

EVIDENCE OF GREEN TOBACCO SICKNESS AND ASSESSMENT OF QUALITY OF LIFE IN FARMERS IN PUNJAB PAKISTAN

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Abstract

Introduction: The tobacco production generates direct and indirect employment for the than 4.9 million people in Pakistan.³ This is reasons that the farmers do not want to quit tobacco production in spite of manual labour, hard season for growth, removal of shoots and flowers manually.

Methodology: It is descriptive, cross-sectional, quantitative study conducted in rural Punjab in order to evaluate green tobacco sickness (GTS) in the farmers. We also want to evaluate the effects of these decease on the farmers. Data has been collected from the farmers during the harvest season. Different socio demographic variables including lifestyle, health, intoxication, pesticide/nicotine exposure has been collected from the farmers.

Results: Regarding lifestyle habits and health conditions, only a minority of participants reported chronic diseases. Specifically, 4 (12.90%) tobacco farmers reported depression, 1 (3.23%) reported both depression and obesity, and 1 reported asthma. Most of the participants did not consume alcohol, and only 2 individuals reported being smokers, consuming 10 to 20 cigarettes per day. **Discussion:** 13 (41.94%) of the 31 tobacco farmers in the study used homemade measures to prevent or alleviate symptoms. These included boldo tea (3 farmers; 9.68%), mint tea (1; 3.23%), soft drinks (2; 6.45%), cachaça (2; 6.45%), water (2; 6.45%), and fruit salt drinks (2; 6.45%).

Conclusion: The study concluded that the tobacco harvesting negatively effects the health, physical well being and intoxication to the farmers. It is the need of the time that the farmer should be educated in terms of intoxication of nicotine and pesticide. They should be made aware of the benefits of PPE in order to improve the quality of life.

INTRODUCTION:

Tobacco is known to be a cash crop which is grown all over Pakistan specially in the Punjab province. Pakistan is 7th largest tobacco producer in the world.¹ The KPK province produces high quality tobacco which is very famous in the world. There are many process factories who convert tobacco to iterates in under different brands and labels.²

The tobacco production generates direct and indirect employment for the than 4.9 million people in Pakistan.³ This is reasons that the farmers do not want to quit tobacco production in spite of manual labour, hard season for growth, removal of shoots and flowers manually.⁴ Tobacco cultivation has many components right from preparation of seedlings. As seedlings grow, they are transplanted. During sprouting (removal of shoots and flowers) are carried out, which require manual Labor. Following harvest, leaves undergo a curing process. Throughout planting and seedling growth, pesticides are applied manually by the farmer.⁵

In addition to pesticide exposure, tobacco farmers are continuously exposed to nicotine present in the leaves, especially during harvest, when direct contact with green and often damp leaves occurs. Nicotine can be absorbed through the skin, causing acute poisoning known as Green Tobacco Sickness (GTS).³ It manifests as nausea, vomiting, dizziness, headache, diarrhea, paleness, salivation, chills, and changes in blood pressure and heart rate.

Previous studies have shown a close relationship between tobacco farming and adverse health outcomes, which negatively affect the physical and psychological well-being of farmers and their families.⁵ Consequently, assessing the quality of life (QoL) of tobacco farmers has become increasingly relevant, particularly to understand the impact of acute nicotine exposure and pesticide contact.⁶

Therefore, the objective of this study was to identify sociodemographic data, lifestyle habits, health conditions, and information regarding exposure to pesticides and/or nicotine among tobacco farmers (via the GTS questionnaire), as well as to evaluate their quality of life using the

WHOQOL-Brief instrument, considering physical, psychological, social, and environmental domains.

Aim of the study:

The aim of the study is to identify the sign and symptoms of green tobacco sickness (GTS) in the farmers. We also want to evaluate the quality of life of farmer effected due to green tobacco sickness (GTS).

Methodology:

It is descriptive, cross-sectional, quantitative study conducted in rural Punjab in order to evaluate green tobacco sickness (GTS) in the farmers. We also want to evaluate the effects of these decease on the farmers.

Data has been collected from the farmers during the harvest season. Different socio demographic variables including lifestyle, health, intoxication, pesticide/nicotine exposure has been collected from the farmers.

This study has gotten approval from the ethical review board and IRB of the University of Lahore, Pakistan. For the purpose of evaluation of Quality of life was assessed using the WHOQOL-Brief instrument.

Inclusion Criteria: Farmers 18 years and above and are working for the tobacco harvesting.

Exclusion Criteria: 18 years and above and are not working for the tobacco harvesting.

Both questionnaires were self-administered by the participants. In accordance with the WHOQOL-Brief guidelines, participants were instructed to respond with reference to the preceding two weeks.

The WHOQOL-Brief is a generic, structured, and standardized instrument developed by the World Health Organization to assess quality of life. It consists of 26 closed-ended questions: two general questions on overall quality of life and 24 questions addressing four domains, each with specific facets:

i) Physical domain: includes pain and discomfort, energy and fatigue, sleep and rest, activities of daily living, dependence on medications and treatments, and work capacity.

ii) psychological domain: covers positive feelings,

thinking, learning, memory and concentration, self-esteem, body image and appearance, negative feelings, spirituality, religiosity, and personal beliefs.

iii) social relationships domain: this domain contains social, personal and sexual relationship.

iv) Environmental domain: This domain evaluates physical security and safety, home environment, financial resources, access to health and social care (availability and quality), opportunities to acquire new information and skills, participation in recreation and leisure activities, physical environment (pollution, noise, traffic, climate), and transportation.

The WHOQOL-Brief provides a universal accepted tools process the quality of life of farmers working in the harvest of tobacco.

Each item of the WHOQOL-Brief is rated using a 5-point Likert scale, which assesses: intensity ("not at all" to "extremely"), capacity ("not at all" to "completely"), frequency ("never" to "always"), and evaluation ("very dissatisfied" to "very satisfied"; "very bad" to "very good").

Statistical analysis: Sociodemographic data, lifestyle habits, health conditions, and information on acute pesticide and/or nicotine

poisoning (DFVT) of the tobacco farmers were analysed using descriptive statistics, including absolute numbers and percentages, means, and standard deviations. To calculate the final scores for each domain and the overall quality of life score of the WHOQOL-Brief instrument, the Excel-based tool developed by Pedroso et al. (2020) was used.⁷

Results:

The questionnaires were administered to 35 tobacco farmers, of which 4 (11.42%) were excluded due to incomplete responses. The Hafizabad District is situated at an altitude of 867 meters. Its geographic coordinates are 25° 26' 3" south latitude and 49° 59' 60" west longitude. The municipality covers an area of 1,470.1 km² and had a population of 1,532,123 inhabitants according to the last census, with a population density of 22022 inhabitants per km².

It is noteworthy that District Hafizabad ranks fourth in tobacco production in the Punjab Province. Furthermore, tobacco production in Paraná has increased over the years, with the state's share rising from 11% to approximately 21.4% during the 2024/25 harvest.

Table 1 – Sociodemographic characteristics, lifestyle habits, and health conditions of the tobacco farmers

Variables	Category	n	%
Sex	Female	13	41.94
	Male	18	58.06
Age	<40 years	15	48.39
	40–50 years	10	32.26
	>50 years	6	19.35
Education	Fundamental Incomplete	14	45.16
	Fundamental Complete	6	19.35
	Secondary Incomplete	1	3.23
	Secondary Complete	7	22.58
	Higher Incomplete	2	6.45
Number of people living with	Higher Complete	1	3.23
	Lives alone	1	3.23
	Up to 3 people	21	67.74
Presence of chronic illness	More than 3 people	9	29.03
	Yes	6	19.35
	No	22	70.97
Smoker	Not reported	3	9.68
	Yes	2	6.45

	No	29	93.55
Alcohol consumption	Never	12	38.71
	1-2 times/month	9	29.03
	1-2 times/week	7	22.58
	Daily	3	9.68

The average age of the tobacco farmers was 39.90 ± 11.92 years, ranging from 20 to 66 years, with the majority being male, having incomplete primary education, and living with up to three people (Table 1). The sociodemographic characteristics observed in this study were similar to those reported by Silva et al., who found that most tobacco producers are men, under 40 years of age, and with incomplete primary education. Regarding lifestyle habits and health conditions, only a minority of participants reported chronic

diseases. Specifically, 4 (12.90%) tobacco farmers reported depression, 1 (3.23%) reported both depression and obesity, and 1 reported asthma. Most of the participants did not consume alcohol, and only 2 individuals reported being smokers, consuming 10 to 20 cigarettes per day (Table 1). Although Silva et al. reported that 60% of producers in their study were non-smokers, in the present study the rate of non-smokers was notably higher, at 93.55%.

Table 2 – Data on the intoxication acute to the pesticides and/or the nicotine (DFVT)

Variables	Tobacco farmers (n=31)	
	N	%
Time of Work in Cultivation		
<10 years	7	22.58
10 – 30 years	12	38.71
>30 years	12	38.71
Activities node Cultivation		
Sowing, Sprout, Harvest, Planting, Application and Classification	20	64.51
Sowing, Sprout, Harvest, Planting and Classification	3	9.68
Sowing, Sprout, Harvest, Planting and Application	3	9.68
Sowing, Harvest, Classification	1	3.23
Sowing, Harvest, Planting	1	3.23
Sowing, Planting, Classification	1	3.23
Harvest, Planting, Classification	1	3.23
Harvest, Classification	1	3.23
Symptoms after the Harvest		
Nausea	10	32.26
Dizziness	13	41.93
Pain of head	12	38.71
Vomit	7	22.58
Diarrhea	3	9.68
Salivation	4	12.90
Weakness	12	38.71
Discomfort abdominal	11	35.48
No, it presents symptom	6	19.35

Use of PPE		
Yes	24	77.42
No	0	0
To the times	7	22.58
PPE used		
Pants, shirt and gloves	18	58.06
Pants and Shirt and Gloves Shirt	7	22.58
	1	3.23
	1	3.23
Measurement homemade to prevent your symptoms		
Yes	13	41.94
No	18	58.06

Table 3 – Characteristics of the Domains and Facets of Tobacco Farmers – WHOQOL-BREIF

Features	%	Average	Standard deviation
Physical	68.45		
Pain and discomfort	64.52		
Energy and fatigue	67.74		
Sleep and rest	54.03	14.95	1.91
Mobility	82.26		
Activities of life daily	73.39		
Dependence of medication or treatment	67.50		
Capacity of treatment	71.67		
Psychological	66.85		
Feelings positive	55.65		
Think, learn, memory and concentration	51.61		
Self-esteem	75.86	14.70	1.98
Image bodily and appearance	73.39		
Feelings negatives	72.58		
Spirituality, religiosity and beliefs personal.	72.58		
Relations social	73.12		
Relations personal	75.00	15.70	2.06
Support and support	69.17		
Activity sexual	75.83		
Environment	59.30		
Security physical and protection	61.29		
Environment of home	77.42		
Resources financial	48.39	13.49	2.15
Care health	42.74		
New information and skills	60.00		
Recreation and leisure	47.58		
Environment physical	62.90		
Self-assessment from the quality of life	73.39	15.74	2.24
QV Total	66.24	14.60	1.67

Psychological Domain

- Key affected facets:
- Thinking, learning, memory, and concentration
- Positive feelings
- Possible causes:
- Physical effort required in cultivation
- Pressure to produce high-quality tobacco to meet market expectations
- Mental and behavioural stressors, including anxiety, sleep problems, stress, and depressive episodes

Physical Domain

- Most affected facet: Sleep and rest
- Possible causes:
- High workload (sometimes up to 24 hours/day)
- Constant worry about tobacco production and market demands
- DFVT symptoms potentially contributing to insomnia

Self-Assessment vs. Total QoL

- Observation: Self-assessment of quality of life was higher than the overall total QoL score.
- Interpretation:
- Self-assessment reflects the individual's personal perception of their quality of life
- Total QoL reflects the objective evaluation based on responses to all WHOQOL-BREF items
- This difference suggests that despite occupational challenges and health risks, tobacco farmers may perceive their own life quality more positively than what is indicated by standardized measures.

Discussion:

The majority of the tobacco farmers interviewed reported having more than 10 years of experience in the activity and participating in all stages of tobacco cultivation (Table 2), a finding consistent with the study conducted with tobacco farmers in the rural area District Hafizabad, Punjab Province, Pakistan study was similar to those reported by Silva et al 2013.⁸

The most frequently reported symptoms in the

present study were nausea, dizziness, headache, weakness, and abdominal discomfort (Table 2), similar to those observed in previous studies conducted in the State of Alagoas in 2010 and in Rio Grande do Sul in 2014 and 2016. The dermal absorption of nicotine into the blood stream causes adverse effect in the farmers.⁹

The known toxicity of nicotine nausea and abdominal cramps, increased temperatures and exertion can further increase nicotine absorption due to enhanced sweating, heart rate, and vasodilation.¹⁰

Nicotine is water soluble and is exposed on the surface on the leaves. As the farmer passes by a touch plant, the nicotine immediately transfer to the blood stream of the farmer.¹¹

Riquinho and Henington (2014), carried out a study in the harvesting of tobacco. They observed that there is greater absorption of nicotine during the rainy season and in the morning which causes dizziness, nausea, vomiting, and even fainting.¹²

The effect of nicotine on the central nerves system is well known. Nicotine also effects the gastrointestinal track resulting in abdominal cramps, nausea and vomiting. The body feels high temperature and excursion. Sweating, increase heart rate and vasodilation are common symptoms in the farmers. Therefore, the symptoms reported in this study are consistent with DFVT, which is one of the primary consequences of exposure to nicotine, the main alkaloid of *Nicotiana tabacum*.¹³

DFVT is considered an occupational disease, with signs and symptoms manifesting mainly during two stages of tobacco production: the harvest and the curing/drying of leaves. Its existence was first suggested by Ramzi in 1713, based on reports of headaches and abdominal discomfort among tobacco farmers in Italy, and it was formally described as an occupational disease in Florida, United States, in the 1970s during a localized outbreak. Reports of DFVT among tobacco farmers have become increasingly frequent, particularly in Pakistan, the second-largest tobacco producer in the world. Occurrences have been documented in District Hafizabad-Pakistan.¹⁴

Since the symptoms related to Green Tobacco

Sickness (DFVT) and pesticide poisoning are similar and non-specific, there has been considerable discussion regarding whether DFVT is truly triggered by acute nicotine exposure or if the observed signs are due to pesticide poisoning. Oliveira et al. (2010) reported an increase in cases of acute poisoning with symptoms consistent with DFVT between August and September, corresponding to the tobacco leaf harvest period in the Northeast region of Pakistan, when pesticide application is minimal.

Park and colleagues (2018) conducted a study in Korea on the tobacco harvesting. They found out that the farmers did not use PPE cloths and other safety equipment. Due to the reason, there were many reported case of pesticide and nicotine poisoning and basic centers.¹⁵

Various types of pesticides are used in tobacco cultivation to optimize production, including sprout inhibitors, herbicides, insecticides, and fungicides. These products are classified according to toxicity as Class IV (slightly toxic), Class III (moderately toxic), and Class II (highly toxic). Although Class I (extremely toxic) pesticides are not used, all pesticides present potential health risks due to their inherent toxicity.¹⁵

The importance of using Personal Protective Equipment (PPE) during the harvest is therefore emphasized. In the present study, most participants reported using PPE (77.42%), with 58.06% indicating that they used pants, a shirt, and gloves (Table 2). However, participants did not clarify whether the PPE consisted of ordinary cotton clothing or the complete standard outfit of waterproof pants, a long-sleeved waterproof shirt, and gloves. Evidence demonstrates that the complete standard attire significantly reduces nicotine absorption. Nevertheless, Riquinho and Hennington (2014) reported that standard waterproof clothing is rarely used, primarily due to the heat and discomfort it causes during sun exposure.¹⁶

Table 2 also shows that 13 (41.94%) of the 31 tobacco farmers in the study used homemade measures to prevent or alleviate symptoms. These included boldo tea (3 farmers; 9.68%), mint tea (1; 3.23%), soft drinks (2; 6.45%), cachaça (2;

6.45%), water (2; 6.45%), and fruit salt drinks (2; 6.45%). These findings align with a 2014 study, which reported rest, hydration through teas, soft drinks, and milk as common preventive or symptom-relief measures. The same study also noted that some farmers smoked before harvesting as a strategy to tolerate symptoms; however, due to the known health risks associated with smoking, this practice is not recommended.¹⁷

As presented in Table 3, which describes the WHOQOL-brief results by domains, facets, and total quality of life score, the tobacco farmers demonstrated good averages across all domains. Specifically, the physical domain scored 68.45%, the psychological domain 66.85%, social relationships 73.12%, and environment 59.30%, indicating an overall favourable perception of quality of life despite occupational risks.¹⁸

The environmental domain presented the lowest satisfaction index among the WHOQOL-brief results. The facets contributing most to this lower score were "Health Care," "Recreation and Leisure," and "Financial Resources."¹⁹

The facet "Health Care" highlights the strong influence of tobacco production on the health of farmers, which is directly affected by Green Tobacco Sickness (DFVT), pesticide exposure, and the physical demands of manual Labor.

Sousa and colleagues (2020) carried out a study in Paraíba to check the PPE used by the farmers during harvesting. It was observed that the farmers are preferring food, basic health services employment as the quality of life rather than to use PPE for their personal protection from the Nicotine and pesticide poisoning. They also consider the children education, dignified living and good sanitary conditions as quality of life.²⁰

Trojan et al. (2009) conducted a study on the farmers who work more than 12 hours a day in the tobacco harvesting season. The study concluded that the farmers do not have specific time for rest or leisure in their life.²¹

"Financial Resources" are important part of farmers life. They tobacco production provides them a good financial resource to survive to himself as well as for the family. The farmer is very sure that his crop would be sold according to

his expectation that will boost his life.²²
Based upon the discussion, it is crystal clear that the farmer is aware of the hastes of nicotine and pesticide poisoning. They will continue to grow tobacco in order to meet with the daily necessities of life in spite of risk of intoxication due to pesticide or nicotine.²³

Conclusion:

This study concluded that green tobacco sickness disease is most common among the tobacco farmers. The farmers knows that nicotine is water soluble and can be absorbed into the blood stream causing multiple effects that may endanger his life.

Tobacco is a cash crop in Pakistan and is sold at a high price in the market. The whole harvesting is done manually. Most of the family is involved in harvesting of the crop to get the financial benefits. The farmers do not have any other rich crop or sources to adopted any other crop cultivation program.

The use of PPE is not important for the farmers, as they consider, a hindrance to their job in mobility and harvesting. They know that PPE are important for safety but they do not use them due to many reasons.

The study concluded that the tobacco harvesting negatively effects the health, physical wellbeing

and intoxication to the farmers. It is the need of the time that the farmer should be educated in terms of intoxication of nicotine and pesticide. They should be made aware of the benefits of PPE in order to improve the quality of life.

Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the University of Lahore, Lahore Pakistan.

Informed Consent Statement

Written informed consent was obtained from all participants involved in the study.

Data Availability Statement

The raw data supporting the conclusions of this article will be made available by the authors on request. The data are not publicly available due to privacy and ethical reasons.

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Conflicts of Interest

The authors declare no conflicts of interest.

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