Food Security-dryland Nexus: Have Livelihood Assets Affected?

D Yuniarti¹,3*, Y Purwaningsih², A M Soesilo² and A Suryantoro²
¹Doctoral Program, Economics Department, Sebelas Maret University, Ketingan, Surakarta, Indonesia.
²Economics Department, Faculty of Economics and Business, Sebelas Maret University, Ketingan, Surakarta, Indonesia.
³Economics Department, Faculty of Economics and Business, Universitas Ahmad Dahlan, Kapas Road 9, Semaki, Yogyakarta, Indonesia

*deni.yuniarti@uad.ac.id

Abstract. The understanding of household food security determinants is crucial for the design of appropriate food security strategies. Taking the case of dryland area in Saptosari Gunungkidul, we examined the influence of livelihood assets (human capital, financial capital, social capital, natural capital, physical capital), income, and family number on household food security. We used cross-sectional survey data. Respondents are poor woman who receives Family Hope Program (PHK). Sample size is 89 households. We use multiple regression method to examine the influence livelihood assets on household food security. Our finding indicates human capital, financial capital, and income enhance household food security. In contrary, family number decrease food security. Meanwhile, physical capital, natural capital and social capital has no influence on food security yet. These results are used to draw policy conclusions on food insecurity through intervention programmers. It can be focusing on the financial sector, education, family planning and income generating activity.

1. Introduction

The increase in food prices during the period 2007-2008 has triggered food security back on the global agenda [1]. Moreover, food security is a basic requirement for the development of human resources [2]. Adequacy of food and nutrient intake will be a good investment for the development of productive human resources. Therefore, food security becomes one of the goals of the MDGs and is then continued in SDGs. To achieve food security, it is important to look for strategies to achieve resilience at all levels, whether global, national, household or individual. This is because, according to [3] food security at the national level does not guarantee food security at the provincial level, district and household levels. This is consistent with studies [4] which state food security in Indonesia, where the macro has had a food security that is based on macro indicators, but it is not reflected at the micro level.

There are disparities between provinces, districts, and households because of the food distribution system in households is affected by geography, environment, health and social [3]. One such factor is geography, ie soil conditions. Soil quality differences affect the food security because it will affect the crop and will affect the availability of food. Yet according to [5] present in each continent and covering over 40 per cent of the earth and are home to more than 2 billion people. Drylands are key to global food and nutrition security for the whole planet. It is 90% of whom live in the developing world and are poor and food insecure [6]. Conditions in dry land areas are further exacerbated by the presence of climate...
change will exacerbate these problems and has already been made to become vulnerable. The presence of El Nino and La Nina phenomena in 2015-2016 gives an estimated impact on harder households on dry land.

The condition of food security in dry land is attractive because its location is considered less favorable due to dry land and low rainfall. However, different conditions are shown by the Jetis and Nglora Villages of Saptosari District of Gunungkidul, where the location is dry land dominated by karts area but has a food security position. It is interesting to examine the determinants of food security in the dry land area. What strategies are carried out by households to face the vulnerabilities caused by natural resources such as dry land and low rainfall?

Since dryland is one of the factors of vulnerability occurrence, this study will use a sustainable livelihood framework approach. Sustainable Livelihood approach provides a framework for the problem of poverty and the vulnerability. Thoughts on the livelihood began with the work Robert Chamber in the mid-1980s. Sustainable Livelihood Approach concept is then developed by the British Department for International Development / DFID started in 1997 by integrating the approach into Development cooperation programs. Sustainable livelihood connecting stakeholders describe the context of vulnerability (vulnerability) in the form of shock, trends and seasons, with poor people who have access to their assets. These assets include human capital, natural capital, physical capital, financial capital, and social capital. Furthermore, these assets gain additional meaning and value through the social, institutional and organizational environments that are part of the transformation of structures and processes. Such transformations affecting the livelihood strategies of a person to benefit from these assets themselves are referred to as livelihood outcomes, can be a greater income, increased well-being, vulnerability reduction, improved food security and also the use of natural resources more sustainable [7].

Study of food security by using the SLF approach done by [8]. Several other studies used some of the variables contained in the SLF concept but did not explicitly state use the SLF approach. These studies, among others [9], [10], [3], [2], [11], and [12]. Studies using the variable portion of SLF concept is [13], [14], [15], [16]. The findings of these studies show mixed results, especially for human capital variables that show inconsistent results from previous studies. The study on the effect of livelihood asset on food security in dry areas is still relatively rare. One is a study [17] that examines the determinants of household vulnerability to food insecurity in dryland Kajiado of Makuueni Counties of Kenya. The results show that the vulnerability of households to food insecurity is determined by land size, household size, rainfall and herd size for Makuueni County and access to climate information, herd size, off-farm employment and gender of the household head for Kajiado County. It is therefore interesting to examine how the impact of livelihood assets on food security on dry land. Knowledge of the influence of poor household assets will help policy-making and the development of proposals to improve household food security issues.

2. Methods

2.1. Location
Research location in Jetis and Nglora Village, Saptosari, Gunungkidul, Yogyakarta. The reason for taking the location is that the location has a unique condition that has a food resistant position while on dry land. Until 2011 the village Ngloro and Jetis District of Saptosari still experiencing food insecurity, but in 2012 had reached a safe condition [18]. Whereas the natural conditions of Gunungkidul Regency including the region with the topography of the region are dominated karst hill areas. The Southern part is dominated by karst hill area which there are many natural caves and also an underground river flowing. With these conditions cause the condition of land in the South is less fertile resulting in agricultural cultivation in this area is less than optimal. One of the subdistricts in Gunungkidul located in the South is Saptosari Subdistrict, where wetland paddy field is unavailable; all rice field is paddy field on dryland.

2.2. Data
We used cross-sectional survey on livelihood assets data. The Appropriate respondent household is the which receives Family Hope Program (PHK), Because they fulfill two criteria are poor [9] and woman [19]. After outlier testing, sample size data is 89 households. We use probability sampling with simple random sampling method. Data collecting through interview using administrated questioner personally.
Household food security indicator is Coping Strategies Index (CSI) which measures how household copies such vulnerability as climate change (drought). The indicator developed by Maxwell [19]. The greater CSI value indicates that households tend to food insecure. Independent variables of livelihood assets are the old human capital of the mother school and the old school head of the family, the financial capital is the debt ownership dummy and dummy ownership of saving, physical capital is the dummy of ownership of the means of transportation, the natural capital is the ownership of farm land, and social capital is the number of activities followed by household. In addition, another independent variable is the number of families and household income. We use multiple regression Ordinary Least Square method to examine the association between livelihood assets and household food security.

3. Results and discussion

Table 1 shown estimation result. The estimation results have to meet the assumptions of normality, multicollinearity, and heteroscedasticity. The value of adjusted $R^2$ indicates 0.179 means that 17.9% of the variation in food security can be explained by the model. Taken together all of the variables that affect the food security suggest by F value statistically significant at $a = 1\%$. The result of the partial test shows that the variable of household size, income, human capital, the financial capital of saving ownership significantly influences the food security of poor households. In contrary, loan ownership, transportation ownership, social capital, and farmland ownership has no effect on food security.

| Variable                        | Beta  | T     | Sig.  | Collinearity Statistics |
|---------------------------------|-------|-------|-------|-------------------------|
|                                 |       |       |       | Tolerance   | VIF     |
| Constant                        | 2.154 | 0.034 |       |             |         |
| Household size                  | 0.290 | 2.821 | 0006  | 0.882       | 1.133   |
| Income                          | -0.253| -2.428| 0017  | 0.860       | 1.163   |
| Household Head School           | 0.112 | 1.009 | 0.316 | 0.758       | 1.319   |
| Household Mother School         | -0.250| -2.104| 0039  | 0.659       | 1.517   |
| Saving ownership Yes 1          | -0.296| -2.996| 0004  | 0.957       | 1.045   |
| Loan ownership Yes 1            | 0.061 | 0.572 | 0.569 | 0.826       | 1.211   |
| Transportation ownership Yes 1  | -0.005| -0.047| 0.963 | 0.784       | 1.275   |
| Number of organization          | 0.028 | 0.258 | 0.797 | 0.778       | 1.285   |
| Farmland ownership Yes 1        | -0.107| -1.038| 0302  | 0.883       | 1.133   |
| Adj. $R^2$                      | 0179  |       |       |             |         |
| F statistic                     | 3.134 |       |       |             |         |

Table 1. Results of Estimation

The variable of the number of families has a positive coefficient. These findings indicate a growing number of families, the higher the value of CSI then food security decline. Income has a negative coefficient, indicating an increase in income will decrease the value of CSI and improve food security. Mother's school duration has a negative coefficient. These findings indicate the longer mother's education, the better food security. Savings ownership has a negative effect. This shows that households that have savings are more food secure than those that do not. While the old variables of school head of the family, ownership of debt, land ownership, social capital and ownership of transportation tools, although having coefficients in accordance with the hypothesis but has no significant effect.

The number of families tends to decrease food security of poor household. More family members are considered to increase the burden of families in meeting food needs. The average number of families is 5 people, maximum 8 and minimum 2 persons per family. The previous study which shows the influence of the number of families on food security is [9], [10], [8], [14], [20], [2]. Income variables have an influence in achieving food security, where an increase in household income will increase the ability to buy food so that it can improve food security. According to [15] income in the short term will increase the ability of household to face food insecurity. Furthermore, according to [9] income can be used to meet various needs, where the pattern of expenditure quantity and quality depends on the purchasing power of the household.

The human capital of mother education shows the longer the mother's education will increase food security. Higher maternal education allows households to better prepare and manage food, thus reducing...
food insecurity and strengthening food security [16]. Different things are shown by human capital of the school head of the family. Where the old school of a head of the family has no influence. Education of the head of the family has not been able to increase income. This could be due to the low level of education, where the average length of school is 5.7 years or the primary school level.

Financial capital is measured by household savings. This asset has an influence on food security. Their savings and loans to help the poor to mitigate potential problems stemming from the lack of liquidity [8]. Financial capital in the form of savings is expected to increase the ability to obtain household needs at any time, especially in the event of vulnerability, the existence of savings will ensure the sustainability of the poor in the future, so as to reduce the risk of food insecurity and then increase food security. Reference [15] states, in low-income households, savings provide reserves to reduce the negative consequences of lost revenues. These results are consistent with studies [15], [13], and [2].

Financial capital in the form of loans shows different findings. The ownership of loans has no effect on food security. This can be caused by [13] borrowing not only used when a shock such as a crop failure, loss of livestock, but also used to death, family illness or for other purposes. This means that the use of loans can be diverse for both food and no food. To that end, the effect of lending depends on its use. If the loan is used to meet food needs, it will reduce the risk of food insecurity and increase food security. But if the loan is used for purposes other than food, it will actually lower food security. The data shows that households' loans are used for daily needs, education, medicine and venture capital.

Physical capital has no effect on food security. This is because the transportation equipment is mostly used for school and work, so it has not been able to improve food security. These findings are not consistent with the study [15] and [12]. Social capital has a positive coefficient, but not significant. This means that social capital has the potential to decrease food security. Any social organization that follows will increase non-food expenditures. This is because some of these organizations require regular contributions. An increase in expenditures for non-food will lower household purchasing power for food, thereby decreasing food security. The influence of social capital is still showing mixed results, where [10] and [12] showed the social capital effect on food security, while studies [8], shows the effect of participation in a group of local savings have no effect significant.

Natural capital in the form of ownership of agricultural land is considered would improve the ability of the poor to improve endurance by producing foodstuffs, other than to generate income, so it will increase the purchasing power of the population to food and ultimately reduce food insecurity [3] and [11]. However, field findings show that agricultural land ownership has not been able to increase food security. This can happen because the average area of land owned is 1327.99 m². Though the land area that can improve food security is a minimum of 2.5 ha [13].

4. Conclusion
Poor household assets have an important role in achieving food security of poor households in dryland. Assets affecting household food security in dryland are human capital, the financial capital of savings ownership. While another household livelihood assets, i.e. financial capital, loan ownership, a physical capital of ownership of transportation, the social capital of the number of social activities followed, and ownership of agricultural land has not been sufficient to affect food security. This means that the livelihood of poor households has not fully affected food security. In addition, the number of families and the income effect on food security.

References
[1] Regmi A and Meade B 2013 Demand side drivers of global food security. Global Food Security, 2(3), 166–171
[2] Radha V and Prasana N 2010 Household Entitlements and Food Security: SEN’S Approach: - A Reality. Interdisciplinary Journal of Contemporary Research in Business. June, Vol 2. No. 2.
[3] Khan A, Ejaz R, Toseef A, Mohammad U T 2012. Determinants of food security in rural areas of Pakistan, 39(12), 951–964
[4] Pangaribowo E and Tsegai D 2011. Food demand analysis of Indonesian households with particular attention to the poorest. ZEF-Discussion Papers on Development Policy, (151),
[5] IFAD, 2016. The Drylands Advantage Protecting the environment, empowering people.
[6] Hazell PBR, Hess U. Drought insurance for agricultural development and food security in dryland areas. 2010;395–405
[7] Kollmair M, Gamper. 2002. The Sustainable Livelihood Approach. Aeschiiried Switzerland: Integrated Training Course of NCCR North-South. September

[8] Demeke AB, Keil, Zeller M. 2011. Using panel data to estimate the effect of rainfall shocks on smallholder’s food security and vulnerability in rural Ethiopia. Climate Change. 108: 185-206

[9] Shekampu T J 2013 Determinants of The Factors Affecting the Food Security Status of Household in Bophelong, South Africa. International Business & Economics Research Journal, May Vol. 12. No. 5.

[10] Dzanja J, Christie M, Fazey I, Hyde T. 2015. The Role of Social Capital in Rural Household Food Security: The Case Study of Dowa and Lilongwe Districts in Central Malawi, 7(12), 165–177

[11] Li, Yun. Wen Yu. 2010. Households Food Security in Poverty-Stricken Regions: Evidence from Western Rural China. Agriculture and Agricultural

[12] Martin, Katie S. 2004. Social Capital is Associated with Decreased Risk of Hunger. Social Science and Medicine, 2645-2654.

[13] Okyere K, Ayalew D, Mekonnen, Zerfu E. 2013. Determinants of Food Security in Selected Agro-Pastoral Communities of Somali and Oromia Regions, Ethiopia. Journal of Food Science and Engineering, 3. 453-471.

[14] Shahid A., Siddiqi MW. 2010. Food Security Analysis of Pakistan: Time Series Approach. Interdisciplinary Journal of Contemporary Research in Business, 2 (2008), 288–

[15] Guo B, Household assets and food security: evidence from the survey of program dynamics. J Farm Econ Iss, 32, 98-110.

[16] Iram U, Butt M. 2004. Determinants of household food security an empirical analysis for Pakistan. International. Journal of Social Economics; 31, 7/8; ProQuest pg. 753

[17] Amwata DA, Nyariki DM, Musimba NRK. 2015. Factors influencing pastoral and agropastoral household vulnerability to food insecurity in the drylands of kenya: a case study of Kajiado and Makueni counties. 787 (july 2015):771–87.

[18] Peta Potensi Kerawanan Pangan Kabupaten Gungkidul, 2015.

[19] Maxwell D. 2008. The Coping Strategies Index Field Methods Manual Second Edition. January.

[20] Purwaningsih Y. 2010. Demand Analysis and Food Security Household Level in Central Java province. Yogyakarta a. Eco-Regional. Vol. 5 1.