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Risk Factor Analysis of Green Tobacco Sickness (GTS) and the handling method on Tobacco Farmers

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A B S T R A C T

Tobacco farmers are at risk of developing occupational diseases associated with exposure to pesticides and absorption of wet tobacco leaves nicotine through the skin that is called Green Tobacco Sickness (GTS). This study used an analytical approach with survey method and using cross-sectional design. This study was conducted at 89 tobacco farmer from 12 districts in Jember regency which is a center of tobacco production in September to December 2013. Data were analyzed by logistic regression statistical test. The results showed that most respondents are male sex, do not go to school, married and has become a tobacco farmer for more than 10 years and have a monthly income below the minimum wage. Most tobacco farmers have low knowledge of GTS symptoms (96.6%), with a negative attitude towards prevention of GTS (98.9%), and have poor precautions of GTS (86.5%). There are 66.3% of tobacco farmers who have GTS symptoms. Statistical tests showed that there were influences between the sexes ($p = 0.022$) and time been tobacco farmer ($p = 0.025$) as well as preventive behavior of GTS ($p = 0.002$) on the occurrence of GTS symptoms on tobacco farmers. The handling Method of GTS is through three approaches (farmers' knowledge and attitudes about GTS, Procurement of PPE, Chairman of Farmers Group and Agricultural Extension Officers). It is needed a socialization in groups of tobacco farmers about the prevention of GTS symptoms through behavioral approach by means of a shower and change clothes after working in the tobacco field, and the use of waterproof clothing, gloves and boots

Introduction

Indonesia is the sixth-largest producer of tobacco after China, Brazil, India, USA and Malawi, with a total production of 136 thousand tons, or approximately 1.91% of

the total world production of tobacco. Meanwhile, the three provinces of East Java, West Nusa Tenggara (NTB) and Central Java is Indonesia's largest tobacco producer,

both in 2009 and 2010. In 2009, these three provinces tobacco production reached 159 thousand tons, or 90% of the total national production of tobacco. While in 2010, the production of these three provinces reached 118 thousand tons, or about 87% of the total national production of tobacco. The proportion of tobacco farmers to agricultural workers has not changed, which stood at 1.6%. Meanwhile, the proportion of tobacco farmers to all workers decreased from 0.7% to 0.6% (1).

The life of tobacco farmers is very vulnerable to the various life aspects. Health aspect is one of the problems for tobacco farmers. Each job poses risks that may affect the health of workers, no exception for tobacco farmers. Tobacco farmers are at risk of developing occupational diseases associated with exposure to pesticides and absorption of wet tobacco leaves nicotine through the skin that is called Green Tobacco Sickness (GTS) (1). GTS is a disease that can be caused by the absorption of nicotine through the skin when tobacco farmers working in wet fields without wearing personal protective equipment. The disease is characterized by symptoms including headache, nausea, vomiting, fatigue (2).

The incidence of GTS in several countries in the world have been studied and showed a fairly high incidence rate. Prospective study Oliveira, et.al (3) in Brazil said 107 of 130 samples of the cases showed GTS symptoms including dizziness, headache, fatigue, nausea and vomiting. According to the study, GTS has a higher tendency occurred in the group of men, non-smokers and working in the tobacco fields during harvest. Research Arcury, et.al, (4) in the state of Carolina, United States, said 18.4% of the 304 tobacco farmers positively affected by GTS with the presence of symptoms of

itching and sores on the skin. While factors associated with the occurrence of GTS including age groups, the time of tobacco farm and the activities carried out in the tobacco fields.

GTS study in Indonesia is still not much done. Study conducted by Suprpto (5) on tobacco farmers in Temanggung Regency said that the GTS incidence rate reached 63.7% with symptoms found was dizziness, headache and fatigue. While the risk factors that influence the occurrence of GTS including work experience, the location of the leaves were picked, and the use of protective equipment. Tobacco leaf picker who has worked in long time, tobacco leaf picker middle location and long sleeves wearer are slightly affected by GTS than the new tobacco leaf picker, leaf picker upper middle location and non long sleeves wearer. While study of Ahsan et al, (6) in three largest tobacco-producing provinces in Indonesia, East Java, Central Java and West Nusa Tenggara, said that 12.2% of tobacco farmers claimed to have experienced symptoms of GTS both during and after working in the tobacco fields.

Jember is one of the largest tobacco producing areas in Indonesia. In 2011, there were 24,616 tobacco farmers in Jember spread over 24 districts. While the tobacco field area reached 10 009 hectares and tobacco production amounted to 6,130 tonnes. There are 4 types of tobacco grown in Jember, namely Na - Oogst tobacco, Voor - Oogst Kasturi, Voor - Oogst Rajang and Voor - Oogst Burkley. In addition, Jember is one area that has a high rainfall ranging from 1,969 mm to 3,394 mm with humidity ranging from 62-91 % (7). It is important considering that GTS occurs when farmers work in the tobacco fields that are wet because of the rain water or dew in the morning. Until now there has been no study

about GTS in Jember. Though the number of tobacco farmers are quite a lot and the presence of climatologically factors, namely high humidity and rainfall, increasing the risk of incidence of GTS for tobacco farmers in Jember.

Based on study data and the references existed, they showed that the incidence of GTS on tobacco farmers is quite high. On the other hand, GTS disease-related study is still very minimal. This study will analyze the characteristics and the behavior of the individual with the GTS incidence and describe the process of contact with a source of transmission. Thus the question that arises in this study is: What are the factors become the risks of GTS disease on tobacco farmers including: individual characteristics factors (age, gender, education, marital status, time been a tobacco farmer), and behavioral factors (knowledge, attitudes, GTS associated actions) as well as how the handling method?

This study used an analytical approach with the survey method and using cross-sectional design, i.e., to study the dynamics of the correlation between risk factors with the effects, by means of approach, observation or data collection at once at some point (point time approach). This study was conducted in 24 districts in Jember which is a center of tobacco production. This study was conducted from September to December 2013. The number of samples required in this study amounted to 89 samples. Data collection techniques used in this study are: Interview, documents survey, and Focus Group Discussion (FGD). The dependent variable is the GTS symptoms on tobacco farmers. Meanwhile, the independent variable consisted of: individual characteristics factors (age, gender, education, marital status, time been a tobacco farmer), and behavioral factors

(knowledge, attitudes, GTS related actions) and how the handling methods.

1. Characteristics of Respondents Against GTS Symptoms On Tobacco farmers

Data of characteristics examined in this study including gender, age, education level, income level, marital status, time been a tobacco farmer, and the presence or absence of GTS symptoms in detail can be seen in Table 5.1 below:

2. Tobacco Farmers behavior About GTS Symptoms

Behavioral domain consists of knowledge, attitudes and actions (8). In this study, the behavior of the tobacco farmers on GTS symptoms described through three indicators, namely: knowledge of GTS, Attitudes toward GTS prevention and GTS precaution.

An Overview of The Study Sites

Jember is well known as one of the major tobacco producing areas in Indonesia. In 2011, there were 24,616 tobacco farmers in 24 districts of 31 districts in Jember. While the tobacco field area reached 10 009 hectares and tobacco production amounted to 6,130 tonnes. There are 4 types of tobacco grown in Jember, namely Na-Oogst tobacco, Voor-Oogst Kasturi, Voor-Oogst Rajang and Voor-Oogst Burkley. Type of tobacco that becomes Jember leading commodities is Na-Oogst tobacco. The advantages of this tobacco are asides of distinctive aroma as well as its elastic character so it is suitable for use as cigar wrapper. Besides historical factors, it is not surprising that the Jember government makes tobacco leaves as one of the images that became a symbol of the region (Government of Jember, 2011).

Tobacco Trade system in Jember uses contract system between the warehouses and tobacco farmers. This perceived disadvantage by tobacco farmers because tobacco profits will be split on two sides while the tobacco farmers are the one who will feel the impact if there is a loss (6). In addition, the cigarette industry will only buy tobacco at a decent price if the moisture content of tobacco leaves meet certain degree. Therefore, tobacco farmers feel threatened if the field that is ready to be harvested rain suddenly. This is why 70% of 12 thousand hectares of tobacco fields in Jember are not harvested because of the low prices. In addition, it is also caused by many tobaccos from outside the area that is sold in Jember (9).

However, the climate and weather in 2013 that was erratic made thousands of tobacco farmers in Jember confused to determine the planting season of tobacco. In fact, usually May was a month of planting season of various types of tobacco. The climate and weather is one of the important factors that affect the growth of tobacco plants and have an impact on the selling price of tobacco leaves (10). Besides the impact of the economy, life as a tobacco farmer also associated with various other life aspects, such as health, psychological and social relationships. In terms of health, the study discuss about quality of life of tobacco farmers is very limited, especially concerning health complaints that are found in tobacco farmers.

1. Characteristics of Respondents Against GTS Symptoms On Tobacco farmers

Table 5.1 shows that the majority of respondents were female (68%) and were married (97.8%). This condition is mostly found in tobacco farm especially during harvest time. Tobacco leaves picker mostly

done by women and even children. Just as the children at the age less than 17 years old who worked on tobacco plantations in the USA are came from three groups: family members of farmers, young migrant workers, and the local kids (2). While the tobacco farmer's wife's participation is usually seen during the harvest which the tobacco farmer's wife helps in picking tobacco leaves. Tobacco farmer's wife also plays a role in determining the selling price and management of money from the sale of tobacco (11).

In terms of age, the majority of respondents aged 40-49 years old (68%). The age distribution according to Fauziah (12) included in the productive age category. Age greatly affect the labor productivity. Within certain limits, increasing a person's age will increase productivity in the work and after a certain age, the productivity will decrease.

These conditions strongly associated with the level of productivity of farmers in tobacco farming. As we know that almost all farming activities associated with the level of physical ability. Farmers in the productive age will certainly have a higher level of productivity compared with farmers who have entered into a non-productive age. Hashim (2006) in Putra (13) states that the age of the farmer is one factor that is closely related to working ability in carrying out farming activities. Therefore, age can be used as a benchmark to see a person's work activity which is still in productive age then most likely someone can work well and maximum.

In terms of time been a tobacco farmer, the results showed that most respondents had worked as a tobacco farmer more than 10 years (66.3%). This condition is likely to occur considering the tobacco farmers in Jember, Sumenep and Pamekasan got the

knowledge of tobacco farming for generations. This tobacco tradition is so strong among the people of Madura so there is an adage that says; " Beni lelakek mon tak nanem beko" which means, not a man if do not grow tobacco (14). Although the study by Arcury et al (15), revealed that the working time as a tobacco farmer had a negative correlation with GTS symptoms.

Table 5.1 shows the majority of respondents (64.9%) had a low level of education. Low educational level means the respondent did not complete the primary school (16). Based on the study result, it showed that most of the respondents did not school or only finished elementary school. This is consistent with study conducted by Fauziah (12) in Pamekasan and Darmasetiawan (17) in Temanggung Regency that said the tobacco farmer as their study respondents have a relatively low level of education. One's education level affects the level of knowledge included in health problems. With low educational levels of tobacco farmers, the lower their knowledge in preventing the GTS symptoms.

In terms of income, the results showed that most respondents have a low income (below minimum wage of Jember regency of Rp 1,095,000.00 per month) that is equal to 74.2%. The nature of tobacco is a fancy product which the tobacco quality will determine the selling price. Although the tobacco productivity is increasing, but if the quality is low then the selling price is also low (18). As for tobacco farmers who partnered with the cigarette factory, the quality is determined by the manufacturer of tobacco cigarettes which are usually called grader. Tobacco farmers have almost no bargaining power because of the quality and price of tobacco is determined by the grader. Tobacco farmers themselves do not know the decision regarding the location of tobacco the level (grade) which is

determined by the grader (6). These conditions ultimately result in low levels of tobacco farmers' income.

2. Tobacco Farmers behavior About GTS Symptoms

Table 5.2 the results showed that most of the tobacco farmers' knowledge level about the GTS is still low (96.6%), attitudes toward GTS prevention is still negative (98.9%), as well as the precautions of GTS symptoms is poor (86.5%). Cognitive knowledge is very important domain in forming one's actions (8). Attitude is a reaction or closed response from a person to a stimulus or object. In this whole attitude determination, knowledge, thoughts, beliefs and emotions play an important role (19).

3. Effect of Respondent Characteristics Against GTS symptoms on the Tobacco Farmers

Statistical tests showed that there were influences between the sexes ($p = 0.022$) and time been tobacco farmer ($p = 0.025$) with the incidence of GTS symptoms on tobacco farmers. In terms of gender, it can be explained that the results of the study showed that the majority of respondents were female (68.3%). This means that the female tobacco farmers are more prone to GTS symptoms than the male tobacco farmers. Because the men who work as a tobacco farmers are active smokers. The results of the study by Arcury et al (15) revealed that tobacco consumption reduces the risk of GTS symptoms.

Most respondents have become tobacco farmers over 10 years (66.3%). According to Suprpto (5), the tobacco leaf picker who has long worked, is less affected by the GTS than the new tobacco leaf picker. So the effect of time been tobacco farmer actually

reduce the likelihood of someone suffered GTS symptoms. In a study conducted by Arcury et al (15) revealed that there is a relationship between duration (years) working as a tobacco farmer with GTS incidence risk with an estimated of OR = 2.86 for the farmers who have been worked for one year in harvest time compared to tobacco farmer who has been working for five years.

4. Effect of Respondent Actions Against GTS symptoms on Tobacco Farmers

Respondent Action against the GTS symptoms consists of: wearing gloves, long-sleeved shirt, waterproof clothing while working on the tobacco fields. In addition, the farmers do not work in the tobacco fields too early and on the wet tobacco. Final action is to wash used clothes after working in the tobacco fields. The results showed that most respondents had poor precautions of GTS symptoms. This means that tobacco farmers are still rare or not take action to prevent GTS symptoms. This condition occurs because they have not been exposed to information about the GTS risk factors and the lack ability of tobacco farmers in the procurement of PPE when working in the tobacco fields.

Statistical tests showed that there is influence of GTS precautions against the occurrence of GTS symptoms on the tobacco farmers. This is indicated by the value of $p = 0.002$. This means that if the tobacco farmers take precautions of GTS symptoms in the form of: using gloves and long-sleeved shirt and waterproof clothing while working on the tobacco fields, not working on the tobacco fields too early in the morning and on the wet tobacco, and washing used clothes after working on the tobacco fields, the tobacco farmers will avoid the symptoms of GTS.

It is as the result study by Suprpto (5) which states the incidence of GTS on the tobacco farmers in Temanggung Regency reached 63.7% with the factors that influence the occurrence of GTS including work experience, the location of leaves picked, and the use of protective equipment. Tobacco leaf picker central location and the long sleeves wearer are less affected by GTS than the new tobacco leaf picker, leaf picker upper middle location and not wearing long sleeves. This is in line with study by Arcury et al (15) which states that the planting, harvesting and drying tobacco as well as working using wet clothes is a risk factor associated positively with GTS symptoms. In the international literature has proved that there is a relationship between tobacco harvest times during the rainy season with GTS symptoms (20, 21, 22, 23,6).

5. Methods of GTS disease management on the tobacco farmers

Based on the results of the FGD with tobacco farmers on one of the farmer group in Kalisat village Kalisat District Jember Regency were obtained results that most farmers are not used to bath with soap after working in the tobacco field. While the clothes for working in the tobacco field were never washed with an excuse that the clothes is devoted to work in the farm. So it just hanged after using without washing.

Associated with GTS symptoms complaints, most farmers claimed to have been accustomed to suffered dizziness and nausea at the morning when in the tobacco field. They experienced this incident between 8 to 10 o'clock in the morning. At the day time the symptoms fade away by itself.

Table.1 Characteristics of Respondents in Jember Regency, 2013

No	Characteristic	Frequency (n)	Percentage (%)
Sex			
1.	Man	28	31.5
	Woman	61	68.5
Age			
2.	30-39 years old	21	23.6
	40-49 years old	61	68.5
	> 50 years old	7	7.9
Education			
3.	No school	48	53.9
	Elementary School	37	41.6
	Junior High School	4	4.5
Income			
4.	Low	66	74.2
	High	23	25.8
Marital Status			
5.	Single	2	2.2
	Married	87	97.8
Time Been Tobacco Farmer			
6.	< 10 years	30	33.7
	> 10 years	59	66.3
GTS Symptoms			
9.	Exist	59	66.3
	None	30	33.7

Table 2. Respondents Behavior Against the GTS Symptoms

No	Behavioral Domain	Amount	Prpercentage
Knowledge about GTS			
1.	Low	86	96.6
	High	3	3.4
GTS Prevention Attitude			
2.	Negative	88	98.9
	Positive	1	1.1
3.	GTS Prevention		
	Predisposing factors: Knowledge and attitudes of tobacco farmers about GTS prevention	77	86.5
		12	13.5

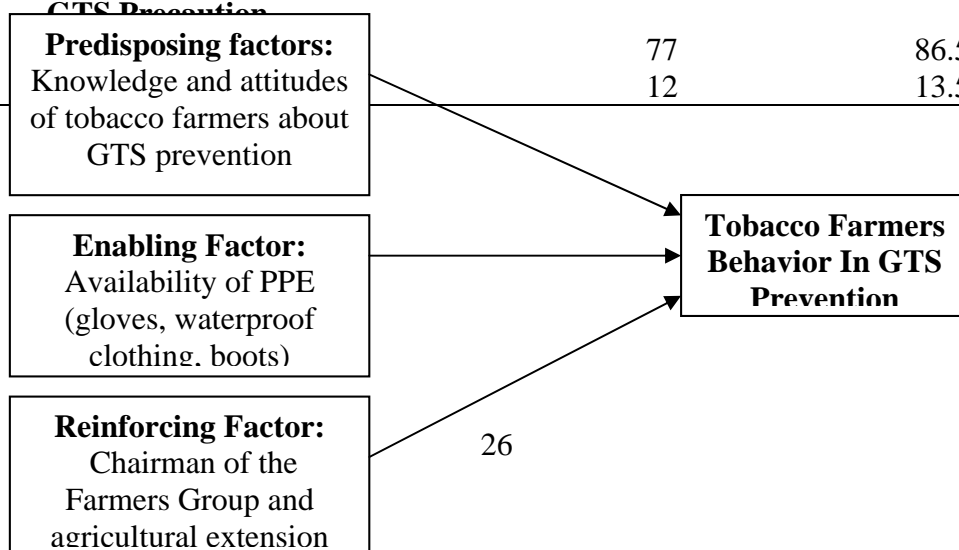


Figure.1 Factors that Influence the Prevention GTS Behavior On Tobacco Farmers

This condition can occur considering the conditions at noon, when the temperature is hot that result in reducing of humidity on the tobacco leaves and in the soil and environment in the tobacco fields so that the absorption of nicotine from wet or damp tobacco leaves through skin can be avoided. GTS symptoms have been reported when in cold weather in at tobacco harvest time (24).

Green in Notoatmodjo (19) analyzes human behavior from three (3) factors: Predisposing factors (predisposing factor) is a factor that is manifest in knowledge, attitudes, beliefs, convictions and values. Supporting factors (enabling factor) is a factor that is manifest in the physical environment, available or not the facilities or health facilities. Driving factors (reinforcing factor) is a factor which is manifest in the attitudes and behavior of health care workers or others, which is the reference group of people's behavior. The relationship between these three factors of behavior determinants are in the handling and prevention of GTS symptoms on the

tobacco farmers based on the results of study are shown in Figure 5.1 below:

In order to determine the method of GTS symptoms prevention that is based on the application of Green theory and the results of the FGD and the results of the study on the tobacco farmers, then the formula is obtained through the following three approaches:

- a. Predisposing factors (predisposing factor): socialization of GTS prevention through counseling on the tobacco farmers through tobacco farmer group activities.
- b. Supporting factors (enabling factor): Procurement of PPE (Personal Protective Equipment) such as gloves and waterproof long clothes and boots worn by tobacco farmers while working in the tobacco fields.
- c. Driving factors (reinforcing factors): Increasing the role of chairman of the farmer groups and agricultural extension officers as role models for the tobacco farmers to gives an example of

the application of GTS precautions while in the tobacco fields.

Considering the GTS symptoms on the tobacco farmers triggered by the absorption of nicotine from the wet tobacco leaf to the skin of tobacco farmers, so the GTS symptom management on the tobacco farmers can be achieved by reducing contact with wet leaves and conditioning the surrounding environment to avoid moisture. GTS complaints will be felt between 3 to 17 hours after exposure and the duration of GTS symptoms will occur for 1-3 days.

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