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PROCEEDINGS OF THE 2ND INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH

Achieving SDGs in South East Asia: Challenging and Tackling of Tropical Health Problems

Editors:
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Darrimiya Hidayati

Editor on Board: Febi Dwirahmadi

Organized by
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FOREWORD

The point of Sustainable Development Goals (SDGs) has been determined in the consistent meeting in all countries. The health sector position is one of the key components in achieving the indicators. Special attention to the health sector focuses on community nutrition, national health systems, access to reproductive health and family planning and sanitation and clean water.

Based on that, Southeast Asian countries are seen as important part in formulating strategic and policy efforts to improve the effectiveness and efficiency of achieving the various goals of the SDGs. Therefore, the Doctoral Program of Health Science, Faculty of Public Health, Universitas Airlangga held The 2nd International Symposium of Public Health. This remarkable event is in collaboration with Faculty of Medicine, Widya Mandala Catholic University Surabaya and Magister Program of Public Health, Jember University. It's an honour to present **"Achieving SDGs in South East Asia: Challenging and Tackling of Tropical Health Problems"**.

We have tried to give our best contributing of our knowledge in the field of public health especially our contribution to help the problems on tropical health, health equity and quality of health care, clinical and community relationship to enhance public health, emerging and re-emerging diseases, nutrition-enhancing as strategic investment, global strategy framework for food security and nutrition, environmental and occupational health and mental health for achieving SDGs in South East Asia.

The aim of this symposium is to disseminate knowledge and share it to the public, especially in the scientific community, such as academics and practitioners in the field of health. The symposium focusing on formulation of policy recommendations for related parties to accelerate the achievement of the target of SDGs in the field of health. The results of this symposium are also expected to be an input for policy makers, from various levels in formulating programs to accelerate the SDGs goals' achievement. This international symposium will help us, to grasp and share more knowledge especially in public health science.

At last, we would like to ackowledge for all parties which are provide the valuable materials as well as financial support for the successful symposium. As chair of organizing committee, I would also like to say deep thank you for all committees; my colleagues, and also students in faculty of Public Health Universitas Airlangga, who have been working to be part of a solid team and amazing committee.

I am looking forward to seeing you at ISoPH in the near future.

Rachmad Suhanda
Chairman of the Committee

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FULL PAPERS

Occupational Exposure to Green Tobacco Sickness among Tobacco Farmers in Jember, East Java, Indonesia

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Keywords: Occupational exposure, green tobacco sickness, tobacco farmers

Abstract: Exposure to nicotine in tobacco leaves was once associated with health problems among farm workers, although there is still controversy as to the chemical types, intensity and forms of exposures that present risk factors for getting Green Tobacco Sickness. The objective of this study is to explain the prevalence of Green Tobacco Sickness among tobacco farmers and associated factors. The method used is cross sectional study with a representative sample of tobacco growers, characterizing social demographic indicators of farmer, occupational exposure, and personal protective equipment. In total, 46 tobacco farmers were assessed and Green Tobacco Sickness prevalence was 11%. Based on sociodemographic characteristics, the majority of the research population are married males, aged from 31 to 40 years, with elementary school education. Most have been smokers at some point in time. Based on employment history being a risk of Green Tobacco Sickness, the majority of respondents work as farmers and landowners for a five-year working period. The length of work is less than eight hours per working day. The intensity of working in a tobacco field within a year ranges from three to seven months. This study reinforces the evidence of the association between nicotine exposure and Green Tobacco Sickness

1 INTRODUCTION

Occupation and working activities are the major social determinants of health. Despite having a demanding job, an employed person often looks healthier and happier than those who are unemployed. However, many workers are exposed to unhealthy and unsafe working conditions.

The plantation sector is one of the workplaces that pose a risk to health. Green Tobacco Sickness (GTS) is an occupational disease found in tobacco picking farmers. GTS is an acute intoxication of nicotine that enters through the skin by absorption of wet tobacco leaf (Park et al., 2017). According to Balu et al. (2011), GTS is a condition of toxication caused by a combination of moisture and nicotine that can affect farmers who process, pick and handle tobacco. Symptoms found in farmers who have suffered from GTS are nausea, vomiting, headaches, dizziness (Balu et al. 2011; Bartholomay et al., 2012), muscle weakness (Balu et al., 2011), abdominal pains, heart palpitations, and increasing blood pressure. In some cases, farmers with GTS can be hospitalized for dehydration, cardiovascular instability, and seizures, (Bartholomay et al., 2012).

Another study of 40 people in Thailand was conducted by Saleeon et al. (2016) which consisted of 20 tobacco farmers and 20 non-tobacco farmers. The level of cotinine found in tobacco farmers was higher than non-tobacco farmers.

A similar study was conducted by Bartholomay et al. (2012) on tobacco farmers in Brazil with a case-control method with a ratio of 1: 2. Fassa et al. (2014) found in their study of tobacco farmers in South Brazil that GTS prevalence in male farmers was 6.6% and in female farmers, it was 11.9%. Risk factors for male farmers are: age, non-smoker, hanging tobacco rods in barns, harvesting wet tobacco, and physical exertion, whereas in female farmers, GTS risk factors are: tobacco binding, transporting tobacco, harvesting wet tobacco, contact with pesticides, and physical exertion. This research suggests developing methods for screening GTS in order to distinguish between GTS exposure and pesticide poisoning more clearly.

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Occupational Exposure to Green Tobacco Sickness among Tobacco Farmers in Jember, East Java, Indonesia.
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Indonesia itself has not yet had much research being done on GTS. Research conducted by Wahyuni & Hariyono (2012) in Tlogomulyo village, Temanggung Regency mentioned that 35.2% of GTS farmers.

Jember Regency is one of the largest tobacco producing areas in Indonesia. In 2011, there were 24,616 tobacco farmers in Jember Regency spread over 24 districts, while the area of tobacco land reaches 10,009 hectares and 6,130 tons of tobacco production (Sawit & Palm, 2013).

2 METHODS

The design of this research is cross sectional and the research population involves tobacco farmers in Jember Regency. The variables studied were sociodemography, occupation, pesticide exposure and Green Tobacco Sickness (GTS). Samples were taken using the cross sectional sampling method of Lameshow (1997):

$$n = \frac{Z^2_{1-\alpha/2}\, p\,(1-p)\, N}{d^2(N-1) + Z^2_{1-\alpha/2}\, p\,(1-p)} \quad (1)$$

Presented samples of 50 people tobacco farmers.

3 RESULTS

Four out of the 50 respondents interviewed did not complete the questionnaire, so only 46 or 92% of the questionnaires could be processed. The results can be seen in the following table:

Table 1: Characteristics of sociodemographic research populations.

Characteristics (N=46)	N	Negative cotinine		Positive cotinine		Sig Pearson
		N	%	N	%	
Gender						0.767
Male	25	12	48	13	52	
Female	21	11	52.4	10	47.6	
Age						0.370
20-30 yrs.	8	3	37.5	5	62.5	
31-40 yrs.	12	7	58.3	5	41.6	
41-50 yrs.	11	7	63.6	4	36.3	
>50 yrs.	16	6	37.5	10	62.5	
Education level						0.870
Not completed SD	9	5	55.6	4	44.4	
Graduated SD	21	10	47.6	11	52.4	
Graduated SLTP	11	5	45.5	6	54.5	
Graduated SLTA	4	2	50	2	50	
Graduated PT	1	1	100	0	0	
Marital Status						0.201
Not married	2	2	100	0	0	
Married	43	20	46.5	23	53.5	
Ever been married	1	1	100	0	0	
Smoking Record						0.930
Non-smoker	8	4	50	4	50	
Ever been a smoker	9	5	55.6	4	44.4	
Smoker	29	14	48.3	15	51.7	
History of alcohol consumption						0.599
No alcohol consumption	41	21	51.2	20	48.8	
Ever consumed alcohol	4	2	50	2	50	
Consuming alcohol	1	0	0	1	100	

Table 2. Employment history and cotinine exposure.

	N	Negative cotinine		Positive cotinine		Sig Pearson
Job status		N	%	N	%	0.155
Farmers	4	4	100	0	0	
Land owner	21	11	52.4	10	47.6	
Farmers and landowners	13	5	38.5	8	61.5	
Farm workers	8	3	37.5	5	62.5	
Working period						0.49
≤ 1 year	1	1	100	0	0	
1-5 years	3	2	66.7	1	33.3	
≥5 years	42	20	47.6	22	52.4	
Revenues earned from tobacco						0.841
<70%	12	6	50	6	50	
71-80%	12	7	58.3	5	41.7	
81-95%	8	3	37.5	5	62.5	
>96%	14	7	50	7	50	
Duration of work in a day						0.748
<8 hours	24	11	45.8	13	54.2	
8-≤12 hours	19	10	52.6	9	47.4	
12-18 hours	2	1	50	1	50	
>18 hours	1	1	100	0	0	
The intensity of work in the plantations for a year						0.358
<3 months	7	3	42.9	4	57.1	
3-7 months	29	13	44.8	16	55.2	
>7 months	10	7	70	3	30	
Physical work deployment						0.768
Physical Work	23	11	47.8	12	52.2	
No physical work	23	12	52.2	11	47.8	

Table 3. Relation of contact history with pesticide with cotinine.

Contact with pesticides	Negative Cotinine		Positive Cotinine		Sig-Pearson
	N	%	N	%	
Contact with pesticides in the past year					0.384
Yes	13	54.2	11	45.8	
No	10	45.5	12	54.5	
Frequency of pesticide usage					0.199
No usage	5	33.3	10	66.7	
1-8 days	9	52.9	8	47.2	
>8 days	9	62.9	5	30.8	
Using pesticides at current time					0.545
Yes	11	52.4	10	47.6	
No	12	45.8	13	54.2	
Mixing pesticides					0.500
Yes	10	52.6	9	47.4	
No	13	48.1	14	51.9	
Transporting pesticide tanks					0.383
Yes	9	45	11	55	
No	14	53.8	12	46.2	
Cleaning the equipment					1.000
Yes	16	50	16	50	
No	7	50	7	50	
Washing contaminated clothing					0.382
Yes	15	53.6	13	46.4	

No	8	44.4	10	55.6	
Enter the target area of pesticides					0.763
Yes	15	53.6	13	46.4	
No	8	44.4	10	55.6	
Contact with tobacco leaves containing pesticide residues					1.000
Yes	7	50	7	50	
No	16	50	16	50	
Contact with pesticides through during wet conditions clothing					1.000
Yes	9	52.9	8	47.1	
No	14	48.3	15	51.7	
Cumulative exposure to pesticides					0.498
No exposure	5	38.5	8	61.5	
≤ 9 years	4	50	4	50	
10-≤19 years	4	50	4	50	
20-≤29 years	8	72.7	3	27.3	
>30 years	2	33.3	4	66.7	

Table 4. Relationship of personal protective equipment usage with GTS.

Green Tobacco Sickness (GTS)	Use of PPE			Chi Square	p-value
	Never	Occasional	Always		
Long-sleeved clothes				5.433	0.143
Yes	1	8	14		
No	3	2	18		
Total	4	10	32		
Trousers				0.868	0.833
Yes	4	5	14		
No	5	3	15		
Total	9	8	29		
Apron				7.371	0.048
Yes	21	1	1		
No	16	6	1		
Total	37	7	2		
Raincoat				4.000	0.261
Yes	19	3	1		
No	16	6	1		
Total	35	9	2		
Gloves				6.904	0.049
Yes	19	4	0		
No	14	7	2		
Total	33	11	2		
Boots				7.394	0.060
Yes	11	2	10		
No	11	8	4		
Total	22	10	14		
Mask				2.087	0.555
Yes	11	8	4		
No	12	6	5		
Total	23	14	9		
Hat				0.419	0.936
Yes	5	4	14		
No	4	3	16		
Total	9	7	30		

4 DISCUSSION

4.1 Sociodemographic Characteristics

Tobacco processing in Jember District, East Java, is classified into 3 parties, which are:

- managed by the government through a traditional company owned by the people under the Agriculture and Plantation office;
- managed by State Owned Enterprises;
- managed by private parties (Perkebunan 2017).

There are 4 types of tobacco produced in general: Naa Oost Bawah Naungan (NO TBN), Naa Oost Tanam Awal (NO TA), Traditional Naa Oost, and Voor Oost (VO).

Workers involved in the tobacco industry are aged from 20 to over 50 years. The ages between 20 and 50 years are the most productive ages. Working in the tobacco industry does not require a certain age of workers. In this study, age was not associated with the incidence of Green Tobacco Sickness (GTS). These results are consistent with studies conducted by Arcury et al. (2016) and Lima et al. (2010) that age is not related to GTS.

Men generally work in tobacco fields to spray pesticides, transport crops, and hang the tobacco leaves out of the warehouse, while the women are in charge of picking tobacco, meronce (local term for arrange) tobacco leaves, and do the sorting of tobacco leaves. At the time of tobacco planting, men and women are both involved. In this study, gender was not related to GTS, in contrast to research conducted by Faria et al. (2014). The results there showed a higher proportion of women in tobacco farming than men. In tobacco farming in Jember, there is a division of responsibilities between male and female farmers with a ratio of 1 male: 2 females. This division mainly occurs during harvest time. The duty of women farmers is to pick tobacco leaves, while the male farmers transport the leaves from the field to the warehouse.

The majority of tobacco farmers in this study attended elementary school (45.6%). Some even never go to school so they cannot read or write. This means that the education level of tobacco farmers is generally at a low level. Working in tobacco plantations does not require a certain level of education. A low education level is also found in the population of tobacco farmers in Thailand (Saleeon et al., 2015b). Research conducted by Fassa et al. (2014) towards farmers in Brazil showed that tobacco farmers' education generally ranges from low to medium. 29 people among 46 (63.5%) had a smoking habit, while the habit of consuming alcohol is only done by 2 of 46 tobacco farmers (0.043%). In terms of ethnicity, all respondents in this study are Javanese.

4.2 Occupational History and Cotinine Exposure

Based on the ownership of tobacco land, the respondents in this study are generally farmers who are not land owners.

The average working period is more than 5 years. Working in tobacco land is generally done for generations. Those who currently work as tobacco farmers, also usually reside in the vicinity of tobacco land. In general, a working day is less than 8 hours. Tobacco planting begins in May and the harvesting is in October.

Most respondents rely solely on farming for income, and have no side jobs. Only 9 people in the sample (19.56%) have side jobs. Revenue originating from tobacco is about 70% to 80% of their primary income. That means that, if the tobacco harvest fails, it will have an impact on the farmers' income.

4.3 Pesticide Contact History with Green Tobacco Sickness

Pesticide contacts in the past year were conducted by 24 people among 46 farmers (52.1%). The frequency of contact with pesticides is carried out for one to eight days per month during a year. Before use, pesticides are mixed with water and stirred. Once it is put in the tank and ready to be sprayed, the tool is cleaned. Not all farmers perform all phases of pesticide use. Clothes worn when spraying pesticides are then immediately washed.

Other activities related to other pesticide contacts are: entering the areas contaminated with pesticides, and contact with spilled leaves. Research conducted by Kahl et al. (2016) shows that tobacco farmers are not only exposed to nicotine in tobacco, but also in combination with pesticide exposure. Pesticide exposure to tobacco farmers leads to illness such as acute to chronic disorders (Meucci et al., 2015). The risk of exposure to pesticides can increase if farmers do not use self-protective clothes (Riquinho & Hennington, 2012).

4.4 Use of Personal Protective Equipment and Green Tobacco Sickness

Personal protective equipment serves to prevent direct contact exposure hazards to the receiving individuals. Personal protective equipment that can be used by tobacco farmers include:

- long-sleeved shirts;
- trousers;
- apron;
- raincoat;
- gloves;
- masks;
- hats.

It can be seen from Table 4 above that the use of personal protective equipment that have long sleeves are used by 32 of 46 people (70%), and trousers are used by 29 of 46 people (63%).

The frequency of respondent based on the type of personal protective equipment never used is:

- Apron, 37 (80%) farmers never use one of these;
- Raincoat, 35 people (76%) never use one of these;
- Gloves, 33 people (71.7%) never use these;
- Boots, 22 people (47%) never use these;
- Mask, 23 people (50%) never use one of these.

You can also see from the table above that the use of gloves and aprons is associated with Green Tobacco Sickness (p=0,048 and p=0,049). Use of self-protective clothing may decrease the risk of GTS (Arcury et al., 2016).

5 CONCLUSIONS

There is a working period of more than 5 years, for 8 to 12 hours work in a day; working frequency in the tobacco area is from 3 to 7 months a year and a great physical effort is generally spent in processing tobacco. During tobacco growing activities, there is contact between farmers and pesticides.

The personal protective equipment that is always used by most farmers are long-sleeved shirts and trousers, while personal protective equipment that is never used by the majority of farmers include aprons, raincoats, gloves, booth shoes and masks. Not all use of personal protective equipment is related to the incidence of Green Tobacco Sickness (GTS) and it is only apron and glove usage that is correlated with Green Tobacco Sickness occurrence.

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