Household Food Security and Vulnerability: the Sustainable Livelihood Framework

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Abstract

This study examines determinants of household food security among the poorest households in Kalibawang, Yogyakarta. The Sustainable Livelihood Framework (SLF) is an approach that we use to explain how the poorest in the rural area in facing the vulnerability due to the coping food problem affected by the El Nino phenomenon by using their assets. To analyze factors in influencing food security for poor households in the village, we consider using determinants of household assets (human capital, financial capital, physical capital, natural capital and social capital), income, dummy employment, and many family members. Also, the sources of data for this study are cross section primary data from 125 poorest households, which are obtained by the Focus Group Discussion (FGD) and personally administered questionnaire methods. For further analysis, we used Coping Strategies Index (CSI) as a food security indicator, and Ordinary Least Square (OLS) is a method to explain the influence of determinants. Based on the analysis, the results indicate the factors that have an impact on the poorest household food security are the female education, financial, physical, and social capital, as well as employment status.Meanwhile, the head of household education, natural capital, and income have no effect on food security among poorest in the rural area.

Key words : food security, sustainable livelihood, vulnerability.

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INTRODUCTION

Food security is one of the main concerns in the world to tackling global hunger. It has urgent to many live aspects, one of them is an economy. Food security monitoring can identify base aspects of population well-being. Food insecurity causes the loss of productivity and tends to decline human resource performance. Moreover, according to Radha dan Prasana (2010), food security is a basic need for human development. Sustainable economic growth possible to achieve with sustainability human development. It depends on food security and nutritional status, in another word nutritious investment is essential for the economy.

Food security becomes an essential issue in Indonesia, where the fact indicates food security achievement in national level it was not transferred to a household level usually. According to Pangaribowo dan Tsegai (2014), based on macro indicators Indonesia has achieved food security, but this condition has not reflected in the micro level.

This suggestion was consistent with Suryana (2014) which affirm several essential points about food security performance in Indonesia. One of them is achievement food security at macro level that not transmitted on household quality and nutrition status. It is due to lower purchasing power, nutritious knowledge, and health status. There is three level of food security namely household food security that is indicated access property to fulfill all the time. The next level is national food security which based on household security. It is hard to declare a country has national food security if the household has not yet.

Finally, global food security that it is mean there is enough food supply to fulfill global necessity (Warr, 2013). But, according to Khan et al. (2012), food security

achievement in national level was not guaranteed food security in the province, regency, and household level, because there is disparity among them. Even, the household has food security status it did not guarantee each household member has food security. This condition related to food distribution system in a household. The factor that influences this condition is geography, environment, health and social factors.

Moreover, Widayaningsih and Barokatuminalloh (2016) suggest that food security in micro level is an important factor to know the state of food security at the household level. Although the macro food security, especially regarding the food supply and the efficient marketing system, does not ensure the equal access to the food for the entire population. To achieve food security we face several problems which have to anticipate, such as population, domination of rice as staple food, diversified food not optimally yet, land transformation, exploitation, and climate change (Sumastuti, 2011). It is important to enhance food security at all level, so to achieve that we have to know what dimension can reach that.

According to World Food Summit (1996), food security is defined as "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." Based on this definition, we can identify four dimensions of food security: availability, access, utilization, and stability. All of the dimension has inter-relationship among them. From these four indicators, stability is the important key to maintaining another food security aspects such as availability, access, and utilization achieved all the time. Stability pillar explains a concept where a country can ensure food

security at one time but could experience food insecurity on another occasion. In another word, stability relates with the vulnerability that indicates that a country, household or individual has no guarantee can achieve food security at all times.

It came from many factors such as trends, shocks, and seasonal that uncontrolled. Food stability also depends on the status of food availability, accessibility, physical access, market access, landscape vulnerability and infrastructural facilities (Sati & Vangchhia, 2017).

The source of shock can from the global issue namely climate change. According to NOOA (2007), climate change is a long-term shift in the statistics of the weather (including its averages). For example, it could show up as a change in climate normal(expected average values for temperature and precipitation) for a given place and time of year, from one decade to the next.

Climate change will affect all four dimensions of food security: food availability, food accessibility, food utilization and food systems stability. It will have an impact on human health, livelihood assets, food production and distribution channels, as well as changing purchasing power and market flows. Its impacts will be both short term, resulting from more frequent and more intense extreme weather events, and long term, caused by changing temperatures and precipitation patterns (FAO, 2008). Food security is the outcome of food system processes all along the food chain. Climate change will affect food security through its impacts on all components of global, national and local food systems. It will first affect the people and food systems that are already vulnerable, but over time the geographic distribution of risk and vulnerability is likely

to shift. Certain livelihood groups need immediate support, but everybody is at risk.Climate change has global consequences to crop yields, production, and risk of hunger of linked socio-economic and climate scenarios (Parry etal, 2004).

One part of the shock is climate change that is now often the case, either El Nino or La Nina. In 2015 the El Nino phenomenon, which is a symptom of irregularities sea conditions characterized by increased sea surface temperature (sea surface temperature or SST) in the Pacific Ocean around the equator (equatorial Pacific), particularly in central and eastern (around the coast of Peru). These conditions will result in the deviation of the global climate as it affects hit many regions of the world. In America and Europe, for example, increased rainfall that triggered the big floods, while in Indonesia, India, Australia, and Africa experienced a reduction in rainfall causing drought. El Nino pattern derived from NOAA indicates that Indonesia experience warm and dry conditions, a strong El Nino that will take up to several months in 2016, the peak occurred in November-December, 2015.

Climate change was resulting in a prolonged drought, causing pressure on the food system. All of pillars namely availability, access, food utilization, thereby putting pressure on food security (Gregory et al., 2005). What the impact of El Nino in the form phenomena drought resulted in the harvest is not optimal or even crop failures were causing harm both to farmers and consumers. On the farmer's side it makes a loss of income from harvests, meanwhile, in consumer side, drought tend to increases food price. This condition will affect household food security. Drought is a shock that causes vulnerability poor households. Poor household was

assumed has food insecurity more relate with purchasing power to buy food (Shekampu, 2013). For that we need to adapt. According to United Nations Framework Convention on Climate Change, adaptation defne as a process through which societies make themselves better able to cope with an uncertain future. Adapting to climate change entails taking the right measures to reduce the negative effects of climate change(or exploit the positive ones) by making the appropriate adjustments and changes.

To analysis food vulnerability we used sustainable livelihood approach that was developed by Chambers dan Conway (1992) that comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. Sustainable Livelihood approach gives us a framework for poverty and vulnerability both of development context and humanity. The comprehensive concept of livelihood are it comprises to capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustained when it can cope with their and recover from stresses and shock and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

Sustainable Livelihood Framework built by Institute for Development Studies in Universitas Sussex and Oxfam, The British Departement for International Development or DFID. Sustainable Livelihood Framework was developed to arrange and improve organization to poverty alleviation. SLF approach stems from the idea that a person's life depends on a lot of opportunities to access capital that is the foundation of their life strategies. This approach used to explain how poorest in rural area coping food problem in facing vulnerability that came from shock

such as El Nino phenomenon by using their poor's assets, namely human capital, financial capital, physical capital, natural capital and social capital. With transformation could be influenced poor's livelihood strategy to obtain some benefit from their own asset that called as livelihood outcomes where one of them is sustainable food security (Kollmair dan Gamper, 2002).

In other words, poor's assets have potential to contribute household food security. According to this explanation, food security is an outcome from livelihood strategy by optimizing household asset. It means, a household asset has potential to contribute to household food security For that, it needs to analysis which of assets could support policy to improve food security. In other words, poor's assets have potential to contribute household food security.
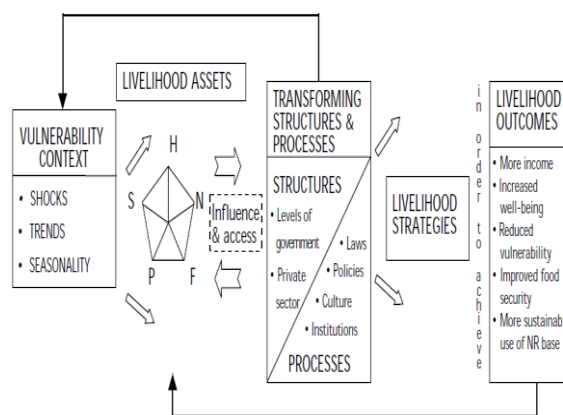
Source: Department of International Development /DFID (1999)
Figure 1. Sustainable Livelihood Framework Conceptual

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support policy to improve food security.

Suistanable livehold framework has the aim to indicate important factor, significance and source from this interaction. The SLF comprise of five primary components namely vulnerability context, livelihood asset (human capital, natural capital, social capital, physical capital, financial capital), transforming structure and processes, livelihood strategies, dan livelihood outcomes. Conceptual diagram of SLF can be shown in Figure 1.

Livelihood assets relating to the identification of five primary assets of people. This concept of seeking benefits precisely and realistically understand one's strengths (assets or capital endowments) and how one uses those assets, thus providing positive outcomes for livelihoods. Pentagon assets are at the core of livelihood framework in the context of vulnerability. Pentagon assets developed to provide information about personal assets.

Assets owned by households we classified into natural capital (such as land, water forests, sea, air quality, erosion, protection, and biodiversity). Physical capital (means of transport, roads, buildings, water supply, sanitation, technology and communications). Financial capital (savings, credit and the flow of funds). Human capital (education, skills, knowledge, health, nutrition, and employment). Social capital (trust between the community, the attitude of cooperation, access to opportunities, safety nets, membership in the organization). Conceptually relationships between assets are the greater of poor household or possessions access to social capital, financial capital, human capital, physical capital, capital, natural resources; then someone will be more empowered to raise revenue. This situation

can improve living standards and encourage people to get out of poverty, increase prosperity, reduce vulnerability and enhance food security. The success of sustainable poverty reduction will only be successful if the agent changes work in harmony with the livelihood strategies, the social environment and adaptability (Kollmair and Gamper, 2002). For variable household assets, each asset has diverse influences.

The approach provides a framework influence SLF assets (which include human capital, natural capital, physical capital, financial capital and social capital) to food security. The greater the access to or possession of any person to social capital, financial capital, human capital, physical capital, capital, natural resources, then someone will be more empowered to raise revenue. This situation can improve living standards and encourage people to get out of poverty, increase prosperity, reduce vulnerability and enhance food security.

Households can use their assets optimally will achieve the outcome in the form of food security better. Assets owned by the poor, both natural capital, physical capital, financial capital, human capital and social capital will enhance the ability of the poor to withstand shock or vulnerability better. Additionally, these assets increase the capacity of the poor to achieve sustainable livelihoods. Therefore, natural capital, physical capital, financial capital, human capital and social capital will increase peoplein obtaining access to foodstuffs, thereby negatively affect household food insecurity and then improve food security. Comprehensive analysis of food security is necessary to understand the relationship between the variables that affect food security.

Based on empirical studies factors influencing food security besides household assets are demographic factors. There are the number of family members, employment and purchasing power in the form of income. Human capital as measured by mother's old school and head household old school. Higher mother education tends to improve food security because it makes household possible to prepare and organize food better than low education (Irram dan Butt, 2004). So, mother's old school has the negative impact of food insecurity or improve food security. Furthermore, better head of household education will increase knowledge and information to increase farm productivity, crop management, and access to a market. It will increase income potential that can use to buy food (Okyere *et al*, 2013 dan Li dan Yu, 2010). Financial capital helps the poor household to decrease problem which source from lack of liquidity (Demek *et al*, 2011). Financial capital such as saving will increase the ability to fulfill a household need while facing vulnerability. It can guarantee household sustainability in the future hence it will decrease food insecurity risk. According to Guo (2011) for a household with low income, saving provide a reserve to relieve negative consequences from lost income. Another financial capital is the loan, which Okyere *et al* (2013) suggest household can use when facing *shock*s like failure crops, loss of livestock, deceased and other household need. It means loan usage for many purposes both food and otherwise. For that, the influence of loan on food security depends on utilizing. If loan use to fulfill food necessity, so the loan can increase food security. Adversely, when loan uses to another necessity it will harm food security.

Physical capital such as motorcycle ownership can help the poor to obtain access to an economic location. It will decline cost to obtain food and nonfood necessity, so household can achieve that with a lower price. As a result, a household can achieve food security (Guo, 2011; Martin et al, 2004). Beside motorcycle, there is another physical indicator namely poultry and distance to near market. According to Demek et al (2011), poultry is an asset that household has. It has many purposes such as provide food reserve, incomes and buffer stock when food production decline. The distance to nearest market make poor household easier to obtain food with a lower price, so it will increase access to food (Dzanja et al, 2013; Li dan Yu, 2010).

Social capital has a different impact on food security (Wasito dan Subayono, 2012). They suggest that social capital has two views, positive and negative. Positive view describes that social capital can bring benefit to society, an example of food security (Dzanja et al, (2013); Martin et al, 2004). Otherwise, it suggests social capital can create negative implication if there are limited access for outside society and information inequality for a member. Another asset is nature capital such as farmland ownership. It will increase household ability to produce foodstuff. Moreover, yield from farmland can improve household income that can use to buy food (Khan et al,2012; Li dan Yu, 2010).

Beside household assets, other determinants are an amount of family, employment status, and income. The amount of family has a different impact on food security. The amount of family member will decrease food security cause will increase burden to fulfill food necessity. On the other hand, it will increase food security if more of a family member has been (Demek et al, 2011; Dzanja et al, 2013; Purwaningsih, 2010; Li dan Yu, 2010).

Another determinant is employment status of head household that indicates by a farmer and nonfarmer. Farmer more secure than other because they have foodstuffs more than other as a farm yield. But, according to Demek et al (2013), Martin et al (2004), Li dan Yu (2010) off farm can give an opportunity to obtain additional income that can improve food security.Income will increase ability poor household to maintain food security cause they can buy foodstuffs.

According to Guo (2011) income, in the short term will increase the ability to facing food insecurity. Moreover, Shekampu (2013) suggest household can use the income to fulfill many necessities, not only for food. Several studies on food associated SLF has been conducted are (Regmi and Meade (2013); Sekhampu (2013); Okyere et al (2013); Dzanja et al (2013); Prevel et al (2012); Khan et al (2012); Demeke et al (2011); Rachim et al (2011); Shahid and Siddiqi (2011); Guo (2011); Purwaningsih (2010), Radha and Prasnna (2010); Li and Yu (2010), Sari and Prishardoyo (2009), Irram and Butt (2004) and Martin et al (2004).

Poor people to facing vulnerability as shock, trends, a season has strategies to cope food problem extremally access to food. They have different strategies to coping that, where household implementing adaptation. There is a theory to explain the strategies, namely Food Coping Strategies whose developed by Maxwell dan Smith (1992). The theory explains how a household response to cope food problem. Based on this theory, we can arrange food security indicator that it called Coping Strategies Index. This study used Coping Strategies Index as the dependent variable. As a food security indicator, Coping Strategies Index (CSI) describe household strategies to cope food problem facing in

vulnerability. The instrument of Coping Strategies Index questionnaire disposed of by Maxwell et al (2008). Moreover, higher CSI score indicates food security status tend to decline (Maxwell et al, 2008). To measure indicators of food security concerning the vulnerability, then use the theory to explain Food Coping Strategies developed by Maxwell and Smith (1992). The theory explains how the response of households facing food problems. Based on this theory, the prepared food security indicators called Coping Strategies Index (CSI). Coping Strategies Index (CSI) is one indicator of food security is relatively straightforward and easy to use, easy to understand directly and correlates well with the size of the food security more complex. CSI uses some questions about how households face a decline in short-term food consumption figures in the score. CSI score indicates a change in the food security status change can decrease or improved (Maxwell al, 2003).According to Maxwell (1995), there are six main strategies of households to face food problems, namely:

1) Consuming less preferred food (eating
2) foods that are less preferred)
3) Limiting portions of food.
4) Borrow food or money to buy food.
5) Reducing maternal food for their children.
6) Reducing the frequency of eating.
7) Do not eat in a day.

Households strategies in facing food problem were shown in Table 1. There is some empirical study which explained the relation between human capital and food security. Several study are Dzanja et al (2013), Khan et al (2012), Demeke et al (2011), Rachim et al (2011), Purwaningsih (2010), Li and Yu (2010), Radha and Prasnna (2010), Sari and Prishardoyo (2009), Irram and Butt (2004) and Martin et al (2004).

The contrary results indicated by Sekhampu (2013) and Okyere et al. (2013) who found that education has no effect on food security. Physical capital shows consistent results that support food security.

Table 1. Coping Strategy Index Households Facing Problem in Food

List Strategy	SCORING RELATIVE FREQUENCY					scores rough	The weight of the level of vulnerability 1 = less 2 & 3 = medium 4 = severe	Score = score rough x weight
In the last 30 days, how often household do the following if it does not have enough food or money to buy food?	1 Almost every day	2 Sometimes (3-6 days / Sunday)	3 Occasional (1-2 days / Sunday)	4 Rarely (<1 day / Sunday)	5 Never (0 day / Sunday)			
	7	4,5	1,5	0,5	0			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
a. Rely on less preferred food and cheap								
b. borrowing food or relying on food assistance from friends or relatives?								
c. Buying food with debt								
d. Using the food was not ready to harvest								
e. Consumed a food crop seeds								
f. Asking the children to eat at the neighbor's place								
g. Asking family members to ask for food								
h. Reduce the portion of food								
i. Reduced consumption of adults to feed children								
j. Feeding of members are working with the costs for household members not working								
k. Rationing money and buy food reserves								
l. Reduce amount of food eaten in a day								
m. Not eating at all a whole day								
COPING STRATEGIES INDEX SCORES								

The study results demonstrated consistent effects on food security by Sekhampu study (2013), Li and Yu (2010), Martin et al (2004). The household has enough income will increase the ability to buy food than less income. It will decrease food insecure households. This relation support by Warr (2012), Pangaribowo & Tsegai (2014), Regmi and Meade (2013), Sekhampu (2013), Radha and Prasnna (2010), Shahid and Siddiqi (2011), Guo (2011), Purwaningsih (2010), Sari and Prishardoyo (2009), Irram and Butt (2004) and Li and Yu (2004).

RESEARCH METHOD

This study based on a model that used by Demek *et al* (2011), which it using *Sustainable Livelihood Framework* (SLF) to examine food security determinants. This part explains the relation between independent variable to dependent variable. In this study, food security indicator is *Coping Strategies Index* (CSI). Hypotheses development will be described the relationship between variable. Based on a literature review of empirical studies above, it can be arranged frame of the research as shown in about the relationship between dependent and independent variable. This framework indicates the sign of each factor to food security.

Figure 2. Conceptual Framework

Identification of factors that can enhance food security will influence the policy-making and development. For that, we need to analyze for security determinants. Based on the analysis it would support for policies to improve household food security.

This study examines household food security in Kalibawang; Kulonprogo Yogyakarta. The unit analysis is poor household cause they were assumed has food insecurity more relate with purchasing power to buy food (Shekampu, 2013). Beside that respondent is women because of they usually, although not always, people who prepare food for household (Maxwell, 2003). The appropriate respondent is the receiver of Program Keluarga Harapan (PKH) which is social protection program from Social Department that gives some cash aid to poorest household and particularly a woman as a recipient.

The population in this study is very poor recipient households of Family Hope Program (PKH) in Kalibawang, Kulon Progo Yogyakarta Special Region. Additionally, this location was chosen based on Mustofa (2012) that clarify Kulonprogo has low stability and quality of food security. The number of population of 211 households (UPPKH DIY 2015). Determination of the number of samples using methods Isaac and Michael. Sample size determination by this method is based on the assumption that the population is normally. The formula is shown below (Sugiyono, 2004). Where, s = sample, N = population =211,2 with degree of freedom = 1, level of confidence 5%, d = 0, 05, P = Q = 0,5.

Based on the formula with a population of 211 and a level of confidence 5 %, then the number of samples is 131. This study uses probability sampling design with random sampling area method for respondents because of their spread across four villages.
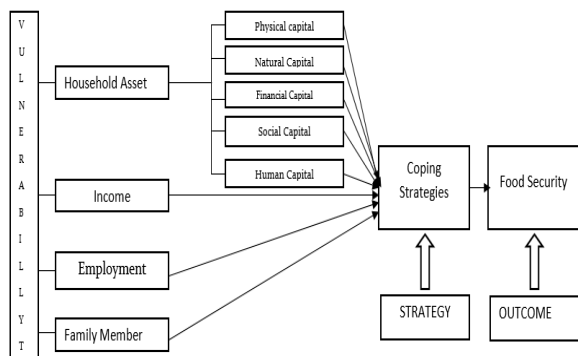
Table 2. Operational Definition of Variables

Variable	Notation	Operational Definition	Scale Data
Food security	K	Coping Strategies Index	Ratios
Human capital	MMKK	Old school households head (year)	Ratios
	MMI	Mother's old school (years)	
Financial capital	MFT	Total Savings (rupiah)	Ratios
	MFP	Loan Amount (Rupiah)	
Physical capital	MP	Dummy Motorcycle Owners: 1 = has a motor; 0 = do not	Nominal
	MAT	have the motor)	
		Dummy Ownership of poultry: 1 = has; 0 = do not have)	
Natural capital	MAL	Owners of agricultural land 1 = agricultural land	Nominal
		0 = no cropland	
Social capital	MSPKK	Dummy involvement in the PKK: 1 = involved as	Nominal
		members: 0 = not engaged member	
The number of families	JK	Number of family members (people)	Ratios
Employment	DP	dummy jobs	Nominal
		1 = farmer; 0 = not farmers	

Furthermore, the determination of the respondents uses the drawing system based on a random number. The operational definition of dependent and independent variable can be shown in Table 2. We use dependency multivariate techniques to estimate the model. There are a dependent variable and independent variables. The analysis tool in this research using multiple linear regression analysis with Ordinary Least Square method.

RESULT AND DISCUSSION

The village in Kalibawang, namely Banjarharjo, Banjaroyo, Banjararum, and Banjarasri has differences condition among village based on the land allotment.

Where Banjarharjo dominates to habitation, field and rice field. Banjaroyo allotment to village, moor, and mixed farm.The different condition was indicated by Banjararum which dominate to the rice field. Banjaroyo allotment to village, moor, and mixed farm.The different condition was indicated by Banjararum which dominate to the rice field, village and filed.

Whereas Banjarasri their allotment area for village, moor and rice field. This allotment land in each village will influence agriculture production. Banjararum was expected has rice stock more than others cause their allotment was dominated by rice field. Furthermore, descriptive statistics exhibit that poor household have five assets based on Sustainable Livelihood Framework (SLF), namely human capital, financial capital, physical capital, nature capital and social capital. Human capital consists of education and skill which respondent has. For education indicator, both of mother and head of a family on average it is dominated by secondary school. This condition indicates that human capital is still low. It will influence the ability to achieve good job and higher income. Moreover, beside old school as education indicator, skill is another indicator for human capital. The household has a skill like making a handy craft, making sugar and traditional food. The financial capital which is measured by saving and loan ownership indicate household has access to a financial institution.

Source of a loan from many institutions like Dasawisma (24,56%), PKK (20,18 %), cooperation (5,26%), relative (15,79) and other (34,21 %) that is a bank, microfinance institution, and neighbor. There are40,8% respondents has saved, meanwhile, the rest 59,2% has no saving yet.Moreover, an almost household has a loan that is 85,60% only 14,40 % has no loan.

The physical capital which measures by motorcycle and bicycle ownership. Household that motorcycle is 54,40%, and 38,40% has a bicycle. Household uses those assets to support mobility like go to the work and school. Social capital is measured by membership in a social organization (Dasawisma and PKK), farmer group, and religion activity. Household become a member in religion activity (85,60%), Dasawisma (68,00%), PKK (36,80%) and farmer community 43,20%). The benefit that household received was dominated by obtaining a loan.

This study quantifies nature capital as a farm, fish pond, yard ownership. Respondent that has farmland are 36,80%, yard (48,80%), and fish pond 8,0%. Additionally, besides household asset variable, there are some demography aspect namely amount of family member, a status of employment, and income. We can identification that the average of family number is 4,5, where a household with a minimum member is 2, and the highest number is 9 person. Whereas modus of family number is 4 person per household.

Furthermore, status employment of head of household divides into two categories namely farmer and non-farmer. Approximately, household head is a farmer (48%). Otherwise, they are nonfarmers such as odd jobs, handyman, merchant, and others.As a farmer, a household has greater opportunity to has

groceries which it yields from their farm.Data exhibit that family head job is to dominate as a farmer (53%), odd jobs (28%), merchant (3%), handyman (2%) dan others (13%). Meanwhile, mother's employment is looking for material for brown sugar, making brown sugar from coconut sap, wicker (46%), farmer (35%), odd jobs (15%) and merchant (45%).

Household income measure by last 30 days income total. Household income comes from husband (58,01%), wife (24,72%) and others such as from their children (17,75%). This indicates that income comes from many sources, even it still dominates by a husband. Average income total is Rp. 512.021,57. Meanwhile, most of the household has Rp. 300.000,00 income on average.As a dependent variable, Coping Strategies Indexof household is 83,98 on average, with modus that is 89 and median 76. Higher CSI indicates lower food security or tends to decline food security status.

Moreover, we will explain estimation result relate with a determinant of food security. It divides into four part, namely assumption test, apriori testing, statistical testing, and discussion. The first part, we test assumption namely normality, heteroscedasticity and multicollinearity. Normality assumption tested using the Jarque-Berra test. Results of testing showed, with a 5% probability JB test is 0,0598 or 5,98% greater than 5%, it means that the residual has a normal distribution, so the residual meet the assumption of normality. Test heteroscedasticity carried out to detect whether an error have the same variance (homoscedastic) or not. The method used to test this assumption is Breusch-Pagan-Godfrey method. Results of chi-square amounted to 35.08% greater than $\alpha = 5\%$, for that we can declare that the estimation fulfills assumption

homoscedasticity. Furthermore, we conduct multicollinearity testing used VIF value. Based on estimation result indicate that all VIF <10, so that it can be concluded that there is no multicollinearity between variables estimation. Estimation of a prior test shows the variable that consistent with hypothesis are human capital mother's old school (MMI, whereas head's households old school (MMKK) does not fit the hypothesis. Financial capital (savings/MFS) has a coefficient corresponding hypothesis as well as the financial capital loans (MFP).

All of the physical capital ownership such as a vehicle (MP), ownership of livestock (MAT), distance to markets (MAJ) had consistent signs with the hypothesis that is negative. That is as well as natural capital in the form of agricultural land (MAL). Social capital, either membership in Dasawisma (MSDSW), PKK (MSPKK), and in farmers' groups (MSKT) consistent with the hypothesis. The number of families (JK) and dummy job (DP) has coefficients consistent with the hypothesis, while not the suitable hypothesis is revenue (P). Simultaneous influence use F test, by using α 5%, the probability of F calculated in Table 3 is 0, 2%, less than 5%, so it concluded that simultaneous independent variables affect significantly on the dependent variable. For the coefficient of determination (adjusted R 2) results, OLS estimates show the adjusted R 2 value of 0.1062. These results show 10.62%, independent variables were able to explain the variation in the dependent variable while the remaining 89.38% is explained by other variables outside the model.

The next test is to see the level of significance of each independent variable. Based on regression analysis results, it shows that the determinant of household food security in Kalibawang are human capital of the old school mom (MMI), financial capital savings (MFT), financial capital loans (MFP), physical capital (MP), social capital membership in Dasawisma (MSDWS), and a dummy of employment (DP). Meanwhile, human capital head old schooling (MMKK), natural capital (MAL), social capital involvement in PKK (MSPKK), farmer groups (MSKT), and income (P) has not influence to household food security Kalibawang, Kulon Progo.

These results indicate that not all assets are used optimally by a household as sustainable livelihood strategies to achieve food security. In detail, the influence of the independent variable on food security is outlined below. Humanassets as measured by mother old school mom (MMI) has a corresponding mark hypotheses and significant effect on food security in the face of vulnerability HOUSEHOLD. The coefficient of -2.6199, indicating when the mother has improved education for 1 year, CSI will decrease by 2.6 points. This shows when the improvement of education, household food security will improve.

Education allows housewives can perform management and regulation of food with a better strategy, so as to reduce food insecurity and strengthen food security in the event of vulnerability in the form of shock long dry season, in other words, the mother's education can be a factor contributing to food security in times of vulnerability happen.

These findings are consistent with studies Irram and Butt (2004), Khan et al (2012), and Shahid Siddiqi (2011). Adversely, human capital variables namely education of head of household has an opposed coefficient with the hypothesis and does not affect significantly on food security. This is because education and knowledge of family head have not been able to

increase productivity and production well, which comes from agriculture and non-agriculture, food management and access to markets that will increase revenue (Okeyere et al, 2013). This is because education is still dominated by lower education level. They are elementary school graduates or did not finish elementary school (57.76%). Therefore, head of a family has not been able to increase food security. These results are consistent with Sekhampu (2013) and Okyere (2013) who found that the family head education has no effect on food security. Conversely, it does not consistent with Rachma et al (2011), Purwaningsih (2010), Li and Yu (2010) and Martin et al (2004). Financial capital (savings/MFT) has a significant influence on food security. The coefficient of saving is - 0.00005. It coefficient express every increase of Rp. 100,000, CSI will decrease 5 points. It is mean household food security has been improved. Saving is one factor that can increase household food security because it allows households to use buy food when revenue is not available.

Table 3. Estimation Result of Food Security Determinants

Variable	Notation	Coefficient	Standar Error	Tstatistic	Probability	Note
Human Capital						
Time Education for Housewife	MMI	-2,6199	1,4979	-1,7491**	0.0831	S
Time Education for Head of Household	MMKK	0,4559	1,2938	0,3524	0.7252	NS
Financial Capital						
Saving	MFS	-0,00005	0,00003	2,0006*	0.0479	S
Loan	MFP	0,000004	0,000002	1,8600*	0.0656	S
Physical Capital						
Transportation	MP	-18,2505	9,4525	1,9308*	0.0561	S
Poultry	MAT	15,9870	11,0702	1,4441	0.1516	NS
Distance to nearest market	MPJ	0,0006	0,0017	0,3312	0.7412	NS
Natural Capital						
Farm area	MAL	-0,0036	0,0043	0,8464	0.3992	NS
Social Capital						
Dummy Dasawisma	MSDW	20,7025	10,3786	1,9947*	0.0486	S
Dummy PKK	MSPKK	-8,7590	9,4200	-0,9299	0. 1471	NS
Dummy Farmer Association	MSKT	-14,3862	9,8523	-1,4602	0.3545	NS
Member of Household	JK	1,7927	3,5599	0,5036	0.0482	NS
Dummy Employment status	DP	-18,7831	9,4003	-1,9982*	0.9527	S
Income	P	0,0000009	0,00001	0,0594	0.0831	NS
Adjusted R-squared	0,1062	Prob J-B test 0,0598				
F-statistic	2,0444	Prob Breusch-Pagan-Godfreyχ^2 0,3508				
Prob(F-statistic)	0,0206					

Note: (*): Significant at 5%; S: Significant NS: Not significant

According to Guo (2011), saving is the most stable factor that influences food security. It has been increased food security during the economic crisis or shock. Financial capital can maintain the liquidity of household when facing vulnerabilities. Theseresults are consistent with Guo (2011) which exhibit savings has an effect on food security.

Another variable of the financial capital is loans (MFP). This is possible due to the limited revenue-owned encourage household to meet they need with borrowing. The estimation results indicate that loan has a positive effect on food insecurity. The coefficient estimate has a positive sign, it means higher loan tend to increase CSI value. The coefficient of loans amounting to 0.00000 44, it shows that each household received a loan by Rp.100.000,00, it will raise the CSI value approximately 0.44 points. It tends household become insecure, whereloans reduce household food security. This condition is possible because the loan has a variety of uses, it can be reserved for food and non-food. Household expenditure shows a percentage of credit usage, where the priority for school (34%), daily necessities (33%), business (11%), transport equipment (3%), electrical installation (6%), whereas which states explicitly to buy food only 12%. This finding implies that the loan worsened household food security because the designation is not only reserved for food, but for other needs. At the time of loan repayment, it will reduce the income that can be used to buy food.

Physical assets as measured by the ownership of the motorcycle (MP) where the dummy variable 1 for households that have a motor and 0 for otherwise. It has a significant adverse effect on food insecurity with a coefficient of -18.25. Based on the coefficient value, assuming other variables are zero, value

of CSI as an indicator of food security (K) to household have motorcycles is: $K = 91,3183 - 18,25MP = 91,3183 - (18,25x1) = 73.07$, while CSI for household that does not have a motorcycle is $K = 91,3183 - 18,25MP = 91,3183 - (18,25x0) = 91,3183$. Smaller CSI shows a level of high resilience food. Therefore, based on the CSI above, it can be concluded that a household with a motorcycle (73.07) has a better food security than that do not (91.3183). These findings indicate the physical assets capable of supporting food security. Motorcycles as a means of transport can facilitate household activities, to obtain food in the market, so as to get a lower price.Especially in Kalibawang is minimal mass transportation. Infrastructure data show that the average distance to near market is 2,718 m or 2.7 km, while the distance to the highway 1.3 km. Distance farthest is 20 km to the market and 10 km to the road, a considerable distance if done on foot gave the public transport is relatively difficult. This information shows that there are respondents who are still far from commercial centers, with the lack of public transportation and the absence of private vehicles, it will be difficult to obtain food from the market at more affordable cost. Thisfinding is consistent with the study of Guo (2011), and Martin et al (2004) which identify the ownership of a motor vehicle influential to food security.

Another physical capital variable is livestock ownership (MAT) that shows coefficients corresponding to the hypothesis, but has no significant effect on food security. This result possible because the poultry have at least two functions, namely to provide food and as a source of income by selling the animals. Proceeds from sales of livestock could be used to purchase food and non-food. For a household in Kalibawang, livestock has a function more inclined to the second function, which is to sell. This finding supported by data

that shows how a household is getting food. Households to obtain meat and eggs through the ownership of its own, namely for chicken (0.35%), and for eggs (0.41%). That is the fulfillment of chicken meat and eggs did not come from poultry owned by the household. In other words, poultry is not used for their consumption but for sale. As for the sale of livestock, as conversion of poultry into money is not able to support food security, because its use is not only to meet food needs. This finding is not consistent with Demek (2011), Dzanja et al (2013), as well as Li and Yu (2010), which shows the influence of ownership of livestock to food security.

The size of physical capital in the form of distance to near market (MAJ) has coefficients which are consistent with the hypothesis but had no significant effect. This condition due to the high activity of the subsistence of household regarding production and small market transactions in the area. Households can obtain food from the shop in the neighborhood. In addition to the distance did not affect the market for their ownership of a motor vehicle which can facilitate household to obtain food at more affordable. These findings are consistent with studies Okyere et al (2013) but not in line with the results of the study Dzanja et al (2013) and Li and Yu (2010).

Social capital as measured by three institutions, namely membership in Dasawisma, PKK and farmer groups. The estimation results indicate membership in Dasawisma (MSDSW) affects food security by coefficient positive at 20.7. This shows if other factors constant, then household participating in the CSI Dasawisma have amounted to: K = 91.3183 + 20,7MSDW = 91.3183 + (20X1) = 112.02.For those who do not participate in Dasawisma by: K = 91.3183 + 20,7MSDW =

91.3183 + (20x0) = 91.3183. CSI scores showed greater food security indicate a lower value.

Based on CSI value it can be concluded, that household asa member of Dasawisma (112.02) had a lower food security of households that are not members (91.3183). The results indicate the involvement of households in Dasawisma does not provide benefits for food security. Thisis because such membership will only burden on households if the utilization of the association to obtain a loan. This condition is happened because of the activities are more oriented to a routine activity that tend to material activity. It is dominated by the activities of savings and loans, thus not capable of being a factor that improves food security. This condition is in line with statements from Wasito and Subagyono (2012) which states that the current social capital has experienced a shift from the common good /civic virtue, turned into social capital negative. These finding adversely affects the implementation of food security and efforts to use the social capital. Low level of trust and materially oriented, the low enrollment and lack of proactive measures, causing process of implementation food security is not running optimally. This result also supported by the survey results that benefits of involvement in a social institution are most often obtain by a household is can get a loan (46%), a place to save (17%), and a gathering of 23%. Moreover, seek the experience and knowledge gained as a benefit of membership expressed by respective 12% and 1% Dasawisma members.

A loan gives more weight to the household to return and thus will reduce the portion of the purchase of food.The different findings show by another social capital indicator namely membership in PKK (MSPKK) and farmers (MSKT). The coefficient both of variables showed consistent with the

hypothesis but does not significantly affect food security. Membership in social institutions and farmer groups have not been able to be a determinant of food security. The finding possible by the uneven information obtained by household. This condition is due to two things. First, household participation in the PKK and farmer groups are not as high as membership in Dasawisma, where membership in Dasawisma amounted to 68%, while membership in the PKK (36.8%) and Farmers (43.2%). Second, comes from their closeness to public institutions, where Dasawisma closer to the people because Dasawisma is part of the PKK. The group Dasawisma is a group consisting of 10-20 households (families) in the Neighborhood while the PKK is an institution in the village or community level. The findings of this social capital are consistent with the study Demek et al (2011), but not by the results of the study Dzanja et al (2013) and Martin et al (2004).

Natural assets in the form of agricultural land despite having a coefficient corresponding to the theory, but no significant effect on food security. This condition due to natural capital in the form of farmland (MAL) has not been used optimally. Moreover, because respondents have owned agricultural land only 46% of those surveyed. The variable nature of assets does not affect on food security of poor households, although it has a negative coefficient. This implies that land ownership has the potential to reduce food insecurity. According to Okyere et al (2013), factors affecting land area increased incomes, if the land area has reached a certain minimum threshold of 2.5 ha. Based household land ownership data, shows that the average size of land owned household limited in the amount of 297.89 m2. This finding is inconsistent with Khan et al (2012) and Okyere et al (2013) which

shows that the land ownership effect on food security.

A variable number of families (JK) has a positive coefficient but no significant effect on food security. This finding has not supported a study of Sekhampu (2013); Demeke et al (2011); Rachim et al (2011); Purwaningsih (2010); Radha and Prasnna (2010), Li and Yu (2010). This is possible because of the limited food that is owned by the household so that the number of families does not affect the status of the household food security. This condition is also indicated by the selection strategies carried out by household when facing vulnerabilities, they reduce a portion of the family member. Households prefer some of the following strategies than directly reducing the share. For example are consuming foods less preferred and cost (79.2%), buying food with borrowings (78.4%), reduced adults consumption to children (76, 8%), minimize the amount of food eaten in one day (76%), and reducing the share (72%).

Variable employment (DP) as measured by the variable dummy one for farmers and 0 for non-farmers, indicating that the job effect on household food security is weak. These findings are consistent with studies Sekhampu (2013) which shows the effect on the employment status of food security. With the estimated coefficient for -18.7831 assuming other variables are zero, then the value of CSI for farmers is: K = 91.3183 - 91.3183 18.7831DP = - (18,783x1) = 72.535, while for non-farmers is: K = 91.3183 - 91.3183 18,7831DP = - (18.783x0) = 91.318. CSI smaller value indicates the level of food security better. Therefore, based on the CSI above, it can be concluded that the farmers (72.535) had better food security than non-farmers (91.518). This result is due to a job as a farmer allows households to have food all the time and have a backup, so that when the shock due to the long drought could still survive.

Whereas if they are not a farmer households do not have enough food to be stored. This finding is consistent with the study by Martin et al (2004) but is not consistent with the study of Li and Yu (2010) found no effect of the number of working families rather than in the agricultural sector to food security. Based on this finding, we have to enhance agriculture sector to enhance farmer income. Finally, it can support household to achive food security. Sumastuti (2011) suggest there are several factor to encourage agriculture development namely, land, labor, and rural economy based.

Income (P) is expected to have the effect of improving food security, with higher incomes allow households to obtain food. However, based on the results of the regression, variable income did not affect the food security. This finding is not in line with the study Sekhampu (2013); Guo (2011); Purwaningsih (2010): Li and Yu (2010), Radha and Prasnna (2010); Irram and Butt (2004) and Martin et al (2004). This finding because the household has a job that can not provide a fixed income for households. Additionally Guo (2011) states, for families with low income, it is not a determinant of food security status, but instead household assets which become the primary determinant to food security.

Furthermore, these findings according to Maxwell et al (2003) because of the allocation of income not only for food but also for non-food expenditure. Because of the complementary elements between foods with other basic needs, especially health care, and education. It is shown the results of the survey, the portion of revenue expenditure used for food spending (51%) and non-food (49%), meaning that the allocation of income almost equally between food and nonfood. Based on research conducted in some parts of Ethiopia showing the main predictors of household food insecurity as: household income, occupation and educational status of head of household, size of household/family, age of head of household, access to credit, access to work, proportion of expenditure about food and marital status(Tantu, Gamebo, Sheno, & Kalabo, 2017)

CONCLUSION

Based on estimation result, human capital (housewife education), financial capital which is both of saving and loan, physical capital (motorcycle ownership), social capital, and dummy employment status has the impact on poorest household food security. Meanwhile, human capital (head of household), natural capital and income have no effect on food security among poorest in the rural area.

This finding indicates that poor's entire asset was not to be determinants of household food security yet. Financial capital in the form of savings can improve food security, the greater savings household have it will reduce food insecurity. Therefore we need to improve the number of households which have savings and the amount of savings. This increase can be done by increasing the number of household income which can be used to save money. Also, it is necessary to expand the financial institutions so that people are easier to keep their funds through a micro financial institution. The government can establish a microfinance community at recipient households PKH.

Increased household income can make by optimizing the potential household's asset by the government in the form of mentoring and facilitation.Physical capital in the form of vehicle ownership motorcycles able to contribute to the food security of poor households. The vehicle can help the

household to obtain food easier and more affordable for easy access to the center economic or market. Therefore, the government needs to build a transportation system that is accessible to the community. The need for improved access to the center of the economic, so as to facilitate the household that does not have a motor of economic activity either for income or to obtain necessities, including food.

Other findings show the work as farmers can increase endurance than very poor households. Therefore enhance the productivity of farmers needs to be done to strengthen food security so that the very poor households can avoid food insecurity. In addition to households that do not have agricultural land can optimize yard area owned by the method of farming land is limited.

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