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OCCUPATIONAL HEALTH EXPOSURE AND SELF-REPORTED ILLNESSES AMONG TOBACCO FARMERS IN SUNA WEST SUB-COUNTY, MIGORI COUNTY, KENYA

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ABSTRACT

Background

Tobacco is a cash crop grown worldwide and it is a crop that is used for both economic and medicinal purposes. However, from the time the tobacco seed is planted to harvest, the health of farmers is at risk, particularly due to injury and illness

Objective

The aim of the study was to determine the duration of occupational health exposure among tobacco farmers, Identify self-reported illness among tobacco farmers and to determine the association of duration of occupational health exposure with the self-reported illnesses among tobacco farmers in Suna West Sub County.

Methodology

Descriptive cross-sectional study design was to determine the occupational health exposure and self-reported illnesses among 280 tobacco farmers .Purposive and random sampling methods were used to recruit the study participants. Semi-structuredquestionnaire was used in data collection. Both descriptive and inferential statistics were used for data analysis.

Results

A total of 280 farmers were interviewed, 58% are not using protective gear despite the fact that 77% are aware of the effect of exposure on their health. 55.4% are not using protective gear because they are too expensive. Of the major public health concern is that 11.2% of respondents dispose pesticide containers by throwing to the bush. Also, self-reported illnesses among tobacco farmers include headache (33.2%), difficulty in breathing (15.7%), Dizziness (12.9%) and other

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were less than 5%.The study further reports associated use of protective gear with headache among the tobacco farmers (P =0.015).

Conclusion

The study concludes that there is poor use of protective gear and the disposal of pesticide containers among farmers. Also, the findings suggest that some reported illnesses could be due to occupational health exposure among farmers.

Keywords: Exposure, Farmer, Occupation, Tobacco.

INTRODUCTION

Tobacco as a plant (*Nicotiana tabacum* or less widely used *Nicotiana rustica*) belongs to the Nightshade family indigenous to North and South America. Nightshade is any member of the genus Solanum. It is interesting to note that 'Shade' does not refer to the blockage of light, but actually descends from the German word 'schade' which means destruction or damage (attributed to toxic/fatal effects characteristics of many *Solanacea* species). It is commercially available in dried and cured forms and is often smoked inform of cigar, Cigarette; in smoking pipe or in water pipe. Tobacco can also be chewed "dipped" (placed between the cheeks and gums). For decades, the tobacco industry, in search of even more profits, has been encouraging countries and farmers to grow more tobacco. They have been promoting tobacco growing as a panacea, claiming that it will bring unparalleled prosperity to farmers, their Communities and their countries (WHO, 2011)

Tobacco is the major preventable cause of death in the world. It is a major risk factor for six of the top causes of death globally i.e. Ischemic heart disease, Cardiovascular diseases, lower respiratory infections, chronic obstructive pulmonary diseases, tuberculosis, trachea and bronchus and lung cancers (WHO 2012)

Almost 6 million people die from tobacco use each year, both from direct tobacco use and second-hand smoke. By 2020, this number will increase to 7.5 million, accounting for 10% of all deaths. Smoking is estimated to cause about 71% of lung cancer, 42% of chronic respiratory disease and nearly 10% of cardiovascular disease. The highest incidence of smoking among men is in lower-middle-income countries; for total population, smoking prevalence is highest among upper-middle-income countries (WHO 2010)

The hazards posed by Tobacco cultivation place tobacco workers at increased risks of injury and illness (TFI, 2008)

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Intensive pesticide use has been accompanied by increased concern about the potential acute and chronic effects of pesticides on health in general and on mental health in particular. (ANVISA, 2012)

Several studies have found association between pesticide poisoning and psychiatric problems, especially depression among farmers and farm workers (Beseler & Stallones, 2008)

Children and adults working with tobacco frequently suffer from green tobacco sickness (GTs) which is caused by dermal absorption of nicotine from contact with wet tobacco leaves. Common symptoms range from nausea, vomiting, and weakness, to headache and dizziness and may also include abdominal cramps and difficulty in breathing as well as fluctuation in blood pressure (Ballard T.et al 2008) Quite apart from the health impacts of smoking or chewing tobacco are the health hazards of working with tobacco. The nicotine inhaled from smoking or absorbed from chewing tobacco is also rapidly absorbed through the skin when harvesting tobacco, leading to a condition called 'green tobacco sickness' (GTS). GTS has been reported to occur in 1-10% of US tobacco workers. Younger workers are at higher risk, which means that the prevalence may be even higher in developing economies where children play a substantial role in harvesting and processing tobacco (WHO 2003).

In many tobacco growing countries, evidence indicates irreparable environmental damage from tobacco agriculture, particularly when associated with the deforestation necessary to increase farm land for tobacco growth and cure tobacco plants. The June 1995 Bellagio statement on tobacco and sustainable development concluded that, in the developing world, "tobacco poses a major challenge, not just to health, but also to environmental sustainability" (WHO, 2015) Tobacco growing requires heavy applications of fertilizers and pesticides like methyl dibromide and ethyl-bromide that harm workers and pollute drinking water. Children and adults are harmed by polluted drinking water from pesticide run-off. (WHO, 2008) Intensive pesticide use has been accompanied by increased concern about the potential acute and chronic effects of pesticides on health in general and on mental health in particular. In Brazil, a country with a large number of farm workers, this problem is of great relevance. Brazil has been the world's largest pesticide consumer since 2008. Consumption has increased 190% in the last decade, considerably above average global growth of 93% (ANVISA, 2012). By 2030, NCDs are projected to account for more than 75% of deaths worldwide.2 NCDs are not predominantly diseases of the affluent world: 80% occur in low and middle income Countries. Tobacco causes at least 16 different types of cancer. It is most closely associated with lung cancer, the world's leading cause of cancer deaths, accounting for nearly one in five cancer deaths. Tobacco use is known to cause several cancers of the throat and oral cavity, as well as cancer in diverse sites, such as the bladder, kidney, stomach and uterine cervix (WHO 2011).The tobacco leaf processing working

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environment can be very humid owing to the use of curing barns. Together with the high concentration of tobacco dust arising from storing the leaves in closed barns, this is conducive to the development of microbes, gram-negative bacteria and diverse kinds of fungi (mesophilic, thermo tolerant, thermophilic actinomycetic, among others) (Reiman et al, 2000).Wearing clothing that becomes wet from contact with wet tobacco, wearing short sleeved shirt, not using gloves, or rain gear, not changing wet clothes, harvesting for more than 7 hours are some of the risk factors for green Tobacco Sickness. (Ballard.T*et al*, 1995). In one survey of tobacco farmers in Brazil found that 48% of family members suffered pesticides related health problems. There is also growing concern about the neuropsychiatric effects among tobacco workers exposed to Organophosphate pesticides, with preliminary studies indicating. Increased rate of depression and suicides in Brazil among Tobacco farmers (WHO, 2012).The devastating socio-economic impact of tobacco has recently been examined in terms of its relationship to the spread of NCDs. WHO estimates that by 2020, 44 million people will die of NCDs globally (WHO, 2011)

MATERIALS AND METHODS

A cross sectional study design was used in this study. Both quantitative and qualitative approaches were used and data collected using semi-structured questionnaire. The variables of interests were duration of occupational health exposure and self-reported illnesses. The population comprised of 1023 registered tobacco farmers in Suna west Sub County. All registered farmers who have been practicing tobacco cultivation and has not moved out of the study area were included. Proportionate to sample size method of sample size determination was used to determine the number of respondents in each administrative ward from a total of 1023 registered tobacco farmers in the sub county. This was determined by using, the Cochran (1963:75) equation. Purposive sampling method was used to recruit study participants from the sub-county and then simple random sampling to select registered tobacco farmers as per each ward in the sub county according to the proportions. The study was approved by the Ethics Committee of the University of Eastern Africa, Baraton. The basic principles of research including minimizing risk of harm, Obtaining informed consent, avoiding deceptive practices and providing the right to withdraw were applied to ensure integrity

of the study. Semi-structured questionnaire was used to collect the study variables during the interview. All completed questionnaires were verified for accuracy and consistency. All sorting, cleaning and analyses were done using SPSS (Version 21). For the objective 1 and 2, descriptive statistics was used to analyze the collected data and the results summarized in the form of frequencies, tables and graphs. For the objective 3, Chi-square was used with the degree of freedom of 1 and any value < 0.05 was considered statistically significant.

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RESULTS

Table 4.1: Demographic profile of respondents

Distribution	Frequency	Percent
Gender of respondents		
Male	201	72%
Female	79	28%
Total	280	100%
Age of respondents		
≤20 Years	2	1%
20-29 Years	48	17%
30-39 Years	95	34%
40-49 Years	70	25%
50-59 Years	53	19%
60 and above	12	4%
Total	**280**	**100%**
Education level of respondents		
none	13	5%
primary	184	66%
secondary	80	28%
tertiary	3	1%
Total	**280**	**100%**
Marital status of respondents		

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Single	13	5%
Married	231	83%
Widowed	32	11%
separated	4	1.4%
Total	**280**	**100%**
Occupation of respondents		
Farming only	209	75%
Farming and business	62	22%
Formal employment and farming	9	3%
Total	**280**	**100%**

A total of 280 tobacco farmers who have been practicing tobacco cultivation for not less than two years were interviewed. Majority of respondent were males 72% (n=201) while female respondents were 28% (n=79). The respondents were also distributed within the four administrative wards,32% (n=90) from Suna Wasimbete Ward, followed by Wiga 30% (n=30), Wasweta I 27% (n=76) and Oruba Ragana 10% (n=29). Majority of respondents 83% (n=231) were married, 11%, (n=32) widowed, 5% (n=13) single while 1% (n=4) separated from their unions. Majority of respondents 66% (n=184) had primary level of education, 28% (n=80) secondary education while the least at 1% (n=3) had tertiary level of education.5% (n=13) of the respondents had no education at all. Majority of respondents 75% (n=109) did farming only as their occupation, 22 % (n=62) practiced farming but also had other businesses to complement their income, while 3% (n=9) of the respondents were in formal employment and together with farming.

Occupational health exposure

Majority of farmers 49% (n=138) have been in tobacco farming for 2 to 5 years, 31% (n=88) have been practicing tobacco farming for 5 to 10 years while 10% wq2 (n=27) have practiced farming for more than 10 years. Majority 44% (n=177) did not use any protective gear were males while 16% (n=45) of females also never used any protection while working in the farms. only 24% (n=67) of the males who were interviewed used protective clothing while 8% (n=23)

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used protective clothing,3.% of the respondents did not understand the importance of using any protective gear. 6.8% (n=19) of the respondents said they employed someone to do the work on their behalf. The majority 55.4% (n=155) said the protective gears were available but

too expensive, 34.6% (n=98) said the protective gears were not available while only 10% (n=27) said the gears were available and affordable. Majority of respondents 91% (n=254) think the protective gears are too expensive and therefore cannot afford using the protective clothing, at the same time 9% (n=24) of the respondents feel they are heavy and uncomfortable to work in them. 1 % (n=2) of respondents still don't see the need of protecting themselves from the effects. Majority 47% (n=131) of respondents who happened to be males said they would continue working without wearing any protective clothing while 16% (n=44) who were females said they would continue working without protection. Majority 58% (n=162) of the respondents disposed of the empty chemical containers through burning while 28% (n=79) of the respondents disposed of the containers by burying. 11 % (n=31) of the respondents threw the empty containers in to the bush while 3% (n=8) kept the containers in their houses. Majority 83.5% (n=234) of the farmers located tobacco seedling nursery next to water body while 12% (n=33) of the nurseries were located in farms. 3.5% (n=10) were located in the homestead while 1% purchased the seedlings from the tobacco companies .Majority 65.71% (n=184) stored the cured tobacco leaves in the store while 33.57% (n=94) of the respondents kept the cured tobacco leaves in the residential house where they also lived with their families. 0.7 % (n=2) stored the cured tobacco leaves at the farm

Table 2: Duration of tobacco farming by respondents

Duration of tobacco farming	Frequency	Percent
1 to 2 years	27	10%
Over 2 to 5years	138	49%
Over 5 to 10 years	88	31%
Over 10 years	27	10%
Total	280	100%

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Table 3: Use of protective gear by gender

Protection from chemicals by gender					
GENDER	Don't protect	Use Protective clothing	Don't know	Employ somebody to spray	Total
Male	117(42%)	67(24%)	4(1.4%)	13(5%)	201(72%)
Female	45(16%)	23(8%)	5(1.8%)	6(2%)	79(28%)
Total	162(58%)	90(32%)	9(3.2%)	19(6.8%)	280(100%)

Table 4.7: Disposal of used chemical containers

Disposal method	frequency	Percentage
Burning	162	58%
Burying	79	28%
Keep in the house	8	3%
Throw in the bush	31	11%
Total	280	100%

Knowledge on risk factors of exposure to tobacco and chemicals

77.2% (n=216) of the respondents are aware of the health effects of tobacco and pesticides while 22.8% (n=64) were ignorant of the effects of the chemicals and pesticides while working in tobacco farms. Majority 70% (n=194of respondents had knowledge that tobacco and pesticides had health effects on family members and neighbors) 16% (n=47) did not have any knowledge 14% (n=38) were not sure if tobacco and pesticides had any health effects at all.

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Table 4.8: Awareness of health effects of tobacco and pesticides on family and neighbors

Response	Frequency	Percent
Yes	195	70%
Don't Know	47	16%
Not Sure	38	14%
Total	280	100%

Self reported illnesses

The most self-reported illnesses included; headache 33.2% (n=93) difficulty in breathing 15.7% (n=44), and dizziness 12.9 % (n=36) and poor appetite 9.3 % (n=26). About 21.4% reported no symptoms and other symptoms such as chills; increased sweating, high heart rate, and increased salivation were below 5%.The three most commonly self-reported illnesses (>10%) were headache, difficulty in breathing and dizziness (Figure 4.3). Those who suffered headache, 15% (n=22) did use protective gear whereas 44% (n=65) did not use, the difference is statistically significant with P value = 0.015 (Chi-square = 0.036) (Table 4.10) However, for the breathing difficulty, 16% (n=23) did use protective gear whereas 17% (n=25) did not use, the difference is not statistically significant with P value = 0.93 (Chi-square = 0.009) Those who experienced dizziness, 11.7% (n=19) did not use any protective gear whereas 5.5% (n=9) used protective gear. This is not statistically significant with P value= 0.61 (chi square = 0.258)

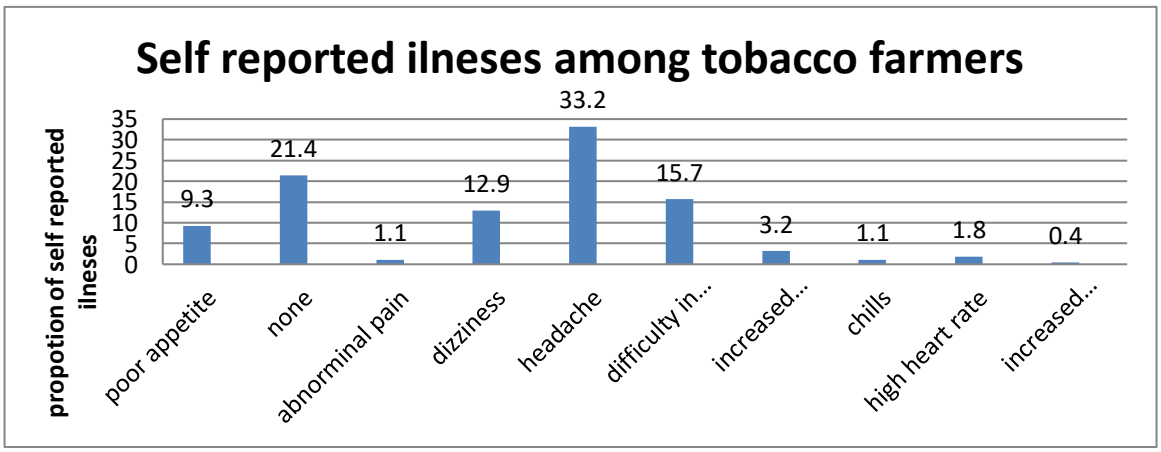

Figure. 1: Self-reported illness among tobacco farmers

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Table 4.9: Self-reported illnesses compared to protective gear usage

Self-reported illnesses	Use of protective gear		P Value
	Yes	No	
Headache	22(13.5%)	65(39.9%)	0.015
Difficulty in breathing	23(14.1%)	25(15.3%)	0.93
Dizziness	9(5.5%)	19(11.7%)	0.61

DISCUSSIONS

The study revealed that majority of farmers have practiced tobacco farming for between 2 years and ten years, and high percentage 66% had attained primary level of education and another 4% having no education background at all, making it very hard to comprehend the written health precaution or warnings on the chemical containers. The study also revealed that a high percentage 61.2% did not use any protective gear at all while working on their farms leading to extreme exposure to the chemicals. These results concurred with study in the US on Green Tobacco Sickness (GTS) (WHO 2003). The study also revealed that most farmers placed tobacco seedling nurseries close to water sources in order to give them easy time when watering the tobacco seedling, this lead to pollution and contamination of the water sources with chemicals from spraying and fertilizers being washes in to the water. Many farmers did not have adequate storage areas for the raw harvested tobacco leaves and cured tobacco thereby having the commodities being stored in the same residential house where they lived with their families. The study revealed that Poor disposal of used chemical containers by many farmers led to exposure to chemicals hence making tobacco farming as an occupation becomes a risk factor to many health conditions due to exposure to the chemicals, dust, Raw nicotine, rain, sunshine and physical injuries among tobacco farmers and their family members.

The self reported illnesses among tobacco farmers include headache (33.2%), difficulty in breathing (15.7%) and Dizziness (12.9%). Others illnesses reported by farmers include poor appetite (9.3%), increased sweating (3.2%), High heart rate (1.8%) abdominal pain and body chills both at (1.1%) and increased salivation (0.4%) The farmers confirmed having experienced one or more of these conditions during working hours and after working in their farms .According to the human watch report 2018 children working on tobacco farms in Indonesia

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reported having experienced nausea, vomiting, headache and dizziness, symptoms associated with acute nicotine poisoning the medical reports from the ministry of health in Migori county where cases of respiratory conditions and headache were reported during the tobacco planting season. This coincidence confirms that the reported illnesses by farmers during the interview are related to tobacco farming.

The study disclosed that 44% the farmers who did not use any protective equipment suffered headache and difficulty in breathing (17%) while those who used protective equipment only 15% and 16% experienced symptoms of headache and difficulty in breathing respectively. According to (ANVISTA, 2012), A huge number of Brazilian farm workers are exposed to pesticides at work in a frequent and prolonged manner, often without any protection. According to (Teh-Wei Hu and Anita H. Lee, 2015) tobacco farmers have little knowledge of toxicity of the chemicals used in tobacco farms and do not know the right way to store, handle and use them. Furthermore, the health of the villagers including non tobacco workers can be affected due to improper disposal of containers and runoff of pesticides and other chemicals in to water sources. Deliberate or accidental poisoning of people or even animals has been reported. The study findings revealed that those who experienced any of the symptoms related to tobacco farming were 151 ($P<0.00$) While those without symptoms 129 ($p>0.002$). This concurs with study by human right watch in Indonesia-'children working on tobacco farms in Indonesia are exposed to nicotine, toxic pesticides, and extreme heat (Human Right Watch 2018)

The study findings indicated that majority of farmers 72%, $p>0.488$ did not have any knowledge on the health effects associated with tobacco farming as compared to 28% P-0.777 who had some knowledge. Poor waste disposal methods of used chemical containers by farmers was noted from the study with 57.6%) burning in the open, 27.4% burying underground, 11.2%) throwing the containers in the bush and 2.9%) keeping them in the house where they live together with their families. This exposed them to these chemicals either directly or indirectly since contamination of water and food is most likely to occur, the chemical spillage may occur hence direct contact with the skin. The unpleasant smell and irritation to the skin, the eyes and upper respiratory tract may occur.

CONCLUSION

This study concludes low use of protective gear among the tobacco farmers. Majority considers the protective gears to be too expensive. Also, there is poor disposal of chemical containers. The findings suggests that it is not only farmers who are exposed, the general population are also exposed to risks, The study further shows that the most self-reported illness are headache, breathing difficulty, dizziness and loss of appetite. The findings suggesting that farmers are suffering from the same illness and therefore there is a need to associate these conditions with

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the occupational health exposure. The study associated headache with the occupational health exposure, this is a preliminary finding that needs further investigations.

The study recommends implementation of an extensive public health education and training programme in tobacco farming communities to promote awareness of health risks associated with tobacco farming and the mitigation measures, this study further recommend enforcement of all the existing laws and regulations related to tobacco production ,sale and use and expansion of research and regular data collection to inform policies and procedures to address occupational health and safety of workers.

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Declaration: The authors declare that they have no competing interests.

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