National College of Business Administration and Economics Lahore

SOCIO-ECONOMIC DETERMINANTS OF CRIMES: A CROSS-SECTIONAL STUDY OF PUNJAB DISTRICTS

BY

AYESHA HAIDER

MASTER OF PHILOSOPHY
IN
ECONOMICS

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NATIONAL COLLEGE OF BUSINESS ADMINISTRATION AND ECONOMICS

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A dissertation submitted to
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In Partial Fulfillment of the
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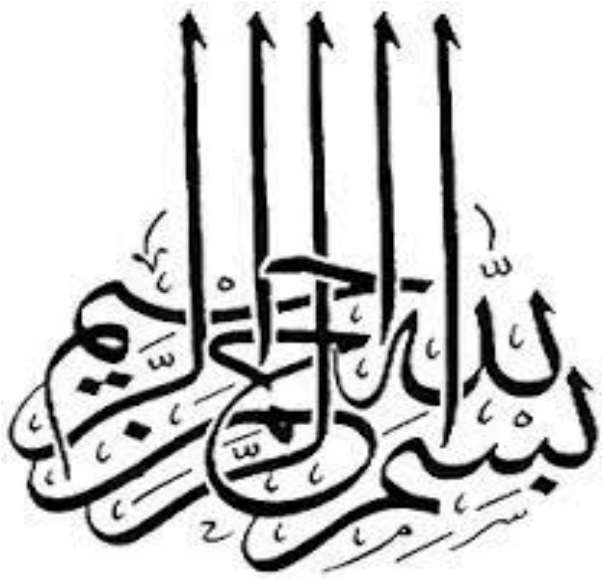

In the name of ALLAH,

The Compassionate,

The Merciful

NATIONAL COLLEGE OF BUSINESS ADMINISTRATION AND ECONOMICS LAHORE

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Dissertation Committee:

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Member

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Member

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Rector
National College of Business Administration and Economics

DECLARATION

It is to declare that this research work has not been submitted for obtaining similar degree from any other university/college.

AYESHA HAIDER
September, 2015

DEDICATED
TO

My Parents

ACKNOWLEDGEMENT

RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis entitled **"Socio-Economic Determinants of Crimes: A Cross-Sectional Study of Punjab Districts"** has been carried out and completed by **Ayesha Haider** under my supervision during her **M.Phil. Economics** Programme.

(Dr. _____)
Supervisor

SUMMARY

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CHAPTER 1

INTRODUCTION

Crime has become a worldwide misery, which is extensively spreading in both, developing and developed countries. Crimes are known to have paralyzed each society in the history of mankind, with the result, it leaves the impressions of insecurity, agitation and mental torture. Crime cannot be defined without encompassing different time periods and regions. Generally crime deals with the unexpected and abnormal attitude of a person, which oppose the law. “A crime is an act of human conduct harmful to others, which the state is bound to prevent. It renders the deviant person liable to punishment as a result of proceeding initiated by the state organs assigned to ascertain the nature, the extent and the legal consequences of the person’s wrongness.” (Curzen, 1999).

The economic theory of crime by Becker (1968) led new fields of empirical research, in which he observed crime as a type of job and compared the costs and benefits of committing a crime. According to him the cost of committing a crime is: punishment, physical torture, fine, imprisonment and psychological guilt. While psychological pleasure and monetary gains were considered to be the benefits of committing crime.

Due to widespread of criminal and illegal acts in majority of eastern and western nations, new doors have opened in the economics of crime to investigate the causes, consequences and socio-economic determinants of crime. Numerous empirical studies analyze some determinants of crime in the countries like United States (Ehrlich, 1973; Lochner, 2004) and United Kingdom (Wolpin, 1978; Machin and Meghir, 2011). A growing number of work examines the socio-economic determinants of crime for European countries like, Italy (Buonanno and Leonida, 2005; Marselli and Vannini, 1997) and Germany (Entorf and Spenger, 2000), for Latin American countries like and Argentina (Garcette, 2004) and Colombia (Gaviria, 2000) for Pakistan (Rehman, 2009, Gillani, 2009, Jalil, 2010, Aurangzeb, 2012).

Crimes in Pakistan have been increasing rapidly over the past few years. The overall crime rate during the last ten years has increased from 247,888 in 2002 to 395,006 in 2012 (Punjab Bureau of Statistics, 2012). The economics of crime is related to multiple fields as for instance; sociology, criminology, psychology, geography and demography. There may also be various socio-economic determinants of crime like unemployment, inflation,

poverty (chaudhary, 2008), urbanization, population density, industrialization, social infrastructure, level of income, literacy and health, cultural, psychological and family background.

This study is an effort to analyze and explore the socio-economic determinants of crime in all thirty five districts of Punjab province in Pakistan. The major purpose of this study is to empirically examine the link between crime and some socio-economic factors such as;

- Unemployment
- Industrialization
- Education
- Remittances
- Population Density

It would also focus on certain useful policy recommendations for the control and prevention of crime.

To begin with, unemployment is the first variable and its widespread presence in an economy is the major cause of increase in crime rate in a certain society. The crime will increase and opportunities for legal earnings fall if unemployment rate increases, because the real costs linked with crime for unemployed individuals go down (Gillani, 2011).

The second variable is population density, which is also considered as a generator of crime. Here density refers to the number of persons per kilometer. The crime is high in those areas where there are more people because there are more commercial activities and criminals have more opportunities to commit crime and more hiding places (Haries, 2006).

Industrialization may also serve as a factor to increase the crime activities and its focus in the urban surroundings. It is explained by the increased feasibility of crime commission, the greater availability of goods and intensification of feelings of relative deprivation because of huge gap between poor and rich or a significant awareness of deprivation due to advertising and promotion through the media.

Education, an important element to stop people from engaging in criminal activities. Due to educational attainment those people who are engaged in crime get some benefits from education. Schooling helps in educating youth and helps in increasing the returns from legitimate work as compared to crime. With the increase in schooling, certain types of street

crime decrease but other types of white collar crimes like embezzlement, fraud and bankruptcy may increase (Lochner, 2004).

The remittances that immigrants send back raise the incomes of recipients, enabling them to increase consumption and investment, improve cost of living; including rent and food. The remittances act as a fuel in order to start business, buy up or expansion, invest more in education. As a result of remittances, the families can have better access to fulfill their needs. So in that case there is less chance to commit crime when people have access to more resources.

SCOPE OF THE STUDY

There may be certain reasons that force an individual to commit crime. The present study is an effort to analyze few factors that may be responsible for crimes across districts of Punjab. We are considering thirty-five districts of Punjab. The present study may be useful for the government of Punjab for eliminating crimes in the districts.

OBJECTIVES

- To find the impact of population density on crime.
- To examine the impact of industrialization on crime.
- To investigate the relationship between unemployment and crime.
- To find the impact of education on crime.
- To observe the effect of remittances on crime.
- To recommend policy measures to check, help and prevent reported crimes in Punjab.

HYPOTHESIS OF THE STUDY

Null hypotheses of the study are:

- H_{01}: Population density has no impact on crime.
- H_{02}: Industrialization has no impact on crime.

- H_{03}: Unemployment has no impact on crime.
- H_{04}: Education has no impact on crime.
- H_{05}: Remittances have no impact on crime.

ORGANIZATION OF THE STUDY

The first chapter is comprised of introduction. In second chapter, a concise literature review is mentioned. Chapter three is composed of crime scene of Punjab and Pakistan. In chapter four, theoretical frame work and methodology is discussed. Chapter five encompasses empirical results and discussion. Chapter six consists of conclusions and policy recommendations.

CHAPTER 2

LITERATURE REVIEW

Becker (1968) introduced a model that demonstrated cost and benefits of committing crime. He analyzed that persons commit crime when financial rewards from crime are greater as compared to financial reward from legal work. He described benefits of crime as psychological pleasure and monetary gains, while cost of crime includes punishment and imprisonment. Two major factors of total cost include the punishment faced, if caught and probability of being caught. The work of Becker focused on determination of policies linked with the costs of illegal behavior.

Ehlrich (1973) analyzed that crime could bring a psychic well-being and monetary gain. He furthermore examined a relationship between crime and income inequality. He found that employment served as an indicator between crime and income inequality. His study focused on participation in illegitimate activities, across different states of United States. This analysis has also presented the concept of punishment and reward, cost and benefits from both illegitimate and legitimate activities, instead of cost of punishment alone. Furthermore, this study determined the association between crime and income disparity, as well as law enforcement practices. The empirical results indicated a positive relationship between a specific type of crime against property and inequality of income of community.

Antonello (1998) investigated economic factors of crime in Italy during the years 1951 to 1994. He tried to evaluate those economic variables that affected more in the long-run equilibrium level of crime. This study focused on the factors of crime in Italy including private nonhuman wealth, consumption and unemployment. Different types of crimes like robbery, theft and homicide had also been taking place. His study included both crimes that are against property and against person. Long run relationships were analyzed by using co-integration analysis between crime and economic variables. The main conclusion showed that low income level due to unemployment was the most prominent economic factor for robbery and homicide. Unemployment rate was considered a major economic variable for theft. There existed a negative relationship between robbery and homicide on one hand and crime.

Pablo et al. (2002) analyzed the effect of income inequality on violent crime across thirty-nine countries. This study was conducted during 1965-95.

The results showed a positive correlation between inequality and crime rate in the countries.

Buonanno (2003) analyzed demographic and socio-economic determinants of crime in provinces of Spain. The data set consisted of 46 provinces of Spain during the year 1993-1999. In this study crime was divided among different categories such as; property crimes and violent crimes, serious crimes and minor crimes. Different factors, like; Socio-economic, urban and demographic were explained. A technique named GMM-system estimator was used and results showed that crime rate was significantly affected by immigration and urbanization. Educational attainment and GDP growth rate were responsible for promoting property crimes. In these districts minor crimes showed less inertia than the serious crimes. It was further demonstrated that unemployed juvenile and immigrants were engaged in criminal activities. The empirical results showed that property crimes were explained more by socioeconomic variables, while crimes against person were explained by demographic factors.

Coomer (2003) focused on the rise and fall of criminal activity throughout America, which indicated a rise in crime rate until 1990's. Besides negative effects of criminal acts; there were some social benefits too, like job opportunities in preventing crime. It was also discussed that such costs and benefits an individual might have to face, when planning to participate in crime. The independent variables were prison population, unemployment, poverty rate, discount rate, inflation, per capita income, population, GDP, high school, income disparity and dependent variable is crime. A simple regression was run to see the results. It was observed that crime rate was increased as a result of increase in unemployment, inflation and poverty rate.

Nolan (2004) has demonstrated a relationship between population size and crime rate elaborated its implications. This study was based on 1294 cities of United States with population size over 25,000 during the year 2000. The cities were selected from all states of U.S. It calculated the area crime rate and average crime rate in order to determine the direction and strength of the relationship between two variables. The link between population and crime rate was related clearly but they were studied under the consideration of group of administrations. A significant and positive link was shown between these variables. But when the cities were split into population strata and crime rate into property and violent crimes, the results became more complicated. It was observed that in a certain group of cities the link between population size and crime rate was positive, while in the other group of cities, this link was negative. It depended on the overall size of population.

Lochner and Moretti (2004) focused on the effect of education on crimes. The education acts as a human capital investment that helps to increase the opportunities of doing legal work, as well as discourages participation in crime. An improvement by one-year level of average education minimized arrest rates by 11 percent or more. It focused on direct effect of education on the psychic and financial rewards gained from crime itself. Schooling helps in increasing and modifying the preferences of a person that generates choices for job selection. Various reasons for effects of education on crimes had been discussed. Firstly, education raised the returns to legitimate tasks; increasing the opportunity costs of unlawful behavior. Secondly, increased wage rate and schooling made the spare time more valuable.

Harries (2006) examined the role of concentration of population on property and violent crimes. The main argument was that population provides a base for property crimes as it attracts thieves. On the other hand, the positive aspect of population density was that it provided natural inspection that stops violent crimes. In densely populated areas, there are a large number of witnesses so there would be fewer chances of violent crimes as people report such cases. This study was based on both property as well as violent crimes in the year 2000 in Baltimore County, USA. The data consisted of 100,000 reported crimes. The county consists of two types of landscapes; one was rural and the other was urban. There were two research findings; one asserted that high density promoted crime while the other research findings concluded that high density provided surveillance in combating crime.

Mahmood et al. (2008) investigated determinants of juvenile crime in two districts of Punjab Province, Faisalabad and Bahawalpur along with Juvenile Jails and two Borstal Institutions. It was a primary research based on a sample of 221 juvenile convicts. The results declared main determinants of Juvenile crime like honor killing, extended family size, land dispute, inferiority complex, income disparity and friend's motivation. There were many other factors that promoted Juvenile delinquency like education, residence or surrounding of respondent, desire for basic needs and motivation of friends which were not significant, but positive. In order to find out economic and social determinants of juvenile crime, a well-structured questionnaire was developed. The data explained that 71 percent of youth crime was murder; the most heinous crime.

Dutta and Husain (2009) investigated the factors responsible for promoting crime in India for the year 1999 to 2005. State level data set was being used. Education, poverty, urbanization, loads on police force,

conviction, economic growth, quick disposal of case variables were calculated in this regard. The results showed that economic demographic as well as socio- variables had considerable impact on crime.

Gillani et al. (2009) analyzed the relationship of inflation, poverty and unemployment in with crimes in Pakistan for the years 1975-2007. It showed the long-run relationship as well as causality among the variables. The results showed the existence of long-run association among variables and crime caused by these variables in Pakistan.

Machin et al. (2011) focused on potential of education that helps in reduction of crime. A causal relationship between crime and school leaving age was being observed in England and Wales. The data consisted women aged 18-40 and men aged 18-40 from 1972 to 1996. Both property and violent crimes were taken into consideration. A Regression Discontinuity Approach was used to examine those effects of education that helped in reducing crime. The empirical findings showed that education helped in reducing property crime and increased social benefits. The results confirmed that additional schooling and improving education among the offenders could be helpful in order to eliminate crime.

Gillani et al. (2011) analyzed a relation between unemployment and crime for the period of 1975 to 2008 in Pakistan. Johansen co-integration methodology was applied to see a long-run relationship and Granger causality through VEC was applied to check causality between different property crimes and unemployment. The empirical results showed a long-run relationship between unemployment and property crime. A unidirectional causality explained that unemployment was the cause of robbery, theft, dacoity and cattle theft.

Ahmad et al. (2012) focused on the effects of remittances on individual's income and consumption in Pakistan. It was concluded that remittances were responsible to boost the supply of money and increase the demand for investment and consumption. In order to find the impact of remittances on consumption of Pakistan during the year 1973-1010, two stage least square techniques were used. To see long-run relationships among remittances, consumption and investment, a co-integration analysis was calculated. Results indicated that an increase in one percent in the remittances yielded 0.95 percent increase in consumption. Augmented Dicky Fuller (ADF) test was applied to check the unit root in the level and first difference of all variables. The results proved that consumption had positive link with GDP and remittances.

Aurangzeb (2012) examined the determinants of crime in Pakistan for the period of 1980 to 2010. The results showed a strong, positive and significant relationship between crime and different variables like house hold consumption, population, wage rate and GDP. A significant and positive and link was found between crime and some determinants like migrants in and out of Pakistan and electricity crisis. Certain useful recommendations were given to government to implement and improve some policies like raise in wage rate and provision of employment opportunities.

Rout (2013) explored the impact of industrialization on crime. As a result of urbanization and expansion in industries in developing countries, it was noticed that juvenile delinquency was rising as a major issue. The increase in superfluous offenses, gang activities, and vandalism also increased noticeably. Unnatural and perverted system misled the young generation. Many other factors were involved in the unhealthy and poor development of young ones like over crowded cities, rapid growth in urbanization, poor housing circumstances, and unsteady progress of families, poverty, death, shanty towns, filth, divorce and desertion. It analyzed all the national and international rules as well as their effectiveness.

Fella (2014) examined some factors that helped in crime reduction through improvement in education. It was also examined that crime could be reduced due to increase in punishments. It focused on the useful, efficient and cost-viable policies to combat crime. A framework was provided to examine the alternative policies and their equilibrium to determine a correlation among education enrolments¸ property crime and some characteristics of distribution of wealth. Life cycle model with optimum consumption had been used. The numerical findings showed that improvement in education in high school was more helpful and cost effective as compared to severity in punishment. Results showed that targeting subsidies at poorer students helped in crime reduction.

Brito (2014) presented the effects of remittances on crime rates. Remittances were received from United States to the households of Mexico. Mexico stands third among those countries that receive remittances. In 2010, those Mexicans working in United States transferred about $22 billion to their family members. Such amount of remittances accounted for 2.1% of Mexican GDP. For the rural areas of Mexico, 19.5% of their income constituted remittances. The municipal-level data was used for remittance-receiving household and murder. After getting results it was shown that remittances reduced murder rates. Furthermore, it helped in reducing poverty while deterring households to commit crime.

Aziz (2014) focused on the prisoners and their need for education. The main objective of this paper was to estimate the educational requirements via distance education. This study was descriptive and data was collected through questionnaire. Data comprised of 10595 prisoners of Central Jail Rawalpindi and District Jail Lahore. Prisoner's sample was drawn through cluster sampling. The study showed that most of the prisoners wanted to improve their education. It was further revealed that the criminals gave more importance to education.

CHAPTER 3

CRIMES IN PAKISTAN

Pakistan is the 6th populous country in the world. If we see the crime situation of Pakistan we come to know that it has been overwhelmed by many disorders like lawlessness, fundamentalism, backwardness and instabilities. The country is facing significant level of criminal acts and massive activities of kidnapping, dacoity, killing, street crime, robbery, murder and civil conflicts. The crimes have increased with the passage of time. Increase in criminal activities has spread ambiguity and mistrust and uncertainty in the society. Due to such circumstances the confidence of domestic as well as foreign investors has dwindled (Gillani, 2009).

Crimes in Pakistan show a rapid increase due to certain factors. There may be economic as well as non-economic factors responsible for this rapid increase in crime. Not only the poor class and illiterate people of society commit crime but some wealthy, elite class and educated people are indulged in committing even heinous crimes too. The purpose of rich class for committing crimes is to earn wealth. This well-placed class wants to earn through illegal means. Moreover the elite class has sources and exploits all the resources while knowing loopholes in the system. In that way they escape from crime in Pakistan. The crime situation in Pakistan shows that the country is lagging behind in environmental, cultural, social, spiritual and moral fields.

Table 3.1
Growth Rate of Crime in Pakistan

Year	Total No. of Crimes Reported	Crime Growth Rate (Percentage)	Crime (per hundred thousand of Population)
1951	76519	-	226
1958	81124	6.02	212
1961	79900	-1.51	185
1966	93633	17.19	180
1971	129679	38.50	206
1976	167032	28.80	228
1981	152782	-8.53	215
1986	220035	44.02	248
1991	403078	83.19	257
1998	431854	7.14	323
2000	388909	-9.94	278
2003	400680	3.03	267
2005	453264	13.12	294
2007	538048	18.71	340
2009	616227	14.53	376
2011	673750	16.88	404

Pakistan Bureau of Statistics, Government of Pakistan (2011).

If we look at the figures in 1947, there were 73105 registered cases and the cases reached to 129,679 in 1971. And it further increased to 673750 in 2011. All the statistics indicated the registered crimes only because 30-50% of crimes are regarded as unreported cases. In Table 1 the figures show total number of reported crimes, growth rate of crime and crime committed (per hundred thousand of population).

CRIMES IN PUNJAB DISTRICTS

The most densely populated province of Pakistan is Punjab. Out of total population of country Punjab comprises 56%. The second largest province of Pakistan with land area 205,344 square km. Total population of this province is 7,25,85,000 (Economic Survey of Pakistan, 2012). Table 3.2 shows that there was 191318 numbers of crimes in 2010 and in 2011 the number of crimes increased to 209961. Crimes in Punjab district have reached to terrifying level and due to increasing crimes the uncertainty among the citizens has intensified. There may be many reasons responsible for increase in crimes like institutional defectiveness, underdevelopment and administrative disorders in society. However, some people in less developed areas suffer from basic amenities of life, unemployment, illiteracy, inflation, increasing population and poverty that forces the persons to commit crime (Aurangzeb, 2012).Some non-economic factors may also be responsible for increase in crimes. Not only uneducated and poor individuals are involved in criminal activities but some literate, rich and well-off persons are also engaged in criminal acts. Accumulation of wealth though unfair and illegal means is their habit. The occurrence of crime adversely affects the investors and businessmen. The criminals are always attracted by unlawful and illegal activities. Crimes hinder the economic activities, so the development in the area is affected (Ahmed, 2014).

The crime statistics of Punjab districts reveals that there is less improvement in cultural, social, moral, psychological and environmental fields. Rich and powerful elite class has resources and they are exploiting the legal system. Such people find loopholes in the system in order to come out of crimes. Lack of justice, weak implementation of policies, corruption, terrorist attacks, manipulation of judiciary and political instability encourage crime in Punjab province. Many actions and measures were taken by government in the affected areas to control crimes but due to above factors it showed sluggish improvement (Ahmed, 2014).

The crime situation reveals that crime pattern varies in various parts of Punjab. Different trends can be seen in crime against person and property. For instance, Lahore takes a lead in crime against person and property. There is large number of registered cases in Lahore, Faisalabad, Rawalpindi, Gujranwala and Okara. Some cities in Southern Punjab like Multan, Muzaffargarh, Rahim Yar Khan have great number of cases. The highest number of reported crimes is 14363 in Lahore district and lowest number of reported crimes is 458 in Mandi Baha-ud-Din district.

Table 3.2
All Reported Crimes of Punjab

	2011 (upto June)	2010 (upto June)	Difference
Cases Registered	209961	191318	18643
Challaned	145575	135324	10251
Under Investigation	39709	33117	6592
Untraced	8593	6702	2001
Cancelled	16084	16175	-91
Prosecution			
Convicted	37398	51291	-13893
Acquitted	30066	47758	

Crime Statistics, Punjab Police Computer Bureau (2011)

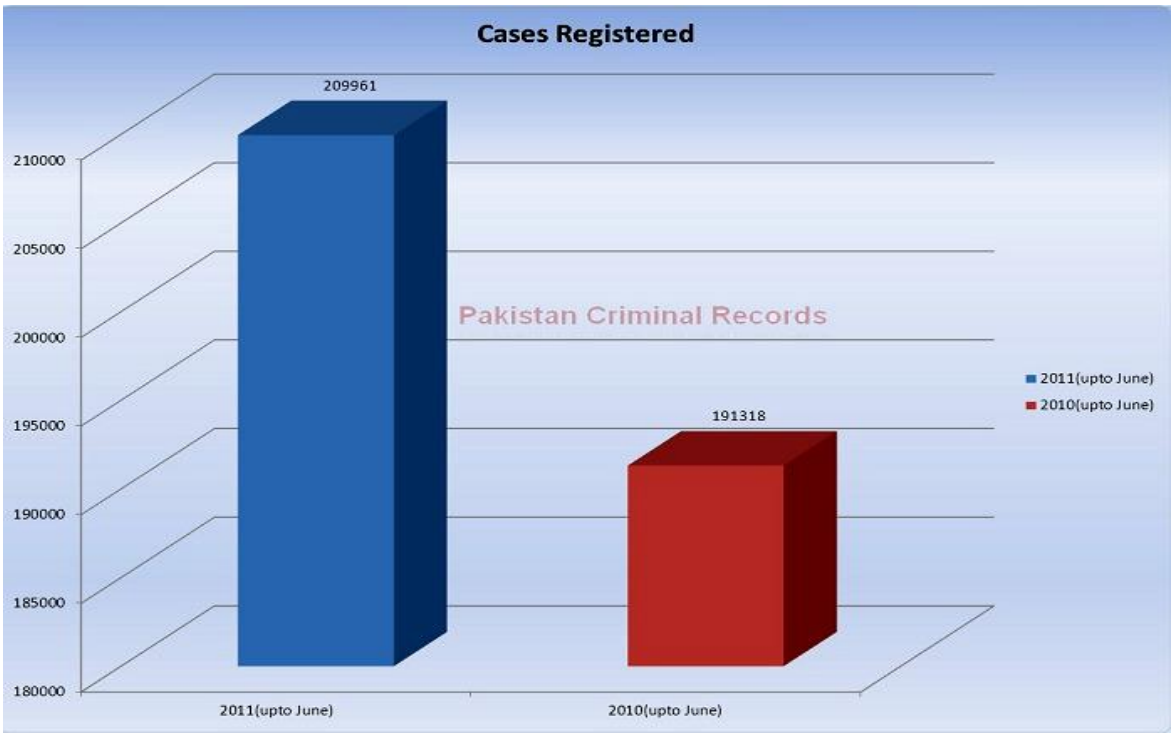

Table 3.2 shows the overall picture of crimes in Punjab. The crime statistics of Punjab shows that the registered cases were 191318 in 2010 that increased to 209961 cases in 2011. The Challaned cases in 2010 were 135324 that increased 145575 in 2011. The reported crime includes murder, attempted murder, hurt, rioting, rape, kidnapping or abduction, dacoity, robbery and burglary. Some Challaned, under investigation and untraced cases were less in 2010 but their number increased in 2011. All such figures are related to only reported crime. The percentage of unreported crime in Punjab is about 30%-50% (Gillani, 2009). There is no authentic source to provide unreported crime.

CHAPTER 4

THEORETICAL FRAMEWORK AND METHODOLOGY

There are multiple factors both social and economic which may be responsible for existence of crime across the districts of Punjab, Pakistan. This study is an effort to analyze both social and economic factors responsible for increasing crime for all thirty-five districts of Punjab for the year 2011. This study examines the impact of population density, unemployment, industrialization, education and remittances on crime.

Unemployment may increase crime (Antonello, 1998; Coomer, 2003, Gillani et al., 2009 and Gill et al., 2011). Remittances may help in decreasing crime by affecting education, investment, consumption and standard of living of people (Ahmad, 2010; Brito, 2014). Crime is high in populous regions. Population density may increase the chances of crime (Nolan, 2004; Haries, 2006). Industrialization, on one side endorses incomes of persons, job possibilities and workmanship while on the other side it may promote crime (Rout, 2013). Education serves as an investment to human capital as it raises the person's choice of selecting profession. It may help in reducing crime (Lochner et al., 2003; Dutta et al., 2009; Machin et al., 2011). This depicts that unemployment, remittances, population, industrialization and education may affect crime.

This study investigates the impact of unemployment, remittances, population density, degree of industrialization and education on crime in all thirty-five districts of Punjab for the year 2011. To find the relationship between the variables regression model is used. The regression model is estimated by using Ordinary Least Square (OLS) method. The model used for this study is given below:

The functional form of the variables discussed is as follows:

$$Cr = f\left(UN,\ PD,\ IND,\ EI,\ REM\right)$$

The regression model of above functional form is given below:

$$Cr_i = \alpha + \beta 1 UN_i + \beta 2 PD_i + \beta 3 IND_i + \beta 4 EI_i + \beta 5 REM_i + e_i,\ i = 1, 2, 3, \ldots\ldots\ldots 35 \qquad (4.1)$$

where e_i is assumed to have $ND\ \left(0,\ \sigma^2\right)$

i.e. l_i has normal, identical and independent normal distribution with $E(l_i) = 0$ and $\text{var}(l_i) = \sigma^2$

Cr = Volume of Crimes in the i^{th} district
UN = Unemployment in the i^{th} district
PD = Population Density in the i^{th} district
IND = Industrialization in the i^{th} district
EI = Education Index in the i^{th} district
REM = Remittances in the i^{th} district

Specification of variables

Cr is the registered crime and is used as dependent variable and f represents the function of unemployment, population density, industrialization, education index and remittances. A brief description of variables is given below:

Crime

The dependant variable in the model is crime. Crime includes murder, attempted murder, hurt, rioting, rape, kidnapping, dacoity, robbery, burglary.

Unemployment

The active labor force that is unemployed and seeking jobs is defined as unemployment. Active labor force comprises of private sector and government employees, laborers, self-employed, those labors working in livestock, agriculture, fishery and poultry etc.

$U_i =$ Number of unemployed/population in D_i …… (4.2)

Population density

If we divide total population by land area per square kilometers we get population density. The land area is considered as total area of region.

$D_i =$ population in D_i /Area of D_i in Square Kilometer…… (4.3)

Industrialization

In this study, industrialization has been calculated by dividing total number of factories by total population of a district. Then it is used as proxy for industrialization.

The formula used is

$$IND_i = \text{Number of factories in } D_i \text{ /population of } D_i \ldots\ldots\ldots \quad (4.4)$$

Education Index

Education index is constructed by combining combined enrollment rate and literacy rate. Combined enrollment rate includes primary, secondary and tertiary enrollment. This includes age group five to twenty four years. The literacy rate includes age group ten years and above. These two variables are normalized by using their actual, minimum and maximum values. 0 percent is considered as minimum and 100 percent as maximum. One-third weightage is assigned to combined enrollment and two-third weightage is assigned to literacy rate. So, education index is composed of literacy rate and combined enrollment rate.

Literacy Index (LI)

$$= \text{actual} - \text{minimum}/\text{maximum} - \text{minimum} \quad \ldots. \quad (4.5)$$

Combined Enrollment Index (CEI)

$$= \text{actual} - \text{minimum} /\text{maximum}-\text{minimum} \ldots. \quad (4.6)$$

$$\text{Education Index (EDI)} = 2/3 \text{ LI} + 1/3 \text{ CEI} \ldots\ldots\ldots \quad (4.7)$$

Remittance

The transfers of money which the households receive in their home place are termed as remittance. Such transfers which are received by one district from another district in same country are termed as domestic remittances. Those transfers which are collected from foreign country are termed as foreign remittances. In this study we used both domestic and foreign remittances.

$$REM_i = \text{Total amount received in } D_i \text{ /population in } D_i \ldots. \qquad (4.8)$$

Data Sources

In this study cross sectional data is used for thirty-five districts of Punjab for the year 2010-2011. The data of registered crimes, population density and industrialization is collected from Punjab Bureau of Statistics, Government of Punjab (2012) and Punjab Police Computer Bureau (2011). Punjab Bureau of Statistics conducts Punjab Development Statistics every year. The data for remittances and unemployment has taken from Punjab Bureau of Statistics, Government of Punjab (2011).Data of education has been taken from Pakistan Social and Living Standard Measurement Survey: 2011-2012, Government of Pakistan (2013).

CHAPTER 5

EMPIRICAL RESULTS AND DISCUSSION

This chapter presents the empirical impact of Industrialization (IND), Education Index (EI), Population Density (PD),Remittances (REM) and Unemployment (UEMP) on Crime reported (Cr) across districts of Punjab. Simple OLS is used to analyze the results as the data is meeting all assumptions of applying Least Squares.

The fitted model is

$$CR_i = 18.607 + 3295.292IND_i - 155.129EI_i - 1899.201REM_i + 7.634UEMP_i + 2273.033PD. \quad (5.1)$$

Table 5.1
Relationship between Dependent and Independent Variables

Dependent Variable: Crime				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**p-value**
C	18.607	1209.955	0.015	0.988
IND	3295.292	2558.712	1.288	0.208
EI	-155.129	2368.569	-0.065	0.948
REM	-1899.201	3698.218	-0.514	0.611
UEMP	7.634	2.104	3.628	0.001
PD	2273.033	299.790	7.582	0.000
R-squared	0.898	Prob(F-statistic)	0.000000	
Adjusted R-squared	0.880	Durbin-Watson stat	1.643	

Population density with coefficient of 2273.033 has positive and highly significant impact on crime in Punjab. The results confirm the findings of previous studies that population density increases crime volume (Nolan, 2004; Harries, 2006). Similarly unemployment has positive but insignificant impact on crime reported across districts of Punjab. The results of the table given above shows that industrialization has positive and insignificant impact on crime across districts of Punjab. Education Index has negative and insignificant impact on crime volume with coefficient of 155.129. Remittances have negative but insignificant impact on crime in different districts of Punjab.

Table 5.2
Diagnostic Tests

Breusch-Godfrey Serial Correlation Language Multiplier Test			
F-statistic	0.492253	Prob. F(1,28)	0.4887
Obs*R-squared	0.604686		

Table 5.3
Heteroskedasticity Test: ARCH

F-statistic	0.342911	Prob. F(1,32)	0.5623
Obs*R-squared	0.360480		

Table 5.4
Ramsey RESET Test

Omitted Variables: Squares of fitted values			
	Value	**Df**	**Probability**
t-statistic	0.112147	28	0.9115
F-statistic	0.012577	(1, 28)	0.9115
Likelihood ratio	0.015718	1	0.9002

The Breuch-Godfrey (Godfrey, 1988) serial correlation LM test is applied to check the presence or absence of autocorrelation among data. Since level of significance "α" is less than p-value it shows that no serial correlation is found among the variables. The problem of autocorrelation among data set is not found. In that case the assumption of applying OLS is fulfilled.

$$y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i x_{t,i} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \tag{5.2}$$

$$\mu_t = \sum_{i=1}^{p} \rho_i \mu_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots \tag{5.3}$$

$$\hat{\mu}_t = \bar{\alpha}_0 + \sum_{1}^{p} \alpha_i x_{t,i} \quad \ldots\ldots\ldots\ldots\ldots\ldots \tag{5.4}$$

when $H_0 : \rho_i = 0 \Rightarrow E(\mu_t) = 0$

One of the basic assumptions of OLS is that variances of residuals are homoscedastic. Hetroscedasticity Engle ARCH Test is being used to test whether the variances of error term are equal or not. It is a test of equal variances. Since level of significance "α" is less than p-value, so it concludes that the variances of error term are equal which implies homoscedasticity.

The Ramsey Regression Equation Specification Error Test (RESET) is being used for model specification. The most important assumption of OLS is model specification. The p-values of t-statistic and F-statistic are greater than level of significance "α". So it concludes that the model is correctly specified.

Table 5.5
ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	201217577.512	5	40243515.502	51.051	.000[b]
Residual	22860740.031	29	788301.380		
Total	224078317.543	34			

There exists significant difference among the values of variables.

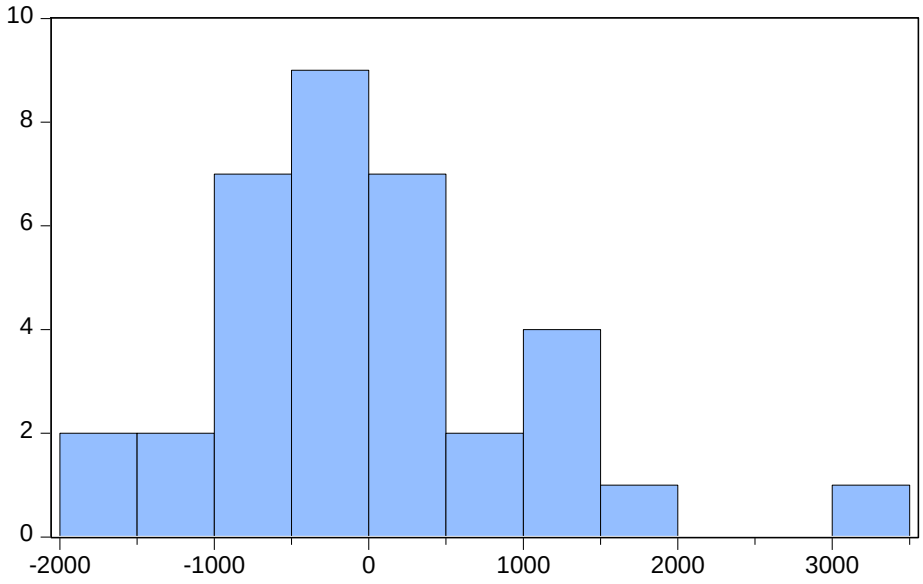

Fig. 5.1: Histogram Normality Test

Table 5.6

Jarque-Bera	4.596020
p-value	0.100459

The graph shows residuals of registered crimes across districts of Punjab. One of the assumptions of OLS is that mean of residuals is zero is satisfied through statistical graph presented above.

Table 5.7
Correlation Matrix

	Cr	**IND**	**EI**	**REM**	**UEMP**	**PD**
Cr	1.0	0.52	0.20	0.18	-0.13	0.89
IND	0.52	1.0	0.41	0.40	-0.21	0.50
EI	0.20	0.42	1.0	0.25	-0.04	0.35
REM	0.18	0.40	0.25	1.0	0.002	0.25
UEMP	-0.13	-0.22	-0.04	0.002	1.0	-0.18
PD	0.89	0.50	0.35	0.25	-0.18	1.0

The correlation matrix shows weak correlation between independent variables. The explanatory variables have no issue of multicollinearity. Hence the assumptions of OLS are fully satisfied and results are reliable. Such data have kurtosis of Skewness as a normal factor

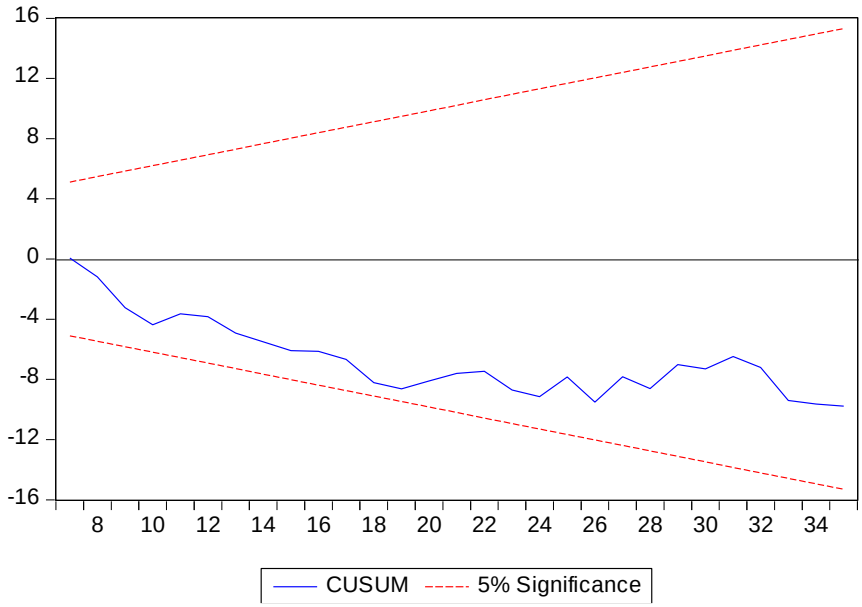

Fig. 5.2: Plot of Cumulative Sum Test

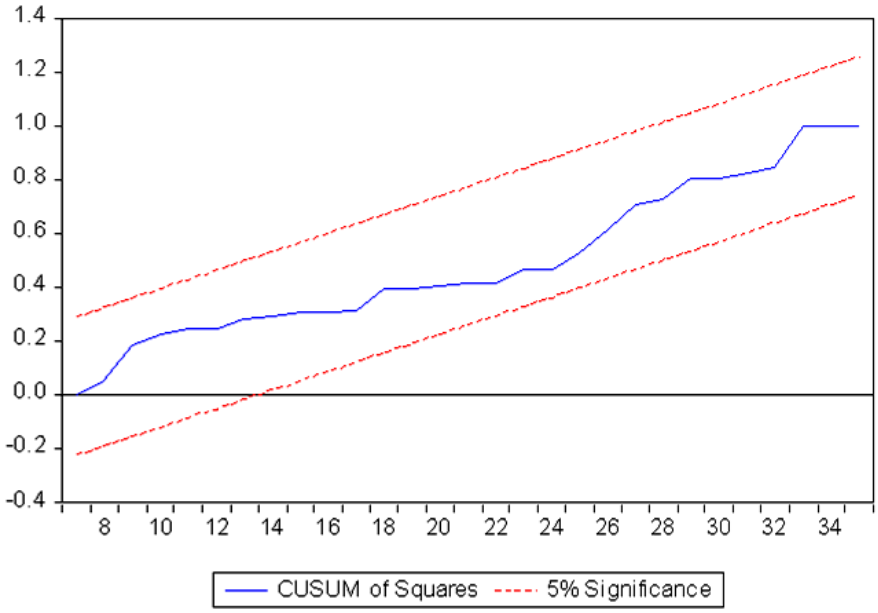

Fig. 5.3: Plot of Cumulative Sum of Squares of Recursive Residuals

To detect the equations for structural stability the cumulative sum (CUSUM) and CUSUMQ of recursive residuals are used. In order to detect the logical deviations in regression coefficients, diagnostic tests are referred. Through CUSUM and CUSUMQ the quick changes in the regression coefficients are identified. From the figures the results indicate that test statistics are inside band of 5 percent confidence interval. This shows the stability of the estimated model over time.

CHAPTER 6

CONCLUSION

The main purpose of this study is to analyze and check the socio-economic determinants like unemployment, population density, remittances, industrialization and education for reducing crimes in all districts of Punjab. The outcomes of study show that these socio-economic determinants have association with crimes in Punjab. A regression analysis has been used in order to examine the determinants of crime in all districts of Punjab for the period of 2010-2011. The results of regression analysis show that population density and unemployment have significant impact on crimes. The main target of this study is to ascertain those determinants which are the major causes of raising crimes in all districts.

Population density is another important determinant. It has positive and highly significant impact on crime in Punjab. They found a significant positive relationship between crime rate and population size for the 1294 cities with population over 25000, indicating that crime rates were high in populated cities. With the increase in population density in big cities, opportunity of committing crime increases. Overcrowded places and areas give more opportunity to the criminals for pick pocket, theft, snatching etc. Therefore, a large no crimes reported in big cities and crowded festivals. The finding of study supports the hypothesis that crimes are affected by the increase in population in a district.

The result shows that there is positive and significant impact of unemployment over crimes. The chances of earning legal money declines by the people when unemployment rate increases in an area. In that case the chances to commit crimes increases. This means that crimes in Punjab districts are linked with unemployment. In order to combat crimes some policies should be suggested aiming at improving employment panorama of workers and labors. The unemployment allowances, internship programs and employment plans for unemployed people may help for reducing crimes. The study assists the hypothesis that there is increase in crimes due to pervasive unemployment in all districts.

The findings of study also suggest that education index has negative and insignificant impact on crime volume. The crime goes down with the increase in level of education. There will be level of education more will be the opportunity to get job and reduce crime.

The results indicated that remittances have negative and insignificant impact on crime. The results of the data analysis conclude that industrialization has positive and insignificant impact on crime across 35 districts of Punjab.

POLICY IMPLICATIONS

Some recommendations are advocated in order to combat crime in all districts of Punjab, Pakistan. Such recommendations may assist the government to frame policies. The reporting system of crime should be appropriate. In law enforcement department like police there should not be government intervention There is a dire need of improving the entire police structure: plugging up the trust gap between police and public, pro-active approach, control on corruption, enhancement of operational capabilities and improvement in administrative infrastructure are few worth mentioning aspects. It is doubtlessly a fact that maintenance of public order is linked with prosperity of the nation.

Role of extraneous factors, however, cannot be under estimated. If population increases by one unit, number of crimes increases by 2273 units. The population explosion with increasing rate needs to be halted immediately. A number of measures have been suggested by community medicine experts that include public awareness about birth control methods, increasing education level, legislative measures and increasing public private partnership. There is a need to develop planned districts with more chances of employment.

Unemployment, with a large chunk of population, living below poverty line is again another impediment in crime control. Unskilled labor with adverse circumstances has contributed largely to this phenomenon. Some adverse circumstances like load shedding, depleting resources of natural gas, soaring prices of fuel, failures to develop alternative energy resources, coupled with security paradigm are other factors to be considered. These factors need to be neutralized on war footings, so as to provide employment to the populace and decrease crime ratio. Unemployment thus may motivate offenders and create opportunity to commit crime. More job opportunities should be created by the government. Even after getting high-quality education people are deprived of doing suitable jobs. Such people are engaged in illegal activities to earn money. Job opportunities in remote or backward areas will minimize the burden in developed and populous areas. This can help in combating criminal activities in big cities.

The relationship of education with crime is again a continuous one. Crimes have direct and indirect linkages with school dropout ratio. Education helps in preventing individuals from committing crime. In addition to that, improving skill level has the potential to reduce crime. For the same reason, experts believe that polishing skills of jailed offenders help in decreasing their tendency to repeat the same act again.

Government should formulate those policies that check the flow of remittances in the homeland. Such policies should discourage the consumption on luxury items so that the remittances could be saved and investment on productive projects.

This lofty goal can however be achieved only through stable and visionary political regime: a regime which is capable of formulating policies, as well as practically translating them. Besides a stable government there is also a dire need of revamping and overhauling the entire police structure. The other two tiers of criminal justice system that is, prosecution and judiciary also need to be brought inside this improvement loop.

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APPENDIX

District	All Reported	Murder	Attempted Murder	Hurt	Rioting	Rape	Kidnapping/ Abduction	Dacoity	Robbery	Burglary
Attock	856	123	106	263	0	22	132	21	63	126
Bahawalnagar	2305	154	283	789	5	160	383	42	208	281
Bahawalpur	3623	147	293	808	13	203	843	116	488	712
Bhakkar	833	58	70	222	0	24	150	23	85	201
Chakwal	892	82	114	349	0	8	107	38	62	132
D.G.Khan	1329	90	139	429	2	34	230	36	164	205
Faisalabad	7657	625	644	1637	0	232	1166	475	3369	1146
Gujranwala	4997	336	391	716	0	96	562	163	1960	773
Gujrat	1743	239	252	391	72	31	276	51	297	206
Hafizabad	1211	116	103	329	0	42	196	56	261	108
Jhang	1763	143	133	796	0	70	344	49		228
Jhelum	606	72	106	286	1	8	85	3	35	82
Kasur	2589	273	241	663		83	400	254	711	237
Khanewal	1245	181	193	706	0	100	446	44	343	312
Khushab	532	65	75	210	0	8	64	11	33	66
Lahore	14363	683	889	1264	0	113	2492	273	4988	3661
Layyah	783	49	73	233	0	37	180	21	60	130
Lodhran	1047	67	61	354	1	83	265	19	84	113
Mandi Bahaud-Din	458	111	111	283	0	33	197	18	131	112
Mianwali	1051	129	209	403	0	6	70	8	99	127
Multan	3980	170	223	1224	0	86	690	108	898	751
Muzzaffargarh	1653	147	209	706	0	106	519	105	222	492
Nankana Sahib	1327	104	111	405	0	49	215	119	204	120
Narowal	880	80	88	438	0	22	155	26	185	54
Okara	3894	241	284	709	0	136	754	504	708	558
Pakpattan	2003	123	112	592	1	133	296	189	308	249
R.Y.Khan	3273	175	188	893	8	239	705	84	322	659
Rajanpur	1151	106	101	415	0	37	177	14	72	229
Rawalpindi	3562	348	470	890	43	46	549	77	562	577
Sahiwal	2517	215	165	694	0	70	386	146	566	275
Sargodha	3179	250	398	907	21	75	400	153	777	448
Sheikhupura	3816	367	285	850	0	98	587	248	904	477
Sialkot	1515	182	231	825	0	34	311	65	793	312
T.T.Singh	1607	130	100	337	0	63	194	104	391	288
Vehari	1917	145	179	695	1	54	375	64	164	240

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