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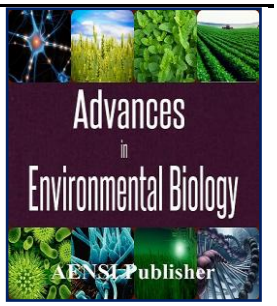

Factors Affecting the Improvement of Farmers Household Food Security In South Sulawesi

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ABSTRACT

This research objectives is to analyze the factors affecting food security level of farmer's household in South Sulawesi. Components of food availability, food access, food absorption and nutritional status of farmer household simultaneously have positive effect on food security level of farmer's household in South Sulawesi. Planting area, productive workforce, agro-ecosystem type and household income have positive effect on food security level of farmers household. Self-production food and poverty level have negative effect on food security level of farmers household. Factors with positive effect positive on household food access are self-production food, work performance of head household, wife work performance, work performance of household members, labor wage, family head income, number of family members who work, while the negative effect is way access. Factors with positive on food absorption of farmers households are household income, agro-ecosystem type, food diversification, wife education while the negative effect is number of dependents. Factors with positive effect on nutritional status are energy adequacy and food diversification.

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INTRODUCTION

Food security for every individual is the most essential thing because it relates with human life process. Household food security is not only seen from sufficiency in food production but household food security contains four aspects: food availability, food access, food absorption and nutritional status of household. The fourth component consists of 18 indicators used to measure security level of farmer's household food [16].

Agricultural sector provides an important role in economic development with very large contribution to whole economic development and providing food security for community [21]. Food security in a region with facilities and infrastructure integration ranging from food consumption availability and realizing household food security [1]. RI Law No. 18 year on food, Article 1, paragraph 4 states that Food security is the conditions fulfillment for State to individual, which is reflected in availability of sufficient food, both in quantity and quality, safe, diverse, nutritious, equitable, and affordable in accordance with beliefs and culture of community, to be able to live healthy, active, productive and sustainable [8].

South Sulawesi Province is a center for rice production for eastern part of Indonesia. South Sulawesi contribution in 2002 for rice production is 6.93% of national product, the fourth after East Java, West Java and Central Java Province. Maize production in South Sulawesi has contribution of 7.78% of national product or the fourth after the East Java, Central Java and Lampung province [12].

Food security conditions in South Sulawesi Province shows that food production growth has increased vegetable food sources, except cassava decreased 7.86 percent, percent peanuts of 9.80, green beans of 14.88 percent and fruit of 0.99 percent. Commodity that increaser are rice of 9.11 percent corn of , 20.00 percent, sweet potatoes of 7.94 percent, soy of 47.62 percent and vegetables of 16.08 percent. Animal food sources increase are fish of 51.59 percent, egg of 24.44 percent and poultry meat of 24.44 percent. While ruminant meat decreased of 10.69 percent [4].

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South Sulawesi is a region with diverse agro-ecosystem types. Food security problem in each agro-ecosystem also indicate a different problem. Coastal agro-ecosystem type has main problem in less stable food supply, wages and household incomes are also very low. Field agro-ecosystem type has main problems in low food absorption and household's nutritional status is still low, and wages and work performance are very low. Mountain agro-ecosystem has main problem in low food availability and low household income.

Theoretical Review:

Food security development consists of six (6) pillars. First, food diversification has aim to self-sufficiency food, maintaining germplasm and improvement of people's income. Second, food supply development and price stability has aims to keep food supply among time and between regions and ensure price stability for producers and consumers. Third, agro-industries development has aim for rural industrialization effort, increase in value added, employment and income. Forth, development of food diversification consumption has aim to improve the quality of people's food in order to live healthy and productive. Fifth, improvement of food security and nutritional status of community has aim to reduce food insecurity and society poverty. And sixth, development of food business has aim to encourage food commodities with global competitiveness to become a source of new growth for Indonesian economy [17].

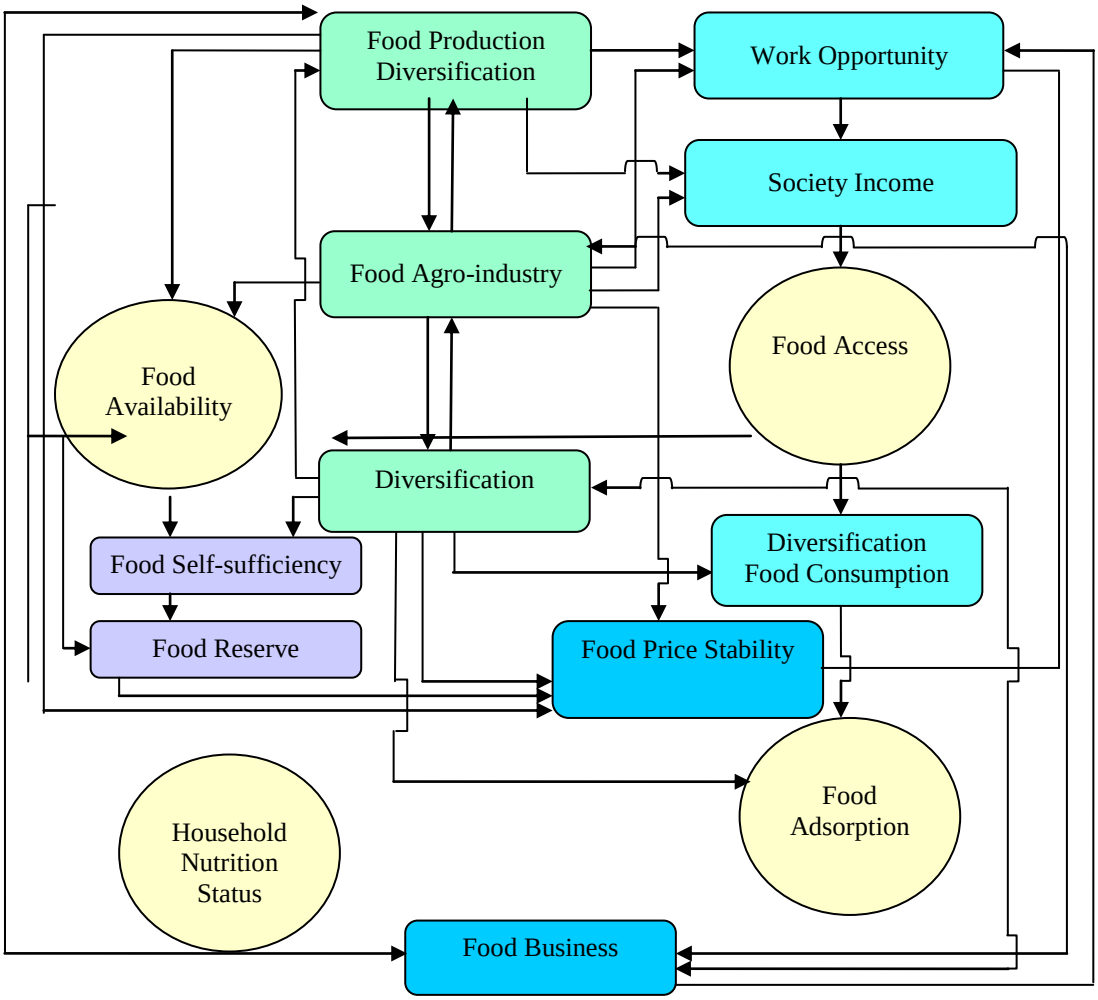

Fig. 1: Development of Food Security Systems Approach in Indonesia (Source: [12].

Becker [6] in his paper on household time allocation develops a theory of household behavior as basis for New Household Economics [10]. Ellis F. [10] states that Becker [6] begins his theory by highlighting the household time available. According to Becker, time is a rare resource for a household, time allocation and efficiency issues become important to study household welfare. The theory considers that decision makers in household as the production and consumption activities have close relation with time allocation and households income simultaneously. Household consumption satisfaction is not only for goods and services acquired in market, but also of various household commodities produced. Other assumptions used are: (1) time and goods or

services is an element of satisfaction, (2) time and goods or services can be used as an input in household production function, and (3) households act as producers and as consumers [10].

According to Ellis [10] and was also developed by Kusnadi in his research; this concept is different from consumption theory that will generate utility directly by consuming certain goods or services. Becker concept, which produces utility rather than goods or services but an end product called Z goods which in turn will produce a certain utility. Z is goods production by households that requires a combination of time available at number inputs of goods and services.

According to Ellis [10]; "value" usage of Z goods is to distinguish the goods from purchase (item X). Therefore, utility function defined as:

$U = f(Z1; Z2;\ldots\ldots Zn)$ (1)

Households produce Z goods from combinations of available time allocation (Ti) with inputs purchased in market (Xi). Household production function according to this concept is:

$Zi = f(X_i, T_i)$ (2)

Households maximize satisfaction that will be limited by production function; total time available and their cash income. Total time constrains (T) is determined based on household time allocation to work outside (Tw) and time available to produce goods $Z(\sum T_i)$. Because the total time constraints (T) are the amount of household time allocation to work outside (Tw) with time available to produce Z goods or $\left(\sum T_i\right)$, total time constraint can be written as follows:

$$T = Tw + \sum Ti \quad (3)$$

Cash income constrain (I) is determined by purchases value of goods formulated with piX_i, where p_i is the i-th item price. In equilibrium; value of goods purchased must be same with value household income and work activities. Value acceptance of work obtained by multiplying the market wage rate (W) with allocation of available time (Tw). Equilibrium condition can be written mathematically as follows:

$pX_i = I = Tw*W$ (4)

Where I is the magnitude value of goods that equal to households cash income [10].

From production side; production function $Zi = f(X_i, T_i)$, can also be expressed as Ti*tiZi and Xi*biZi. Where ti is time required to produce one unit of Z goods and bi are the inputs required to produce one unit of Zi with presence of T on a time constraint, then both of these constraints can be simplified to:

$piX_i + T_iW = F = T*W + V$ (5)

F = income
piX_i = value of purchased goods
T_i = time allocation to produce Z goods
W = wage rate market
T = amount of time available
V = income other than wages

According to Ellis [10] and also Kusnadi; this F equation of Becker is referred as full income. For simplification, W is assumed to become constant. Household full income is income if the available time is measured by level of wages coupled with incomes derived from non-work activities. Full income can also be interpreted as the maximum household's cash income that can be achieved by allocating the entire time and other resources to earn income without consumption.

Households can spend a full income directly or indirectly. Directly is to buy goods market and indirectly to produce final goods are ready for consumption, including for household usage. If households allocate their time to produce household goods or final goods are ready to eat (item Z), individuals or farmers do not earn income. The implication is that individuals in household can allocate their time constraints to produce final goods; to work; and relaxed with objective to maximize the household utility function.

Becker concept of time allocation can be described by curve to look relationship between household final goods produced and time allocation. This reasoning is same as Ellis [10], further understanding of Becker concept is presented in Figure 3.

Figure 3 shows the total time available for all household activities and family members are denoted by T. Total time M is allocated into three activities, namely the household domestic activities (TZ); work for wages (Tw) and leisure and fun (TH).

The vertical axis is amount of household goods production ready for consumption (Z), while the horizontal axis shows the time available to household (OT). Individual time for household activities is O-T1, while time for wage work is equal to T1-T2. Allocation of remaining time of total time available is a time that can be used for leisure and fun namely T2-T.

Household time usage allocation produces curve of total products (TP). TP curve is a curve to produce Z goods by utilizing a household activities or production function to shows the transformation of work time on final output in form of Z goods.

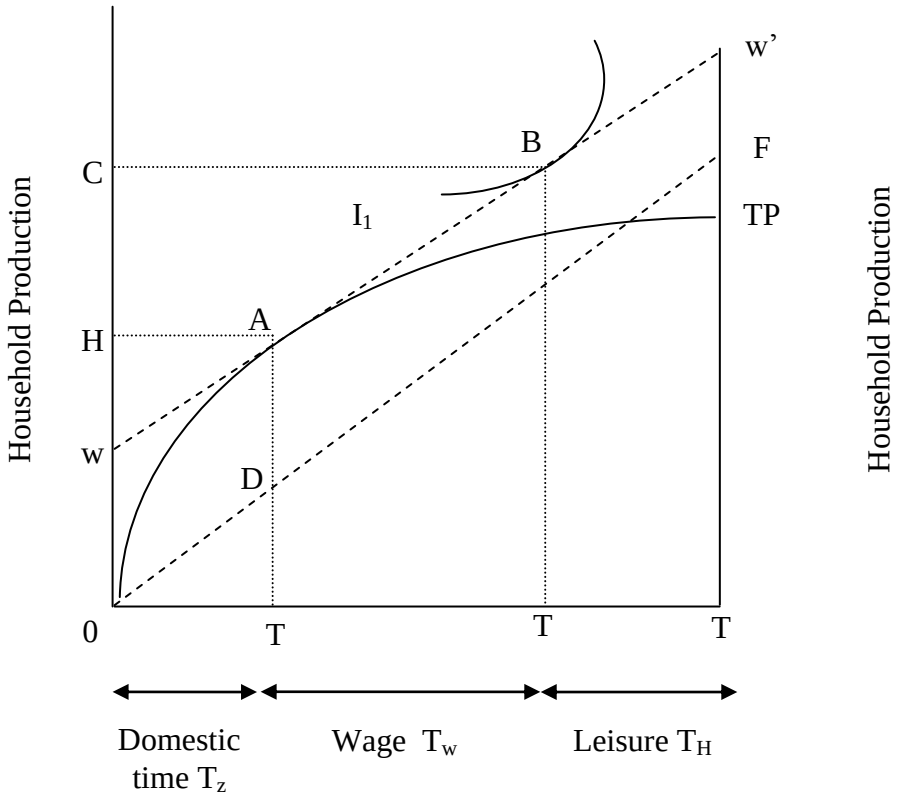

Fig. 3: Household Time Allocation from Becker Model.

If individual members of household work outside, household will earn income. Total household income received is stated in Figure 3 at OF line. OF line with slope w/p (where w is wage and p is price of goods purchased) illustrates the total increase in real income due to addition of work hours. Prevail real wage is illustrated with broken line ww'. Point F shows opportunity cost of a household from total time available (T) at level of real wages. Opportunity cost is same with wT/p [10].

Household balance to produce Z is reached at point A, when an additional product of work at house is same with real wages;

$$MPP = w/p \text{ or } MVP = w \quad (6)$$

In this condition, TP curve tangent to real wage rate (ww^1), time spent at OT^1 and end products produced of OH. Point H is the total cost for domestic component of household activities in order to produce Z goods. Combination of Z goods household production with leisure time produces a particular utility that described as indifference curve (I, I). Household balance point in consuming Z goods represented by point B, Marginal Rate of Substitution of leisure time (leisure) to Z is equal to ratio of opportunity cost to leisure time to market price of Z goods.

$$(MU_L/MU_Z) = (w/p) \quad (7)$$

According to Elly [11]; conditions above occur with assumption the prevailing wage rate is constant. Wage rate will also change this condition due to change in wage rate will cause income change. Furthermore, income changes will affect on allocation of household time to work at home; work outside for wages and leisure or have fun [11].

So this theory can be shown that individuals can decide to allocate his time between the options to work (work) or casual (leisure) with assumption that individual has a fixed amount of time available. Work is time spent doing an activity to earn wages. While relaxing time are all kinds of activities that are not getting paid, e.g. housework and time for consumption, breaks and so on.

Figure 3 is also able to meet the constraints of utility maximization in a model of household economy. Time constraints are the sum of three components of time represented by horizontal line. CH income constraints on graph is equal to market wage w multiplied by working time Tw. Household full income is shown by upward F shift to w' to enter to net value of labor devoted to household activities.

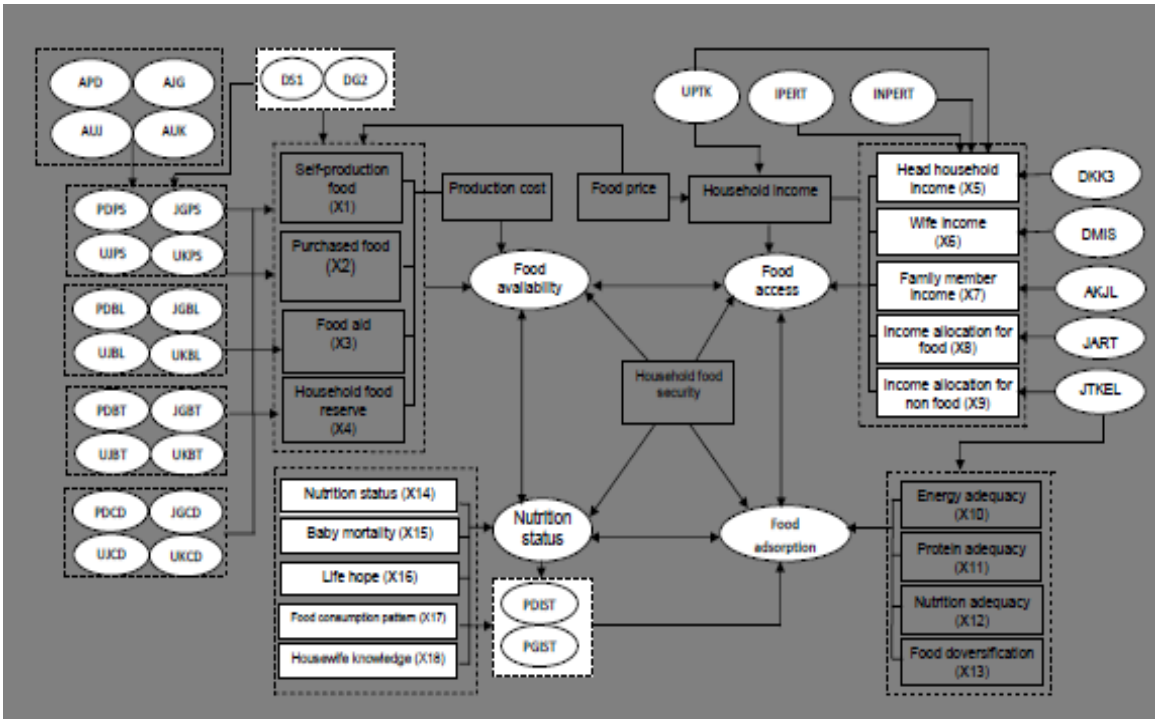

Fig. 4: Relation the Research Variables of Household Food Security in South Sulawesi.

Descriptions:
APD = Rice Area
AJG = Corn Area
AUJ = Sweet Potatoes Area
AUK = Cassava Area
TKKL = Productive Family Labor
DS1 = Dummy For fields Agro-ecosystems is better than coast and mountains Agro-ecosystems
DG2 = Dummy for Mountain Agro-ecosystems is better than coastal Agro-ecosystems
PDBL = Purchased Rice
JGBL = Purchased Corn
UJBL = Purchased Sweet Potato
UKBL = Purchased Cassava
IRT = Households income
PDBT = Rice Aid
JGBT = Corn Aid
UJBT = Sweet Potatoes Aid
UKBT = Cassava Aid
DMIS = Dummy for Poverty Level
PDCD = Rice Reserve
JGCD = Corn Reserve
UJCD = Sweet Potatoes Reserve
UKCD = Cassava Reserves
IRT = Household Income
IKRT = Household Head Income
IIRT = Housewife Income
IART = Household Member Income
IPERT = Agriculture Income
INPERT = Non-Agricultural Income
DKK3 = Dummy for Work Performance of Household Head
TKE = Energy Level Adequacy
Scene = Protein Levels Adequacy
TKVA = Vitamin A Level Adequacy
PDIS = Wife Education
PKPGN = Food Consumption Pattern

JTKEL = Number of Dependent Family

Research Methods:

The study was conducted in South Sulawesi province, with consideration that South Sulawesi is one rice barn in eastern Indonesia. Object location determined by Multistage sampling, with four stages, namely the determination of district, sub-district, village and households.

Method to determine the household respondent is purposive method with following provisions: (1) household head has a job as a farmer, (2) having a wife and child. Amount of sample is calculated based on formula of Parrel *et al*. [18]:

$$n = \frac{NZ^2\sigma^2}{Nd^2 + Z^2\sigma^2} \quad (8)$$

N = Number of sample
N = Population household rice farmers
Z = Z normal distribution of Z table at a rate of 95% (1.96)
σ^2 = Variance population approached from land area (0.3870)
d^2 = Storage acceptable 10%

First time is conducted a census of farmers areas in all three agro-ecosystem types to determine population range. Population approached at three agro-ecosystem types have land equal to 0.3870 hectares.

The result shows that population that meet the criteria in coastal agro-ecosystem types as much as 215 households, field agro-ecosystem types are 300 household and mountain agro-ecosystem types are 122 households. Based on calculations above, samples (n) of coastal agro-ecosystem types are 88 households, field agro-ecosystem types are 100 households, and mountain agro-ecosystem types are 67 households. Total samples are 88 255 households.

Table 1: Number of households Farmers at Each Neighborhood and Number of Samples at Three Agro-ecosystems Type in South Sulawesi.

Name of Neighborhood	Household Head	Samples
Coastal Agro-ecosystem Type (a)		
Neighborhood 1	45	18
Neighborhood 2	48	20
Neighborhood 3	40	16
Neighborhood 4	38	16
Neighborhood 5	44	18
Total (a)	215	88
Field Agro-ecosystem Type (b)		
Neighborhood 1	75	25
Neighborhood 2	48	16
Neighborhood 3	55	18
Neighborhood 4	45	15
Neighborhood 5	40	14
Neighborhood 6	37	12
Total (b)	300	100
Mountain Agro-ecosystem Type (c)		
Neighborhood 1	30	16
Neighborhood 2	25	14
Neighborhood 3	35	19
Neighborhood 4	32	18
Total (c)	122	67
Grand Total	637	255

Samples as representativeness of households are taken by proportionate random sampling method. Implementation is begins with preparation of a random sample framework. It contains name lists of household head (HH) for every neighborhood (RT) that meet criteria. Samples of each neighborhood are calculated by equation (2).

Sd = (m/N x n) (9)
Sd = number of samples at each neighborhood
m = Number of households each neighborhood
N = Population of farmers
n = number of samples desired

Samples is determined proportionally equation 9. Neighborhoods at coastal agro-ecosystem types are 5, field agro-ecosystem type are 6 and mountain agro-ecosystem types are 4. Detail sample chosen in is presented in Table 1.

Research Result:

Factors Affecting Food Availability of Farmers Household:

Food availability of farmer households consists of four variables namely self-produced food, purchased food, food aid and food reserves. Four variables will be analyzed from economic factors variables affecting household, as presented in several tables below.

Table 2: Effect of Self-Production Food on Food Availability of Farmers Household in South Sulawesi.

Variables	Regression Coefficient	T-count	Significance level	Variables name	Statistic criteria
Parameter Estimation Result of Self-Production Rice (PDPS)					
Intercept	-6089,60***	-3,98	<,0001	Constant	F-count : 3576,69*** Adj R Square : 0,98255 DW : 1,574109
APD	118947,10***	100,81	<,0001	Rice Land Area	
TKKL	150,0529ns	0,30	0,7651	Productive Worker	
DS1	5294,234***	5,03	<,0001	Field Agro-ecosystem Dummy	
DG2	1964,578ns	1,60	0,1104	Mountain Agro-ecosystem Dummy	
Parameter Estimation Result of Self-Production Corn (JGPS)					
Intercept	-529,676***	-2,84	0,0049	Constant	F-count : 5945,29*** Adj R Square : 0,97908 DW : 1,435863
AJG	102228,8***	109,04	<.0001	Corn Land Area	
DS1	710,0863***	2,91	0,0039	Field Agro-ecosystem Dummy	
Parameter Estimation Result of Self-Production Sweet Potato (UJPS)					
Intercept	-149,559ns	-1,36	0,1752	Constant	F-count : 126,77*** Adj R Square : 0,66450 DW : 1,829267
AUJ	23670,53***	21,63	<.0001	Sweet Potato Land Area	
TKKL	26,72969ns	0,75	0,4519	Productive Worker	
DS1	3180193***	4,46	<.0001	Field Agro-ecosystem Dummy	
DG2	165,1722*	1,89	0,0605	Mountain Agro-ecosystem Dummy	
Parameter Estimation Result of Self-Production Cassava (UKPS)					
Intercept	-72,6626*	-1,85	0,0651	Constant	F-count : 3512,39*** Adj R Square : 0,97646 DW : 1,914196
AUK	46471,67***	102,61	<.0001	Cassava Land Area	
TKKL	1,542501ns	0,14	0.8907	Productive Worker	
DS1	123,7588***	6,19	<.0001	Field Agro-ecosystem Dummy	

Table 2 shows that endogenous variables simultaneously have significant and positive effect on food availability of farmer's household for land area of rice, maize, sweet potato and cassava, and agro-ecosystem type. These results are consistent with Handewi [13] who states that rice, maize, cassava and sweet potato are significant variables to determine food insecure area namely households ability to produce main food.

Table 3: Effect of Purchased Food on Food Availability of Farmers Household in South Sulawesi.

Variables	Regression Coefficient	T-count	Significance Level	Variables name	Statistic Criteria
Parameter Estimation Result of Purchased Rice (PDBL)					
Intercept	53376,14ns	1,48	0,1412	Constant	F-count: 13,36*** Adj R Square : 0,8870 DW : 1,26439
IRT	0,027278ns	1,43	0,1540	Household Income	
PDPS	-0,47468***	-4,71	<.0001	Self-Production Rice	
Parameter Estimation Result of Purchased Corn (JGBL)					
Intercept	17727,58***	3,29	0,0013	Constant	F-count: 32,32*** Adj R Square : 0,19782 DW : 1,668916
IRT	-0,00253ns	-0,86	0,3902	Household Income	
JGPS	-0,43667***	-7,97	<.0001	Self-Production Corn	
Parameter Estimation Result of Purchased Sweet Potato (UJBL)					
Intercept	11588,05**	2,38	0,0181	Constant	F-count: 63,34*** Adj R Square : 0,32923 DW : 1,473122
IRT	0,004315*	1,65	0,0998	Household Income	
UJPS	-11,1604***	-11,22	<.0001	Self-Production Sweet Potato	
Parameter Estimation Result of Purchased Cassava (UKBL)					
Intercept	18155,95***	3,08	0,0023	Constant	F-count: 48,06*** Adj R Square : 0,27038 DW : 1,730812
IRT	0,002148ns	0,68	0,4984	Household Income	
UKPS	-7,47612***	-9,74	<.0001	Self-Production Cassava	

Table 3 shows that purchased food that simultaneously has negative affect are rice, maize, sweet potato and cassava that self-production. This suggests that food availability of farmer household in South Sulawesi is largely determined by household's behavior in farming activities to produce the main food. This is consistent with research of Baliwati, YF [5] that farmer household food security is determined by number of major food produced by household.

Table 4: Effect of Food Aid on Food Availability of Farmers Household in South Sulawesi.

Variables	Regression Coefficient	T-count	Significance Level	Variables name	Statistic Criteria
Parameter Estimation Result of Rice Aid (PDBT)					
Intercept	13962,05***	3,10	0,0022	Constant	F-count : 46,64*** Adj R Square : 0,26438 DW : 1,908981
IRT	-0,00104ns	-0,43	0,6668	Household Income	
DMIS6	-12045,8***	-9,63	<.0001	Poverty Level Dummy	
Parameter Estimation Result of Corn Aid (JGBT)					
Intercept	2511,108ns	1,35	0,1784	Constant	F-count : 14,20*** Adj R Square : 0,09418 DW : 2,119005
IRT	0,000254ns	0,25	0,8001	Household Income	
JGPS	-0,09989***	-5,33	<.0001	Self-Production Rice	
Parameter Estimation Result of Sweet Potato Aid (UJBT)					
Intercept	5052,902***	2,94	0,0036	Constant	F-count : 15,79*** Adj R Square : 0,10432 DW : 1,980165
IRT	-0,00123ns	-1,32	0,1875	Household Income	
UJPS	-1,89883***	-5,36	<.0001	Self-Production Sweet Potato	
Parameter Estimation Result of Cassava Aid (UKBT)					
Intercept	2000,196***	8,21	<.0001	Constant	F- count: 3,98** Adj R Square : 0,01160 DW : 1,997625
UKPS	-0,43190**	-2,00	0,0471	Self-Production Cassava	

Table 4 shows that food aid of farmer's household in South Sulawesi is affected by poverty level and households ability to produce the main food other than rice. This is consistent with Sumarwan [19] who state that poor people have the low ability to meet the food supply, it makes household food security is difficult to achieve. Efforts to improve food security of farmer's household in South Sulawesi should makes policies that favor to the poor.

Table 5: Effect of Food Reserves on Food Availability of Farmers Household in South Sulawesi.

Variables	Regression Coefficient	T-count	Significance Level	Variables name	Statistic Criteria
Parameter Estimation Result of Rice Reserve (PDCD)					
Intercept	-18935,6***	-3,36	0,0009	Constant	F-count : 166,08*** Adj R Square :0,39391 DW : 1,804163
PDPS	1,151455***	12,89	<.0001	Self-Production Rice	
Parameter Estimation Result of Corn Reserve (JGCD)					
Intercept	1558,924*	1,90	0,0580	Constant	F- count: 20,12*** Adj R Square : 0,07002 DW : 1,89274
JGPS	0,234091***	4,49	<.0001	Self-Production Corn	
Parameter Estimation Result of Sweet Potato Reserve (UJCD)					
Intercept	15,28413ns	0,29	0,7716	Constant	F- count: 4218,88*** Adj R Square : 0,94320 DW : 2,153969
UJBL	0,213144***	64,95	<.0001	Self-Production Sweet Potato	
Parameter Estimation Result of Cassava Reserve (UKCD)					
Intercept	2,861798ns	0,09	0,9301	Constant	F- count: 24916,1*** Adj R Square : 0,98991 DW : 2,058746
UKBL	0,251414***	157,85	<.0001	Self-Production Cassava	

Table 5 shows that food reserves of farmer household in South Sulawesi is affected number of major food production produced by households namely rice, maize, cassava and sweet potatoes. All four variables have significant and positive effect. It means household food aid could be reduced or eliminated if the household has the ability to produce sufficient food. This analysis result is consistent with Jellinek and Rustanto [15] that success in maintaining the household food security is determined by household's ability to produce food from various food sources such as self-produced, purchased food and food reserves at household level. Policy to establish household food barns are needed to maintain food security of farmers household.

Factors Affecting Food Access of Farmers Household:

Household food access in this study consists of four components, namely the household head income, wife's income, family member's income, income allocation for food, income allocation for non Food [7]. In this study endogenous variables make up the household food access of farmers in analysis model that consist of household income head, wife income, family income, farm income and non-farm income.

Table 6 shows that significant exogenous variables are work performance of household head, wife work performance, worker, number of family members who work and roads access. This analysis results show that exogenous variables can improve household food access, especially in efforts to increase household income to achieve household food security. This analysis results are consistent with Ariani, M. And Saliem, HP [3] that

farmer household food security is determined by income of households and their members, especially in meeting the expenditure for food consumption as well as other needs. Increased labor costs for household members who work outside farm sector largely determines level of household food access. This is consistent with Djauhari [9] that consumption expenditure is closely related to number of household members, household members work. Household with diverse income sources are better able to maintain continuity in fulfillment of food consumption.

Table 6: Factors Affecting Farmers Household Food Access in South Sulawesi.

Variables	Regression Coefficient	T-count	Significance Level	Variables name	Statistic Criteria
Parameter Estimation Result of Household Head Income (IKRT)					
Intercept	1120188***	23,01	<.0001	Constant	F-count : 29,50*** Adj R Square : 0,25187 DW : 1,862506
PGPS	1,461519ns	1,56	0,1207	Self-Production Food	
PGBL	-1,51841ns	-1,55	0,1220	Purchased Food	
DKK3	334374,0***	9,20	<.0001	Household Head Work Variance Dummy	
Parameter Estimation Result of Wife Income (IIRT)					
Intercept	-5496,29ns	-0,18	0,8578	Constant	F- count: 50,57*** Adj R Square : 0,36929 DW : 1,925517
PDIST	1531,673ns	0,56	0,5781	Wife Education	
DIS4	238258,2***	11,63	<.0001	Wife Work Variance Dummy	
UPTK	3,786755***	4,35	<.0001	Worker Wage	
Parameter Estimation Result of Family Member Income (IART)					
Intercept	-61530,0ns	-1,55	0,1226	Constant	F- count: 276,45*** Adj R Square : 0,81266 DW : 1,702836
JART	147886,5***	10,34	<.0001	Family Member Number	
DAN5	10895,79ns	0,57	0,5671	Family Member Work Variance Dummy	
AKJL	-11,6537***	-5,33	<.0001	Road Access	
UPTK	17,00390***	16,79	<.0001	Worker Wage	
Parameter Estimation Result of Farm Income (IPERT)					
Intercept	891415,1***	8,78	<.0001	Constant	F- count: 9,04*** Adj R Square : 0,5952 DW : 1,825478
PGPS	2,877404***	3,97	<.0001	Self-Production Food	
IKRT	0,074825ns	0,97	0,3319	Household Head Income	
Parameter Estimation Result of Non Farm Income (INPERT)					
Intercept	-16440,8ns	-0,22	0,8265	Constant	F- count: 399,16*** Adj R Square : 0,75817 DW : 1,859962
IKRT	0,018860ns	0,26	0,7782	Household Head Income	
DKK3	391677,6***	15,65	<.0001	Household Head Work Variance Dummy	

Factors Affecting Farmers Household Food Absorption:

Farmer household food absorption consisted of four variables: level of energy adequacy, protein adequacy, vitamin A adequacy and food diversification . Simultaneously, factors affecting farmer household food absorption in South Sulawesi is shown in Table 7.

Table 7: Factors Affecting Farmers Household Food Absorption In South Sulawesi.

Variables	Regression Coefficient	T-count	Significance Level	Variables name	Statistic Criteria
Parameter Estimation Result of Energy Adequacy Level (TKE)					
JTKEL	-213,229***	-4,24	<.0001	Family Dependent	F-count : 268,85*** Adj R Square : 0,80775 DW : 0,73935
IRT	0,000684**	2,42	0,0162	Household Income	
PKPGN	5,716186***	3,58	0,0004	Food Consumption Pattern	
PDIST	64,70177***	3,18	0,0017	Wife Education	
Parameter Estimation Result of Protein Adequacy Level (TKP)					
JTKEL	-10,8452***	-7,49	<.0001	Family Dependent	F- count: 350,44*** Adj R Square : 0,84571 DW : 0,96044
IRT	0,000023***	2,88	0,0043	Household Income	
PKPGN	0,251160***	5,46	<.0001	Food Consumption Pattern	
PDIST	1,578336***	2,69	0,0075	Wife Education	
Parameter Estimation Result of Vitamin A Adequacy Level (TKVA)					
Intercept	11,08912***	7,77	<.0001	Constant	F- count: 39,34*** Adj R Square : 0,31168 DW : 1,201023
IRT	0,000001213ns	1,43	0.1530	Household Income	
JTKEL	-1,35916***	-10,15	<.0001	Family Dependent	
DG2	1,345419**	3,02	0,0028	Mountain Agro-Ecosystem Dummy	
Parameter Estimation Result of Food Diversification (PRPGN)					
Intercept	-171,376**	-2,30	0,0222	Constant	F- count: 15,63*** Adj R Square : 0,8720 DW : 1,218053
IRT	0,000053*	1,86	0,0640	Household Income	
PDIST	3,540197*	1,86	0,0645	Wife Education	
JTKEL	1,665245ns	0,36	0,7191	Family Dependent	
PKPGN	1,600111***	7,30	<.0001	Food Consumption Pattern	

Analysis with simultaneous equation shows that Level of energy adequacy, protein and vitamin A adequacy are affected by number of family dependents, household income, food consumption patterns and education wives and mountain agro-ecosystem dummy. This analysis result consistent with [14] that household food security is affected by level of energy and protein adequacy. In addition, [2] states that level of energy adequacy and protein consumption by type ecology determines level of household food security. Conclusions of these studies are attainment levels of energy consumption reached 68.1%, and rate of protein consumption is 96.91 % of people who have fertile land. People who have less fertile land energy consumption levels of 60.1% and protein consumption levels of 78.3%.

Table 7 also shows that food absorption of farmer households in South Sulawesi are also affected by wife's education and food consumption patterns. Both of these factors are highly related because wife regulates food consumption patterns at household level. This is consistent with [9] which states that food consumption expenditure to meet the adequacy level of energy, protein and vitamin A is associated with age and wife education.

Factors Affecting Nutritional Status of Farmers Household:

Nutritional status of farmer households in this study consists of four variables: infant nutritional status, toddler's mortality, and life expectancy and food consumption patterns. Simultaneous effects of these variables on household's nutritional status are presented in Table 8.

Table 8: Factors Affecting Farmers Household Nutritional Status in South Sulawesi.

Variables	Regression Coefficient	T-count	Significance Level	Variables name	Statistic Criteria
Parameter Estimation Result of Baby Nutrition Status (SGBLT)					
Intercept	578,6921***	19,94	<.0001	Constant	F- count: 4,23*** Adj R Square : 0,3672 DW : 1,711849
TKVA	1,299903ns	0,58	0,5626	Vitamin A Adequacy Level	
PDIST	0,981235ns	0,63	0,5314	Wife Education	
PGIST	0,212974***	3,31	0,0011	Wife Knowledge	
Parameter Estimation Result of Toddler Mortality (MRBLT)					
Intercept	212,2189***	5,64	<.0001	Constant	F- count: 1,70ns Adj R Square : 0,01090 DW : 1,404657
TKE	0,014275**	2,06	0,0409	Energy Adequacy Level	
TKVA	0,288740ns	0,18	0,8584	Vitamin A Adequacy Level	
PGIST	0,005852ns	0,13	0,8935	Wife Knowledge	
PRPGN	0,108390ns	1,29	0,1979	Food Diversity	
Parameter Estimation Result of Household Life Hope Age (UHRT)					
Intercept	349,0508***	10,15	<.0001	Constant	F- count: 10,27 Adj R Square :0,09867 DW : 1,392152
PDIST	0,195505ns	0,19	0,8468	Wife Education	
PGIST	0,004140ns	0,09	0,9271	Wife Knowledge	
PKPGN	0,641833***	4,87	<.0001	Food Consumption Pattern	
Parameter Estimation Result of Food Consumption Pattern (PKPGN)					
Intercept	157,1852***	5,45	<.0001	Constant	F-count: 10,75*** Adj R Square : 0,3313 DW : 1,038176
IRT	-0,00001ns	-0,97	0,3327	Household Income	
PGIST	0,043618ns	0,99	0,3255	Wife Knowledge	
JTKEL	-0,26534ns	-0,11	0,9127	Family Dependent	
PRPGN	0,338538***	5,41	<.0001	Food Diversity	

Table 8 shows that simultaneous factors with significant effect on household's nutritional status are wife knowledge, level of energy adequacy, food consumption patterns and food diversification. This analysis result is consistent with [20] that household nutritional status is determined by housewife role to set food consumption pattern and food diversification.

Conclusion:

Four components of household food security consisting of food availability, food access, food absorption and nutritional status of households simultaneously have positive effect on food security level of farmer household in South Sulawesi. Factors affecting individual components of household food security level are follows:

a. Factors with positive effect on household farmer food availability farmers are planting area, productive workforce, agro-ecosystem type, household income. Factors with negative effect on household food availability are self-production food and poverty level.

b. Factors with positive effect on household food access are a farmer's self-production food, work performance of household head, wife work performance, work performance of household members, wage labor, household head income, family members who work, while the negative effect is road access.

c. Factors with positive effect on food absorption of farmers household are household income, agro-ecosystem type, food diversification, wife education, while negative effect is number dependents.

d. Factors with positive effect on nutritional status are energy adequacy level and food diversification.

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