ECONOMIC AND ENVIRONMENTAL IMPLICATIONS OF NON-CUSTOM PAID VEHICLES IN DISTRICT SWAT

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CERTIFICATE

This is to certify that this thesis entitled: **"Economic and Environmental Implications of non-Custom Paid Vehicles in District Swat".** submitted by Sajid Iqbal is accepted in its present form by the Department of Environmental Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in **Master of Philosophy in Environmental Economics**.

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DECLARATION

I, Sajid Iqbal, PIDE2016FMPHILENV19, hereby declare that I have produced the work presented in this thesis, during the scheduled period of study. I also declare that I have not taken any material from any source except referred to wherever due that amount of plagiarism is within acceptable range. If a violation of HEC rules on research has occurred in this thesis. I shall be liable to punishable action under the plagiarism rules of the HEC.

Acknowledgement

Allah, The Almighty, is the only one deserving of all praise and glory, for He is the only One who can set our paths straight. Muhammad (P.B.U.H.), The Last Prophet of Allah Almighty is the one who show humankind the path of enlightenment.

I would first like to thank my thesis supervisor **Dr. Junaid Alam Memon**, Assistant Professor at Pakistan Institute of Development Economics. Dr. Memon was always open to help and guide.

My acknowledgement would be incomplete without thanking the biggest source of my strength, my family. The blessings of my parents and the love and care of my brother and sister who never let things get dull or boring. I thanks them for putting up with me in difficult moments where I felt stumped and for goading me on to follow my dream of getting this degree.

Researching is a tedious task that cannot be complete in isolation. The support and help of friends and the guidance of teachers is of utmost importance in this process. I express my deepest gratitude to those who helped me in this journey.

Sajid Iqbal

Abstract

District Swat is famous for its scenic beauty and clean environment. However, there are various factors, which affect the local natural environment. Among these, the important factors are population increase and resulting increase in the number of vehicles. NCP vehicles are not only causing air pollution, traffic jams and rod accidents in Malakand division but this illegal trade also costs the government of Pakistan. With this background, this study analyzed the economic and environmental effects of NCP vehicles in the district Swat. The study used both primary and secondary data. The primary data was collected from 300 vehicles users in district Swat through structured questionnaire. To estimate the emissions from the vehicles used, secondary data was used which has obtained from District Police Office (DPO), Swat. The sample was selected from three tehsils namely Mingora, Khwazakhela and Kabal. To estimate the economic and environmental costs of NCP vehicles in district Swat, both descriptive statistics and regression analysis is used. The regression analysis is use to estimate the determinants of the health cost due to air pollution, noise pollution and congestions. Furthermore, the perceptions of the users were noted and analyzed in the text. The findings revealed that majority of the respondents possessed 1300 CC engine vehicles. Small road width, increase in number of non-custom paid vehicles, improper management of traffic control were the key causes of congestion. Due to congestion, the residents suffer from headache, mental stress, tension, irritation and wastage of time. Not all but some of the respondents were willing to pay and support the congestion tax. Majority of the respondents reported that air quality is dirty. In comparison to the air quality of last 10 years, it worsened. Majority of respondents reported that increase in number of non-custom paid vehicles is the main cause of air pollution. Some of the respondents faced Eye, skin and breathing problems. Main reason of noise pollution in district Swat is increase in number of vehicles especially increase in number of non-custom paid vehicles followed by urbanization and industries. The respondents suffered from sleeping disturbance, patient mental disturbance, tiredness and hearing problem due to noise pollution. The regression results showed that traveling time, Distance from the main road and main bus stand has positive and statistically significant impact on the health cost. The age and income has negative and statistically significant impact on the health cost.

Besides, willingness to pay for congestion tax of the rural people is more than that of the urban. The coefficient of monthly income has positive and statistically significant impact on the willingness to pay more congestion taxes. The coefficient for variable ‘distance of residence from main road’ and household size has positive and statistically significant impact on willing to pay more congestion taxes. According to the responses of the respondents, the prices of NCP impact the CP prices in the market. The simulations show that district Swat produces more CO_2 emissions as compared to other areas. There needs strict monitoring over the boarders of Afghanistan which is the main source of NCP vehicles transfer in Swat. It is also suggested to the local government and local traffic police to control the excess flow of vehicle and strictly advise the drivers to follow the traffic rules in district Swat to avoid such problems. I recommend the local government to limit the number of registration and make changes in the legislation to control these NCP. I also suggest the head of Vehicle Emission Testing Station (VITS) to issue the stickers and certificate to those vehicles, which fulfil the national environmental quality standard (NEQS) and ban those, which failed to fulfill the standards.

CHAPTER 1

INTRODUCTION

1.1: Background and Statement of the Problem

District Swat is famous for its scenic beauty and clean environment. However, there are various factors, which affect the local natural environment. Among these, the important factors are population increase and resulting increase in the number of vehicles. The population of district Swat is 2.31 million, which was 1.25 million in the year 1998 (PBS, 2018). The growing population also fueled increase in the demand for vehicles.

The people in Swat use both custom paid and non-custom paid (NCP) vehicles. Majority of the people prefer to buy NCP vehicles because these have low prices as compared to custom paid vehicles. The local administration cannot take any actions against these NCPs because District Swat has exempted from the Customs Act 1969. The statistics given in table 1.1 shows that the total number of vehicles has increased during 2011 and 2015 in both district Swat and in Khyber Pakhtunkhwa. However, a large number of non-custom paid (NCP) vehicles are locally register with the district police office in district Swat. According to the latest data available in the DPO Swat office, a total of 60,000 NCP vehicles moving in district Swat in the year 2016. Total number of all vehicles in Swat is 114,226 and every 18^{th} person owns a vehicle in Swat (Khaliq, F. (2015).These vehicles causes' environmental degradation and ultimately impact the local community. Therefore, the need for an energy efficient and environmental transportation system especially in the extra-large cities of the world emerges out forcefully (Salman and Qureshi. (2009).

Table 1. 1: Number of Motor Vehicles (On Road) of Different Classes Government and

Private Owned in Swat and Khyber Pakhtunkhwa

Year	District	Total	Motor Cycle & Scooter	Motor Cars, Jeeps	Tractors	Buses/ Mini Buses	Motor Cabs (Taxies	Motor Cabs Rickshaws	Delivery Vans/ Pick-up	Public Carrier Vehicles (Trucks)	Other
2011	Swat	33409	6760	7892	2301	788	1168	2820	4243	2643	4794
	KP	857852	292947	154617	42904	44178	6080	44082	50296	51493	171255
2012	Swat	33597	6768	7894	2305	788	1168	2912	4245	2644	4873
	KP	997877	389692	158604	45247	45146	5933	45218	60806	53427	193804
2013	Swat	33597	6768	7894	2305	788	1168	2912	4245	2644	4873
	KP	997877	389692	158604	45247	45146	5933	45218	60806	53427	193804
2014	Swat	40314	10751	10003	2374	920	0	3211	4610	3282	5163
	KP	1269813	560533	189873	47428	46277	1674	50485	74639	56263	242641
2015	Swat	43847	13125	10124	2403	929	0	3939	4651	3413	5263
	KP	1380330	658594	191719	48346	46364	1674	55058	78503	56919	243153

Source: Computed by authors based on field survey for the year 2018.

From the year 2011 to 2015 there is an increase of 60.91% in total number of vehicles in KP while in district Swat the total number of vehicles increased by 31.24% (Table 1.1). The increasing number of vehicles is more severe and alarming in Malakand division because there is no restriction from government on NCP vehicles to use internally (Khaliq, 2015). Such vehicles are use in the seven districts of Khyber Pakhtunkhwa namely Buner, Chitral, Malakand, Shangla, Lower Dir and Upper Dir. According to Yusufzai, (2011), there are 1.45 million

vehicles moving in these seven districts without paying any custom and excise duty to the government.

The most important factor that further makes keeping a vehicle affordable is availability of low cost fuel called compressed natural gas (CNG). The petrol and diesel prices are higher than the CNG; therefore, most of the people converted their vehicles into CNG. Due to which the pressure on gas consumption is continuously increasing which further caused load shedding and low pressure of natural gas impacting the local community. Most of CNG stations are in Mingora city, which is the main city of district Swat. All of CNG vehicles (both custom paid and Non-custom paid) fueled from these stations are making Mingora city more congested. Traffic jams becomes more severe at morning and evening time due to use of public and private vehicles for the offices, schools, colleges and other important activities (Salman & Qureshi 2009).

It's also worth mentioning to note that most of the non-custom paid vehicles are being imported from Japan through Afghanistan and retained locally in Swat or sent to other areas of Pakistan. The cost of these automobiles ranges from one-third (1/3) to half of the actual price of the cars of the same model in Pakistan.

In district Swat, the situation is serious because people use both NCP and CP vehicles. The capital city faces problems in devising proper traffic planning and management causing serious congestion and ultimately the local economy (Matin.et al 2012). The increasing number of NCP vehicles has both economic[1] and environmental implications in the District Swat. The

[1] The economic implications of the NCP vehicles mainly includes their impact on the prices of the custom paid vehicles and health cost born by the local people in district Swat.

increase in the number of vehicles is one of the main causes of warm weather in the Swat valley (Khaliq, 2016).

Furthermore, NCP vehicles are not only causing air pollution, traffic jams and rod accidents in Malakand division but this illegal trade also costs the government of Pakistan about 5,080 billion rupees per year (Sharif, Farooq & Bashir.2000).

To avoid such issues, there needs effective management for transportation sector especially in the big cities (Weisbrod, Vary, & Treyz, 2003). As According to DPO Office Swat, these NCP vehicles, temporarily registered with local police stations in all the seven district of Malakand division, but there are approximately 840 non-custom paid vehicles, which are not register with local police station in district Dir-lower. The total number of noncustom paid vehicles registered and non-registered with the local police station are reported in table 1.2.

Table 1. 2: Total number of vehicles (Registered and Unregistered) in Malakand Division

Districts	**Total number of NCP vehicles noncustom paid vehicles**	**NCP vehicles Registered with local police stations**	**NCP vehicles Not-Registered with local police stations**
Swat	44749	44749	0
Buner	9832	9832	0
Shangla	5406	5406	0
Dir lower	39363	38523	840
Dir upper	14425	14425	0
Chitral	4215	4215	0
Total	**117990**	**117150**	**840**

Source: District Police Office, Swat (2018)

District Swat has more NCP vehicles as compared to other districts (table 1.2) which is one of the motivations to work on analyzing the economic and environmental effects of NCP vehicles. This empirical study will help planners in devising policy to protect the environment and lessen the economic burden for the local community of District Swat. More specifically, this study will answer the key research questions: Do the prices of the non-custom paid vehicles impact the prices of custom paid vehicles? Are the vehicles' owners willing to pay congestion tax? Is the local people suffers from congestion, air and noise pollution?

Moreover, what socioeconomic factors explain the variation in their health costs?

1.2: Objectives of the Study

The purpose of this study is to analyze the

1. Economic implications of non-custom paid vehicles such as impacts on the prices of the custom paid vehicles and health cost in district Swat.
2. Environmental cost of non-custom paid vehicles in term of CO_2 emission, air pollution, noise pollution and congestions.
3. Willingness to pay for congestion tax by vehicles' owners in the study area.

1.3: Hypotheses of the study

1. Traveling time, Distance from the main road and main bus stand has positive impact on the health cost while age and income has negative impact on the health cost.
2. Monthly income has positive impact on the willingness to pay more congestion taxes.

1.4: Organization of the study

This study is organize to five chapter. The introduction of the study is given in Chapter 1. Chapter 2 focus on literature review. Data and methodology has been given in chapter 3. Results and discussion is given in chapter 4. In chapter 5, conclusion and recommendations has been given.

CHAPTER 2

LITERATURE REVIEW

Effective transportation system fuels the economic development, but there are many problems and externalities, which are also caused by this sector, needs to tackle through proper effective urban policy (Ruta, 2002). Among the externalities congestion is one of the factors that require proper management and planning (Matin, et al 2012). The high traffic cause injuries (Bhatti and Ajaib, 2008), economic and environmental problems (Jakob and Fisher, 2006; Behrens et al. 1992) and social cost (DeLuchi et al 1987; Kanafani 1983). Among these problems, air and noise pollution are also important factors caused by the transportation system (Jones, 1993; Fuller, et, al. 1983; Levinson, Gillen, Kanafani, Mathieu, 1996; Hokanson et al. 1981). Many researchers pointed out that road accidents, are also one of the outcomes of transport system (Sullivan, 1988; Livneh and Hakkert, 1972; MacKenzie, et al. 1992; Komanoff and Ketcham, 1993) and millions of the people die every year due to road accidents (WHO. (2004).

Noise pollution in general can also have psychological effects and can affect reading abilities and long-term memories of children (Stansfeld, et al. 2003). Not only noise can be partly responsible for causing hearing damages such as tinnitus but it can also affect blood circulation, extreme hypertension, coronary heart disease and myocardial infarctions (Guerreiro, 2014). Silvia Banfi, (2000) explored the external costs of transport in 17 European countries. Transport is an essential component of life. Effective transport networks bring health benefits by giving people access to work and essential services, shops, leisure facilities and enabling social contact (Killoran et al. 2006). However, different modes of transport have specific effects on society. As road transport accounts for the largest share of transport activities, directly influences urban

development and produces the greatest effects on emissions of pollutants and consumption of energy (European Commission. Directorate General for Energy, 2006). Exposure to noise has adverse effects on the health of the population and ranked traffic noise second among environmental threats to public health (World Health Organization, 2011). Singh & Davar (2004) reported that main sources of noise pollution are loudspeakers and automobiles, which affect population. Major effects of noise pollution include interference with communication, sleeplessness, and reduced efficiency.

The noise pollution also impact children's health and their reading abilities and memories (Hygge et al. 2002; Evans et al. 2007). Among the other causes of noise pollution, researchers identified other causes of noise pollution such as teacher and learner frustration (Evans, 1993), learning weaknesses (Evans & Stecker, 2004), lack of attention (Cohen, et al. 1973) increased stimulation (Yerkes & Dodson, 1908) and noise irritation (Eagan, 2004). Cardiovascular diseases also found in adults from noise pollution of vehicles and aircrafts and there are some evidences that noise may also influence children's blood pressure levels (kempen, et al. 2006) & Belojevic, et al 2008). Studies have also found associations between noise exposure and children's psychological health (Stansfeld, et al. 2009) & Lercher, et al. 2002).

Study in Hong Kong shows that air pollution from vehicles is main cause of respiratory diseases and lungs infections in children (Chan-Yeung, 2000). There are many sources of air pollution but land transportation is the main reason (Afroz, et al. 2003). Epidemiological studies show a clear relationship between air pollution and asthma, chronic and pulmonary diseases, and some time deaths also occurs from these diseases (MacNee, et al. 1999).

Carbon monoxide is an odorless and really dangerous gas that comes out from combustion of fuels in vehicles engine, and by inhalation it enters in to blood due to which circulation of blood affects, adversely affecting the internal body tissues and sensitive organs and like brain and heart (Bascom, et al, 1996). According to the report of Ministry of Economic Development, (2001) in New Zealand the main source of carbon monoxide is vehicles. In studies (Braun, 1992; Dockery, et al, 1982 & Xu, et al, 1991; Euler et al. 1987; Ostro, 1990; Ransom, et al. 1992) found that increase in the air pollution causes lungs diseases, pulmonary diseases respiratory diseases like cough, shortness of breath, wheezing, and asthma attacks.

Congestion from traffic affects the daily routine of people and also increases the health cost. There are many studies on congestion and its effects, Arnott and small (1994) found the undesirable effect of vehicle to environment, like air pollution noise pollution and congestion. McKinnon, (1999) reported the effect of congestion on daily routine actions. Goodwin and Dargay, 1999) highlighted the traffic congestion issues faced in Europe. Study conducted by Australian Government, Department of Transport and Regional service (2007), estimated the cost of congestion amounted to USD 10 billion per year that includes operation cost, private and business time cost. . While Khan and Islam (2013) estimated the congestion cost of USD 3.868 billion in Dhaka which include social, environmental and travel time cost.

The congestion on road also effects the tourists on roads and waste time of employed people affecting their economic productivity (Weisbrod, et al. 2003; Hashimoto, 1990). In addition, to develop the tourism industry, it is important to control the congestion problems on roads. Moreover, some time the rate of accidents is relatively high in tourism sessions (Hau, 1992) which discourage the tourists. In the report of WHO (2009) one of the major reason for

accident of tourist is the congestion on roads. The congestion has severe economic and environmental impacts which is serious problem of both developed and under developing countries (Golob, and Regan, 2000).

Air pollution in south Asia region is serious leading to a low quality of life and making its cities less attractive (Sánchez-Triana, et al. 2014). According to the report of Gallup Pakistan Big Data Analysis (2016), in Pakistan the number of private vehicle is rapidly increasing than that of public vehicles, due to which the congestion on roads is increased. The traffic related problem like congestion and air pollution can only be control by reducing the growth of private vehicles use (Sheldon & Jones, 1993).

The transportation system also causes CO_2 emissions impacting human health (McCubbin and Delucchi, 2003). This increasing CO_2 emission can be reduce through reduction in the prices of the alternative fuels (Kazimi, 1997). The congestion tax is also one of the solution to reduce to protect the environment (Fullerton, et al 2008).

District Swat is one of the recreational area where the NCP vehicles are moving within bounds of Malakand division and these vehicles, which is illegally traded from Afghanistan without custom duty. Due to its low cost, people can easily purchase it, which manifolds the environmental burden in the district. This is the extra burden, which put pressure on the prices of the custom paid vehicles and cause many environmental problems. The present study contributes to literature by evaluating the economic and environmental implication of noncustom paid vehicle in the District Swat. Similar study were not been conducted in the past so this study covers this gap.

CHAPTER 3

DATA AND METHODOLOGY

3.1: Nature of Data

The present study is based on both primary and secondary data. The primary data was collected from 300 vehicles users in district Swat through structured questionnaire (see appendix-A). The questionnaire included data on general information, congestion, air pollution and noise pollution.

To estimate the emissions from the vehicles used, secondary data is used which has obtained from District Police Office (DPO), Swat.

3.2: Sampling design

Most of the NCP vehicles are available in the general bus stand of Mingora, Khwazakhela and Kabal tehsils of district Swat, which accommodates majority of the NCP vehicles for transport in the District. So, a sample of 300 NCP vehicles owners (respondents) that selected from these Bus Stands (Adas) and residence of these three tehsils. The respondents were collected randomly. The sampled taken from Mingora, Khwazakhel and Kabal were 28.7%, 28 % and 43% of the total sample. The total sample size has been estimated through online sample size calculator using confidence interval as 95% and margin of error 5%.

3.3: Methodology

To estimate the economic and environmental costs of NCP vehicles in district Swat, both descriptive statistics and regression analysis is used. The regression analysis is use to estimate

the determinants of the health cost due to air pollution, noise pollution and congestions. The details of the economic and environmental indicators are, given as under:

3.3.1: Congestion:

"Traffic congestion is defined as the condition in which traffic move slower than normal speed as huge number of vehicles use the same road and trying to move forward and potential of the road is less than traffic flow" (Weisbrod et al., 2003). In this study the congestion information has been obtained through questionnaire (see part-B of appendix-A).

3.3.2: Air pollution:

"Air pollution is the term used to describe the presence in the atmosphere of one or more air contaminants in quantity that will be injurious to or unreasonably interfere with public health welfare and the natural and environmental process" (EPA 2002). The indicator of air pollution, was estimated using, the perceptions of the respondents. This information was obtained through questionnaire (see part C of appendix-A).

3.3.3: Noise pollution:

Noise is a sound, which is unwanted by humans because of negative effect on human health physically, and mentally (York, 1971). This indicator will be estimated using the perceptions of the respondents and by using Sony tube software proposed by Shujahi and Hussain (2016) according to them if the average dB turns out to be more than the standard (85 dB), then that is considered as noise pollution. This information was obtained through, questionnaire

(See part D of appendix-A).

3.3.4: Aggregate health Costs function

The perception of the respondents was also be noted about the effect of NCP on the prices of CP vehicles. Besides, the aggregate health cost function, estimated through, the following regression model:

$$HC_i = \beta_0 + \beta_1 T_i + \beta_2 DR_i + \beta_3 B_i + \beta_4 R_i + \beta_5 DB_i + \beta_6 E_i + \beta_7 Y_i + \beta_8 A_i + \mu_i \quad (3.1)$$

Where HC is the monthly health cost of ith respondent, T_i is the length of time the *ith* individual exposed to a congestion (travelling time), DR_i is the residence distance of the respondent from main road. B_i Is the existence of any barrier during traveling, R_i is the area to which the respondent belongs, DB_i is the distance of the individual between residence and main bus stand (ada).E_i Is the education of the individual in years, y_i is the per month income of the individual and A_i is the age of the individual in years. We estimate this model with the help of Ordinary Least Square.

3.3.5: CO_2 Emission from the vehicles use

The carbon dioxide emission released from the vehicles use is, estimated through using conversion factors for different fuel use. To this end, secondary data is used.

3.3.6 Determinants of the willingness to pay for congestion tax

The determinants of the willingness to pay for congestion tax were, estimated using the following linear logistic regression model.

$$WTP_i = \alpha_0 + \alpha_1 T_i + \alpha_2 DR_i + \alpha_3 DR_i + \alpha_4 B_i + \alpha_5 R_i + \alpha_6 DB_i + \alpha_7 E_i + \alpha_8 HS_i + \alpha_9 Y_i + \mu_i \quad (3.2)$$

where WTP is a binary dependent variable taking value 1 if the vehicle owner is willing to pay offered congestion tax and 0 otherwise, $T_i$is the length of time the *ith* individual is exposed to a congestion (travelling time), DR_i is the residence distance of the respondent from main road. B_i is the existence of any barrier during traveling, R_i is the area to which the respondent belongs, DB_i is the distance of the individual between residence and main bus stand (ada), E_i is the education of the individual in years, HS is the house hold size and y_i is the per month income of the individual.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter provides information about the descriptive statistics of the variables used in the study. Besides, the analysis of congestion, air pollution, noise pollution and their causes, are given in detail, in subsequent sections. Analysis about price effect, health cost and willingness for the congestion tax is also given and explained in this chapter.

4.2 Descriptive statistics of the major variables

The average education of the respondents is middle class (7^{th}), with an average income of Rs 29000/- per month. In addition, the respondents on average possessed more Non-custom paid than custom paid vehicles consuming 12000 rupees per month on fuel. The reason is that respondents can easily get non-custom paid vehicles in the study area. The average traveling time of the individual is 15 hours per month with an average distance of 258 km per month. The average distance of the residence of the individual from main road is 1.5 km and 2.0 km from main bus stand (Table 4.1).

Table 4. 1: Descriptive Statistics of Variable Used In Study

Variables	Definition	Mean	Standard deviation
Monthly Health Cost (**Dependent)**	Monthly health cost bear by individual due environmental problems (congestion, air pollution, noise pollution) from vehicles.	3255.67	2005.31
Explanatory variables			
Education	Education of the respondents (in year)	7.95	4.10
Age	Age of the individual (in years)	27.25	4.70
Income	Per month income of the respondent (in Rs)	29215.92	11680.15
Household size	House hold size	9.21	3.62
Custom paid	Total number of custom paid vehicles	0.52	0.60
Non custom paid	Total number of non-custom paid vehicles	0.94	.45
Distance	Average distance travelled by individual in a week including holidays in vehicle.	257.40	85.12
Fuel quantity	Average quantity of fuel used by individual during traveling in a week.	12008.10	9989.97
Time	Average per week travelling time of individual in hours.	15.33	4.65
Distance of residence	Average distance in Km of individual residence from main road.	1.55	1.16
Distance from main bus stand (ada)	Average distance in km of individual residence from main bus stands (ada).	2.05	1.78
Congestion tax	Average amount of willingness to pay for congestion tax per month.	351.33	233.52
Fuel availably	Availability of fuel in filling station per week.	7.0	.00
Time in filling stations	Average time an individual spend in filling station in a week.	2.66	2.55

Source: Computed by authors based on field survey for the year 2018.

4.3 Type of vehicle and fuel used

The information of the possession of vehicles by type of engine CC are given in table 4.2 showing that majority of the respondents possessed 1300 CC engine vehicles. Besides, about 40 percent of the vehicle owners use petrol followed by and petrol plus CNG (35%) as a fuel in their vehicles.

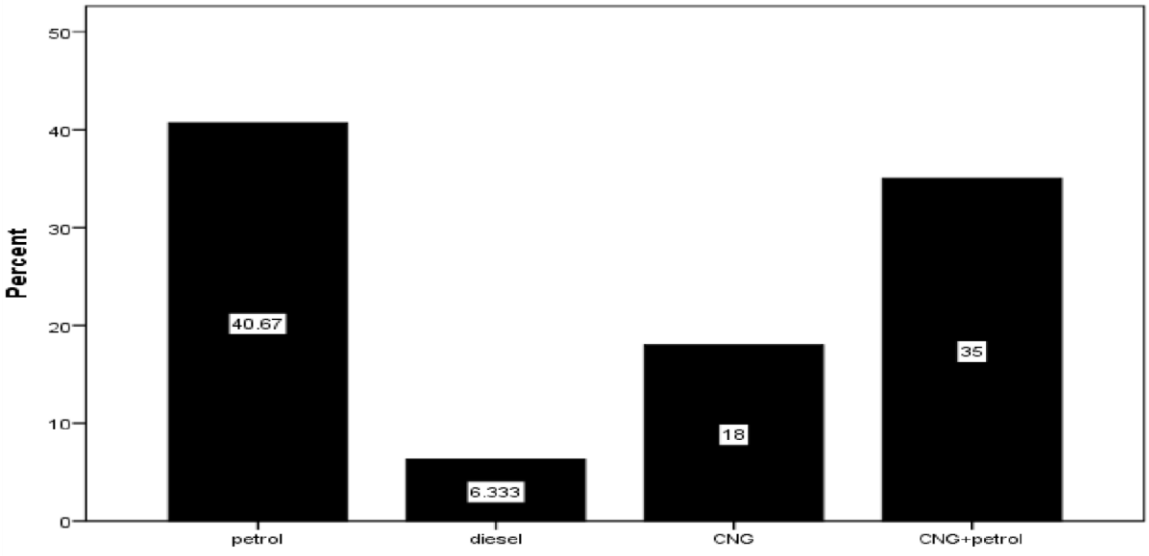
Table 4. 2: Type of Vehicle possessed by respondents with respect to Engine CC

Engine CC	Frequency	Percent
800	16	5.3%
1000	47	15.7%
1300	88	29.3%
1400	15	5.0%
1500	13	4.3%
1600	38	12.7%
1800	31	10.3%
2000	35	11.7%
3000	17	5.7%
Total	**300**	**100**

Source: Computed by authors based on field survey for the year 2018.

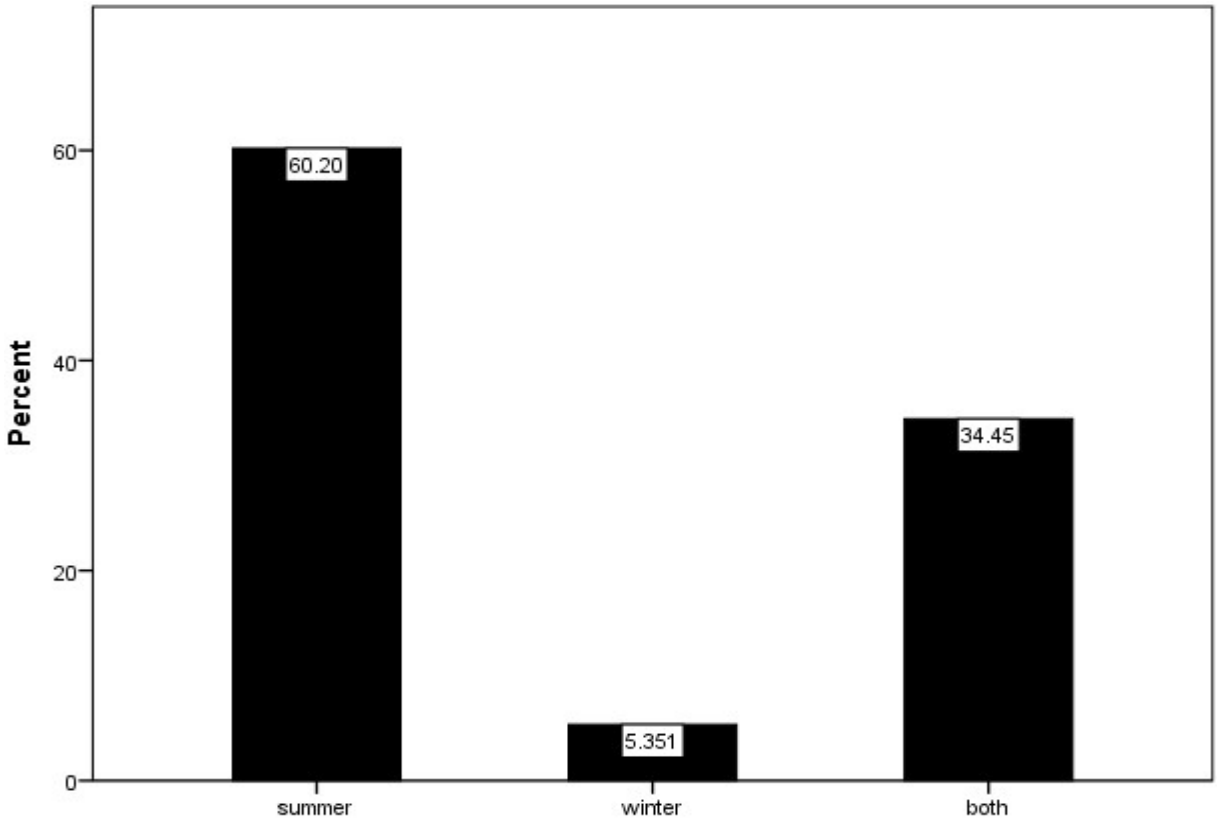
It is also worth mentioning to note that the traffic problems arise mainly in the summer season in district Swat (Figure 4.2). The reason is that Swat is a tourist area and many tourists both national and international visit in Swat to enjoy its cold weather, glaciers and hilly areas.

Figure 4. 1: Type of Fuel used



Source: Computed by authors based on field survey for the year 2018.

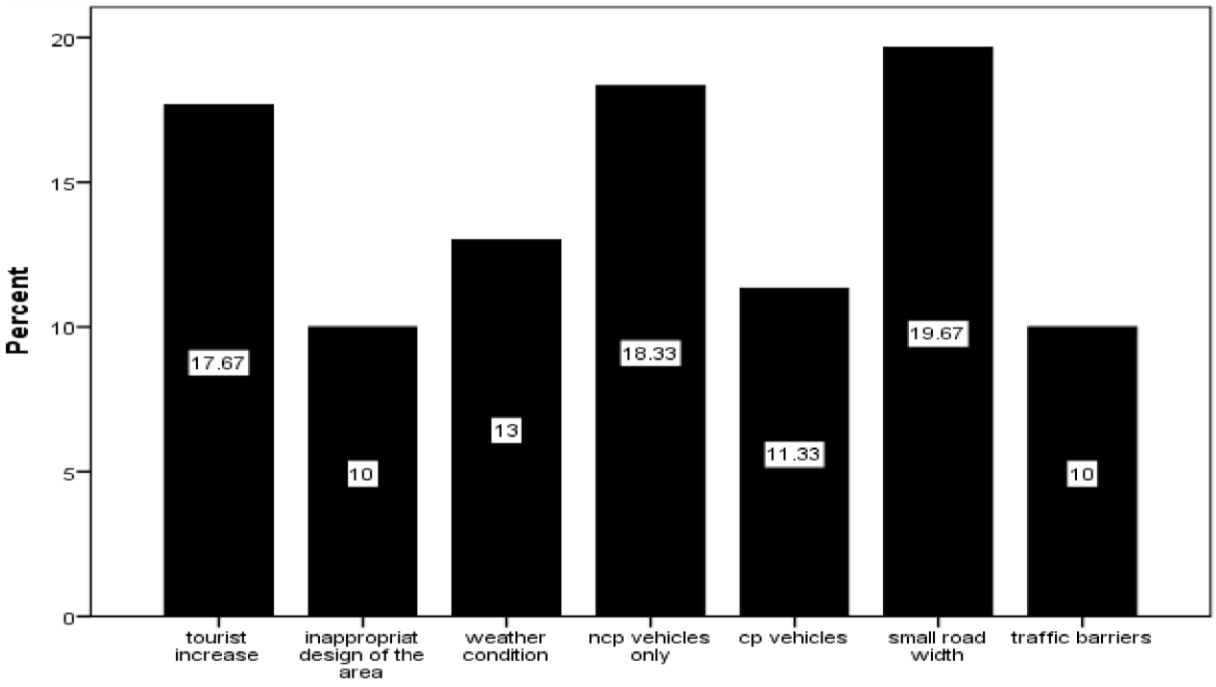
Figure 4. 2: Severity of the traffic problems across seasons



4.4. Main cause of congestion in study area

According to perception of the respondents, the people of the district Swat are facing a severe problem of traffic congestion on road. As 19.67% of the respondents reported that small road width is the main cause of congestion. The number of vehicles is more than road width capacity due to which flow of vehicles is affected and causes road congestion. Besides, the increase in number of non-custom paid vehicles, which is increasing rapidly in the area due to which rush on road also increases and cause congestion. Swat is famous for tourism, therefore large number of tourists is visiting Swat on daily basis and due to small road width and improper management of traffic control, congestion on roads occurs.

Figure 4. 3: Perception of respondents about Causes of Congestion



Source: Computed by authors based on field survey for the year 2018.

4.5 Perceptions on the Effects of congestion on health

Table 4.3 and 4.4 showing the perception of the respondents about the effect of congestion on health. Majority of the respondents reported that the people in district Swat are directly affecting from congestion. Majority of the respondent reported that people are mainly facing the problem of mental stress followed by irritation. Yusufzai (2011) found that congestion on road stimulate the human body, which create a certain type of hormones, which make person feel tired, irritated and mentally stressed. Some of the respondents also reported that people facing the problems of headache, tension and wastage of problem due to congestion in the study area (Table 4.4).

Table 4. 3: perceptions on the Effect of congestion

Effect on congestion on health	Frequency	Percent
Definitely Yes.	88	29.3%
Yes.	158	52.7%
Indecisive	14	4.7%
No	40	13.3%
Total	**300**	**100.0%**

Table 4. 4: Type of Congestion Effects on Health

Effect of congestion on health	frequency	Percent
Headache	34	21.8%
Mental stress	40	25.6%
Tension	20	12.8%
Irritation	37	23.7%
Waste your time	23	14.7%
Other (specify)	4	1.3%
Total	**158**	**100.0**

Source: Computed by authors based on field survey for the year 2018.

4.6 Willingness to support and pay congestion tax.

Table 4.5 shows the perception of the respondents about willingness to support congestion tax. As people of district Swat is facing severe problem of congestion on road due to noncustom paid vehicles, small road width and tourist increase, and facing a severe health problems and also face financial loss in the form of extra fuel use. These are the key factors due to which respondents are willing to support congestion tax.

Table 4. 5 : Willingness to support and willingness to pay congestion tax

Type of Response	Willingness to Support		Willingness to pay	
	Frequency	Percent	Frequency	Percent
Definitely Yes	37	12.3%	37	12.3
Yes	104	34.7%	104	34.7
Indecisive	76	25.3%	76	25.3
No	57	19.0%	57	19.0
Definitely No	26	8.7%	26	8.7
Total	300	100	300	100

Source: Computed by authors based on field survey for the year 2018.

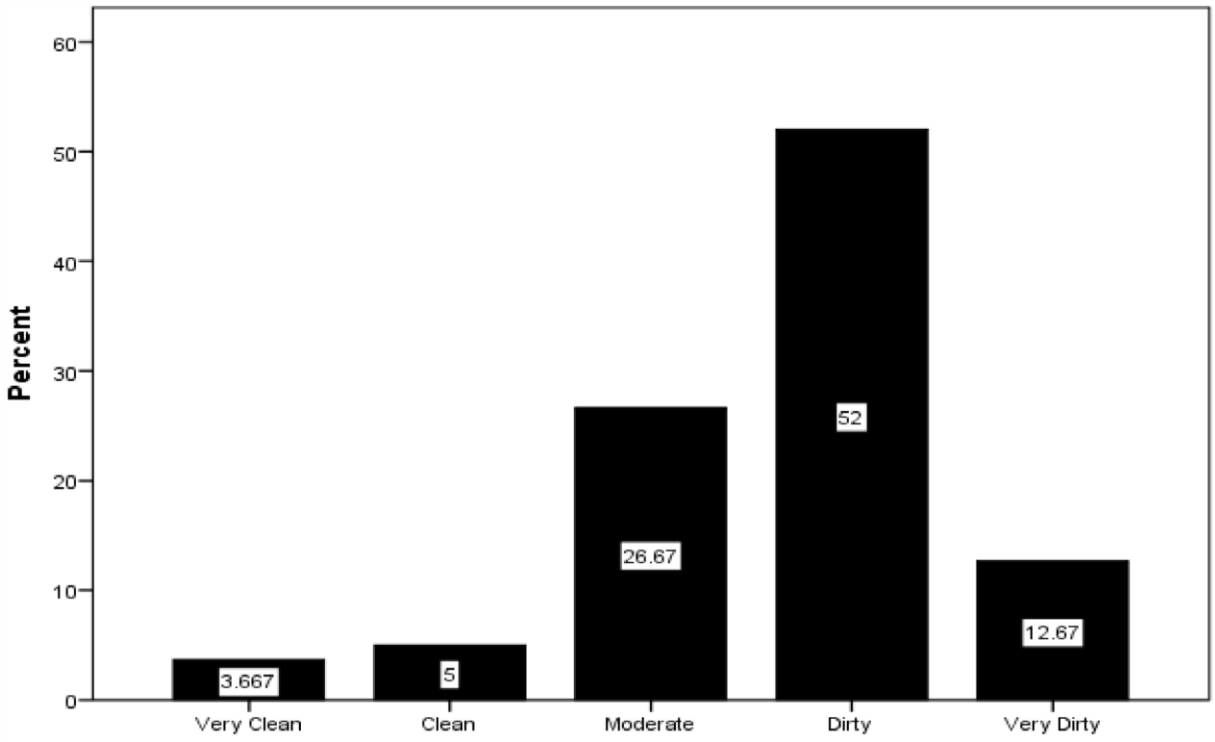
The table 4.6 and 4.7 shows the perceptions of the respondents about how much amount they are willing to pay as congestion tax to minimize problem of congestion on roads. Although

district Swat is tax free zone but still majority of the respondents are willing to pay and support the congestion tax. On average they were willing to pay congestion tax amounted to Rs. 352 per month.

4.7 Perception of the respondents about air pollution

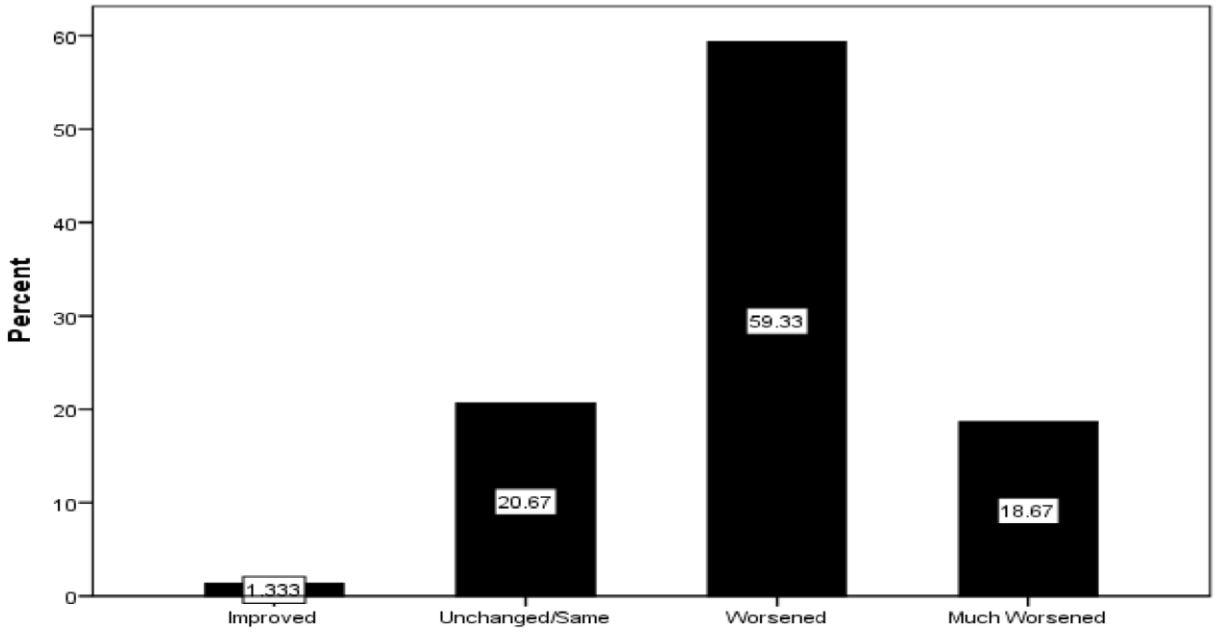
District Swat is famous for its beauty and clean environment, but there are many factors like increase in number of vehicles, industries and many other which affect directly or indirectly the environment of Swat. Majority of the respondents reported that air quality is dirty. In comparison to the air quality of last 10 years, it worsened because of population increase and increase in number of vehicles (4.5).

Figure 4. 4: Perception of the respondents about the quality of air



Source: Computed by authors based on field survey for the year 2018.

Figure 4. 5: perception of the respondents of the comparison of current Air quality with 10 years ago



Source: Computed by authors based on field survey for the year 2018.

4.8 Main causes of air pollution

Table 4.6 shows the perceptions of respondents about cause of air pollution. Majority of respondents reported that increase in number of vehicles especially increase in number of non-custom paid vehicles is the main cause of air pollution. Respondents also reported that increase in construction activity also cause air pollution, which require machineries and other equipment. Urbanization has also reported as one of the key causes of air pollution. This is due to increased demand of urban population for vehicles and other daily needs.

Table 4. 6 : Main Causes of Air Pollution

Cause	Perception in percent	frequency
Construction	38.6%	116
Vehicle increase	54.2%	162
CP	0.6%	1
NCP	68.7%	111
both	30.7%	50
Urbanization	6.7%	20
Other	0.5%	2
Total	**100%**	**300**

Source: Computed by authors based on field survey for the year 2018.

4.9 Reasons of increasing air pollution

Main reason of air pollution in district Swat is the emission from vehicles suffering the local community (Dawn News, 2016). The table 4.7 explains the perception of the respondents about increase in air pollution and most of the respondents reported that according air pollution increased in district Swat.

The table 4.8 explains the main reason of increasing air pollution in the study area. There are many sources generating air pollution. Some major reasons due to which noise pollution produced are industries, vehicles, factories in Pakistan (Hussain, 2018). Majority of respondents reported that in district Swat main reason of air pollution is increase in number of vehicles followed by industries and road construction.

Table 4. 7: perceptions about increase in air pollution

Increase air Pollution	Frequency	Percent
Definitely Yes	188	62.7
Yes	102	34.0
Indecisive	6	2.0
No	4	1.3
Total	**300**	**100**

Source: Computed by authors based on field survey for the year 2018.

Table 4. 8: Reasons of Increase in Air Pollution

Main reason of increasing air pollution	Frequency	% of the total respondents
Increase in number of vehicles	95	94.1%
Increase in number of industries	4	3.5%
Increase in road construction activities	3	2.4%
Total	**102**	**100.0%**

Source: Computed by authors based on field survey for the year 2018.

4.10 Effects of air pollution

As the problem of air pollution is increasing in district Swat day by day. The data available at district health office (DHO) shows that in the year 2016 about 4042 patients have affected from air pollution in district Swat. In our sample majority of the respondents have also affected from air pollution in district Swat. Furthermore, majority of respondents reported that they were facing the problems of eyes followed by breathing and skin problems.

Table 4. 9 : Effect of air pollution

Effect of air pollution	Frequency	Percent
Yes	226	75.3%
No	74	24.7%
Total	**300**	**100.0**

Table 4. 10: Effects of Air pollution on health

Effect of air problem	frequency	% of the total respondents
Eye problems	94	41.8%
Skin problem	39	17.3%
Breathing problems	92	40.9%
Other	0	0%
Total	**225**	**100.0%**

Source: Computed by authors based on field survey for the year 2018.

4.11 Reason of noise pollution

Noise is the unpleasant sound, which adversely affect the human health. According to perception of the respondent (Table 4.11) majority of the respondents are feeling noise disturbance in the area. They also reported that main reason of noise pollution in district Swat is increase in number of vehicles especially increase in number of non-custom paid vehicles followed by urbanization and industries (Table 4.12). Shabih (1989) found that traffic on road is the main cause of noise pollution. In district Swat there is at least one vehicle for every 8 peoples. The large number of these vehicles produces noise pollution in the area.

Table 4. 11: Noise disturbance

Noise disturbance	Frequency	Percent
Definitely Yes	59	19.7%
Yes	187	62.3%
Indincive	46	15.%3
No	8	2.7%
Total	**300**	**100.0%**

Source: Computed by authors based on field survey for the year 2018.

Table 4. 12 : Main Reasons of Noise Pollution

Main reason of noise pollution	% of total respondents	frequency
Vehicle Increase	79.6%	147
CP	1.4%	2
NCP	66.0%	97
Both	32.7%	48
Industries	3.2%	8
Urbanization	13.4%	25
Other	3.8	7
Total	**100%**	**187**

Source: Computed by authors based on field survey for the year 2018.

4.12 Effects of noise pollution on health

According to WHO criteria the noise levels in residential areas should be 45-60db, in commercial areas 55-70db and industrial areas 65-80db (World Health Organization, 1980). Majority of the respondents reported that they have affected from noise pollution (Table 4.13) and also they feeling mental disturbance due to noise pollution in district Swat (4.14). Due to large number of vehicles on roads, noise pollution in district Swat reaches to severe limit. The data available at Swat district health office, about 15,548 of ear diseases recorded in the year 2016 (Khaliq, F. (2016). Some of the respondents also facing problems hearing problem, irritation and mental stress.

Table 4. 13: Effect of noise pollution

Effect of noise pollution on health	Frequency	Percent
definitely yes	76	25.3%
Yes	160	53.3%
Indecisive	64	21.3%
No	0	0%
Definitely no	0	0%
Total	**300**	**100.0**

Source: Computed by authors based on field survey for the year 2018.

Table 4. 14: Effect of Noise Pollution on Health

Effect of noise pollution	% of the total respondents	Frequency
Sleeping disturbance	6.0%	10
Patient mental disturbance	65.0%	104
Tiredness	8.5%	14
Hearing problem	19.5%	30
Other	1.0%	2
Total	**100%**	**160**

Source: Computed by authors based on field survey for the year 2018.

4.13 Estimated Aggregate health cost function for measuring health cost

The results of the estimated aggregate health cost function given in table 4.15 in which we observe positive and statistically significant coefficient for traveling time. This indicates that when the respondent drives for long periods of time then his health cost will increases. This result is reasonable because driving is attentive activity and required more energy and activeness. Therefore, a respondent drive for a long period of time often faces a number of

diseases, which adversely affect their health, and consequently increases his health cost. The coefficient of the variable distance from the main road is positive and statistically significant showing if the distance from the main road increase then the health cost of the individual also increases, because the individual will have to travel an extra distance. The coefficient for the variable barriers during traveling time is statistically insignificant this result is reasonable because if there are barriers on road than the health cost decreases. The people avoid to reduce travelling consequently have less exposure to air and noise pollution.

The result for the dummy variable residence area is also statistically significant, and explains that the health cost of the respondents in rural areas is less than that of urban respondents. Because in urban areas the people are more affected having more expose to pollutions and congestion due to which their health cost increases comparatively.

The result for variable distance from main bus stand is also statistically significant. If distance from main bus stand is increasing then health cost will also be increases because the individual has to travel an extra distance to reach main bus stand. The result for variable education is also significant because, educated people are more conscious to health and the health cost of the educated people is more than, uneducated people.

The age has direct relationship with monthly health cost because the occurrences of diseases are most likely to increase with age. The coefficient for the variable monthly income is also statistically significant because as the income of the individual increases, the individual would be in a position to spend more on health.

Although the coefficient of determination has a low value (0.0348) but the overall significance of the model is statistically significant as indicated by the value of F-Statistic.

Table 4. 15: Regression Results of the Aggregate Health Cost Function

Dependent variable Monthly Health Cost	**Coefficients**	**Standard Error**
Traveling Time	25.37095***	5.10799
Distance of Residence from main Road	122.3153***	23.2368
Barriers during Traveling (Dummy)	-38.42835	53.6451
Residence Area (Dummy)	-103.5496***	49.2342
Distance from main Bus Stand	54.97011***	13.7432
Education	57.13916***	5.9539
Age	29.5549***	5.19196
Monthly income	-125.2172*	56.7617
Constant	2428.004***	612.354
Diagnostic check		
R squared	0.0348	
F Statistic	2011.1027***	

Source: Computed by authors based on field survey, 2018.

- Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

4.14 Determinants of the willingness to pay for congestion tax

The regression results for the determinants of willingness to pay for congestion tax is given in table 4.16. The results show that the willingness to pay for congestion tax of the rural areas is more than that of the urban. Its coefficient is also statistically significant. This may be due to the fact that travelling of the rural people is low or less frequent than, urban people. So rural peoples are more willing to pay congestion tax than that of urban peoples.

The coefficient of education has negative and statistically significant, which means that if education increases then their willingness to pay for congestion tax decreases. The educated people are more willing to pay for other daily needs so they would be less willing to pay taxes.

The coefficient of age is also statistically significant because with increase in age the willingness to pay for congestion tax increases if their exposure to traffic related problem declines.

The coefficient of monthly income is positive and statistically significant showing that individuals having more income, will be in a position to pay more congestion taxes. The coefficient of travelling time has negative impact on willingness to pay congestion taxes. This is due to the fact that the congestion tax would create financial burden to the individuals who has more exposure to travelling.

The coefficient for variable ‘distance of residence from main road’ is positive and statistically significant because the individuals have to cross many barriers to reach to the main road. So to save the time, they would be willing to pay more congestion taxes.

The result of coefficient for the variable barriers in travelling time is also significant which means that if there is less barriers in travelling then the individual will be more willing to pay congestion tax.

The coefficient of barrier is negative and statistically significant showing that as the barriers increases the willingness to pay for congestion tax decreases. This is due to the fact that there are many military check posts in Swat, which by itself creates congestion and have nothing to do with congestion taxes. Therefore, they local people are not willing to pay in such cases.

The coefficient of the variable distance from main bus stands is positive and statistically significant means that if the distance from the main bus stands of the individual increases then the individuals will be more willingness to pay congestion tax because they have to spend more time and cross many barriers.

The coefficient of the variable household size has negative and statistically significant impact on the willingness to pay congestion tax. This is due to the fact that the households would be willing to pay more for day-to-day expenses than paying congestion taxes.

Table 4. 16: Determinants of Willingness to Pay for Congestion Tax

Dependent variable for congestion tax (Dummy)	Coefficients	Marginal effects
Type of Area (Dummy)	0.0733*	0.0159
	(0.285)	(0.0621)
Education	-0.0281*	-0.00611
	(0.0342)	(0.0074)
Age	0.00798	.0017368
	(0.0298)	(.00648)
Monthly income	2.2405*	4.8706
	(1.2105)	(0.0000)
Traveling Time	-0.0172	-0.003746
	(0.0312)	(0.0068)
Distance of Residence from main Road	0.321**	0.069801
	(0.138)	(0.03009)
Barriers during Traveling (dummy)	-0.946***	-0.2137
	(0.313)	(0.07065)
Distance from main Bus Stand	0.387***	0.08418
	(0.115)	(0.02368)
Household Size	-0.0750*	-0.016312
	(0.0395)	(0.00855)
Constant	0.0630	
	(1.236)	
Observations	300	
Pseudo R squared	0.1102	
Wald chi^2	30.90***	

Source: Computed by authors based on field survey for the year 2018 ➢

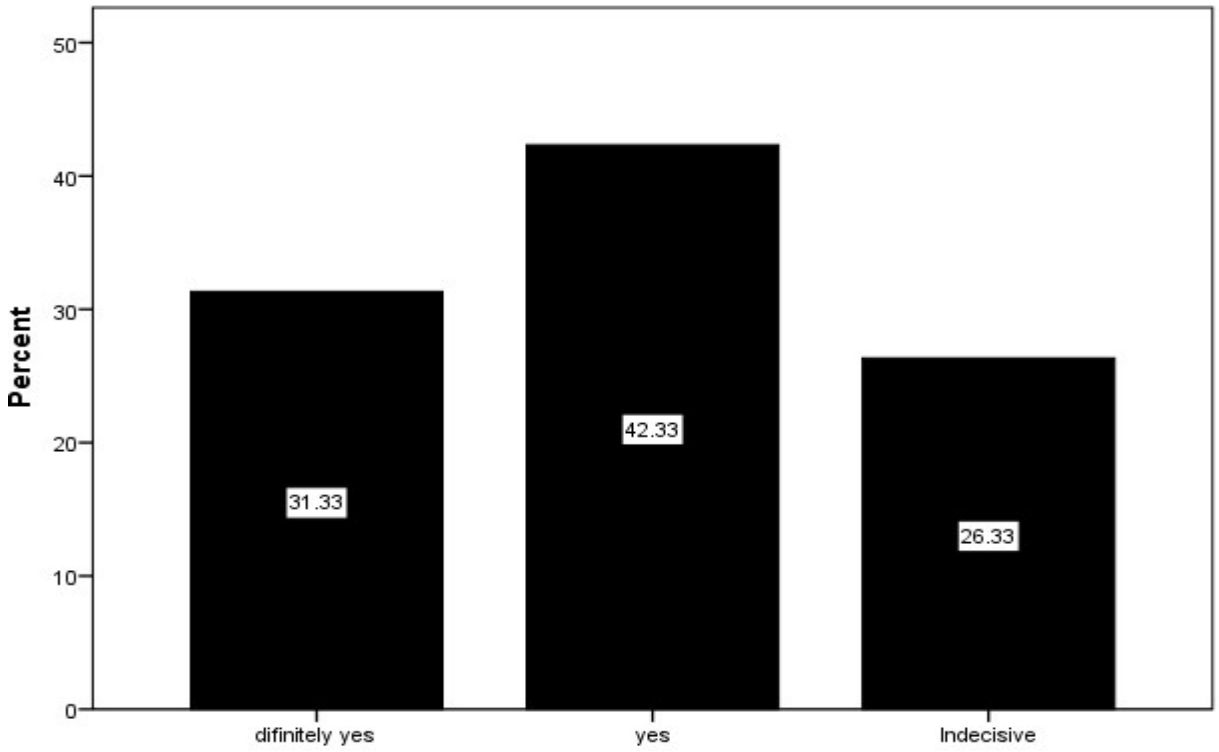
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

4.15 Perceptions on the impact of NCP prices on the prices of CP vehicles

Although there are many factors which impact the prices of vehicles in district Swat but the lower prices of NCP vehicles is one of these factors. People can purchase luxurious vehicles at lower prices distorting the market for CP vehicles. The increase number of vehicles in the district put pressure on the consumption of petrol and CNG, which is also creating problems for those who have CP vehicles. When the respondents were ask that is the NCP vehicles reduces the

prices of CP vehicles, majority of them (42%) reported that the prices of NCP vehicles also reduce the prices of CP vehicles.

Figure 4. 6: **Perceptions of the respondents on the impact of NCP vehicles prices on CP prices**



Source: Computed by authors based on field survey for the year 2018.

4.16 CO_2 Emissions

Table 4.17 show annual emission of CO_2 gas from non-custom-paid vehicles in six districts of Malakand division. The simulation have been made through using the Carbonify.com online calculator which estimate total tons of CO_2 annually for small, medium and large vehicles. This calculator requires the quantity mile per month so for that I convert the average travelling distance (1029 km) kilometer of the respondents in Swat into mile per month. The simulations have made for small, medium and large vehicles. The estimates obtained shows that district Swat produces more CO_2 emissions as compared to other areas.

Although the whole transport sector is responsible for the environmental degradation in Malakand division in general and in Swat in particular but the NCP has significant contribution to this degradation. The NCP vehicles can be controlled either by legal imitative in swat or through strict monitoring over the boarders of Afghanistan and Swat.

Table 4. 17 : CO_2 emissions from non-custom paid

Districts	Total number of Non Custom Paid Vehicles	Average annual CO2 Emissions in tones(if average travel is 1029 km per month) for the medium car (21 mpg fuel economy)	Average annual CO2 Emissions in tones(if average travel is 1029 km per month) for the Small car (40 mpg fuel economy)	Average annual CO2 Emissions in tones(if average travel 1029 km per month) for the SUV/4 wheel drive (15 mpg fuel economy)
Swat	44749	98848.75	184294.2816	263038.2019
Buner	9832	21718.49	40492.1088	57793.28256
Shangla	5406	11941.64	22264.0704	31776.90048
Dir lower	39363	86951.29	162112.5792	231378.863
Dir upper	14425	31864.25	59407.92	84791.304
Chitral	4215	9310.766	17359.056	24776.1072
Total	**117990**	**260635.2**	**485930**	**693554.7**

* The average CO_2 emission has been estimated through emission calculator:
http://www.carbonify.com/carboncalculator.htm

Note: 1004 kilometers = 624 miles

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

This chapter provides a brief summary, findings and recommendations based on the study.

5.1 Conclusion

District Swat is famous for its scenic beauty and clean environment. However, there are various factors, which affect the local natural environment. Among these, the important factors are population increase and resulting increase in the number of vehicles. NCP vehicles are not only causing air pollution, traffic jams and rod accidents in Malakand division but this illegal trade also costs the government of Pakistan. With this background, this study analyzed the economic and environmental effects of NCP vehicles in the district Swat. The study used both primary and secondary data. The primary data was collected from 300 vehicles users in district Swat through structured questionnaire. To estimate the emissions from the vehicles used, secondary data was used which has obtained from District Police Office (DPO), Swat. The sample was selected from three tehsils namely Mingora, Khwazakhela and Kabal. To estimate the economic and environmental costs of NCP vehicles in district Swat, both descriptive statistics and regression analysis is used. The regression analysis is use to estimate the determinants of the health cost due to air pollution, noise pollution and congestions.

Furthermore, the perceptions of the users were noted and analyze in the text.

The findings revealed that majority of the respondents possessed 1300 CC engine vehicles. Small road width, increase in number of non-custom paid vehicles, improper management of traffic control were the key causes of congestion. Due to congestion, the residents suffer from

headache, mental stress, tension, irritation and wastage of time. Not all but some of the respondents were willing to pay and support the congestion tax.

Majority of the respondents reported that air quality is dirty. In comparison to the air quality of last 10 years, it worsened. Majority of respondents reported that increase in number of vehicles especially increase in number of non-custom paid vehicles is the main cause of air pollution.

Some of the respondents faced Eye, skin and breathing problems. Main reason of noise pollution in district Swat is increase in number of vehicles especially increase in number of non-custom paid vehicles followed by urbanization and industries. The respondents suffered from Sleeping disturbance, Patient mental disturbance, Tiredness and Hearing problem due to noise pollution.

The regression results of the aggregate health cost function showed that traveling time has positive and statistically significant impact on the health cost.

Distance from the main road and main bus stand has positive and statistically significant impact on health cost. The age also has direct relationship with monthly health cost. The monthly income has negative and statistically significant impact on the health cost.

The regression results of the determinants of willingness to pay for congestion tax show that willingness to pay for congestion tax of the rural people is more than that of the urban. The coefficient of education has negative and statistically significant impact on the willingness to pay congestion tax. The coefficient of monthly income has positive and statistically significant impact on the willingness to pay more congestion taxes. The coefficient for variable ‘distance of residence from main road’ has positive and statistically significant impact on willing to pay

more congestion taxes. The coefficient of barrier has negative and statistically significant impact the willingness to pay for congestion tax decreases. The coefficient household size has negative and statistically significant impact on the willingness to pay congestion tax. According to the responses of the respondents, the prices of NCP impact the CP prices in the market.

The simulations show that district Swat produces more CO_2 emissions as compared to other areas

5.2 Recommendations

As the respondents reported that comparing with the last 10 years, the environment of the Swat gets worsens. The main factor of degradation of environment of district Swat is increase in population, increase in number of vehicles especially in number of non-custom paid vehicles and tourists. There needs strict monitoring over the boarders of Afghanistan which is the main source of NCP vehicles transfer in Swat

In summer session large number of tourists visit Swat impacting the local peoples in many ways like road accidents, congestion on roads, noise pollution etc.. Therefore, I suggest to the local government and local traffic police to control the excess flow of vehicle and strictly advise the drivers to follow the traffic rules in district Swat to avoid such problems.

Due to tax free zone there is no excise tax on vehicles in Malakand division due to which the prices of vehicles are very low almost 1/3 of the custom paid. Due to low prices everyone can buy and has easy access to these vehicles causing many economic and social problems in Malakand division. To avoid the issue of increasing number of vehicles I recommend the local government to limit the number of registration and make changes in the legislation to control these NCP.

Third main problem is the small road width due to which the people are facing problem of congestion. Therefore, I recommend the FHA and NHA to increase the road width in Swat to decrease the problem of congestion.

Fourth main problem in district Swat is the problem of noise and air pollution. I request the head of Vehicle Emission Testing Station (VITS) to issue the stickers and certificate to those vehicles, which fulfil the national environmental quality standard (NEQS) and ban those, which failed to fulfill the standards. Furthermore I recommend to local community to protect the forests and plant more trees to minimize the problem of air pollution from vehicles.

5.3 Limitations of the study and future research

1. The study estimates the impact of NCP vehicles on the congestion, air and noise pollution but the CP vehicles also cause such problems. This is difficult to separate the impact of NCP vehicles. Therefore, this study relied on perceptions of the respondents only.
2. This would be interesting if the analysis were carried out for the different types of NCP vehicles, which has been ignored in this study due to time constraint.
3. The simulations may also be carried out for different types of NCP vehicles, which have been ignored by this study.

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APPENDIX-A:

Questionnaire on Economic and Environmental Costs of Non-Custom Paid (NCP) Vehicles in District Swat

This questionnaire intends to gather specific information about the economic and environmental implication of non-custom paid vehicle in district Swat. This research is the partial fulfillment of requirements for the award of the MPhil degree in Environmental Economics from Pakistan Institute of Development Economics (PIDE) Islamabad.

All the information provided in this questionnaire will be confidential and will used for academic purposes only. Identity of information will not be disclose in report writing or any stage of data processing and analysis.

Thank you for your cooperation.

Part A General Information

1. Name of the respondent? _____
2. Status in the household (1=Head/2=Member) _____
3. Location Mingora ☐ Khwazakhela ☐ Kabal ☐ Other ☐
4. Type of Area (1=Rural /2=Urban) _____
5. What is your education (in years)? _____
6. What is your age (in years)? _____
7. Per month income of the HH (in PKR rupees)? _____
8. Household size (No.) _____
9. Which type of vehicle do you have? (Tick if applies).

a. Custom paid. ☐➔ If Yes, Quantity _____

b. Non- custom paid. ☐➔ If Yes, Quantity _____

Type of vehicle	Engine CC	Fuel type 1= Petrol 2= Diesel 3= CNG 4= CNG+Pertrol 5= Electric + Petrol (Hybrid)	Average distance travelled in a week in car including holidays (in Kms)	Fuel Quantity used p er week
CP				
NCP				

10. How much time in hours per week you are travelling ----------

11. What is the distance in kilometer between your residence and the main road ----------

12. Are there any barriers when you are travelling Yes ☐ No ☐

13. What is the distance in kilometers between the main bus stand (Ada) and your residence--------

14. What type of vehicle you use for your everyday transpiration needs?

a) Public ☐ b) Private ☐

PART B CONGESTION

1. By assigning number from 1-8, rank the main causes of congestion in the area? (You cannot assign same rank to two causes)

i. Tourist Increase. _____

ii. Inappropriate Design of the area (lack of zoning). _____

iii. Weather condition. _____.

iv. NCP Vehicles only _____

v. Custom paid vehicles only _____

vi. Both custom paid and NCP vehicles _____

vii. Small Road width. _____

viii. Traffic Barriers. _____Other (Specify please) ----------

2. Is traffic congestion really a problem in your area? Severity

i. Not at all a problem ☐

ii. It's a small problem ☐

iii. Moderate level problem ☐

iv. A real problem

v. Extremely serious problem ☐

3. Does the traffic congestion directly affect you?

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive. ☐

iv. No. ☐

v. Definitely no. ☐

If (yes) then specify how? (Select all that apply)

i. Tension ☐
ii. Headache. ☐
iii. Mental stress. ☐
iv. Irritation. ☐
v. Waste your time. ☐

vi. Other specify)._____

4. To solve the congestion problem, if the government want to impose a congestion tax, then would you be willing to support it.

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive ☐

ii. No. ☐

v. Definitely No. ☐

5. To solve the congestion problem, if the government want to impose a congestion tax, then would you be willing to pay it.

   i. Definitely Yes. ☐

   ii. Yes. ☐

   iii. Indecisive ☐

   iv. No. ☐

   v. Definitely No. ☐

6. If yes for Q-5 then how much in Rs. _____ per month

Part C Air Pollution

1. How would you rate the overall quality of air in the area?

   i. Very Clean ☐

   ii. Clean. ☐

   iii. Moderate ☐

   iv. Dirty ☐

   v. Very Dirty ☐

2. Compared with 10 years ago, how you perceive the overall air quality in your area at the present?

   i. Much improved ☐

   ii. Improved ☐

   iii. Unchanged/Same ☐

   iv. Worsened ☐

   v. Much Worsened ☐

3. What do you think, what is the main cause of air pollution in your area?

   i. Construction
   ii. Vehicle increase (specify please):
   Custom paid ☐
   NCP Vehicles ☐
   Or both ☐
   iii. Urbanization ☐
   iv. Any other specify please ----------.

4. How air pollution affect you?

   i. Highly affecting. ☐

   ii. Not much affecting. ☐

   iii. Neutral. ☐

   iv. Not at all. ☐

5. Do you feel irritation due to dust while walking on the roadside?

   i. Definitely Yes. ☐

   ii. Yes. ☐

   iii. Indecisive ☐

   iv. No. ☐

   v. Definitely No. ☐

   If (yes) Q.4, please specify the reason.

   i. Heavy traffic. ☐

   ii. Urbanization. ☐

   iii. Vehicles increase. ☐

   iv. Other (Specify please) ----------

6. Did you suffer from any kind of allergy due to dust while walking on the roadside?

   i. Yes. ☐

   ii. No. ☐

If (yes) Q.6, please specify the allergy

i. Eye problem
ii. Skin problem
iii. Breathing problem
iv. Other _____

7. Does air pollution increasing in your area?

i. Definitely Yes. ☐
ii. Yes. ☐
iii. Indecisive ☐
iv. No ☐
v. Definitely No. ☐

If (yes) Q.7 than specify the main reason.

i. Increase in number of vehicles. ☐.
ii. Increase in road construction activities. ☐
iii. Increase in number of industries ☐

Part D Noise Pollution

1. Do you feel noise disturbance in your area?

i. Definitely Yes. ☐
ii. Yes. ☐
iii. Indecisive ☐
iv. No. ☐
v. Definitely No. ☐

2. In your opinion what is the main reason of noise pollution in your area?

i. Vehicles. ☐

a) Custom paid ☐

b) Non-custom paid ☐

c) Both ☐

ii. Industries. ☐

iii. Urbanization. ☐

iv. other.(specify

3. How much are you sensitive to noise pollution?

i. Highly sensitive. ☐

ii. Low Sensitive. ☐

iii. No sensitive ☐

4. What kind of irritation you feel from noise?

i. Hearing problem. ☐

ii. Mental disturbance. ☐

iii. Lack of concentration.☐

iv. Other. _____

5. Which time is noisier during 24 hours in your area?

i. Morning. ☐

ii. Noon. ☐

iii. Evening. ☐

iv. Night. ☐

6. Does noise pollution of traffic directly affect your health?

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive ☐

iv. No. ☐

v. Definitely No.

If "Yes", Q.6, then how it affects your health?

i. Sleeping disturbance ☐
ii. Patient mental disturbance ☐
iii. Tiredness ☐
iv. Hearing problem ☐
v. Hearing problem ☐

Part E Other

1. In your opinion, do the prices of the local registered vehicles decline if the prices of the NCP also decline?

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive ☐

iv. No. ☐

v. Definitely No. ☐

ii. In what season traffic problem severe in the area? Specify.

_____

iii. Do you think that the congestions on roads discourage the tourists?

i. Definitely Yes. ☐
ii. Yes. ☐
iii. Indecisive ☐
iv. No ☐
v. Definitely No ☐

iv. How many days in a week you can get fuel in filing stations?

_____

v. How much time you spend in fuel stations in 7 days?

_____

vi. Which type of problem do you face in filling stations? Specify please

_____

_____

vii. Do you think that if the NCP vehicles are banned, then it would solve the congestion problem.

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive ☐

iv. No ☐

v. Definitely No ☐

viii. Do you think that if the NCP vehicles are banned, then it would solve the air pollution problem

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive ☐

iv. No. ☐

v. Definitely No. ☐

ix. Do you think that if the NCP vehicles are banned, then it would solve the noise pollution problem

i. Definitely Yes. ☐

ii. Yes. ☐

iii. Indecisive ☐

iv. No. ☐

v. Definitely No. ☐

x. How much monthly health cost do you bear from environmental problems (Congestion, air pollution and noise pollution) caused by NCP vehicles in your area Rs.-------