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# Incidences of Green Tobacco Sickness (GTS) on tobacco farmer and prevention efforts through social capital utilization in Indonesia

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**Abstract.** The purpose of this study was to find the incidences and associated factors of GTS among tobacco farmer and prevention efforts through Social capital Utilization in Indonesia. This research is a quantitative is analytical using cross sectional design, and qualitative research with FGD which is implemented for 8 months on April-November 2017, with tobacco farmer respondents from 12 districts in Jember Regency which is the center of tobacco production. 322 samples of the research was collected by stratified random sampling. The results showed that knowledge is significantly related to GTS Symptoms (sig 0.03), Attitudes (sig 0,094) and The action of GTS Prevention (sig 0.06), the use of PPE is significantly related to GTS (0.03). The result of FGD showed the harvest time in Na-ogst and Kasturi tobacco plantation was done in the different time. When the harvest time was before the sun raised which caused the tobacco leaves still in wet condition and easily to contact with the skin of the tobacco farmer which did not use the Personal Protection Equipment. The community leader of tobacco farmer in the prevention of GTS, which is facilitated from Plantation the Institution and from the tobacco industry as the media to campaign the prevention of GTS.

## 1. Introduction

The sixth place of the largest tobacco producer in the world, which is Indonesia, produce the total 136 thousands tons (1,91%) of the total world production of tobacco. There are three province that contribute the most to the tobacco production in Indonesia, including East Java, Nusa Tenggara Barat (NTB) and Central Java, both in 2009 and 2010. These provinces tobacco production reached 159000 tons (90%) of total national tobacco production in 2009 and 118000 tons, or approximately 87% of total national tobacco production In 2010. There has no change in the proportion of tobacco farmers to the agricultural workers, which stood at 1.6%. Meanwhile, it was found that the proportion of tobacco farmers to all workers was declining from 0.7% to 0.6% [1].

Tobacco farmers life is very susceptible to many aspects of life. One of the problems come from the health aspect. Each work or job that are done by the tobacco farmers poses a risk that can affect their health. They are on the brink of risk of having occupational diseases related to the exposure to pesticides and the absorption of wet tobacco leaves nicotine through the skin. The occupational disease related to it is then called Green Tobacco Sickness (GTS) [1]. GTS is a disease that can be caused by the absorption of nicotine through the skin when farmers work in wet tobacco fields without wearing personal protective equipment. The symptoms of this disease are headache, nausea, vomiting and fatigue [2].

The rate of GTS incidence in several countries in the world is fairly high rate. Based Prospective studies Oliveira, et.al in Brazil found that about 107 (82%) out of the 130 sample of cases group indicated symptoms of GTS including dizziness, headache, fatigue, nausea and vomiting [3]. Based of other



study, GTS has a higher tendency to be occurred in the group of men, nonsmokers and working in tobacco fields during harvest. Also found that about 18.4% of 304 among Migrant Latino Farmworkers in the state of Carolina, United States, who work as tobacco farmers are GTS positive [4]. The presence of symptoms of itching and the wounds on the skin proved the GTS positive. While several factors related to the occurrence of GTS are the time of tobacco farming, the activities carried out in the tobacco fields, and age groups.

In Indonesia, research about the GTS is still not much done yet. Some research on tobacco farmers in Temanggung Regency mentions that the incidence rate of GTS reached 63.7% and also mentions the symptoms are dizziness, headache and fatigue<sup>4</sup>. There are many risk factors that influence the occurrence of GTS i.e the position of the leaves picked, the use of protective equipment, and work experience. Tobacco leaf pickers who have worked in a long time, tobacco leaves picker at the central location as well as the long sleeves wearer are less affected by GTS than the new working tobacco leaf pickers, leaves picker at top center location and not a long sleeves wearer. Research in East Java, Central Java and West Nusa Tenggara which is the largest tobacco-producing provinces in Indonesia mentioned that approximately 12.2% of tobacco farmers said that they had experienced symptoms of GTS both during and after working in the tobacco fields [5].

In 2011, there were 24,616 tobacco farmers in Jember that are spread over 24 districts, which is one of the largest tobacco producers in Indonesia. Jember has tobacco production capacity up to 6,130 tons from as many as 10,009 hectares fields area. Voor-Oogst Kasturi, Na-Oogst, Voor-Oogst Burkley and Voor-Oogst Chop tobacco are the name of tobacco that is grown in Jember. Additionally, Jember has a high rainfall ranging from 1,969 mm to 3,394 mm with humidity ranging between 62-91%<sup>9</sup>. It is important considering the GTS occur when farmers work in tobacco fields that were wet from rain or dew in the morning. There has been no research on the GTS in Jember until now. Though the number of tobacco farmers that are quite a lot and the climatological factors, namely high humidity and rainfall, are increasing the risk of incidence of GTS for tobacco farmers in Jember. From the condition above this is important to research the incidences of green tobacco sickness (GTS) on tobacco farmers and prevention efforts through social capital utilization in Jember district, East Java province Indonesia.

## 2. Methods

Based on the research data and the available reference showed that the incidence of GTS occurrence on the tobacco farmers is high. On the other hand, GTS disease-related research is still very minimal. This study aimed to analyze the incidences of green tobacco sickness (GTS) on tobacco farmers and prevention efforts through social capital in Jember District, Indonesia.

This study is mix methods quantitative and qualitative research, used an analytical process with cross sectional approach to determine the the incidences of green tobacco sickness (GTS) on tobacco farmers and prevention efforts through social capital utilization in Jember district, East Java province Indonesia, by the interview using a questionnaire as the quantitative methods and Focus Group Discussion (FGD) as the qualitative methods. Ethical approval was obtained from the University of Jember Human Research Ethics Committee for this study (Ref Number 135/UN25.8/KEPK/DL/2018). The study population was a tobacco farmer from 12 districts as the producing of tobacco leave in Jember. They were included as sampled by Random totaled 322 respondents, from Mei to November 2017. The dependent variable in this study was the symptoms of GTS occurrence and the health seeking behaviour on tobacco farmers. The independent variables were the characteristics of the individual. The quantitative data collected will be analyzed using the crosstab and logistic regression. The qualitative data collected will be analyzed using the thematic content analysis.

### 3. Results And Discussion

#### 3.1 Overview of Study Location

The location of this study was focused on districts in Jember, districts center for tobacco. Based on the data in the preliminary study conducted by researchers through the Plantation Office of Jember Regency in 2013, the regions in question were the District Kalisat and Mayang. In which both locations are entering a period of preparation for the harvest. So it will be easier for researchers to measure kotinin levels in the blood. Because they are in a period in which making a lot of contact with wet tobacco leaves. Jember Regency is famous as one of the major tobacco-producing areas in Indonesia. There were about 24.616 tobacco farmers in 24 districts of 31 districts in Jember in 2011. Jember has tobacco fields area as many as 10.009 hectares and 6,130 tons tobacco production capacity. In Jember there are 4 types of tobacco grown, namely Voor-Oogst Kasturi, Na-Oogst, Voor-Oogst Chop, and Voor-Oogst Burkley tobacco. Na-Oogst is the types of tobacco that became leading commodity of Jember. The advantages of this tobacco in addition to the distinctive aroma as well as its elastic character so it is suitable to be used as cigars wrapping. Besides the historical factors, it is not surprising that the Jember government make tobacco leaves as one of the images that became a symbol of the region (Jember Regency Government, 2011).

The system used in trading the tobacco is contract system between the warehouse and tobacco farmers. It is perceived as detrimental to tobacco farmers because tobacco profits will be split into two sides while tobacco farmers is the one who will feel the impact in case of loss (Ahsan, et al, 2008). In addition, the tobacco industry will only buy tobacco at a decent price if the moisture content of tobacco leaves meet the certain degree. Therefore, the tobacco farmers feel threatened if the field ready to be harvested is suddenly rain. That condition makes 70% of the 12 thousand hectares of tobacco in Jember aren't harvested because of the low price. In addition, it is also caused by a number of tobacco production from outside the area that are sold in Jember (Djunaidy, 2012).

However, erratic climate and weather in 2013 made thousands of tobacco farmers in Jember have problems deciding tobacco planting season. In fact, usually May was an early planting season of various types of tobacco. Though the climate and weather are one of the important factors that affect the growth of tobacco plants that have an impact on the selling price of tobacco leaf (Chamim, et al, 2010). Besides the impact on the economy, life as a tobacco farmer is also associated with many other aspects of life, such as health, social relationships, and psychological. In terms of health, the study discusses the quality of life for tobacco farmers is very limited, especially concerning health complaints that found in many tobacco farmers.

#### 3.2 Overview of Study Respondents

The study was conducted in May 2017. The respondents in this study are tobacco farmers in the district which have been mentioned above with a sample of 322 respondents. Characteristics data examined in this study include sex, education level, marital status, and partnership status with the factory cigarettes including in farmer group, and whether they involved in social activity group.

A side from the characteristics data on the respondents, the researchers also collect related data of GTS symptoms perceived by tobacco farmers such as: Dizziness, nausea, vomiting, fatigue, decreased appetite and insomnia felt during the morning when they were in the garden, as well as the efforts made by the tobacco farmers in overcoming the symptoms of GTS that appears analyze the incidences of green tobacco sickness (GTS) on tobacco farmers and prevention efforts through by using Personal Protection Equipment (PPE) in activity on tobacco plantation.

#### 3.3 Characteristics of Study Respondents

Characteristics Data examined in this study include sex, age, education level, income level, marital status, time being a tobacco farmer. Below is an explanation of each characteristic of tobacco farmers who became study respondents.

**Tabel 1.** Characteristics of Respondents by Gender

Gender	Frequency	Percent
Male	234	2,7
Female	88	27,3
Total	322	100

In Table 1 showed that the percentage of male respondents are most than the female respondent. There were 72.7% of a male tobacco farmer and only 27.3% of female tobacco farmer. This result the same with the tobacco farmer in Thailand, that GTS occurred in females more than one and half times than in males [6]. In tobacco farming, not only the men who worked in the fields, but also involves a lot of women. This condition is mostly found in tobacco farming, especially during harvest time. Tobacco leaf pickers mostly did by women and even children. The children at the age less than 17 years that working on tobacco plantations in the USA comes from three groups: migrant youth workers, family members of farmers, and local children [7]. This research the same with the result of the research about tobacco farmer in Jember district by Rokhmah et al [8] that there was 2,5% of children than involved into tobacco plantation. Besides children, in developing country like Indonesia, a woman involved in tobacco plantation. While the participation of tobacco farmers wives is usually seen at harvest time in which tobacco farmer's wife helps them by picking tobacco leaves and also plays a role in determining the managing the money from the sale of tobacco and selling price [9]. The condition is strongly associated with the level of productivity of farmers to farm tobacco. As we know that almost all farming activities associated with the level of physical ability. When farmers in the productive age will have higher productivity levels than the farmers who have entered into non-productive age. States that one factor that is closely related to the ability to work in carrying out farming activities is the age of farmers [10]. Therefore, the age can be used as a benchmark to see the activities of a person in a work where the age conditions are still productive then most likely one can work well and maximum.

**Tabel 2.** Characteristics of Respondents by Marital Status

Marital Status	Frequency	Persent
Married	308	95.7
Not Marrird	14	4,3
Total	322	100

Source: Processed primary data

In Table 3 shows the characteristics of the tobacco farmers based on marital status. The result showed that most tobacco farmers have married status that is equal to 95.7%. This condition the same with the result of the research on tobacco farmer in Jember District by Khoiron et al., [11]. indicate that on average respondents are male and female, most are married and aged over 50 years, and has worked as tobacco farmers over 10 years of 92.5%. At US study found that the mortality rate of singlespeople is 58% higher than those who were married or in pairs. In a relationship or marriage is seen as a representation of social relevance that helps a person to live longer [12].

In terms of time working as tobacco farmers, the results showed that most respondents had worked as a tobacco farmer in 1-10 years was 39.1%. This condition is very possible considering tobacco farmers in Jember, Sumenep and Pamekasan gain knowledge tobacco farming for generations. So strong of this tobacco tradition in the Madurese community there is an adagium that says; "*Beni lelakek mon tak nanem beko*", which means, not men if do not grow tobacco [13]. It caused the tobacco farmer in Jember always plant tobacco leaves although the price was low and not giving the benefit. Revealed that time working as a tobacco farmer have a negative relationship with the symptoms of GTS [4]. In detail the tables of the characteristics of tobacco farmers based on timeworking as tobacco farmers can be seen in Table 3 below;

**Tabel 3.** Characteristics of Respondents by Time Working As Tobacco Farmers

Time Working	Frequency	Percent
0-10 years	126	39.1
11-20 years	85	26.4
>20 years	111	34.5
Total	322	100

Source: Processed primary data

Table 5 shows the majority of respondents (73.6%) had a low level of education graduated from junior high school. Even 0.9% among respondents reported graduated from university. Then the next sequence was 13.4% completed senior High school and graduated from elementary school at 11.8%. Low education levels mean the respondent finished from low education or primary school (The Constitution RI number 23 of 2003). This research was different with the tobacco farmer in Thailand that Almost all farmers graduated from a primary school and farming was their traditional vocation [6]. Based on the study result showed that the majority of respondents expressed no school or only completed primary school in junior high school. This is according to study conducted by Fauziah [14] in Pamekasan and Darmasetiawan [15] in Temanggung Regency stating tobacco farmers as study respondents have relatively low level of education. A person's education level affects the level of knowledge, including in matters of health. With low levels of education of tobacco farmers, then their knowledge of GTS is also lower which includes the effort to prevent the symptoms of GTS. In detail the characteristics of tobacco farmers in Jember regency can be seen in Table 6 below :

**Tabel 4.** Characteristics of Respondents by Education Level

Education Level	Frequency	Percent
University	3	0.9
Senior High School	43	13.4
Junior High School	237	73.6
Elementary School	38	11.8
Total	322	100

Source: Processed primary data

Related with the involving of a tobacco farmer in the group, showed that most of the respondent not included in the tobacco farmer group (72.7%). And only 33.2% of the tobacco farmer was included in tobacco farmer group. Tobacco farmer group was facilitated by the plantation institution or tobacco industry in Jember District. The result of FGD process to identify the learning needed (potential group, time, and media) and the community leader as the pilot project of the empowerment of tobacco farmer in the prevention of GTS incidence. The role of tobacco farmer group which facilitated by field officer of plantation institution and tobacco industry (PT. Sadana Arif Musa and PT Pandu Sata Utama) was very important as the media to campaign the prevention of GTS. The activities of those was the trying how using Personal Protection Equipment (PPE) in prevention the absorption of nicotine from wet tobacco leaves and from the dangerous of chemical fertilizer. In detail table on the characteristics of respondents by including in tobacco farmer group or not can be seen in Table 5 below :

**Tabel 5.** Characteristics of Respondents by Including in Tobacco Farmer Group

Status	Frequency	Percent
Included group	83	33.2
Not included group	239	72,7
Total	322	100

Source: Processed primary data

### 3.4 The Behaviour of GTS on Tobacco Farmers

The results of statistical analysis showed: Knowledge is significantly related to GTS Symptoms (sig 0.03), Attitudes (sig 0,094) and The action on GTS Prevention (sig 0.06). and use of PPE is significantly related to symptoms of GTS (0.03). It needed by FGD to identify the learning needed (potencial group, time, and media) and the community leader as the pilot project of the empowerment of tobacco farmer in prevention of GTS incidence. The result of the FGD process showed that the harvest time in Na-ogst tobacco plantation by tobacco farmer was done in the early morning before the sun raised. in caused the tobacco leaves still in wet condition and easily to contact with the skin of the tobacco farmer which did not use the Personal Protection Equipment (PPE) included long clothes and water resistant. It caused the absorbtion of nicotine from wet tobacco leaves which direct contact to the skin of tobacco farmer was easily. It caused the GTS syndrome on the tobacco farmer. But this condition is different with the result of research on tobacco farmer in Brazil showed that contact with wet tobacco leaves were not associated with illness (Bartholomay et al., 2012).

This condition was different with the tobacco farmer which planted Kasturi tobacco leaves. Because Kasturi tobacco leaves need to harvest time was not in early in the morning, but in the afternoon. It meanted that the tobacco leaves in the warm condition and not caused the absorbtion of nicotine from wet tobacco leaves to the skin of tobacco farmer. So the GTS syndrome can be prevented. This condition the same with the result of the research in tobacco farmer at Thailand which showed that the process of Thailand traditional tobacco cultivation which involves contact with nicotine and pesticides through dermal exposure is a major risk of Green Tobacco Sicknes (GTS) [6]. The result of this study the same result with the study before by Rokhmah et al [8] about the GTS Risk Factors on Tobacco Farmers mentioned that there are 66% tobacco farmers who have symptoms of GTS in Jember. This was confirmed by study of Chifdillah which states that the majority of tobacco farmers (54.7%) in Jember have status of poor physical health [16].

Conditions such as those mentioned above can be caused by conditions of tobacco farmers in general belong to the middle and lower classes and from poor families. Proved from the results of the study that says that majority of tobacco farmers had an education level of elementary and had an income below the minimum wage. This has an impact on their financial ability to access adequate health care is lacking. GTS incident is considered underestimated. This problem arises mostly on the workers community groups with poor status (low incomes) as well as the problem of the high cost of health care become a barrier for them [17]. In another fact, GTS on tobacco farmer had side effect on mental health. This condition the same with the research of Faria et al (2014) that the number of green tobacco sickness episodes in the previous year and the number of lifetime pesticide poisoning episodes were directly associated with Minor Psychiatric Disorders (MPD).

#### 4. Conclusions

The tobacco farmers on Jember District showed that most gender of respondents is men and had married. The most education of respondents is low (elementary junior high school), being tobacco farmers until 10. Only a few of them is included in farmer group. The statistical analysis showed Knowledge is significantly related to GTS Symptoms. Attitudes and the action of GTS Prevention. and use of PPE is significantly related to symptoms of GTS. The result of FGD was the learning needed (potensial group, time, and media) and the community leader as the pilot project of the empowerment of tobacco farmer in the prevention of GTS incidence. The potential group was facilitated from Plantation the Institution and from the tobacco industry as the media to campaign the prevention of GTS.

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