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Climate change adaptation in Tanjung Mas – Semarang: a comparison between male- and female-headed households

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Abstract. Mainly due to its complexity, the effort to mainstream gender in addressing climate change issues has been far from the satisfying result. However, there is an urgent call to accommodate gender lens issues and to become more gender sensitive in an attempt to have an effective intervention in responding climate change impact. To enrich the reports on gender and climate change adaptation in city-based case, this paper aims to elaborate climate change adaptation in Tanjung Mas – Semarang city focusing on the gender perspective analysis in male- and female-headed households. The quantitative descriptive method is applied to carry out the analyses, including adaptive strategy and gender role analyses. The research result indicates there are not any significant differences in the climate change adaptation strategies applied in male- and female-headed households. This shows that women in the female-headed households, with their double burden, performed well in managing their roles. Therefore, in particular perspective, it may not be relevant to state that woman and female-headed households are likely to be more vulnerable compared with their counterparts.

1. Introduction

Climate change is a global phenomenon that is calling for further attention. The impact of climate change significantly influences human activities in various sectors mostly for those who live in a coastal area [1],[2][3]. Most rapid growing cities in developing countries are located close to the sea. These high-density cities are at risk due to different climate change hazards mostly flood and water surges [3]. Accordingly, there has been a growing concern on the policy-making process as well as academic research on climate change adaptation to minimize damage and loss as the impact of the climate change. However, mainly due to its complexity, the effort to mainstream gender in addressing climate change issues has been far from the satisfying result [5][6].

There are at least two themes to relate gender and climate change. Those are “vulnerable” and “virtue” [7]. Women are likely to be more vulnerable than men. Women mostly in the developing and less developed countries have relatively lower education, limited ability to find support and information, and most importantly has so little control to the family outcome compared to the men in the family. Even though it is not formally stated, there are more women categorized as poor compared to men as their counterpart. Despite women are commonly defined as vulnerable, women are, however, have more consciousness on environmental issues. They are more sensitive, closer to natural



surroundings, better prepared for dealing with changes, and likely to be more supportive to deal with new/different policies. Therefore, there is an urgent call for the government at every level to accommodate gender lens issues and to become more gender sensitive to create more robust policy in responding climate change phenomena [8].

An important first step to accommodate gender lens in climate change analyses is based on a comparison between male- and female-headed households [9][10],[11]. There are growing numbers of female-headed households across the globe for various reasons [12],[13],[14]. Based on several studies, it is generally indicated that female headed-households are likely to be more vulnerable than the male headed-households as they are poorer because of the lower capability of the women as the breadwinner to earn incomes [14],[15]. However, the current research to connect climate change adaptation and types of households are mostly focusing on rural area and agricultural based activities [10],[11][13]. Even though both women who live in the rural and urban are classified as the most vulnerable, however, there are some differences in the strategy options as well as norms/values applied. To enrich the discourse on gender and climate change adaptation in city-based case, this paper aims to elaborate climate change adaptation in Tanjung Mas – Semarang city focusing on the gender perspective analysis in male- and female-headed households. The climate change adaptation analyses are focused on the way of the people at the household level respond to the flood as most obvious climate change impact emerge in the City.

Semarang City has quite a significant climate change impact. The city has been experiencing coastal inundation for 30-70 cm on average, and reaching 100 cm in certain area, as well as land subsidence for about 13.5 cm annually [16]. Tanjung Mas is one of the most vulnerable prone areas because of flood due to the coastal inundation and land subsidence. It is the densest urban village and becomes one of the pockets of poverty in the city. Therefore, to have more detail findings, the study area is only focusing on the neighborhood of Tanjung Mas.

2. Study Area and Methods

Tanjung Mas is an urban village located within the administrative boundary of Semarang city, the capital of Central Java Province. Fig. 1 illustrates the study area. It consists of six *Rukun Warga (RW)*¹ with 9,604 inhabitants and 1700 households [17]. The sex ratio of the population is 0.88, indicated there are more female compared with male living in the area. Most of them work as blue collar workers in the neighboring industries and construction laborers in the Tanjung Mas Harbour and therefore, categorized as poor. Flood happens almost every day before developing Banger polder and seawall. It is only since 2014 the flood decreases significantly up to 2-3 times a week in the tied season with 3-20 cm high of the flood. The condition in RW 1 is slightly better than in RW 12-16 as its location is not directly alongside to the sea.

Analyses used the quantitative descriptive method, with 98 households as the respondents. Primary data obtained from questionnaires in combination with interviews with particular nominated stakeholders. The number of respondents set by using Slovin formula [18]:

$$n = \frac{N}{Ne^2 + 1} \quad (1)$$

n: number of respondents (i.e. households)

N: number of population

e : error tolerance (i.e. 10%)

¹ Rukun Warga in an administrative boundary in neighborhood level. It consists of several sub-neighbourhood called as Rukun Tetangga.

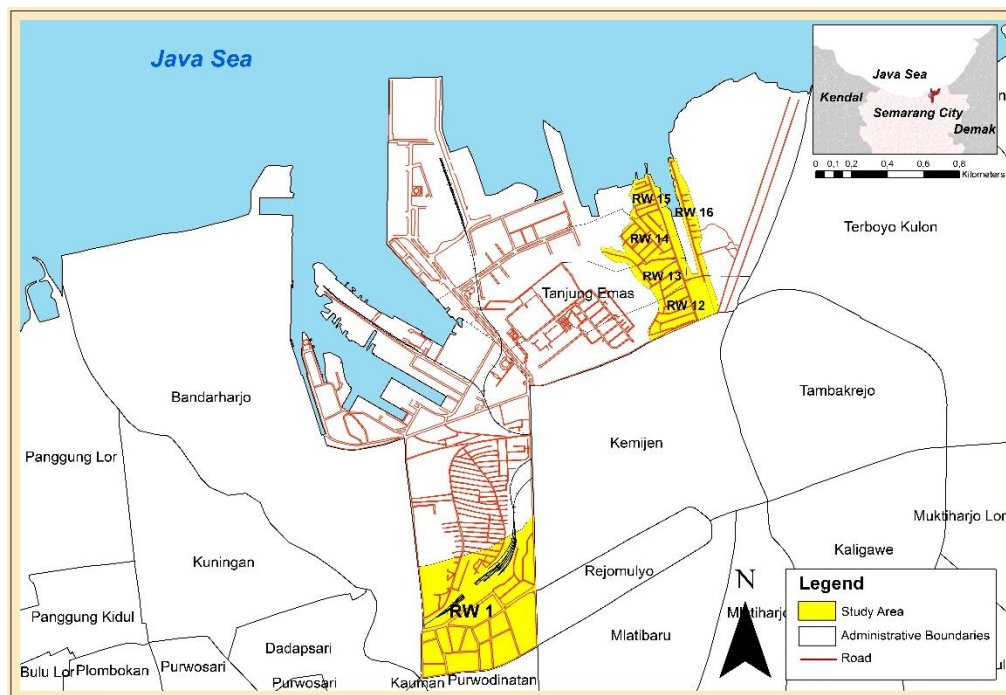


Figure 1. Study Area

The sampling method was proportional random sampling which means the number of respondents is proportionally based on the number of households in each selected RW. The respondents are divided into two main categories; 53 respondents are classified as male-headed households and 45 respondents are defined as female-headed families. The questionnaires are then compiled and interpreted in two main analyses, i.e. adaptive strategy and gender role. Types of adaptation and role of gender are summarized based on the results of the literature review.

3. Result and Discussion

3.1. Adaptation Strategy in the Selected Areas in Tanjung Mas

Adaptation strategies are those actions initiated by each household to cope with the flood in the six selected RWs in Tanjung Mas. There are three types of adaptation, categories as physical, social, and economic (see Table 1). As illustrated in the Table, there are not any significant differences on the strategies applied in male- and female-headed family. In physical aspect, elevating the house is the most common adaptation strategy. They are likely to elevate the house every 5-10 years. The cost ranging from US\$ 350 – US\$ 6,000 to elevate at least 3-4 meters high. Among the 98 respondents, about 50% both from male- and female-headed households borrow the money from the bank, cooperatives, and even money lenders to ensure that they are able to renovate their house. Both types of the family prefer to stay rather than move to better (no-flooded) area. There is only a slightly higher percentage of female-headed households those are move but only temporarily (during the disaster) compared to the male-headed households. The main reason why they like to stay is mainly that the current house is close enough to their workplace. Besides, they do not have enough money to move as the money has been utilized to elevate the house. Most of them are also born in the area so they have strong bonding with the place and may find difficulties to adapt to the new place.

Table 1. Adaptation Strategies in the Selected Areas in Tanjung Mas

Adaptation Form	Types of Family	YES	NO	Total
Physical				
Elevating the house	Male-headed households	85%	15%	100%
	Female-headed households	80%	20%	100%
Evacuate to temporarily place	Male-headed households	6%	94%	100%
	Female-headed households	13%	87%	100%
Social				
Being a member of social organization related to disaster	Male-headed households	19%	81%	100%
	Female-headed households	9%	91%	100%
Improving knowledge/information on the disaster (i.e. flood)	Male-headed households	74%	26%	100%
	Female-headed households	64%	36%	100%
Borrow money from neighbors	Male-headed households	51%	49%	100%
	Female-headed households	56%	44%	100%
Economic				
Alternative job during disaster	Male-headed households	25%	75%	100%
	Female-headed households	24%	76%	100%
Working family members	Male-headed households	57%	43%	100%
	Female-headed households	38%	62%	100%

Similar to the physical aspect, both types of households also have similar adaptation strategy in the social aspect. Only a few of them are engaged in the social organization. Male-headed households are more likely to be a member of social organization compared to the female-headed households. There are least four main local organizations established in the area; women organization so-called *PKK (Pendidikan dan Kesejahteraan Keluarga)*, youth organization named *Karang Taruna*, neighborhood watch known as *Siskamling*, and Save and Rescue or *SARDa*. Other adaptation strategies in the social category are improving knowledge/information and borrowing money from neighbors. All the respondents considered that knowledge is important. There are not any differences between male- and female-households in gaining and implementing their knowledge. They mostly learn and get the knowledge related to disaster from their experience. All the respondents do not receive information regularly from an appropriate official capacity building activity. Some of the interesting and practical knowledge is how they put electronics and other valuable assets on the 2nd floor and building a "small barriers" at the door to slow down water intrusion to the house. The last adaptation strategy in social aspect is borrowing money. An interesting finding that is closely related with common custom in the neighborhood is that more than half of the respondents in both types of households consider borrowing money from neighbors as a choice to deal with the disaster. There are higher percentages of female-headed households having this strategy compared with the male-headed households. On average, the money is more or less 30% of their monthly income (US\$ 50), and. use to fulfill their basic daily needs.

There are also comparable adaptation strategies for both types of households in economic aspect. Most of them do not have an alternative job during the disaster and therefore, most of them are very vulnerable as they do not have an alternative to fulfill their daily needs during the disaster event. However, there are more family members work in the male-headed households compared to the female-headed households. Accordingly, mainly in economic, the female-headed households are more vulnerable compared with the male-headed households. Despite the similarity, the financial capacity is important in the adaptation strategies.

3.2. Gender Role in the Selected Households in Tanjung Mas

Following an explanation of the adaptation strategies, Table 2 explains the gender role in the selected households in Tanjung Mas. As found in the previous research, there are three categories in gender role, namely productive, reproductive, and community responsibility which is focusing on disaster preparedness and response [19][20]; with two types of families, i.e. in male- and female-headed households. There are at least two obvious findings. First, the female has a significant role as the bread-winner and the decision maker in female-headed households only. Second, the female has a dominant role in domestic works for both types of households. There is only slightly higher role of man in taking care of the children in comparison two other types of domestic responsibilities such as washing dishes and cleaning the house. Those two profiles suggest the households applied traditional family value where the man has more concern on the economic issues while the woman more into the responsibility for managing the household works.

Regarding the gender role related to the disaster (i.e. flood), Table 2 shows the role in three phases; pre-disaster, during disaster, and post-disaster. It can be seen in Table 2 that obviously in t of male-headed households, men have a very significant in all stages (pre, during, and pot disaster), and the women have a role mostly only in the female-headed family. However, in particular role, namely accessing knowledge on the disaster, rescuing family members and assets and almost all post-disaster activities, there is slightly an equal role between men and women mostly in the male-headed households.

3.3. Brief Discussion

This study has shown adaptation strategies at the household-level in one most vulnerable neighborhood in Semarang coastal area to deal with the flood, regarded as a regular or common disaster. Following the findings on the adaptation option, there is an analysis of the gender role to further elaborate implementing the strategy.

Female-headed households in the study area are likely to be more vulnerable at least for two reasons. The first is because the women in the family who performs as the bread-winner is low educated, so the second is women are likely to have lower income compared with men in the male-headed family. Fig. 2 and Fig. 3 present the comparison of income and education between male and female-headed households.

Despite female-headed households are more vulnerable for several reasons, however, both types of households have similar adaptation strategies. Both households are likely to elevate their house as the priority to live in the area. The main differences on the strategies are only in regard to the social form of adaptation such as taking part in the social organization and improving knowledge those are preferable only for the male-headed households and decision to stay in the temporary houses during a flood is preferable only for the female-headed households.

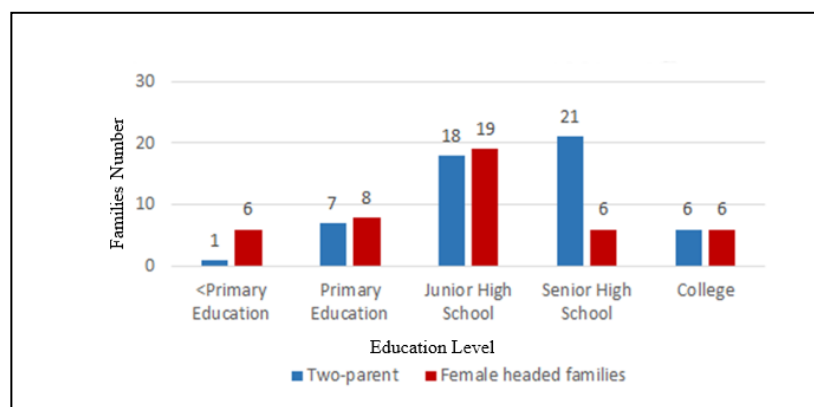


Figure 2. Education Level in Tanjung Mas, 2015

Table 2. Gender Role in Selected Households in Tanjung Mas

		Male	Female	Male Dominance	Female Dominance	Equal	Total
Productive Profile							
Breadwinner	Male-headed households	28.3%	0.0%	37.7%	3.8%	30.2%	100%
	Female-headed households	6.7%	75.6%	0.0%	11.1%	6.7%	100%
Family decision maker	Male-headed households	37.7%	0.0%	58.5%	1.9%	1.9%	100%
	Female-headed households	4.4%	75.6%	6.7%	13.3%	0.0%	100%
Domestic Responsibilities							
Taking care of the children	Male-headed households	1.9%	47.2%	11.3%	34.0%	5.7%	100%
	Female-headed households	0.0%	88.9%	0.0%	11.1%	0.0%	100%
Preparing food	Male-headed households	1.9%	77.4%	0.0%	18.9%	1.9%	100%
	Female-headed households	0.0%	88.9%	0.0%	11.1%	0.0%	100%
Washing dishes	Male-headed households	1.9%	64.2%	3.8%	28.3%	1.9%	100%
	Female-headed households	0.0%	84.4%	0.0%	15.6%	0.0%	100%
Washing clothes	Male-headed households	1.9%	71.7%	0.0%	24.5%	1.9%	100%
	Female-headed households	0.0%	84.4%	0.0%	15.6%	0.0%	100%
Cleaning house	Male-headed households	1.9%	52.8%	9.4%	34.0%	1.9%	100%
	Female-headed households	0.0%	80.0%	0.0%	20.0%	0.0%	100%
Cooking	Male-headed households	1.9%	79.2%	0.0%	17.0%	1.9%	100%
	Female-headed households	0.0%	88.9%	0.0%	11.1%	0.0%	100%
Disaster preparedness & response							
Pra Disaster							
Building protection	Male-headed households	20.8%	0.0%	64.2%	0.0%	15.1%	100%
	Female-headed households	2.3%	69.8%	9.3%	4.7%	14.0%	100%
Knowledge on disaster	Male-headed households	17.0%	0.0%	30.2%	0.0%	52.8%	100%

		Male	Female	Male Dominance	Female Dominance	Equal	Total
Being a member of social organization	Female-headed households	17.8%	44.4%	0.0%	0.0%	37.8%	100%
	Male-headed households	7.5%	0.0%	3.8%	0.0%	1.9%	13.2%
	Female-headed households	2.2%	11.1%	0.0%	0.0%	6.7%	20.0%
During Disaster							
Rescuing family members	Male-headed households	1.9%	0.0%	67.9%	0.0%	30.2%	100%
	Female-headed households	0.0%	40.0%	15.6%	15.6%	28.9%	100%
	Male-headed households	3.8%	0.0%	52.8%	0.0%	43.4%	100%
Rescuing assets	Female-headed households	0.0%	46.7%	11.1%	24.4%	17.8%	100%
	Male-headed households	28.3%	3.8%	30.2%	1.9%	35.8%	100%
	Female-headed households	4.4%	77.8%	2.2%	6.7%	8.9%	100%
Post Disaster							
Cleaning the house	Male-headed households	0.0%	0.0%	54.7%	0.0%	45.3%	100%
	Female-headed households	0.0%	60.0%	6.7%	4.4%	28.9%	100%
	Male-headed households	24.5%	0.0%	47.2%	0.0%	28.3%	100%
House renovation	Female-headed households	4.4%	42.2%	6.7%	11.1%	35.6%	100%
	Male-headed households	34.0%	0.0%	26.4%	3.8%	35.8%	100%
	Female-headed households	0.0%	75.6%	13.3%	11.1%	0.0%	100%
Living cost							

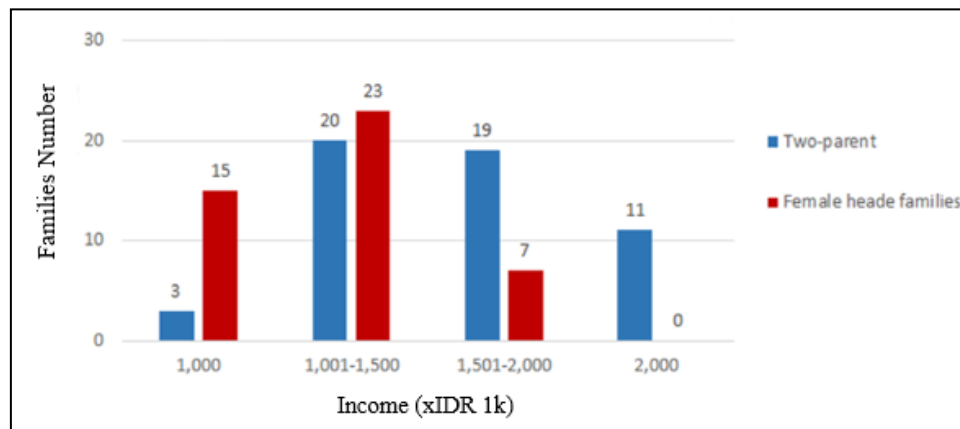


Figure 3. Level of Income in Tanjung Mas, 2015

The situation is an imbalance in the female-headed family where the women become the breadwinner. In this household, women have the double burden, to generate income as well to ensure that various domestic jobs are well completed. In the male-headed family, even though women have the responsibility in doing all the domestic jobs, but they are not the main income earner in the family. However, both types of families are likely to have a similar approach in dealing with flood and end with the same decision, i.e. stay instead of move to the safer areas. The findings much in line with a study in Nigeria, it does not necessarily to assume that female-headed families are poorer and therefore regard as more vulnerable even though they are likely to be low educated and earn less income than man [14].

4. Conclusion

The research resulted there are not any significant differences in the climate change adaptation strategies applied in male- and female-headed households. This shows that women in the female-headed households with their double burden, perform very well in managing their roles. Even though female-headed households are categorized as more vulnerable but the study has shown an evidence that women have good adaptation strategies to survive and even more become resilient. To end, in particular perspective, it may not be relevant to state that woman and female-headed households are likely to be more vulnerable compared to their counterparts.

References

- [1] Takagi H, Esteban M and Thao N D 2014 *Introduction: Coastal Disasters and Climate Change in Vietnam* ed Thao N D, Takagi H and Esteban M (UK: Oxford) pp xxi-xxviii
- [2] Wamsler C, Brink E and Rivera C 2013 Planning for climate change in urban areas: from theory to practice *Journal of Cleaner Production* **50** pp 68-81
- [3] McGranahan G, Balk D and Anderson B 2007 The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones *Environment and Urbanization* **19**(1) pp 17-37
- [4] Chandrappa R, Gupta S and Kulshrestha U C 2011 *Coping with climate change: principles and Asian context* (Heidelberg: Springer Science & Business Media) pp. 117-46
- [5] Alston M 2013 Women and adaptation *Wiley Interdisciplinary Reviews: Climate Change* **4**(5) pp 351-8
- [6] Terry G 2009 *Climate change and gender justice* (Warwickshire, UK: Oxfam GB,)
- [7] Arora-Jonsson S 2011 Virtue and vulnerability: Discourses on women, gender, and climate change *Global Environmental Change* **21**(2) pp 744-51

- [8] Alston M 2014 Gender mainstreaming and climate change *Women's Studies International Forum* **47** pp 287-94
- [9] Van Aelst K and Holvoet N 2016 Intersections of gender and marital status in accessing climate change adaptation: Evidence from rural Tanzania *World Development* **79** pp 40-50
- [10] Bhattarai B, Beilin R and Ford R 2015 Gender, agrobiodiversity, and climate change: A study of adaptation practices in the Nepal Himalayas *World Development* **70** pp 122-32
- [11] Huynh P T and Resurreccion B P 2014 Women's differentiated vulnerability and adaptations to climate-related agricultural water scarcity in rural Central Vietnam *Climate and Development* **6(3)** pp 226-37
- [12] Liu C, Esteve A and Treviño R 2017 Female-headed households and living conditions in Latin America *World Development* **90** pp 311-28
- [13] Flatø M, Muttarak R and Pelsler A 2017 Women, weather, and woes: the triangular dynamics of female-headed households, economic vulnerability, and climate variability in South Africa *World Development* **90** pp 41-62
- [14] Oginni A, Ahonsi B and Ukwuije F 2013 Are female-headed households typically poorer than male-headed households in Nigeria? *The Journal of Socio-Economics* **45** pp 132-7
- [15] Buvinić M and Gupta G R 1997 Female-headed households and female-maintained families: are they worth targeting to reduce poverty in developing countries? *Economic development and cultural change* **45(2)** pp 259-80
- [16] Handayani W and Kumalasari N R 2015 *Migration as future adaptive capacity: The case of Java – Indonesia* ed Hillmann F, Pahl M *et al* (London: Environmental Change, Adaptation and Migration: Bringing in the Region) pp 117–38
- [17] CBS (Central Bureau of Statistics) 2016 Tanjung Mas Village Monograph Semarang
- [18] Singarimbun M 1982 *Survey Research Method* (in Indonesia) (Jakarta: Lembaga Penelitian Pendidikan dan Penerangan Ekonomi dan Sosial)
- [19] Rochmayanto Y and Kurniasih P 2013 Gender role in climate change adaptation of mountainous ecosystem in Solok Regency, West Sumatra (in Indonesia) *Jurnal Analisis Kebijakan Kehutanan* **10(3)** 203-213.
- [20] Fakih M 1996 Gender as a Tool in Social Field of Analysis (in Indonesia) *Jurnal Analisis Sosial* ed 4