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# Phasing Out Tobacco Leaf Supply: A Study On Farmers' Willingness And Transition Potential


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**Abstract**

Tobacco use has been associated with detrimental health issues and kill more than 8 million people on annual basis causing monetary cost of more than 1.4 trillion USD. Various demand reduction measures have attracted much of the scholarly work as compared to tobacco leaf supply reduction measures. The current study has focused on how tobacco leaf supply, a major and important input for cigarettes, can be phased out with minimal adverse effects on tobacco farmers. Objectives of the study are to explore the willingness and the extent of decrease in tobacco quantity of tobacco farmers. Furthermore, it is also aimed to determine the factors which influence the farmers' willingness of tobacco leaf supply reduction while it is hypothesized that a more diversified livelihood portfolio is positively associated with farmers' willingness for tobacco leaf supply reduction. The study employed cross-sectional data collected from Swabi, Mardan and Charsadda districts of the Khyber Pakhtunkhwa province of Pakistan collected through face interview using a well-designed and structured questionnaire applying multistage sampling techniques for sampling. Both descriptive and econometrics techniques were applied to determine the willingness for phasing out tobacco leaf supply. The study found that there is mixed situation as some farmers are willing while others need incentives for decreasing and phasing out tobacco leaf supply. The fact that non-contract farmers produced less than half the quantity of license holders indicates the effectiveness of contract-based tobacco production. There was a significant difference in production and prices of tobacco between license-holder and non-license-holder farmers. The study recommends that consent of all those farmers who want to cultivate tobacco should be sought in advance, and then the required tobacco quota should be distributed among them according to their farm size, tobacco infrastructure and their previous history. Moreover, tobacco leaf supply can be decreased further by ensuring quota compliance by contract-holder farmers.



**Keywords:** Tobacco Farming Transition, Farmer Willingness, Crop Diversification, Sustainable Livelihoods

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## 1. INTRODUCTION:

Tobacco consumption has an established relation with various detrimental Non-Communicable Diseases (NCDs) like cancer, heart diseases, respiratory problems, asthma, emphysema, and particularly lung cancer, killing more than 8 million people annually. (Majeed et al., 2008; Khan, 2012; Habib et al., 2018; WHO, 2018 & Khanam, et al., 2019). Tobacco associated health cost in the form of direct health care and lost productivity due to absence from work & premature mortality is estimated to reach 1436 billion USD globally (Anh, et al., 2016; & Goodchild, et al., 2018). Global concern about the detriments of tobacco associated NCDs prompted the U.N. General Assembly to adopt the 2030 development agenda including 17 Sustainable Development Goals (SDGs) to be achieved by member states by 2030 (U.N., 2015). Among the 17 SDGs it is SDG 3 which asks for addressing the issue of health and strengthening of implementation of the WHO Framework Convention on Tobacco Control (WHO-FCTC) to ensure healthy lives, wellbeing and reducing premature mortality (WHO, 2003; UN, 2015; & WHO, 2015).

Despite the associated health hazards, tobacco has been playing important role in public finance, labor market and international trade. It is a short term crop produced in more than 120 countries on the global level. Due to shift in policies regarding tobacco consumption and high cost of labor and tobacco leaf in developed countries, tobacco industry shifted its focus to developing countries and increased both tobacco production and consumption in developing world. Along with almost 80 percent of the tobacco attributable diseases' share, developing countries produce more than 80 percent of total tobacco production. It has been estimated that tobacco production provides employment opportunities to over 33 million labors through growing and initial processing, while including other tobacco related activities the employment magnitude rises to over 100 million, where developing countries share almost 90 percent (ILO, 2014). Employment and income generation from cigarette and bidi segment of tobacco has been estimated to the tune of 6.54 million and 126.5 billion rupees respectively (Sen et al., 1999). Economic contribution of tobacco crop in the economies of developing countries has also been investigated in countries like Brazil, China, Malawi, Zimbabwe and Turkey. Brazilian economy shows that tobacco contributes in generating 2.2 million jobs and provides higher net returns than many other crops. Unlike Brazil, tobacco in China is not as profitable because other crops like soybean, sugarcane, rice and cotton have higher returns as compared to tobacco on per man-day labor basis (Hu, et al., 2006). Tobacco production contributes 6 percent of GDP, 20 percent of employment and 50 percent of food expenses in Malawi economy (Takane, 2004). Similarly, in Zimbabwe tobacco plays a dominant role in the export earning, employment generation and contribution in GDP. Tobacco shares 30 percent in country' export, 10 percent in GDP with total sale of 593 million USD and 5 percent of employment with total of 250,000 jobs. Likewise, tobacco employs 1.5 million workers in Turkey also. The country earns 541 million USD from tobacco exports and generates revenue of 2,300 million USD in the form of various taxes (FAO, 2003).

Like other developing countries, tobacco occupies an important position in terms of profitability, revenue and employment in Pakistan. The economic significance of tobacco crop in Pakistan economy can be inferred from the workforce of 350,000, it employs, which generates 300 billion rupees of revenue and livelihoods for 1.2 million people annually. There are almost 75,000 tobacco growers producing about 80 to 85 million kilograms of Flue-Cured Virginia (FCV) tobacco each year. Tobacco contributed nearly 89 billion rupees to national treasury in the form of various taxes in 2013-14 (PTB, 2018).

Implementation of tobacco control policies have set in contraction in demand for licit tobacco products due to their rising prices. However, many countries have seen a surge in the illicit tobacco products which not only affects health of individuals but also national exchequers, adversely (Bate, 2018; & Nguyen, et al., 2019). Illicit tobacco products harm the effectiveness of tobacco control policy by limiting the tax pass-through to prices of legal cigarettes as the companies fear losing market (Cevik, 2018). Illicit tobacco products take three forms mostly, including international transit brands, undeclared locally produced Duty Non paid (DNP) by legal manufacturers, and counterfeit products violating Intellectual Property Rights (IPRs). Two components of the mentioned illicit tobacco markets are associated with local tobacco leaf supply. Various estimates show the illicit cigarette market share varies from as low as 9 percent to as high as 39 percent. Regulating tobacco leaf supply can help in decreasing supply of illicit cigarettes which is sometimes exaggerated to delay the effective taxation in Pakistan (World Bank Group, 2019).

Moreover, transferring the decrease in demand for tobacco products to the tobacco leaf supply can be achieved more simply with realizing the farmers to decrease supply of tobacco leaf in the market to avoid price decrease. The slow and gradual decrease in demand for tobacco leaf may help farmers to cultivate and experiment with new high-value crops alongside tobacco cultivation. The current study aimed to explore the willingness and the extent of decrease in tobacco quantity of tobacco farmers. Furthermore, it is also aimed to determine the factors which influence the farmers' willingness of tobacco leaf supply reduction. We hypothesized that a more diversified livelihood portfolio is positively associated with farmers' willingness for tobacco leaf supply reduction.

## 2. Literature Review

The early American colonizers introduced tobacco to the civilized world as a weed of numerous health benefits which later played a significant role in their economies (Rodu, 2004). However, with the passage of time it became more controversial due to its association with health problem. Moreover, it happened to be intensively debated crop both from production and consumption aspects. It is analyzed in terms of health impacts and macro-economic contribution worldwide. Health services providers see its consumption association with various adverse health conditions and major modifiable risk behavior for diseases like cancer, heart and respiratory system which results in enormous health care burden across the globe (Wang, et. al., 2006).

Researchers have assessed that tobacco growing farmers damage environment by the use of firewood to cure tobacco in their barns, and cut thousands of hectares of forests every year (Geist, 2009 a). Moreover, the environmental damage is further aggravated by leaching of nutrients from soil and pollution caused by fertilizers and pesticides application to tobacco plants (Geist, 2009 b). Along-with production related health hazards, tobacco have peculiar consumption related health risks pertaining to diseases of the cardiovascular system, in particular myocardial infarction (heart attack), diseases of the respiratory tract such as Chronic Obstructive Pulmonary Disease (COPD), asthma, emphysema, and cancer, particularly lung cancer and cancers of the larynx, and tongue.

Apart from consumption related health cost and environmental damage, tobacco cultivating farmers are at increased risk of various hazards like injury and illness. Children and women working in tobacco environment are more likely to suffer from Green Tobacco Sickness (GTS) caused by dermal adoption in morning time or rainy season when tobacco leaves are wet. Symptoms of GTS include vomiting, fall in blood pressure and heart rates, nausea, dizziness, weakness, abdominal cramps and difficulty in breathing (Arcury et al., 2003).

Along-with GTS tobacco farmers are prone to further health damages like poisoning, skin and eye irritations, respiratory and kidney problems due to pesticide application for plant protection purposes (Cox, 1992; & Cox, 1995). However, the incidence of benefit and cost in different places, other side of the debate on tobacco focus on its contribution in terms of employment generating capacity, income to people involved in farming, tobacco labor and traders, tax revenue for federal, state and local governments and foreign exchange preserving and earning (Chaloupka & Warner, 2000).

Decades ago tobacco has been viewed as a dilemma for development. It was felt that tobacco is posing threat to development as its long term cost in the form of health, economic, social and environmental degradation outweighs the temporary livelihood argument for tobacco farmers and workers (Baris, et al., 2000). With the passage of time many

multilateral organizations started to view tobacco as major threat to global sustainable development in general and developing world in particular, as tobacco poses threat not only to health, but also affects social & economic development and environmental sustainability (Bailey, et al., 1995). Tobacco leaf supply reduction can play an important role in the avoiding tobacco associated health burden. It is pertinent to know whether farmers are willing to decrease tobacco leaf supply reduction in the face of a high tobacco induced disease burden. The current study has addressed the issue by assessing the willingness of tobacco farmers for tobacco leaf supply reduction.

## 3. Data and Methodology

This study is based on cross-sectional data collected from Swabi, Mardan and Charsadda districts of the Khyber Pakhtunkhwa province of Pakistan. These are the major tobacco producing districts and the climatic conditions of these districts are considered suitable for tobacco cultivation because moderate rains occur during tobacco crop season. The region lies at 34.124 to 34.199 N and 71.750 to 72.461 E, and the elevation ranges from 310 to 340 meters above the sea level. The climates vary from semi-arid hot to subtropical humid, with average annual precipitation ranging from 460 to 639 millimeters. Average temperature varies from 22.2 to 22.5 Centigrade. The frost-free conditions in tobacco season and average temperature of the area are considered to be suitable for higher yields of tobacco. Furthermore, the area has well-developed canal irrigation system augmented by underground water through tube-wells, which are employed for better yield.

Taking into account the financial and time constraints, a sample of 330 farming households was selected and 322 farmers' data were used for analysis, since eight farmers reported incomplete data. Among the 322 farmers, 205 were tobacco growers, whereas, the remaining 117 did not grow tobacco crop and were therefore, labeled as the non-tobacco group. A stratified multistage sampling technique was used to select the sample from the respective districts. In the first stage the three districts Swabi, Mardan, and Charsadda were selected based on their share of total production. In the second stage one tehsil (sub-district) was selected in each Charsadda and Mardan (i.e, Tangi and Takhtbhai, respectively) while two tehsils, Chota Lahore, and Razzar were selected in the Swabi district on the basis of their share in total production. Among the districts, the sample was distributed proportionately based on the share of total tobacco production in each district. Charsadda and Mardan account for 15 and 25 percent, respectively, of Pakistan's total tobacco production (Nasrullah, et al., 2019).

We applied both descriptive and econometrics techniques to determine the willingness for phasing out tobacco leaf supply. Along with these we also compared the different socio-economic aspects of tobacco and non-tobacco farmers using t-test to check whether there is significant difference by comparing their means. Also we utilized t-test to check the significance of difference between actual produced tobacco and threshold level to which farmers were willing to decrease to production.

### 3.1 Willingness for decrease in tobacco quantity

Tobacco is considered as a lethal crop and its use in different forms is associated with more than 8 million annual deaths of its users. Different countries of the world have enacted different laws for its control. The tobacco control regulations and innovations in cigarette manufacturing technology have resulted in gradual fall in its demand. It is imperative for farmers to respond to the decline in demand and switch to alternative crops to ensure their livelihood. We examined the willingness level of farmers to decrease in tobacco production over time. We first examined their willingness at the current price level and determined how much proportion of the farmers are willing, then we gave another option if they are willing on decrease of quantity of tobacco if they are given increase of half of the price in current price i.e increase prices from current 180 to 270 rupees per kg. We checked the response to doubling the price for those who showed unwillingness at the initial options of current and one half of the original prices. We also asked about their current quantity of tobacco produced and about the threshold quantity they will decrease their tobacco production. The proportion of farmers in each group is given as below

$$Prop_{willing_i} = \frac{num_{willing_i}}{tot_{farmers}} * 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where

$Prop_{willing_i}$ stands for willing group i, i= never willing group, willing at current prices, willing at 1.5 times of current prices and willing at double of the current prices

$num_{willing_i}$ Stands for number of farmers in each of the mentioned group

$tot_{farmers}$ Stands for the total number of tobacco farmers in the sample

### *3.2 Econometric Model to Determine Willingness for Decrease in Tobacco Leaf Supply*

To determine the role of license and other factors in decreasing tobacco leaf supply we employed probit model. The choice of probit model was based on the distribution of error term checked through Shapiro-wilk test. We hypothesized that license status will increase the willingness for decrease in tobacco supply in response to decline in tobacco demand. Besides license status we used age, education level, family size, farm size, district dummies, diversification score, tobacco prices, total tobacco produced, tenancy status, renting in or out of tobacco quota to other farmers and infrastructure investment. Dependent variable was willingness dummy. The model is given below

$$y = \alpha + \beta_1 Lic_D + \sum X_i \beta_{i_{+1}} + \mathcal{E}\,, \mathcal{E} \sim N(0,1) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

y = 1 if farmer is willing to decrease in quota, 0 otherwise

$Lic_D$ is dummy for license status, 1 if farmer is license holder, 0 otherwise

$X_1$= age of farmer (Years)
$X_2$= Education level (Years)
$X_3$= family size (No. of persons in family)
$X_4$= farm size (jeribs equal to half of acre)
$X_5$= diversification index score lies between 0 and 1
$X_6$= tobacco prices of the previous year (Rs./ kg)
$X_7$= dummy for rent in/out, 1 if farmer practice rent in/out, 0 otherwise
$X_8$= dummy Swabi district; 1 if yes, 0 otherwise
$X_9$= dummy Mardan district; 1 if yes, 0 otherwise
$X_{10}$= dummy for tenant, 1 if the farmer is tenant, 0 otherwise

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$X_{11}$= dummy for owner cum tenant, 1 if the farmer is owner cum tenant, 0 otherwise
$X_{12}$ = total quantity of tobacco produced (kg)
$X_{13}$ = total value of infrastructure investment (Rs.)

## 4. Results and Discussion

This part of the study describes the results about farmers' willingness for cut in quota and factors influencing for cut in quota quantity.

### 4.1 Descriptive statistics of socio-economic characteristics of farmers

Tobacco is viewed as a crop that provides farmers with a good livelihood compared to other crops. It is reasonable then, to expect that the quality of this livelihood would be reflected in the tobacco farmers' socio-economic status compared to farmers of other crops. However, this study shows no significant difference between the per capita income of tobacco and non-tobacco farmers. Income from crops is higher in tobacco farming group, but they used significantly more land by 4.65 jeribs to generate that extra income of 69,603 rupees per household.

Household size is larger among tobacco farmers, which makes sense, since tobacco is a labor-intensive crop, and employing hired labor shrinks its profitability as seen in other countries like Kenya (Magati, et al., 2019). Furthermore, farmers reported that due to the health risk associated with working in tobacco, laborers demand higher wages to account for the higher health risk. Therefore, farmers with larger families find tobacco profitable while those with smaller families may prefer to quit tobacco cultivation. Tobacco is attractive for its contribution to household income and profit, but a household which is dependent on hired labor will find its profitability more elusive (Goma, et al., 2016).

Data also show that non-farming sector can provide higher income, but the labor-intensive nature of the tobacco crop does not allow the tobacco farmers to participate in non-farm activities. This results in lower participation in the non-farm sector. Similar findings have been reported in studies conducted in Indonesia, Malawi, and Kenya by Magati, et al., (2019), Makoka, et al., (2017), and the World Bank, (2007). Means and differences for tobacco farmers and non-tobacco farmers with different socio-economic profiles are presented in Table 4.1.

**Table 4.1 Socio-economic profiles of tobacco and non tobacco farmer**

| Profile | Unit | Non-tobacco group | Tobacco group | Diff. | Stand. error | t-value |
|---|---|---|---|---|---|---|
| **Age** | Year | 42.81 | 42.85 | -0.04 | 1.51 | 0.027< 0.78 |
| **Education level** | Year | 10.18 | 10.74 | -0.56* | 0.30 | 1.62 > 0.10 |
| **Household size** | No. | 12.11 | 13.47 | -1.35* | 0.89 | 1.40 > 0.16 |
| **Farm size** | Jerib | 9.40 | 14.05 | -4.65* | 1.08 | 3.86 > 0.000 |
| **Earners** | No. | 2.86 | 3.22 | -0.36* | 0.20 | 1.57 > 0.12 |
| **Farm employment** | No. | 2.68 | 2.84 | -0.16 | 0.20 | 0.51 < 0.60 |
| **Non-farm employment** | No. | 1.06 | 0.90 | 0.16* | 0.15 | 0.94 > 0.34 |
| **Total livestock** | No. | 1.99 | 2.94 | -0.95* | 0.27 | 3.54 > 0.005 |
| **Livestock income** | Rs. | 119,478 | 151,312 | -31,834* | 32,425 | 1.02 > 0.30 |
| **Non-crops income** | Rs. | 605,607 | 625,237 | -19,630 | 84,719 | 0.23< 0.81 |
| **Crops Income** | Rs. | 307,898 | 377,502 | -69,603* | 43,182 | 1.61> 0.10 |
| **Per capita income** | Rs. | 100,323 | 104,74 | -4421 | -14,114 | 0.31 < 0.75 |

*significant at 1%

Source: Field Survey, 2018-19

### 4.2 Capacity for controlling tobacco-leaf supply by restricting quota violations

Tobacco companies estimate their quotas based on demand for tobacco products in domestic as well as foreign markets. They assign quotas to farmers according to their history for quality, the size of their land holdings, and the company's own requirements. Quota following is necessary not only for controlling tobacco leaf over-supply, but also for controlling the epidemic of tobacco use. However, this study demonstrates that most tobacco farmers hardly followed their assigned quota, and they actually produced in excess of nearly 22 percent on the overall basis. They produced 5,867 kg against their assigned quota of 4,811 kg, amounting to an average of 1,056 kg excess.

District-wise analysis revealed that farmers in the Charsadda district had the highest violation of quota restrictions and produced 32 percent more tobacco than their assigned quota. They were assigned 4,345 kg of tobacco production quota but produced 5,841 kg on the average. Similarly, farmers in the Swabi and Mardan districts also over-produced tobacco by 20 and 22 percent, respectively. Reasons for non-following the quota included the increasing profitability associated with economy-of-scale operations, the existence of alternative markets, verbal assurances from tobacco industry' officials that they would purchase the extra quantity, and political pressure on government to intervene and compel the tobacco industry to purchase the excess tobacco.

The government's caving to political pressure in turn provides the tobacco industry with an opportunity to obtain concessions in the form of less stringent regulations. Discussion with farmers revealed that in case of excess tobacco supply, the tobacco companies dictate their terms and not only pay lower prices for the excess quantity but also delay the payments. Control of these intertwined factors could help to reduce tobacco leaf supply which is the main input for tobacco products. The extent of tobacco leaf supply control by restricting quota violations is given in Table 4.2.

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**Table 4.2** **Tobacco-leaf supply control by restricting quota violations**

| District | Obs | Tobacco produced (kg) | Quota assigned (kg) | Difference (kg) | \|T\|> \|t\| |
|---|---|---|---|---|---|
| **Charsadda** | 20 | 5,741 (3,994) | 4,345 (2,511) | 1,396* (2,460) | 2.54 > 0.02 |
| **Mardan** | 35 | 4,953 (3,603) | 4,057 (2,384) | 896* (1,970) | 2.69 > 0.01 |
| **Swabi** | 83 | 6,283 (3,689) | 5,241 (2,031) | 1,042* (3,038) | 3.12 > 0.003 |
| **Total** | 138 | 5,867 (3,728) | 4,811 (2,930) | 1,056* (2,711) | 4.57 > 0.00 |

*Figures in parenthesis are standard deviations*

Source**:** *Field Survey, 2018-19*

### 4.3 Disposal of over-produced tobacco by non-followers

Tobacco is a crop which has no direct use for farmers like wheat, maize, sugarcane or any other edible crop. This reflects the riskiness of producing tobacco without having an agreement and also producing more than the assigned quota in agreement. Our analysis of the data revealed that quota non-followers employed different strategies to sell the over-produced tobacco. It shows that 35.16 percent of the farmers were able to sell the over produced quota to the tobacco company by getting surplus quota from their respective tobacco company. However, they bear the cost in the form of accepting reduced prices and delay in payment. Other 17 percent of the farmers were able to use the license of their relatives, neighbors and friends on the condition of selling good quality of tobacco to avoid contract cancellation. Although more than 50 percent of quota non-followers were able to sell their tobacco to registered tobacco companies but almost the other half of non-followers had no other option and sold their tobacco to the exploitative chain of commission agents and middle-men. Apart from paying lower prices and high tare weights they delayed the payment by more than 6 months. The table below reflects that among the other half of non-followers more than 24 percent sold their tobacco to commission agents at their purchasing centers while more than 23 percent were contacted by middlemen at their tobacco barns and goddowns to purchase tobacco from them. Information about the frequencies and percentages of disposal of over production of non-followers are presented in Table 4.3.

**Table 4.3** **Channels for selling of over-produced tobacco**

| Selling entity | Frequency | Percentage |
|---|---|---|
| **Tobacco company extra quantity** | 32 | 35.16 |
| **Use of other' license** | 16 | 17.58 |
| **Commission agents** | 22 | 24.18 |
| **Middlemen** | 21 | 23.08 |
| **Total** | 91 | 100 |

**Source:** *Field survey, 2018-19*

### 4.4 Willingness' groups-wise quota and decrease in quantity

Farmers have different perceptions and knowledge about tobacco control policies, adverse health effects of tobacco on their families and society. Willingness for decrease in tobacco supply depends on the combination of different factors mentioned. Farmers who rely on tobacco for most of their livelihoods show their non-willingness to decrease tobacco leaf production. These farmers had average quota of 4,180 kg and mostly small farmers. However, farmers in other groups showed willingness to decrease tobacco leaf supply either without any compensation or based on compensation. The without compensation willing group had average quota of 4,867 kg, revealed their willingness to decrease tobacco to 2,733 kg on average. It reflects that the current price willingness group is ready for a decrease of 2133 kg on average. Similarly, there are farmers' groups who can be motivated by incentivizing them in the form of higher prices to avoid fall in their total income. These farmers were grouped in two groups, one that demanded increase in tobacco prices up to 50 percent whereas, the other one showed willingness for decreasing tobacco leaf supply on condition of increasing the tobacco leaf prices by 100 percent. Former group had tobacco quota of 4,400 kg while the later one had 5,509 kg on average basis. Both these groups revealed their willingness on the decrease in tobacco production by 2,477 and 2,899 kg respectively. On overall basis farmers are willing to decrease from 5,085 kg of tobacco production to 2,703 kg for a decrease of 2,382 kg. Details of the assigned quota, threshold quantity and decrease in quantity of tobacco for different groups are presented in Table 4.4.

**Table 4.4** **Willingness group wise quota, threshold and decrease in quantity details**

| Wilingness group | Total quota (Kg) (SD) | Threshold level (Kg) (SD) | Decrease Quantity (Kg) (SD) |
|---|---|---|---|
| **Never willing** | 4,180 (2,129) | 4,180 (2,129) | 0 |
| **Current price willing** | 4,867 (3,219) | 2,733 (2,405) | 2,133 (1,673) |
| **Half more price willing** | 4,400 (2,426) | 1,923 (618) | 2,477 (2,373) |
| **Double price willing** | 5,509 (5,396) | 2,612 (1,458) | 2,897 (5,060) |
| **Total** | 5,085 (4,313) | 2,703 (1,887) | 2,382 (3,789) |

**Source:** *Field survey, 2018-19*

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### 4.5 Willingness for decrease in tobacco-leaf supply

Tobacco control requires commensuration in both demand and supply side factors. Over-supply of tobacco-leaf may lead to lower ex-factory prices and lead to high prevalence rates. With contraction in tobacco demand, supply needs to be gradually decreased overtime. This can be achieved by decreasing the quota allotted to farmers as per contraction in demand. We explored about unconditional willingness of farmers for decrease in tobacco leaf supply. Findings show that farmers having license with any tobacco company were less willing to decrease tobacco cultivation as compared to non-license holder farmers. Marginal effect of license status shows about 20 percent less probability of willingness for decrease in tobacco supply. Similarly, being tobacco farmer from Mardan and Swabi were also associated with 27 and 34 percent less probability of willingness on decreasing tobacco supply. Furthermore, increasing dependence on tobacco for livelihood and tenancy status also increases the probability of unwillingness for quota decrease. However, farm size and diversification showed positive and significant association for decreasing tobacco quota. These findings commensurate with theory as farmers who have the assurance of tobacco market and pre-determined prices will not risk their livelihood in new experiments. These results reflect the risk aversion behavior as most of the people avoid the risk for uncertain payoffs over certain payoffs. However, farmers already achieved diversification in their livelihood are more willing for decrease in tobacco supply because of their reduced dependence of tobacco and their familiarity with other livelihood activities. Details of the effects of different factors are presented in Table 4.5.

**Table 4.5 Willingness to decrease tobacco supply**

| Variables | Marginal effects | Coeff | R.SE | Z | P> \|Z\| | 95% [C. I] | X |
|---|---|---|---|---|---|---|---|
| **License status (D)** | -0.196 | -0.496 | 0.280 | -1.78* | 0.076 | -1.045 – 0.052 | 0.745 |
| **Age (years)** | 0.002 | 0.004 | 0.007 | 0.58 | 0.561 | -0.009 – 0.017 | 42.15 |
| **Education(years)** | 0.003 | 0.008 | 0.035 | 0.25 | 0.806 | -0.059 – 0.076 | 10.21 |
| **Family size (No)** | -0.001 | -0.003 | 0.013 | -0.25 | 0.806 | -0.030 – 0.023 | 14.10 |
| **Farm size (jeribs)** | 0.016 | 0.027 | 0.016 | 1.72* | 0.086 | -0.004 – 0.057 | 14.63 |
| **Diversification score** | 0.749 | 1.88 | 0.658 | 2.86*** | 0.004 | 0.594 – 3.176 | 0.638 |
| **Tobacco price** | 0.002 | 0.004 | 0.009 | 0.45 | 0.650 | -0.015 – 0.024 | 163.63 |
| **Rent in/out (D)** | -0.073 | -0185 | 0.217 | -0.85 | 0.394 | -0.610 – 0.240 | 0.465 |
| **Infrastructure value** | 0.003 | 0.007 | 0.023 | 0.34 | 0.733 | -0.038 – 0.053 | 9.948 |
| **Total tobacco** | -0.042 | -0.106 | 0.045 | -2.37** | 0.018 | -0.193 - -0.018 | 5.26 |
| **Mardan (D)** | -0.273 | -0.730 | 0.341 | -2.14** | 0.032 | -1.390 - -0.061 | 0.210 |
| **Swabi (D)** | -0.344 | -0.893 | 0.308 | -2.90*** | 0.004 | -1.497 – -0.289 | 0.644 |
| **Tenant (D)** | -0.155 | -0.395 | 0.243 | -1.63 | 0.104 | -0.871 – 0.081 | 0.470 |
| **Own cum tenant (D)** | 0.008 | 0.021 | 0.302 | 0.07 | 0.945 | -0.572 – 0.613 | 0.216 |
| **Constant** | | -0.761 | 1.703 | -0.45 | 0.655 | -4.100 – 2.578 | |

No. of observations =185, Wald chi2(14) = 34.87, Prob > chi2 = 0.0015, Pseudo R2 = 0.1194
Log pseudolikelihood = -112.63642, y = Pr(consent) (predict)= .46349973,
*** significance level of 1 percent, ** significance level of 5 percent, * significance level of 10 percent

**Source:** *Field survey, 2018-19*

## 5. Conclusion and Recommendations

The study was conducted with the objective to explore the willingness of tobacco farmers to decrease and phase-out tobacco leaf supply. The study found that there is mixed situation as some farmers are willing while others need incentives for decreasing and phasing out tobacco leaf supply. It was found that 75 percent of the farmers use production contracts and they produced 5,851 kg of tobacco on average. However, the fact that non-contract farmers produced less than half the quantity of license holders indicates the effectiveness of contract-based tobacco production. There was a significant difference in production and prices of tobacco between license-holder and non-license-holder farmers. Contract holders received average prices of 166.03 rupees per kilogram, while non-contract holders could receive average prices of 155.53 rupees per kilogram. It was found that being a license holder and heavy reliance on tobacco for income generation is negatively associated with decreasing tobacco leaf supply while high livelihood diversification score is associated with willingness for decrease in tobacco leaf supply.

The study recommends that farmers be prohibited from producing tobacco without a proper agreement. Mere advice from PTB can be replaced by concrete government action. However, consent of all those farmers who want to cultivate tobacco should be sought in advance, and then the required tobacco quota should be distributed among them according to their farm size, tobacco infrastructure and their previous history. Illegal manufacturers and tobacco buyers without contracted tobacco farmers should be strictly banned. Banning illegal manufacturers and buyers will help in controlling tobacco leaf supply and discouraging illicit tobacco products availability. Likewise, contracts should be ensured to farmers only on the basis of their land registration and relevant tobacco curing structures. Moreover, tobacco leaf supply can be decreased further by ensuring quota compliance by contract-holder farmers. Taxes can also be applied as a tool to ensure farmers follow quotas and to discourage quota violations. Government can impose a progressive tax on contracted farmers according to the extent of quota violation. Binding the tobacco companies to purchase all the cured tobacco (poor and good grades) from contract holders can eliminate space for illegal manufacturers and buyers in the market. Squeezing out space for illegal manufacturers and buyers will also help in controlling illicit tobacco trade. Apart from these measures, earmarking certain shares of tobacco taxes for motivating farmers to decrease tobacco leaf supply and increase their willingness for quota cuts can help increase the effectiveness of contract-based tobacco production. Finally, new business opportunities in the form of poultry, dairy, and contract-based horticultural crops production can provide tobacco farmers with sustainable sources of livelihood and encourage tobacco quitting.

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