

## Potential Fire Hazard, Vulnerability and Family Wellbeing of Jatinegara Public House's Residents

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### Abstract

Public houses usually are a high density residential which leads to fire hazard, poor emergency services, as well as the highly increased of family vulnerability. This study aims to analyze the potential fire hazard, vulnerability, and subjective wellbeing of families living in the Jatinegara public house. The design of this study was cross sectional involving 157 families whom selected by stratified random sampling. The study found that age of wife and attitude towards the hazard of fire had a positive relationship to subjective wellbeing of the family. Social dimension and economic dimensions of vulnerability had a negative relationship with subjective wellbeing. Results of regression analysis found that age of wife and family's attitudes toward the fire hazard had a positive effect on subjective wellbeing of the family, while the age of husband, income per capita, social vulnerability, and vulnerability of economic had a negative effect on subjective wellbeing of the family.

Keywords: potential fire hazard, resident's behavior, vulnerability, subjective wellbeing

### Abstrak

Rumah susun merupakan jenis hunian padat yang memicu timbulnya permasalahan lain berupa kejadian kebakaran, layanan gawat darurat yang buruk, serta kerentanan keluarga yang tinggi. Penelitian ini bertujuan untuk menganalisis potensi ancaman kebakaran, kerentanan, dan kesejahteraan subjektif keluarga yang tinggal di Rumah Susun Jatinegara Barat. Penelitian ini menggunakan desain *cross sectional* dengan melibatkan 157 keluarga yang dipilih secara *random sampling*. Hasil uji korelasi menemukan bahwa usia istri dan sikap terhadap ancaman kebakaran memiliki hubungan yang positif signifikan terhadap kesejahteraan subjektif keluarga. Kerentanan sosial dan kerentanan ekonomi memiliki hubungan yang negatif signifikan dengan kesejahteraan subjektif keluarga. Hasil uji regresi menemukan bahwa usia istri dan sikap terhadap ancaman kebakaran berpengaruh positif signifikan terhadap kesejahteraan subjektif keluarga, sedangkan usia suami, pendapatan, kerentanan sosial, dan kerentanan ekonomi berpengaruh negatif signifikan terhadap kesejahteraan subjektif keluarga.

Kata kunci: ancaman bahaya kebakaran, perilaku penghuni, kerentanan, kesejahteraan subjektif

## INTRODUCTION

The house is a gathering place for family members that should be a safe and comfortable place. Based on Central Statistic Agency data (2014), the uncontrolled growth and distribution rate of the population increases the population density that directly impacts the inadequacy of settlements so that illegal, slum and uninhabitable settlements are arised. One of the efforts to resolve this problem in the National Medium Term Development Plan 2015-2019, Ministry of Public Works and Public Housing 2014 designed the development policy of 550,000 units of new public houses in Indonesia that provided for low-income people. Public houses that proclaimed by the government is a type of dwelling that is categorized as dense settlement. Densely populated areas affect the occurrence of fire incidents (Bristinas 2013), vulnerable to problems of fire, poor housing, and inadequate emergency services (Twigg 2017).

Population density is reciprocal connected with access to economic resources, and lowering the opportunity to seek quality services and resulting in limited fulfillment of basic needs (Sunarti 2011). Dense occupancy is not only related to fire incident but also the behavior of residents that can increase the danger (Vukomanovic 2013) and high risk during evacuation in case of fire (Cutter et al., 2003) due to limited number of exits. Based on the Fire Department (2015), there are 30 percent of 669 incidents of fire in Jakarta during 2015 occurred in high rise buildings. Nearly 100 percent of fire incidents are caused by short-circuit electric current due to occupant behavior. This makes the families living in public house being vulnerable.

The vulnerability faced by families who lived in public house can be seen from various dimensions, including dimensions of family capacity, socioeconomic, community service and information and mobility challenges (Brecwalld *et al.*, 2015). The vulnerability of the socioeconomic dimension in the crisis level that are the inhabitants of vulnerable public house is deprived of their right to have a residence permit (homelessness). A number of other factors that may also contribute to socio-economic vulnerability are the factors of density, unit conditions, inability to pay rent, and home security (Paradis *et al.* 2014). Fafard (2015) found that residents of rented low-rise public house were more than likely to experience food insecurity three times larger than the inhabitants of simple property public house, the proneness would lead to vulnerability (Cardenan 2009).

Sumner (2011) mentions that poverty, vulnerability, and wellbeing are the three complementary dimensions of the poverty measurement and deprivation (loss) concept. Sunarti (2009) state that vulnerability is the opposite of family resilience that further determines a welfare. Lowell (2015) found the affordability of homes regard with the family welfare as home ownership is found to affect family welfare (Hu 2011, Bloze 2010, Well 2000). Arcury (2014) says there is a factor of stress levels of the inhabitants that are positively influenced significantly from the status of home ownership, which further affects the welfare of the family. Sunarti and Khomsan (2006) stated that the measurement of family welfare includes quantitative and qualitative indicators. Qualitative aspects of well-being can be reflected by a series of psychological social indicators such as serenity, satisfaction, happiness, freedom (including freedom from fear, anxiety, restlessness, anxiety),

hope, and certainty. Basically these indicators are related to each other, such as sense of peace and security associated with the aspect of certainty in which there is also the aspect of hope. Although no one can guarantee certainty in this world, but the degree of certainty in earning income for livelihood, it differs between different sectors of employment.

MacKerron (2011) summarizes from many subjective welfare points of view understood as a combination of: (a) the fulfillment of needs (with what is owned); (b) the fulfillment of wishes or purposes; (c) meaningful action and exclusion of self potential; (d) action of mood and taste; (e) self-evaluation reports on their own welfare. Sumner (2011) argues that the new analytical approach should be able to manage complexity and recognize many faces of vulnerability, such as initiating vulnerability analysis through subjective well-being. Through the welfare lens, the complexity of vulnerability and risk can begin to be understood. This research analyzing vulnerability through a welfare approach is one of the novelties of this study. This research is important to do related to knowledge, attitude, potential of fire threat in building, and susceptibility to family welfare of the public house.

This research expected can identify the welfare and vulnerability of families in the public house so that it can reduce the vulnerability and minimize the threat or risk in the future. Therefore, there are several objectives in this research, namely (1) identifying family and environmental characteristics, knowledge, attitudes, potential fire threats, vulnerability, and subjective well-being of families living in West Jatinegara public house; (2) to analyze the relationship between family and environmental characteristics, knowledge, attitudes, potential fire threats, and vulnerability to subjective well-being of families living in the West Jatinegara public house; And (3) analyze the influence of family and environmental characteristics, knowledge, attitudes, potential fire threats, and vulnerability to subjective well-being of families living in West Jatinegara public house.

## METHOD

This research is part of an umbrella research entitled "Factors Related to Subjective Wellbeing of Families Living in West Jatinegara Public house". This research uses cross sectional design because the data being studied is not sustainable. The method used is direct interview method by using questionnaire. This research was conducted purposively in Jatinegara Barat Public House, East Jakarta. Study times include preparation, data collection, processing, analysis, and report writing.

The population of this study is intact families with husband and wife who are still complete, from 311 population of 157 samples selected by random sampling with whole family criteria without seeing having teenagers or not having teenagers.

The data that used in the research are primary and secondary data. Primary data were obtained through interview method with questionnaires including data: (1) family characteristics (wife and husband age, wife and husband' length of education, per capita income, number of residents, and duration of stay), (2) environmental characteristics unit, unit location and floor order), (3) Knowledge and attitudes to fire threats using some items from The Regulatory Refrom Fire Safety Order (2006); (4) The potential for fire threats comprises occupant behavior

referred to The Regulatory Refrom Fire Safety Order (2006) and density referred to National Agency of Population and Family Planning (2016), (5) Family vulnerability using items from Golden et al., (2012), (6) Subjective family welfare using items referenced from Diener (2000) and Sunarti (2003). Secondary data is obtained from the management of the West Jatinegara Public house which includes general data on the condition of the region, data on the number of household heads, data on the number of residents, data on the number of residential units, and others.

The data obtained in this study is then processed using Microsoft Excel and Statistical Package for Social Science (SPSS) version 16. The data quality of knowledge and attitudes to fire threats, potential fire threats, family vulnerability, and subjective wellbeing are controlled by conducting reliability tests. The knowledge and attitude questionnaire on fire threats using the referenced and modified items of The Regulatory Refrom Fire Safety Order (2006), consists of 15 closed statement items with a Semantic 0-1 scale, ie "Yes and No". Respondents' statements include residents' knowledge about prevention, presence of emergency response facilities, and fire evacuation with Cronbach's alpha value of 0.713. The fire threat potential questionnaire was measured based on the density referred to by the BPS (broad  $m^2$  / person) and the residual behavior referred to and modified from The Regulatory Refrom Fire Safety Order (2006), consisting of 12 closed statement items with a Semantic 0-1 scale, ie " Yes and No". The statement covers the residents' habit of using or using household appliances related to electricity and gas with Cronbach's alpha value of 0.730.

The family susceptibility questionnaire is referred and modified in part from Golden O et al. (2012). The instrument is consisting of 31 closed statement items and divided into three dimensions of social, economic, and environmental vulnerability with the semantic scale of 0-1, ie score 0 (if the answer does not have the vulnerability of the type) and score 1 (if the answer has the vulnerability of the type) with Cronbach's alpha value of 0.806. The subjective welfare questionnaire is referred to and modified in part by Diener (2000) and Sunarti (2003), consisting of 10 statement items using a semantic scale of 1-4 (highly dissatisfied-very satisfied) for inferencing analysis in order to obtain better diversity, but for Descriptive use scale 0-2 scale (0 = strongly disagree, disagree; 1 = agree; 2 = strongly agree) for consistency of research result. Subjective well-being is divided into two dimensions: social dimension and psychological dimension with Cronbach's alpha value of 0.806. The total score obtained from each variable is then transformed into an average index.

The analysis that used in this research is Spearman correlation and multiple linear regression. Spearman's correlation analysis was performed to examine the relationship between research variables, family and environmental characteristics, knowledge, attitudes, potential fire threats, and vulnerability to subjective well-being. Multiple linear regression tests were conducted to analyze the influence of family and environmental characteristics, knowledge, attitudes, potential fire threats, and susceptibility to subjective well-being of the family.

## RESULT

### Family and Environmental Characteristics

The results indicate that the average age of wife and husband is 41.45 years and 45.62 years. The average length of education pursued by wife and husband is 9.09 years and 9.36 years (graduated from junior high school) with the highest level of education reaching S1 level. More than half (62.4%) of families have occupied rusunawa for 8 months. The average total per capita family income per month is Rp773,396 with a minimum revenue amount of 500 000 IDR and a maximum of 10 950 000 IDR. Six out of ten examples (64%) were in the small family category ( $\leq 4$  people) with an average large family member of the sample being 4.95 people. In addition, the sample family spread from the third floor to the 16th floor. The sample family is also spread out public house on both tower A and tower B and one of two sample families (53.9%) occupies the unit position in the center.

### Subjective Knowledge, Attitudes, Potential Threats, Vulnerability, and Subjective Wellbeing of the Public House Residents of Jatinegara Barat

The results of the research referring to Table 1 found that the attitude of the residents to the fire threat has the highest average achievement that is 62.2 points. The highest statement item was obtained that more than half samples (71.8%) were prudent in using potentially fire-causing materials, while the lowest item was indicated by half samples (50.3%) who having difficulty to contact the fire department for not knowing the emergency number of the fire department Fire. Resident knowledge of fire risk has a mean of 60.0 points (Table 1), with the highest item form amount of almost all of samples (95.5%) who looking at the APAR (Fire Extinguishers) in the West Jatinegara public house, and most of the samples (88.5%) know the evacuation route in case of disaster. Meanwhile, the lowest statement item indicated that only 8.9 percent of the sample knew the phone number of the East Jakarta fire department.

Table 1 Descriptive analysis of knowledge, attitudes, potential threats, vulnerability, and subjective wellbeing of the public house residents' families

Variable	Min-Max	Average $\pm$ Deviation Standard
a. Knowledge of residents	18.9-100	60.0 $\pm$ 17.9
b. Attitude of residents	26.7-100	62.2 $\pm$ 14.7
c. Potential fire threats:		
- Residents behavior	8.3-75	36.9 $\pm$ 16.0
- Density of occupancy	2-15	6.94 $\pm$ 2.64
d. Family vulnerability:		
- Social	20-93	51.6 $\pm$ 13.5
- Economy	12.5-87.5	39.3 $\pm$ 15.7
- Environment	0-100	58.3 $\pm$ 20.6
e. Subjective Wellbeing :		
- Social dimension	0-100	47.8 $\pm$ 16.6
- Psychological dimension	10-100	44.7 $\pm$ 13.9

The potential of fire threats is measured from two aspects, that are occupant behavior and occupancy density. The average behavior of the residents is 36.9 points (Table 1), with the highest statement item of more than half of samples (65.6%) not pulling the plug on the equipment (TV, Iron and others) so that it stays for a long time and does not remove the TV plug when out of the house. Meanwhile, the average occupancy density of 6.94 m<sup>2</sup> is indicated by most of samples (84.7%) having homes with densities below the ideal standard of less than 8m<sup>2</sup> per person.

Family vulnerability is measured by three dimensions of social, economic, and environmental vulnerability. The environmental susceptibility was rated at 58.3 points (Table 1), with the highest statement item most of samples (87.3%) saying not all elevators function properly. Followed by the item of the highest statement of social vulnerability that all samples (100%) occupy the house are not own ownership, but rent and can not be owned, and from the dimensions of economic vulnerability of 77.1 percent of samples have no family savings.

### **Relationship between Family and Environmental Characteristics, Knowledge, Attitudes, Threat Potential, and Vulnerability with Subjective Wellbeing Components**

The results of the correlation test (Table 2) found that the age of the wife had a significant positive relationship with the psychological well-being dimension and subjective well-being dimension of the family. This indicates that the more mature the wife's age then the psychological well-being and subjective well-being of the family is getting higher.

Table 2 The correlation coefficient between family and environmental characteristics, knowledge, attitudes, potential fire threats, and vulnerability to the subjective components of family welfare

Variable	Social Dimension	Psychological Dimensions	Subjective Welfare
Age of wife (years)	.154	.159*	.188*
Age of husband (years)	.074	.137	.124
Length of husband education (years)	.075	-.044	.025*
Revenue (rupiah)	-.057	-.049	-.064
Number of residents (persons))	-.068	.007	-.040
Length of stay (month)	-.004	.082	.042
Knowledge of fire threats (index score)	-.160*	-.055	-.134
Attitude of fire threats (index score)	.213**	.096	.192*
Potential fire threats:			
Resident behavior (index score)	.091	.079	.096
Density (m <sup>2</sup> )	.045	.085	.076
Vulnerability:			
Social vulnerability (index score)	-.286**	-.144	-.266**
Economic vulnerability (index score)	-.136	-.155	-.174*
Environmental vulnerability (index score)	-.025	-.190*	-.120

The length of husband education is positively significant with subjective wellbeing. This means that the higher the level of husband's education, then the subjective well being is higher. Attitudes to fire threats have a significant positive relationship with the welfare of the social dimension and total subjective well-being of the family. This indicates that the higher the family attitudes toward the potential threat of fire, the welfare of social dimension and subjective well-being is increasing in total. Social and economic vulnerability has a significant negative relationship with total subjective wellbeing which means the higher the social vulnerability the family, then the lower subjective well being. Environmental vulnerability has a significant negative relationship with the well-being of the psychological dimension. This indicates that the higher the vulnerability of the environment, the welfare of the psychological dimension will decreases.

### Factors that Influencing Family Subjective Welfare

Result of regression test (Table 3) shows that wife age (B= 0.431) have a significant positive effect on subjective wellness of family which mean every increase of wife age 1 year will improve subjective prosperity with 1 point. Age of husband (B= -0.383) have a significant negative effect on subjective wellbeing. This indicates that any increase in the age of the husband of 1 year will decrease subjective wellbeing by 0.231 index score.

Tabel 3 Regression test of family and environmental characteristics, knowledge, attitudes, potential fire threats, and vulnerability to subjective well-being of the family

Variable	Family Subjective Subjective		Sig
	Standardized	B	
Constant			.001
Age of wife (years)	.431	.502	.020*
Age of husband (years)	-.383	-.421	.041*
Length of husband education (years)	.122	.530	.142
Revenue (rupiah)	-.218	-1.448E-6	.006**
Number of residents (persons))	-.119	-.883	.241
Knowledge of fire threat (index score)	-.118	-.078	.213
Attitudes to fire threats (index score)	.176	.152	.020*
Potential fire threats:			
- Resident behavior (index score)	-.029	-.014	.749
- Density (m <sup>2</sup> )	-.086	-3.020	.341
Vulnerability:			
Social vulnerability (index score)	-.353	-.367	.000**
Economic vulnerability (index score)	-.231	-.175	.005*
Environmental vulnerability (index score)	-.087	-.053	.249
F		3.109	
Sig		0.000**	
R <sup>2</sup>		0.261	
Adjusted R <sup>2</sup>		0.231	

Description: \* significant at p <0.05; \*\* significant at p <0.01

The effect test results also found that per capita income ( $B=-0.218$ ) had a significant negative effect on subjective well-being of the family. This means that any per capita income per family decrease, will increase subjective prosperity by 0,311 index score.. Attitudes to the threat of fire ( $B=0.176$ ) have a significant positive effect on subjective wellbeing which means that every increase of one family attitudes toward the threat of fire will increase subjective welfare by 0, 311 index score.

Social vulnerability ( $B=-0.353$ ) and economic vulnerability ( $B=-0.231$ ) have a significant negative effect on subjective subjective well-being, which means that each increase of one vulnerability unit, socially and economically, will decrease the subjective well-being of the family by 0.231 index score.. Overall this regression model has Adjusted R Square value of 0.231. This may explain that the research variables that affect the subjective well-being of the family of 23.1 percent, while the other 76.9 percent influenced by other variables not examined in the study.

## DISCUSSION

Human life quality and environmental quality are a reflection of functioning in the family ecosystem (Bubolz & Sontag 1993). In the public house residents, the quality of life is assessed from the level of realization life values and the achievement of goals, while the quality of the environment includes various dimensions such as security, health, adequacy of residence, and others that relevant to the quality of the housing environment and can affect the quality of family life susceptible occurs crisis both from social and economic aspect. Based on the results of the study, social and economic vulnerability has a significant negative relationship with subjective wellbeing, which means the higher social and economic vulnerability the family has, the subjective well being is lower. This result is in line with research conducted by Brecwalld et al. (2015) which states that the vulnerability of the socioeconomic dimension to the crisis level of the vulnerable residents is deprived of their right to have a residence permit (homelessness). In accordance with the findings Shelton (2009) that risk factors into homelessness associated with family dysfunction and economic and social shortages.

Other findings found that wife age was positively related to subjective wellbeing. This means that the more the wife's age, then the higher the subjective well-being of the family. These results are consistent with Steptoe et al (2014) and Graham (2016) that state the age of women is associated with subjective wellbeing. The average age of the wives in the Jatinegara West public house is 41 years, according to National Agency of Population and Family Planning (2001), the age included women of childbearing age (women of the age of 18-49 years who are unmarried, married, or widowed). Another finding related to subjective wellbeing is the length of the husband's education. This means that the higher level of husband's education will further improve subjective wellbeing. These results are consistent with the findings of Steptoe et al (2014) and Lutz (2011) who state that long education relating to subjective wellbeing.

In this regard, attitudes to fire threats have a significant positive relationship with the welfare of the social dimension and total subjective well-being of the family. This indicates that the higher the family attitudes toward the potential threat of fire, then the welfare of social dimension and subjective well-being is increase.



The level of formal education play a role as mediation of knowledge and issues such as fire management (Diaz *et al.* 2016) whose subsequent level of education serves as a predictor for knowledge of fire management strategies. The higher the level of education the understanding of fire, will increases the ecology and fuel (Absher *et al.* 2006). Knowledge increases with changes in attitudes to fire threats (Samuel, 2014; Frankenberg *et al.*, 2013; Musigapong, 2013; Kanouse, 1998). This research found that the attitude toward fire has a positive relationship with welfare.

The results of regression test found that per capita income had a significant negative effect on the subjective well-being of the family. This means that any per capita income decrease will increase subjective wellbeing. This is in line with research conducted by Easterlin (1974) in Winters (2015), Andreoni (2011), Muller (2012), Krauss *et al.* (2013), Brown (2016), Martin (2016) who claim that the increase in income levels does not always increase the level of happiness, one can assess the well-being of living based on how well that can be done compared to and for others. In this study, the decrease in income due to the allocation of funds to pay the rent is considered enough to give the level of family satisfaction and willingness to share. Sunarti *et al.* (2010) states that an important component of the subjective well-being of the family includes a sincere feeling, which is always thankful to God for whatever happens and has good satisfaction even in the conditions of the marginal family.

The age of the husband has a significant negative effect on subjective wellbeing. This suggests that any increase in the husband's age will decrease subjective wellbeing. Subjective wellbeing is influenced by objective living conditions such as income, social support, and health, so that in certain circumstances increasingly age decreases the welfare (Diener 2000). The average length of education of husbands in the Jatinegara West public house is nine years in line with Graham's (2016) findings that subjective wellbeing also declines with low levels of education, and decreases in income (Pinquart 2000; Cheung, 2015).

Social vulnerability has a significant negative effect on the subjective wellbeing of the family which means any increase in social vulnerability that the family has will decrease subjective wellbeing. It is related to the high points gained from the social vulnerability of the inhabitants of the public house is the number of families borne, the married child still lives in one house, and no family members are to go apart or wander, thus increasing the social vulnerability of the family. Robinson *et al.* (2003) states that the number of human resources depends on its ability to generate economic benefits and if it ignored there will be losses that affect the level of family satisfaction. In addition, the economic vulnerability has a significant negative effect on the subjective wellbeing of the family which means any increase in economic vulnerability to the family will decrease subjective wellbeing. In accordance with the findings of Cardenas (2009) which states that the economic vulnerability affects the subjective well-being of the family is the lack of livelihood and loss of work can decrease satisfaction in life. A number of limitations in this study, among others, the sample of public house residents are taken in the West Jatinegara Public house so that causes a limitation in generalize the findings of other residents of towers. In addition, the residents of the newly researched public house occupied the West Jatinegara public house for 8 months and did not examine the potential changes in the threat and vulnerability of the family from time to time.

## CONCLUSION AND SUGGESTION

### Conclusion

The average age of wives and husbands of Jatinegara West public house owners is 41 and 45 years. The average education of husband and wife is junior high school. More than half of sample families are not poor with average per capita income of 773 390 IDR. On average each unit is occupied by five people with an area per capita of 6.94 m<sup>2</sup>. The average length of stay has reached eight months. Residents already know the evacuation path of the building in the event of a disaster, have caution when using tools or materials that have the potential to cause a fire, and are satisfied with the relationship between family members. Residents still have the behavior of not pulling the plug and the TV plug when out of the house, as well as the elevator that does not work properly. The results of the correlation test found that the wife's age and attitudes to fire threats had a significant positive relationship to the subjective well-being of the family. Social vulnerability and economic vulnerability have a significant negative relationship with the subjective well-being of the family. The result of regression test found that wife age and attitudes toward fire threat have positive significant effect to subjective well-being of family, while husband age, income per capita, social vulnerability, and economic vulnerability have significant negative effect to subjective well-being of family.

### Suggestion

Based on the results of the research that has been obtained, the suggestion that can be given is for the government to be able to minimize the risky environment such as the functioning of elevator facilities and building friendly facilities for person with disabilities. For families with per capita area below the ideal standard (less than 8m<sup>2</sup>) is expected to pay more attention to the indoor spatial arrangements, including maximizing the vertical space to reduce excessive density, effectively managing household items and reducing unnecessary items, and improve safety behavior and zero tolerance against potential fires. Future research is important to examine more deeply about the changing potential risks, vulnerabilities, and wellbeing of public house-dwelling families over time, so that it is not only studied in the first 8 months alone.

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