the rural people of Jatimekar Mekar, Jemah Village recorded narrow. For example, this can be compared with the area of paddy fields (*sawah*) owned outside the Jatigede area, such as in Sindang Hamlet, Rancakalong Village, Sumedang, based on 64 respondents, the largest area of paddy fields owned by Sindang Hamlet farmers of Rancakalong, Sumedang ranged from 30 *bata* (420 m^2) to 70 *bata* (980 m^2) (Hidayat et al. 2020). Similarly, the homegarden size of Jatimekar Hamlet was narrow (900 m^2/household). For example, it is compared to that of the home garden of Ciboboko, Mekarasih, and Chegar Mekar, Jatigede, recorded on average between 90 m^2/household and 100 m^2/household, and 140 m^2/household, respectively (Suwartapradja et al., 2023). Consequently, of the decreasing area of the 3 types of agroecosystems in Jatimekar Hamlet, this could lead to a decrease in agricultural production, and also a decrease in income and insecurity food for the affected household (OTD) by the construction of the Jatigede Dam (Asih and Klasen, 2017; Suwartapradja et al., 2023).

Change in Rice-field Cultivation

Rice harvesting in Jatimekar Hamlet, Jemah Village is carried out twice a year. Rice harvesting is usually undertaken in March and July, during the dry season. This is because it is influenced by rainfall, namely rainfall begins to increase in September and decreases very drastically in June and July. The farmers of Jatimekar Hamlet usually harvest rice in several ways, such as independently by the family who owns or cultivates the land; through mutual cooperation (*liliuran*) with village residents and/or by renting a tractor. The method of harvesting rice is carried out by farmers, usually paddy that has been cut with sickles/using a tractor, then tied, threshed, and put in sacks to be transported home. Most of the harvested paddy is then processed into rice for milling and the rest is stored as seeds for planting activities in the next cropping season. Rice products are commonly not sold by farmers. This is because rice is mainly used for daily rice consumption within the family. Considering that rice production is insufficient for daily needs. Apart from that, to avoid the risk of paddy crop failure. For example, in the case of one respondent, during the harvest season in July 2019, his paddy crops were attacked by rats. As a result, paddy production decreased by 82% from the previous harvest. For the amount of inputs-outputs in the paddy farming businesses in Jatimekar Hamlet, Jemah Village, can be seen in Table 2.

Table 2. Cost and Yield of Paddy-field Cultivation in a Year (per 1000 m^2)

Input	Value (in Rp. 000)	Value distribution (%)
Fertilizer	1,700	40.77
Pesticide	120	2.88
Hired labor	1,650	39.57
Tractor operation	700	16.79
Total	4,170	100.00
Output	**Value (in Rp. 000)**	**Value distribution (%)**
The First harvesting in wet season	2,475	49.25
The second harvesting in dry season	2,550	50.75
Total	5,025	100.00

Based on the interviews with informants, the average 1 quintal of processed rice can produce 65 kg of rice, with a milling cost of Rp 40,000/quintal, meanwhile the selling price of dry unhusked rice is Rp 500,000/quintal and the price of rice is Rp 10,000/kilogram in 2019. If assessed without

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Vol 8 (2): 541-553, June 2024

taking into account transportation costs, the surplus obtained from rice that has been processed into rice is Rp 110,000/quintal. Therefore, the choice of consuming is more profitable than selling it. Paddy field farming carried out by the people of Jatimekar Hamlet has provided the daily food needs of their families. Rice is still the main staple food for the people of Jatimekar Hamlet, while tuber crops are still a supplementary food. This makes the existence of paddy fields important in supporting the supply and fulfillment of the food needs of the villagers.

On the basis of the results of processing income data converted to rupiah values, the average income obtained from paddy farming is Rp 608,875/household/year. According to interview with an informant, a land area of 0.1 hectare provides a net income of Rp 855,000/year (Table 2). If converted to an area of 1 hectare, then the results of paddy farming can provide an income of Rp 8,550,000/year. According to Hadiana's study (2017) mentions that the income of paddy farming in Kirisik Village, Jatinunggal District, Sumedang Regency reaches Rp 21,241,739, -/hectare/year in two growing seasons. Furthermore, based on the study by Syamsiyah et al. (2017) states that the income of paddy farming in Hegarmanah Village, Sumedang Regency in one year (2 plantings) ranges from Rp 5,150,000-39,330,000 for a land area of 0.1-1.04 hectare. Therefore, based on the results of the two studies, the income of rice farmers in Jatimekar Hamlets is considered low. The relatively low income from the paddy farming is partly caused by the high costs of external inputs, in the form of inorganic fertilizer, synthetic pesticides and labor (Iskandar and Iskandar, 2023; Lumintang, 2013). Apart from that, the absence of an irrigation network causes low rice production because planting intensity depends on climatic conditions (Misra, 2014; Gunadi, 2018; Iskandar and Iskandar, 2023).

Apart from being influenced by biophysical factors, agricultural production results are also influenced by agricultural patterns (Iskandar and Iskandar, 2023). The farming pattern carried out by paddy farmers in Jatimekar Village means that most of their intake depends on external sources, such as paddy seeds, inorganic fertilizer and synthetic pesticides. This external input dependence has made production costs higher and farmers' incomes decreased. Based on the interviews and financial analysis of the paddy farming management, it is known that the amount of inputs for inorganic fertilizers and synthetic pesticides recorded 43.65% of the total input costs (Table 2).

The Role of Mixed-garden Cultivation

Some activities in management of mixed-garden, including the maintenance of crops, such as providing water, weeding weeds, applying fertilizers, and eradicating plant pests with the use of pesticides. Crop watering activities are carried out, especially during the dry season, using a gasoline-powered water pump, by pumping water using water lake of the Jatigede Dam. However, farmers who have water pumps are very limited, because the price of a water pump machine is quite expensive. In addition, the price of fuel to operate the water pump machine is also quite high. Therefore, only farmers who can afford to buy water pumps have enough money. Not only that, the location of mixed-garden land is on a steep topography, so that some farmers are able to provide water to the plants in mixed garden, as a result many crops get drought, and produce low or even crop failure.

Other maintenance activities, applying fertilizer and eradicating various pests that usually damage the crops in mixed-gardens. In general, the costs that are quite high in managing mixed-garden agro-ecosystems are for labor costs, purchase of fertilizers, and purchase of plant seeds. The number of inputs-outputs in the agro-ecosystem system can be seen in Table 4. Some activities in the maintenance of agro-ecosystems, such as providing water, weeding weeds, applying fertilizers,

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Vol 8 (2): 541-553, June 2024

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Other maintenance activities, applying fertilizer and eradicating the crop pests that usually damage the various crops of mixed gardens. In general, the costs that are quite high in managing mixed-garden agro-ecosystems, namely for labor costs, purchase of inorganic fertilizers, synthetic pesticides, and purchase of plant seeds. The number of inputs-outputs in the agro-ecosystem system can be seen in Table 3.

Table 3. Cost and Yield of Mixed-garden Cultivation in a Year (per 7000 m^2)

Input	Value (in Rp. 000)	Value distribution (%)
Fertilizer	1,070	23.11
Pesticide	720	15.55
Hired labor	2,000	43.20
Seeds	840	18.14
Total	4,630	100.00
Output	**Value (in Rp. 000)**	**Value distribution (%)**
Yield of banana	500	3.09
Yield of ground nut	14,000	86.69
Yield of	1,650	10.22
Total	16,150	100.00

Harvesting of various crops in mixed-garden agroecosystems is carried out independently by land cultivators and their family members, such as husband, wife, and children, because the average area of mixed-garden land is small (0.09 hectares/household). The rice harvest is not sold but is used to meet the daily needs of the family. Meanwhile, some of the results from non-rice crops are used as seeds for planting the following year, and the rest are sold to village middle men (*bandar desa*). The selling price is determined by agreement between the farmer and the village middle men. Cash from sales of crop production in mixed-gardens is used to purchase various daily household needs. In contrast to non-rice production, some of the rice produced from harvesting of mixed-garden is usually used as seeds for planting the following year, and the rest of the production is processed into rice for daily family consumption.

Table 4. Mixed-garden Yield's Distribution

Distribution of product	Value (Rp.)	Percentage (%)
Sold	4,154,133	94.41
Consumed	202,867	4.61
As seed	43,000	0.98
Total	4,400,000	100.00

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Vol 8 (2): 541-553, June 2024

Based on the calculation of total production of mixed-garden agroecosystem, the average amount of production sold is Rp 4,154,133/household/year (94.41 %). This production was used for home consumption approximately Rp 202,806/household/year (4.61 %), and was saved for seeds Rp 43,000/household/year (0.98%) (Table 4).

Based on the results of production calculations from the mixed-garden agro-ecosystems, the average income for farmers is Rp 3,585,067/household/year. In general, the amount of farmer income is influenced by the amount of input costs used in the production process of the farming (Iskandar and Iskandar, 2023). On the basis of interviews with respondent of mixed garden owner, it can be obtained data that for an arable land area of 0.7 ha, the income is Rp 11,520,000/year, with cropping system of banana, lemon grass, peanut and cassava crops. Input costs required during the production process, including chemical fertilizer Rp 1,070,000 (23.11% and total input cost), synthetic pesticides Rp 720,000 (15.55% of the total input cost), Rp 2,000,000, - (43.20% of the total input cost), and seeds of Rp 840,000 (18.14% of the total input cost) (Table 4).

The yield of mixed-garden production varies greatly depending on management, land area and variety of plant species. The results of data processing show that the contribution of household income received from mixed-gardens is proven to be greater than that of agricultural produce in paddy fields, which is in line with the results of the study by Zega et al. (2013), Olivi and Qurniati (2015), and Winarni et al. (2016). This is because the species of crops planted in mixed-gardens are commercial plants (Abdoellah, 2017).

The Role of Homegarden

The homegarden is a plot of land around the house that is usually planted with a mixture of various species of plants, in the form of annual and annual plant species. Homeland agroecosystems have various ecological, socio-economic and cultural functions (Iskandar and Iskandar, 2023). The total area of the homegarden in the Jatimekar Hamlet area is 2,719 m^2, but only 2,363 m^2 (66.90%) has been utilized. A total of 22 households (66.67%) have used the home garden to fulfill their daily food needs, with the average homegarden area that has been managed being 82.39 m^2/household.

Various plants, including mangga arum manis (*Mangiera indica* L), mangga kedong gincu (*Mangifera indica* L), pisang kapas (*Musa x paradisiaca* L), pisang roid (*Musa x paradisiaca* L), rambutan (*Nephelium lappaceum* L), jambu batu (*Psidium guajava* L), singkong (*Manihot esculenta* Crantz), jahe (*Zingiber oficinale* Roscoe), lengkuas (*Alpinia galanga* L), kunyit (*Curcuma longa* L), sereh (*Cymbopogon nardus* (L.) Rendle), salam (*Syzygium polyanthum* (Wight) Walp), cabe rawit (*Capsicum frutescens* L), and tomat (*Solanum lycopersicum* L) are predominantly palnted in the homegarden. Some plants, including bawang daun (*Allium fistulosum* L) and sereh (*Cymbopogon nardus* (L) Rendle) are also planted in the polybags and pots as a way of optimizing land use.

In general, the species of plants that are cultivated in the homegarden, in the form of species of herbs and fruits, the results of which are used to meet the needs of daily home consumption and some product surpluses area usually distributed to neighbors who need it. Cultivating the homegarden contributes to increasing household income, with the average income earned being Rp 772,989/household/year. This result similar to that previous studies, that is in that haomegarden has been able to save household expenses and increase the average family income (Rauf et al., 2013).

Although the homegarden of non-commercial homegarden in Jatimekar Hamlet is lower than that of commercial homegarden in Sukapura Village, Kertasari District, Bandung Regency, recoded Rp 3,696,000 (Prihatini et al, 2027), the products of the homegraden of Jatimekar hamlet have a very

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (2): 541-553, June 2024

significant contribution to affected people (OTD) of Jatimekar Hamlet. In addition, the productivity of the homegarden can still be increased, including by optimizing the homegarden in the future (Iskandar and Iskandar, 2023).

In addition to planting various species of plants, the people of Jatimekar Mekar hamlet also use the homegarden as a fish pond and cattle barn, which also contributes to increasing income in the context of supplying and meeting food needs. The fish pond business is a strategy for optimizing narrow homegarden and is useful for meeting the nutritional needs of families and increasing income (Suwartapradja et al., 2023). In addition, livestock farming in homegarden can be beneficial in increasing household income and the availability of family animal protein consumption (Manese et al., 2018).

The managed fish pond is a pond for rearing common carp (*Cyprinus carpio*) and tilapia fish (*Oreochromis niloticus*), which when they are around 6 months old are ready to be harvested, and the produce is sold to the village midlemen. There are 3 families (9.09%) who have used their homegarden as fish ponds, with an average income of Rp 1,078,000/household/year. Meanwhile, the livestock business managed by people in the homegarden is breeding chickens, sheep, goats and cows. The people carrying out livestock business was recorded 20 families (60.60%). This business has also contributed to providing additional income, with the average income obtained from the livestock business amounting to Rp 1,031,550/household/year.

Off-farm Sources of Income

The people of Jatimekar Hamlet involved in various off-frame jobs in trading, home industry, raft rental, fishing, floating net cages (KJA), *ojeg* drivers, teachers and private employees. In the daily activities of the people of Jatimekar Hamlet, in order to obtain income to meet their daily needs, on average each household carries out 3 types of business, whether from farming, non-farming or mixed. This was done, because the results of farming which were predominantly carried out by the people were not sufficient to meet the daily food needs of the family. The highest average contribution of income received by residents in the type of business/occupation from the non-agricultural sector.

Study shows that relatively high income in the processed food home industry is obtained without taking into account labor wages, because all work in the chip manufacturing operation is carried out independently. On the bases of interviews with informants who own the home industry of processed cassava chips, stated that 50 kg of cassava produces 20 kg of cassava chips, with the price of the chips being Rp 40,000/kg. Thus, 50 kg of cassava costs Rp 50,000, if it has not been proceeding becomes chips, then after processing the selling value increases to Rp 800,000,

Processed food products are useful in supporting improved family nutrition and are an effort to accelerate the economic development of the Jatigede OTD community (Pratama, 2017). The existence of this industry provides many benefits, such as; providing employment opportunities, providing added value to agricultural products, increasing income, and providing additional family food consumption.

Fulfillment of food consumption needs obtained from farming production and non-farming sector income is converted into rupiah units based on the amount of daily food expenditure to determine its contribution to the food expenditure of each household. Based on the results of field data processing, the percentage of total food expenditure that comes from farming is 15.95%, while that comes from non-farming is 84.05%. The low contribution to food expenditure of the people of

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Vol 8 (2): 541-553, June 2024

Jatimekar Household from agricultural production indicates the low level of food independence of Jatimekar Hamlet, because most of the food supply is obtained by purchasing from the market.

Adequacy of Food Consumption

On the basis on the results of family expenditure, it can be seen that the highest average expenditure is in the type of expenditure for food, namely Rp 8,403,470/household/year, then sequentially followed by the type of education expenditure of Rp 3,645,278/household/year, transportation of Rp 1,914,129/household/year, electricity Rp 1,010,813/household/year, telecommunications Rp 976,038/household/year, toiletries and cosmetics Rp 401,491/household/year, clothing Rp 241,875/KK/year, and health Rp 180,000/household/year.

The welfare of the rural people greatly influences household economic access to food and thus also influences the quantity and quality of food consumed (Elizabeth, 2018). The proportion of food expenditure which is higher than the proportion of non-food expenditure indicates that the respondent farming households are still not prosperous. This is in line with the results of a previous study conducted by Arida et al. (2015) and Simbolon (2016). According to the results of the Simbolon (2016) study, factors that have a real and positive influence on household food expenditure are household income and the number of household members.

On the basis of the calculation of the people's food expenditure, it can be noted that the food expenditure of Jatimekar Hamlet is around Rp 2,616,174/person/year (57.61%) and per capita non-food expenditure reaches Rp 1,924,766/person/year (42.39%). The expenditure of the people of Jatimekar Hamlet is in the low category when compared to the general average per capita expenditure of the population of Sumedang Regency in 2018 is Rp 11,828,184/person/year, consisting of 50.48% (Rp 5,970,867.28/person/year) for food expenditure and 49.52% (Rp 5,857,316.72/person/year) for non-food expenditure (BPS Sumedang Regency, 2018).

Based on the results of calculating the proportion of food expenditure for the residents of Kampung Jatimekar, it is known that families with a low level of food expenditure (<60%) are 11 families (33.33%), while families with a high proportion of food expenditure (> 60%) are 22 families (66.67%). The low proportion of food expenditure occurs because these households/families obtain their food supply from the results of their paddy field farming and mixed-gardens. Thus, the amount of expenditure allocated to buy food is reduced, because some of it has been met from the results of farming. The opposite is true for households that have a high proportion of food expenditure, due to their high dependence on the market to meet their daily food needs. Apart from that, the low proportion of food expenditure is also influenced by income.

On the basis of interviews regarding eating patterns, it is known that the average individual in a household eats 3 times a day, namely in the morning, afternoon and evening. Types of food commodities that are usually consumed daily are divided into 9 groups. The grains group consists of rice and corn. The tuber food group includes; cassava, sweet potato, taro, and potato. animal food groups include; chicken, fish, eggs and milk, and so on. Based on interviews with informants, it is known that rice is the main staple food at breakfast, lunch and dinner. These results are in line with the results of a study by Harisman (2017), the pattern of food expenditure according to commodity type among farmers shows the same pattern, namely expenditure on grain is still the largest and the smallest is fruit and tuber commodities.

On the basis of interviews and measurements in the field regarding consumption patterns and consumption portions for each individual in the household, the energy and protein content consumed

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (2): 541-553, June 2024

was then calculated based on the Food Composition List (FCL) (Directorate of Community Nutrition, 2018). Furthermore, the data on energy consumption per capita for each household is compared with Energy Adequacy Rate (EAR) according to Minister of Health Regulation Number 75 of 2013, which is 2,150 kCal/capita/day.

The results of data processing show that the number of households whose consumption level is > 80% EAR is 1 household (3.03%), while the number of households whose consumption level is <80% EAR is 32 families (96.97%). Meanwhile, the per capita calorie consumption of Sumedang Regency residents in 2018 was 2,215.89 kCal and protein was 62.99 g (BPS Sumedang Regency, 2018) which is sufficient for the nutritional adequacy level which is set up by the government. Based on this data, the calorie value consumed by the average people of Jatimekar Hamlet is lower than the calorie value consumed by the average resident of Sumedang Regency in 2018.

The results of data processing from the proportion of food expenditure and per capita energy consumption in each household, were analyzed using an analysis of the level of adequacy of food consumption (Eduwardo, 2020). The results of the analysis show that, as many as 21 households (63.64%) belong to the food insecure household group, 11 households (33.33%) are undernourished households, and 1 household (3.03%) food insecurity (Table 4.20). In line with the results of Heryanah's study (2012) stated that in rural areas in West Java, food secure households account for less than a quarter of the rural household population (24.54%), and the remainder (75.46%) are food insecure. People of Jatimekar Hamlet, according to the results of the analysis of the adequacy level of food consumption, showed that energy consumption per capita was 1,254.66 kCal/day and protein consumption per capita was 56.15 g/day, included in the category of nutritional adequacy deficit, and protein adequacy in the moderate category based on the standard calculation of the level of nutritional adequacy.

The percentage of energy adequacy (EAR) at the research location belongs to the deficit category, because the types of food consumed for energy booster are less varied, such as the consumption of coffee, tea, *opak*, and *bakwan* in the morning and is done repeatedly, as a result the amount of energy consumed in the morning tends to be lower than during the day and at night. These results are in line with the results of the study by Arida, et al. (2015) that the lack of diversity in the types of energy-boosting foods consumed causes low energy consumption on the average population. Meanwhile, the percentage of nutritional adequacy level (*Tingkat Kecukupan Gizi*) in the study locations was classified as moderate, because rice consumption is the largest expenditure compared to expenditure on other types of food. This is in line with the results of a study by Arida et al (2015) in Aceh Besar district that rice is the staple food menu at the research location. Rice has a low protein content, but because it is consumed in large quantities and frequently, it will make a large contribution to daily protein consumption. In addition, another cause is the availability of fish protein from the Jatigede Reservoir, which people have been able to use to meet their daily consumption needs. As a source of protein, fish has the potential to play an important role in food security program efforts, especially community nutrition security (Hikmayani et al., 2017).

The food independence ratio is a measure of the comparison between the amount of domestic production and consumption. The higher the food independence ratio value, the greater the food production capacity of a region (Gunadi, 2018). The results of the analysis of the ratio of food self-sufficiency show that the ratio between the amount of food production and the amount of consumption plus the amount of food reserves is 0.32. Meanwhile, food independence occurs if the food independence ratio value is greater than or equal to 1.2. Based on this ratio value, the food

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (2): 541-553, June 2024

independence performance of Jatimekar Village is included in food insecurity), because the ratio value is <0.8.

CONCLUSION AND SUGGESTION

Based on this study, it can be concluded that the affected household (OTD) of Jatigede Dam, in Jatimekar Hamlet, Jemah Village, Sumedang, have low food security conditions. This is because the results of food self-sufficiency—the ratio between the total food production of the population and the amount of consumption plus food reserves—is low. Meanwhile, food availability, economic and physical access to food, food utilization, and stability over time are in the low category. Considering that as a source of food and income for the people in farming for affected household, it has many constraints, such as paddy fields, mixed gardens, and yards which are becoming narrower, natural factors often occur with drought and crop failure, and the high cost of various farming inputs, such as fertilizers these are organic, synthetic pesticides, and plant seeds.

Considering that the area of agricultural land for affected household is inadequate, agricultural practices are endeavored to apply the Low External Inputs and Sustainable (LEISA system), namely the farming system to further increase various farming inputs, such as the use of organic fertilizers from manure and compost, as well as botanical pesticides. In addition, there is a need to increase farming in the homegarden agroforestry system, bearing in mind that traditionally the agroforestry farming in the homegarden usually applies the planting of various species of plants, applies various inputs from the outside, but the home garden agroforestry system is more resistant to drought and flooding, as well as soil resistance to pest attacks, and helps conservation. a variety of crops, can help fertilize the soil, reduce soil erosion, and produce oxygen, and as a sequestration of greenhouse gases, such as CO_2.

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