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ORIGINAL ARTICLE

Assessing knowledge, attitudes, and practices of tobacco cultivators regarding their health hazards: a study on Kushtia district

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Abstract

Objective: Tobacco farming is common in Bangladesh, particularly in Kushtia district, but it's harmful to farmers' health. This study looks at what tobacco farmers know, think, and do about their health. The findings will help create targeted interventions to improve their well-being.

Methods: A survey was conducted among 300 tobacco farmers in Kushtia Sadar, Mirpur, and Daulatpur upazilas, including 214 males (71.3%) and 86 females (28.7%). Data were collected using a structured questionnaire covering demographics, knowledge, attitudes, and practices. Descriptive statistics and Pearson correlation analysis were performed using SPSS version 27 and Microsoft Excel version 19.

Results: The study found that 71.3% of tobacco farmers were men, and 38% had no formal education. Health problems were common, with 33% reporting allergies, 32% suffering from coughs and breathing issues, and 24% experiencing headaches. While 73.3% recognized the harmful effects of pesticides, only 59.3% were aware of the risks of handling tobacco leaves, and 40.7% acknowledged serious health risks from tobacco farming. Correlation analysis showed education level positively correlates with reporting physical health problems ($r = 0.181$, $p < 0.01$). Physical health problems positively correlated with acknowledging pesticide risks ($r = 0.230$, $p < 0.01$). However, a weak negative correlation ($r = -0.076$, $p < 0.01$) exists between physical health issues and concern about long-term effects.

Conclusion: In summary, this study highlights the need for targeted intervention to enhance knowledge and safer farming techniques, while also advocating for measures to protect farmers' health and promote sustainable practices in the tobacco sector.

Keywords: Knowledge, Tobacco Cultivators, Health Hazards

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INTRODUCTION

Tobacco, scientifically known as Nicotiana Tabacum, is a botanical species that is cultivated for its leaves, which undergo a drying process to be transformed into various tobacco products such as cigarettes, pipe tobacco, cigars, chewing tobacco, and snuff. The health risks associated with tobacco usage are widely recognized.[1] Tobacco production is rising globally, particularly in developing countries. Thus, the features of tobacco farm workers are changing and their job-related health risks are of great relevance to public health.[2] Bangladesh, one of the developing countries, consumes a significant portion of tobacco in the world. Tobacco in Bangladesh is being cultivated from the ancient time however nowadays commercial tobacco farming is under a debate.[3] Tobacco is considered to be a non-nutritive substance, and the utilization of tobacco as a raw material in any industry is deemed unsuitable for the health of humans.[4] Tobacco cultivation in Bangladesh accounts for less than 0.5% of agricultural employment, indicating that it is a labor-intensive crop.[5] Despite the fact that tobacco cultivation has adverse effects on health, the environment, and the economy, many producers will continue to cultivate tobacco across the globe.[6] Tobacco farmers constitute a specific demographic group characterized by their occupation, which renders them susceptible to occupational illnesses. Occupational diseases arise due to the interplay between workers acting as hosts and their work or the work environment. Long-term exposure to intricate and multifactorial dangers in the context of tobacco growing is likely to result in adverse health outcomes.[7] The presence of nicotine in tobacco cultivation poses a health risk, as it becomes water-soluble and dissipates in condensate water on tobacco leaves during early morning atmospheric moisture condensation.[8] The tobacco business says that growing tobacco can bring in money for the government and give farmers a good way to make a living. Truly, growing tobacco often causes issues with money, mistreatment of workers, damage to the environment, and health issues for farms.[9] Bangladesh occupies the 20th position among countries that produce tobacco. In recent years, there has been a notable 65% surge in tobacco cultivation relative to other cereal commodities.[10,11] According to the latest official agricultural statistics, it has been observed that out of the total of 64 districts, 29 districts exhibit varying degrees of tobacco cultivation, encompassing around 45,869 hectares of agricultural land.[12] Tobacco cultivation in Bangladesh is distributed over the country, with a notable concentration in the northern and southwestern regions, particularly in Rangpur and Kushtia. Additionally, the eastern mountainous region, such as the Chittagong Hill Tracts, also cultivates numerous tobacco kinds.[4] Farmers who work on tobacco farms or who process leaves are at risk for major health problems, including increased cancer risk from chemical exposure, respiratory disorders, and green tobacco sickness from coming into direct contact with tobacco leaves during cultivation and harvest.[13,14] Moreover, chemical poisoning affects farm workers and nearby residents of tobacco-growing fields due to pesticide application, which is frequently done by youngsters under the age of fifteen. [11,15] Tobacco is a significant global public health hazard, resulting in more than 8 million fatalities annually on a global scale. Approximately 1.3 million deaths

are the consequence of secondhand smoke exposure, while over 7 million deaths are directly attributable to smoking.[16] This study addresses the gap in understanding tobacco farmers' knowledge, attitudes, and practices regarding health risks in Kushtia, a key tobacco farming region. The research aims to develop targeted interventions to promote safer agricultural methods and improve farmers' health and well-being.

Literature review:

The World Health Organization estimates that, tobacco-related maladies claim the lives of 6 million individuals annually, which is more than the combined mortality from tuberculosis (TB), HIV/AIDS, and malaria.[17] A significant portion of tobacco workers, specifically 89.7%, expressed concerns regarding the potential health hazards associated with crop farming and processing employment.[18] Tobacco farming poses significant harm, not only due to its detrimental effects on workers, but also as a result of the utilisation of chemical fertilisers and pesticides.[18] Some tobacco growers are aware of the health risks that come with tobacco production, such as diseases linked to tobacco use and damage to the environment.[19] But people are worried that the government isn't doing enough to help and that switching to more sustainable options will be hard.[20] In addition, some people think that tobacco farmers get government money, which makes people feel mixed feelings about them.[21] Older age, lesser education, tobacco firm financial backing, ease of marketing tobacco products, access to financing, and the impression of larger profitability than other crops influence farmers' tobacco cultivation decisions.[22] A recent study by Rahman & Parvin, 2017, looked into the morals and economics of tobacco farming and found that farmers are unwilling to stop growing tobacco even though they say it is wrong.[23] A study found that the cultivation of tobacco in Bangladesh presents notable health risks for farmers.[18] Individuals engaged in tobacco farming encounter a range of health issues, including but not limited to signs such as nausea, vomiting, dizziness, headache, weakness, cough, difficulty breathing, and excessive salivation.[21] These health concerns impact not only the agricultural labor force but also the elderly, infants, and women residing in the farming communities. The absence of adequate safety protocols and persistent exposure to tobacco leaves heighten the likelihood of tobacco-related illnesses.[25] Farmers exhibit a notable deficiency in their knowledge and understanding regarding the potential health hazards linked to the cultivation of tobacco.[26]

METHOD

The current descriptive cross-sectional study was performed on 300 tobacco cultivators from three upazilas of Kushtia district using purposive sampling methods in 2024.

Sample Size

In this study, we selected 300 tobacco cultivators from the three upazilas of Kushtia District (Kushtia Sadar, Daulatpur, and Mirpur) using purposive sampling methods, ensuring balanced representation with 100 respondents from each upazila. Although Cochran's formula suggests a sample size of approximately 384 for a 95% confidence level and a 5% margin of error, our choice of 300 respondents was guided by practical considerations of field data collection and resource constraints. This sample size is sufficient to provide reliable and diverse

insights into the tobacco cultivation practices within the region.

Data Collection and Analysis:

Data were collected from tobacco cultivators in the three upazilas of Kushtia district using purposive sampling. A structured questionnaire, translated into Bangla to accommodate the predominantly illiterate population, gathered comprehensive data divided into four sections: demographic information, knowledge assessment, attitudes assessment, and practices assessment, based on the KAP (Knowledge, Attitudes, and Practices) model. Field data collectors assisted respondents in completing the questionnaires to ensure accuracy and completeness. The data were processed using SPSS version 27 and MS Excel version 2019, involving data entry, coding, and thorough cleaning. Normality tests indicated that the data followed a normal distribution. Descriptive statistics analyzed demographic characteristics and health risks, while Pearson correlation analysis examined relationships between various factors and awareness of tobacco hazards. This meticulous approach ensured robust and reliable data, providing valuable insights into the practices and health implications of tobacco cultivation in the Kushtia district.

RESULTS

In Table 1, participant demographic information is presented, providing insights into the characteristics of the sample population involved in the study. The study area comprised three distinct regions, with an equal distribution of participants across each area: Kushtia Sadar (33.3%), Mirpur (33.3%), and Daulatpur (33.3%). Gender distribution indicated a slight majority of male participants (71.3%) compared to female participants (28.7%). Age distribution revealed a diverse range of participants, with the majority falling between the ages of 31-45 (44.3%), followed by those aged 16-30 (34.0%), 46-60 (18.0%), and 61-67 (3.7%). Regarding education level, the majority of participants had no formal education (38.0%) or completed primary school (24.0%), while fewer had secondary school (25.0%), higher secondary (10.7%), or university education (2.3%). Designation varied among participants, with 60.3% identifying as owners and 39.7% as employees. A significant portion of participants (54.0%) reported growing tobacco on their land, with the majority cultivating 4-6 bighas of land (34.3%). Despite the labor-intensive nature of tobacco farming, the majority of participants (84.0%) perceived it as profitable based on time, labor, and cost considerations. Experience in tobacco cultivation varied, with the majority having 1-5 years of experience (56.3%), followed by 6-10 years (22.3%), 11-20 years (6.3%), 21-30 years (7.3%), and 31-45 years (5.7%). The comprehensive demographic information provided in Table 1 offers valuable insights into the characteristics of the study population, facilitating a deeper understanding of their perspectives and experiences related to tobacco farming.

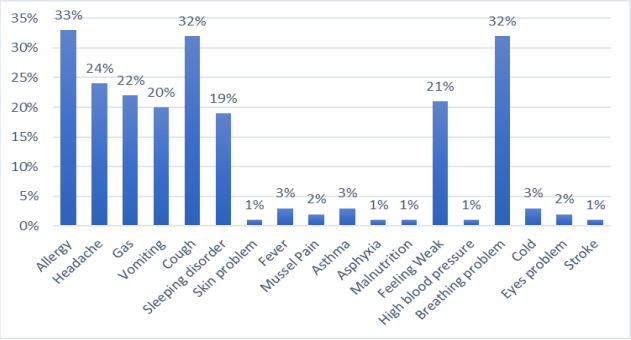

Figure 1. Different diseases of tobacco cultivators and their percentage

Table 1. Participants' demographic information

Variables	Responses	n	%
Study Area	Kushtia Sadar	100	33.3
	Mirpur	100	33.3
	Daulatpur	100	33.3
Gender	Male	214	71.3
	Female	86	28.7
Age	16-30	102	34.0
	31-45	133	44.3
	46-60	54	18.0
	61-67	11	3.7
Education level	No formal education	114	38.0
	Primary school	72	24.0
	Secondary school	75	25.0
	Higher secondary	32	10.7
	University	7	2.3
Designation	Owner	181	60.3
	Employee	119	39.7
Do you grow tobacco on your land?	Yes	162	54.0
	No	138	46.0
How many bighas of land do you cultivate tobacco?	Not answered	103	34.3
	1-3	44	14.7
	4-6	103	34.3
	7-9	35	11.7
	10-18	15	5.0
Based on time, labor, cost do you think tobacco farming is profitable?	Yes	252	84.0
	No	44	14.7
Experience in Tobacco Cultivation	Not answered	6	2.0
	1-5	169	56.3
	6-10	67	22.3
	11-20	19	6.3
	21-30	22	7.3
	31-45	17	5.7

Figure 1 presents the frequency and percentage distribution of various diseases prevalent among 300 tobacco cultivators in Kushtia district. Allergy ranks highest, affecting 33% of the total sample. Following closely are cough and breathing problems, each affecting 32%. Headaches are also common, with 24%, while gas-related issues affect 22%. Vomiting (20%) and sleeping disorders (19%) are also significant health concerns. Other ailments include muscle pain (2%), skin problems (1%), fever (3%), asthma (3%), asphyxia (1%), malnutrition (1%), feeling weak (21%), high blood pressure (1%), colds (3%), eye problems (2%), and strokes (1%). The rest of the respondents don't face any health issues. These statistics underscore the diverse health challenges faced by individuals involved in tobacco cultivation, highlighting the need for targeted interventions and healthcare support within this community.

Table 2. Participants' Knowledge Assessment

Variables	Responses	n	%
Do you think pesticides used in tobacco farming can make people sick?	Yes	220	73.3
	No	80	26.7
Do you know that moving tobacco leaves can be harmful to health?	Yes	178	59.3
	No	122	40.7
Do you think working long hours in tobacco farming can cause respiratory problems?	Yes	204	68.0
	No	96	32.0
Do you know the health risks of staying in the vicinity of nicotine in tobacco?	Yes	126	42.0
	No	174	58.0
Do you think it is important to use protective equipment while applying pesticides in tobacco cultivation?	Yes	253	84.3
	No	47	15.7

Table 2 presents an assessment of participant knowledge regarding various aspects of tobacco farming and associated health risks. The data highlights their perceptions and awareness levels of key factors in tobacco cultivation. A majority (73.3%) believe pesticides used in tobacco farming can make people sick, and 68.0% acknowledge potential respiratory problems from long hours of work in tobacco farming. Additionally, 84.3% recognize the importance of using protective equipment during pesticide application. However, only 59.3% are aware that handling tobacco leaves can be harmful, and just 42.0% understand the health risks of being near nicotine. These findings underscore varying

levels of awareness among participants about the health hazards of tobacco farming, indicating the need for educational interventions and awareness campaigns.

Table 3. Participants' Attitude Assessment

Variables	Responses	n	%
Do you believe that tobacco farming poses serious health risks to farmers?	Strongly disagree	8	2.7
	Disagree	39	13.0
	Neutral	80	26.7
	Agree	122	40.7
	Strongly agree	51	17.0
Are you concerned about the possible long-term health effects of tobacco farming?	Strongly disagree	4	1.3
	Disagree	78	26.0
	Neutral	95	31.7
	Agree	89	29.7
	Strongly agree	34	11.3
Do you think you may be at risk of getting sick from working with tobacco plants?	Strongly disagree	4	1.3
	Disagree	46	15.3
	Neutral	101	33.7
	Agree	118	39.3
	Strongly agree	31	10.3
Do you feel that the health risks of tobacco farming are serious?	Strongly disagree	2	0.7
	Disagree	46	15.3
	Neutral	108	36.0
	Agree	118	39.3
	Strongly agree	26	8.7
Are you open to adopt alternative farming practices that are less harmful to health?	Strongly disagree	4	1.3
	Disagree	42	14.0
	Neutral	124	41.3
	Agree	97	32.3
	Strongly agree	33	11.0

Table 3 examines participant attitudes and perceptions regarding health risks in tobacco farming and their openness to alternative practices. Results show that 40.7% agree and 17.0% strongly agree that tobacco farming poses serious health risks, whereas 2.7% strongly disagree and 13.0% disagree. Concerns about long-term health effects are evident, with 29.7% agreeing and 11.3% strongly agreeing, in contrast to 1.3% strongly disagreeing and 26.0% disagreeing. Regarding personal risk, 39.3% agree and 10.3% strongly agree that they may fall ill from working with tobacco, with 8.7% strongly agreeing on the seriousness of health risks, while 0.7% strongly disagree and 15.3% disagree. Attitudes towards adopting alternative farming practices show 32.3% agreeing and 11.0% strongly agreeing, though 41.3% remain neutral and 14.0% disagree. These findings highlight the nuanced perspectives of farmers, emphasizing the necessity for targeted educational interventions to promote safer agricultural practices in the tobacco industry.

Table 4. Participants' Practice Assessment

Variables	Responses	n	%
How often do you use protective equipment (eg, gloves, masks) when using pesticides in tobacco farming?	Always/ Often	72	24.0
	Sometimes	139	46.3
	Rarely/ Never	89	29.7
Do you regularly clean your hands and body after working with tobacco leaves or pesticides?	Always/ Often	217	72.3
	Sometimes	77	25.7
	Rarely/ Never	6	2.0
Have you ever sought training or information about safe tobacco growing practices?	Always/ Often	69	23.0
	Sometimes	131	43.7
	Rarely/ Never	100	33.3
How often do you open windows or wear safety equipment when storing pesticides?	Always/ Often	124	41.3
	Sometimes	126	42.0
	Rarely/ Never	50	16.7
Are you considering switching to alternative crops that pose less health risks in the future?	Always/ Often	112	37.3
	Sometimes	117	39.0
	Rarely/ Never	71	23.7

Table 4 provides insights into participants' behaviors and intentions regarding safety practices in tobacco farming, as well as their consideration of alternative crops with potentially lower health risks. Participants were asked to indicate the frequency of their use of protective equipment, cleanliness practices after working with tobacco leaves or pesticides, and seeking of training or information about safe tobacco growing practices. The data reveals varied levels of adherence to safety protocols among participants. A notable portion of participants (46.3%) reported using protective equipment sometimes, while 24.0% use it always or often, and 29.7% rarely or never use it. In terms of cleanliness practices, 72.3% of participants reported always or often cleaning their hands and body after working with tobacco, whereas 25.7% do so sometimes, and only 2.0% rarely or never clean. Additionally, 43.7% of participants sometimes seek training or information about safe tobacco growing practices, while 33.3% rarely or never do. When it comes to storing pesticides, 42.0% sometimes open windows or wear safety equipment, 41.3% always or often do so, and 16.7% rarely or never take these precautions. Lastly, regarding consideration of alternative crops, 39.0% of participants sometimes consider switching, 37.3% always or often consider it, and 23.7% rarely or never do. These findings underscore the importance of promoting consistent adherence to safety practices and exploring alternatives to mitigate health risks in tobacco farming.

The correlation figure 2 provides a detailed analysis of the relationships among gender, education level, physical health status, and various Knowledge, Attitude, and Practice (KAP) variables related to tobacco farming and health risks. Gender shows no significant correlation with education level or physical health problems, suggesting no observed association between gender and these variables in this dataset. However, education level positively correlates with reporting physical health problems ($r = 0.181$, $p < 0.01$), suggesting that individuals with higher education levels may be more aware of or inclined to report health issues, highlighting the role of education in health awareness. Physical health problems positively correlate with acknowledging the health risks of pesticides ($r = 0.230$, $p < 0.01$) indicating that those experiencing health issues may have heightened awareness level. Conversely, there is a statistically significant, but very weak negative correlation ($r = -0.076$, $p < 0.01$) between experiencing physical health problems and concern about long-term health effects, suggesting that individuals with physical health issues show slightly less concern about long-term risks. Additionally, education level negatively correlates with the use of protective equipment ($r = -0.383$, $p < 0.01$), suggesting that more educated individuals may be less likely to use protective measures when working with pesticides in tobacco farming. Additionally, physical health problems negatively correlate with the use of protective equipment ($r = -0.165$, $p < 0.01$), indicating that those experiencing health issues may avoid using protective gear, possibly due to discomfort or practical challenges. These findings illustrate the complex relationships between demographic factors, health status, and health-related attitudes and practices in tobacco farming, with statistically significant correlations (**) at the 0.01 level and (*) at the 0.05 level adding credence to the observed relationships.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Gender of the respondent	1																	
2. Education level	-0.001	1																
3. Do you suffer from any physical problems?	-0.064	.181**	1															
4. Do you think pesticides used in tobacco farming can make people sick?	-.132*	-.164**	.230**	1														
5. Do you know that moving tobacco leaves can be harmful to health?	-0.03	-.126*	.173**	.314**	1													
6. Do you think working long hours in tobacco farming can cause respiratory problems?	0.039	-0.043	.229**	.152**	.130*	1												
7. Do you know the health risks of staying in the vicinity of nicotine in tobacco?	0.017	-.210**	-0.073	0.086	.155**	0.005	1											
8. Do you think it is important to use protective equipment while applying pesticides in tobacco cultivation?	-0.05	-.265**	-0.06	.113*	0.017	-.138*	.125*	1										
9. Do you believe that tobacco farming poses serious health risks to farmers?	0.056	.230**	0.009	-.331**	-.350**	-.150**	-.175**	-.132*	1									
10. Are you concerned about the possible long-term health effects of tobacco farming?	0.049	.262**	-0.076	-.240**	-.330**	-.126*	-.143*	-.156**	.500**	1								
11. Do you think you may be at risk of getting sick from working with tobacco plants?	-0.009	.153**	-.176**	-.178**	-.321**	-0.073	-0.104	-.208**	.411**	.520**	1							
12. Do you feel that the health risks of tobacco farming are serious?	0.014	.180**	-0.054	-.216**	-.294**	-.151**	-0.105	-.156**	.493**	.471**	.458**	1						
13. Are you open to adopt alternative farming practices that are less harmful to health?	-0.044	.145*	0.017	-.135*	-.173**	-0.073	-.124*	-.129*	.355**	.277**	.208**	.389**	1					
14. How often do you use protective equipment (eg, gloves, masks) when using pesticides in tobacco farming?	-0.069	-.383**	-.165**	.191**	.187**	0.015	.223**	.306**	-.239**	-.314**	-.140*	-.146*	-.230**	1				
15. Do you regularly clean your hands and body after working with tobacco leaves or pesticides?	-0.022	-.220**	-0.114	.155**	0.038	0.05	-0.022	0.056	-0.094	-.174**	-0.076	-0.043	-0.071	.302**	1			
16. Have you ever sought training or information about safe tobacco growing practices?	0.051	-0.051	0.09	0.007	.150**	.116*	.118*	.150**	0.016	-0.033	-0.005	-0.048	-0.063	.223**	.115*	1		
17. How often do you open windows or wear safety equipment when storing pesticides?	-0.049	-0.04	0.024	-0.003	-0.084	0.027	-0.094	0.02	0.095	0.025	0.005	0.051	.158**	0.027	0.018	.116*	1	
18. Are you considering switching to alternative crops that pose less health risks in the future?	0.055	-0.092	0.066	0.078	.227**	.206**	-0.001	0.029	-.138*	-.196**	-.184**	-.187**	-.238**	.198**	0.08	.141*	.120*	1

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Figure 2. Pearson correlation among gender, education level, feeling physical problem with KAP variables

DISCUSSION

Using cross-sectional survey data, this study has ascertained the knowledge, attitude, and practices of tobacco cultivators' health hazards in three upazilas of Kushtia district. The majority of the respondents of the study were male (71.3%) while female was only (28.7%). Most of the respondents were illiterate (38%) while secondary school and university graduates are 25% and 2.3% respectively. We observed 84% of the study respondents think that based on time, labor, and cost tobacco cultivation is profitable. This belief motivates them to do more tobacco farming. Among the respondents, 56.3% reported having up to five years of tobacco farming experience, while the majority had no prior experience, making them more vulnerable to the risks due to their lack of protective knowledge. The study reveals a high prevalence of health problems among tobacco growers in the Kushtia district, with respiratory issues like allergies, cough, and breathing difficulties affecting 33%, 32%, and 32% of the sample population, respectively. There are some similar studies in literature which support the findings of this study. According to studies, tobacco producers have a higher chance of acquiring respiratory diseases.[15,28] Another study by Moyo et al., 2023 reported that, the incidence of breathing issues among tobacco farmers is large, with studies revealing a high occurrence of respiratory symptoms and airflow limitation caused by obstructive lung disease.[29] Furthermore, a significant proportion of tobacco farmers (24%) experience headaches, while 22% report gas-related concerns. The result of a study conducted in Brazil by Santos et al., 2017, reveals that the prevalence of headache among tobacco planters is found to be approximately 16.71% which is almost 7.30% lower than our study result.[30] Additionally, gas issues, such as stomach-ache, were discovered to impact around 8.30% of tobacco growers. These

findings indicate that tobacco cultivators in Kushtia experience headaches and gas issues more frequently than those in Brazil, underscoring the diverse health challenges that individuals engaged in tobacco cultivation are exposed to.

The study shows varying awareness levels about health dangers among tobacco farmers. Most participants recognize the risks of pesticides (73.3%) and the importance of protective equipment (84.3%), but fewer are aware of the risks of handling tobacco leaves (59.3%) and nicotine exposure (42.0%). These findings are more positive than Anbazhagan et al. (2022), which showed that frequent pesticide users lack awareness of their dangers and the need for protective gear, despite experiencing health issues.[31] According to studies, while some farmers wear protective equipment such as face masks and gloves, others may not use them efficiently.[32,33]

Participants' views on tobacco farming's health concerns vary in this study. Many (40.7%) agree that tobacco production provides major health dangers to farmers, with 17.0% strongly agreeing. However, 15.3% disagree. These indicate that tobacco farmers have different views on the health risks of their job. Tobacco farming is linked to several health issues for farmers, such as nausea, vomiting, vertigo, and respiratory ailments.[24] Concerns regarding the potential long-term health effects of tobacco cultivation were expressed by 29.7% of participants who agreed and 11.3% who strongly agreed, which is a noteworthy finding.[27] This finding indicates that a considerable percentage of respondents were cognizant of the possible health consequences associated with their profession, an essential factor in ensuring health and safety in the agricultural industry. Growers of tobacco in southern Brazil are conscious of the health risks associated with their occupation, which include musculoskeletal ailments, pesticide toxicity, and green tobacco illness.[27] The research shows mixed opinions on adopting less harmful farming methods: 32.3% agree, 11.0% strongly agree, 41.3% are neutral, and 14.0% disagree. This ambivalence could hinder efforts to promote eco-friendly and health-conscious practices in the tobacco sector.

The study reveals varied adherence to safety procedures among tobacco growers: 24.0% always or frequently wear protective gear with pesticides, 46.3% do so occasionally, but 72.3% consistently wash after handling pesticides or tobacco leaves, indicating generally high cleanliness levels. However, only 2.0% of tobacco farmers in Kushtia occasionally or never engage in safety practices, showing some gaps in knowledge and hygiene. The majority use safety measures, unlike in Indonesia, where only 34% of farmers practice safety.[35] Another interesting finding is that 37.3% of participants always or often consider switching to healthier crops, and 39.0% sometimes consider it. Studies in India show that farmers are willing to shift away from tobacco farming if certain criteria are met.[36] The United Nations Framework Convention on Tobacco Control emphasizes the need for regulatory land-use policies to promote varied farming techniques and alternative livelihoods, and highlights the global effort to facilitate transitions away from tobacco growing.[37] The study found that higher education levels are associated with increased reporting of physical health problems, suggesting greater awareness or

willingness to disclose issues. Gregorio et al. (2011) similarly found that tobacco knowledge is influenced by formal education levels.[38] This finding emphasises the potential significance of education in raising health awareness and encouraging people to recognise and report health issues, which is critical for successful health management and intervention.

Although the sample size of this study was smaller than the initially calculated target, the findings remained consistent across key demographics, showing clear and repeated patterns in the knowledge, attitudes, and practices (KAP) variables among tobacco farmers. This consistency suggests that the sample, though reduced, was sufficiently representative to provide meaningful insights into the broader population in the region. The balanced representation across the three main upazilas also added robustness to the data, reinforcing that the core findings reflect broader trends within the Kushtia district.

CONCLUSION

This study provides a comprehensive assessment of the knowledge, attitudes, and practices (KAP) of tobacco cultivators in Kushtia district, highlighting demographic characteristics, prevalent health issues, and participants' awareness and safety measures. It underscores the significant health risks faced by tobacco growers, including respiratory diseases, migraines, and gastrointestinal problems. Despite varying demographics, many participants perceive tobacco farming as financially rewarding, indicating a need for interventions that balance economic benefits with health concerns. While awareness of pesticide-related risks is evident, gaps remain regarding other hazards like direct tobacco leaf contact and nicotine exposure, emphasizing the importance of educational initiatives. The study also reveals diverse perspectives on health risks and receptiveness to alternative farming approaches, underscoring the necessity for tailored interventions that accommodate differing viewpoints. Ensuring consistent adherence to safety protocols through regulatory enforcement and comprehensive training is crucial. Actionable recommendations include targeted educational campaigns, advocacy for precautionary measures, and support for alternative livelihoods to promote health and sustainability in the tobacco sector.

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Ethical Declaration : While the research team was unable to obtain formal ethical clearance due to the absence of an established committee at the Islamic University, rest assured that the researchers adhered to the ethical criteria mentioned in the Helsinki Declaration throughout the study. The researchers gave individuals a concise informed consent form and clearly discussed all ethical aspects. The confidentiality was preserved, and no personal information (such as names, addresses, or contact information) was obtained. Participants received no

monetary compensation and were able to decline any enquiries. In addition, reputable scholars assessed the study questionnaire to ensure that it met ethical norms and scholarly principles.

Author Contribution: Conceptualization: NU, HI, Data curation: NU, Formal analysis: NU, HI, Investigation: NU, Methodology: NU, HI, Resources: NU, HI, Software: NU, Supervision: HI, Validation: NU, HI, Visualization: NU, Writing-original draft: NU, HI, Writing - review & editing: HI

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