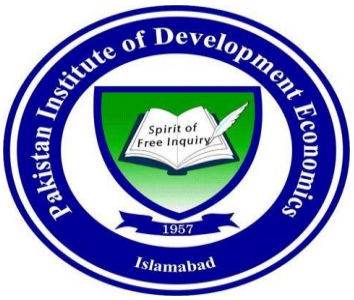
# COMMUTING TIME AND ITS IMPLICATIONS ON PERSONAL CARE, SOCIAL AND HOUSEHOLD BASED ACTIVITIES: A MICRO-ECONOMETRICS ANALYSIS


Submitted By

**MUHAMMAD NASIR**

Roll# ETS 05 (Session 2012-14)



**Department of Econometrics and Statistics**

**Pakistan Institute of Development Economics**

**Islamabad, Pakistan**

# COMMUTING TIME AND ITS IMPLICATIONS ON PERSONAL CARE, SOCIAL AND HOUSEHOLD BASED ACTIVITIES: A MICRO-ECONOMETRICS ANALYSIS

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The Department Of Econometrics and Statistics,
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By

**MUHAMMAD NASIR**

Roll # ETS 05 (Session 2012-14)

Supervised By

**DR. ZAHID ASGHAR**

**Department of Econometrics and Statistics**

**Pakistan Institute of Development Economics**

**Islamabad, Pakistan**

# IN THE NAME OF

# ALLAH

## The Most Beneficent

## The Most Merciful

“To Allah belongs whatever is in the heavens and whatever is in the earth. Whether you show what is within yourselves or conceal it, Allah will bring you to account for it. Then He will forgive whom He wills and punish whom He wills, and Allah is over all things competent.”

(Al-Baqarah, 2:284)

## GOLDEN SAYING OF

# THE HOLY PROPHET

## (Peace and Blessings of Allah be Upon Him)

"Do not wish to be like anyone except in two cases. (The first is) A person, whom Allah has given wealth and he spends it righteously; (the second is) the one whom Allah has given wisdom (the Holy Qur'an) and he acts according to it and teaches it to others".

(Al-Hadith)

***DEDICATED***

***TO***

***MY BELOVED PARENTS***

# ACKNOWLEDGEMENTS

All praise for Almighty Allah, the cherisher and sustainer of the worlds and all respect for Allah's Apostle (Peace be upon Him). My sincere gratitude to Almighty Allah, who made me able to do this work.

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**MUHAMMAD NASIR**

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| | |
|---|---|
| ACS | American Community Survey |
| ATUS | American Time Use Survey |
| BMI | Body Mass Index |
| BRFSS | Behavioral Risk Factor Surveillance System |
| CEP | Centre for Economic Performance |
| CPA | Causal Path Analysis |
| CVD | Cardiovascular disease |
| DNTS | Dutch National Travel Survey |
| EU | European Council |
| FGLS | Feasible Generalized Least Square |
| FAHBS | Finnish Adults Health Behavior Survey |
| GDP | Gross Domestic Product |
| GLS | Generalized Least Square |
| GNP | Gross National Product |
| GRBI | Gender Responsive Budgeting Initiatives |
| GSOEP | German Socio-Economic Panel |
| HR | Hazard Ratio |
| km | Kilometre |
| LFS | Labor Force Survey |
| LSE | London School of Economics |
| MII | Mobility Impact Index |
| MLRM | Multivariable linear regression methods |
| ML | Maximum Likelihood |
| MMR | Mumbai Metropolitan Region |

| | |
|---|---|
| MNL | Multinomial Logit |
| NCHS | National Center for Health Statistics |
| NHTS | National Household Transportation Survey |
| NLSY | National Longitudinal Survey of Youth |
| NMHS | National Multicenter Health Survey |
| NPHI | National Public Health Institute |
| OECD | Organization for Economic Cooperation and Development |
| ONS | Office of National Statistics |
| PSU | Primary Sample Unit |
| PTUS | Pakistan Time Use Survey |
| RPAQ | Recent Physical Activity Questionnaire |
| SEM | Simultaneous Equation Models |
| SEER | Surveillance Epidemiology and End Results |
| SF8 | Study Short Form survey |
| SNA | System of National Accounts |
| SRS | Stratified Random Sampling |
| SSU | Secondary Sample Unit |
| SSS | Social Scientific Survey |
| SUR | Seemingly Unrelated Regression |
| TSU | Third Stage Sampling Units |
| UAPS | Urban Audit Perceptions Survey |
| UNPD | United Nation Population Division |
| USBLS | United State Bureau of Labor Statistics |

ABSTRACT

This study describes individuals' trade-off among daily commuting time, personal care, social and household related activities by taking into consideration the association between commuting time and daily performed main activities via a cross-sectional analysis of 37,830 individuals, from a nationally representative dataset *i.e.,* Pakistan Time Use Survey (2007). In this study firstly, we explored the most important determinants of commuting time using binary logistic regression model. Secondly, we examined whether there is trade-off between daily commuting time and daily performed main activities: personal care, social and household related activities using seemingly unrelated regressions model. We calculated mean adjusted minutes made on daily performed main activities for several daily commuting time. The average daily commuting time found to be 111.00 minutes and 28.22 minutes for both male and female respectively. A 60 minutes increase in daily commuting time is associated with 38.37 minutes and 42.89 minutes decrease in personal care related activities for male and female respectively. While household related activities decrease by 24.13 minutes and 73.63 minutes for both male and female respectively. But social and cultural activities increase by 3.22 minutes and 10.95 minutes for male and female respectively. Similarly personal care related activities of individuals from urban and rural decreased by 42.89 minutes and 46.88 minutes respectively. The comparative analysis is also explored for province *i.e.,* Punjab, Sindh, KPK and Balochistan and for age specific groups. This study conclude that few amount of time given to household based activities and personal care related activities due to lengthy daily commuting duration affects one's daily routine life. This study suggests that an individual should make utmost efforts to reduce daily commuting time: by searching a job closer to their dwelling, residence should be nearby city centre where use of land is multipurpose (not at edge of city that is greatly affected by sprawl).

# CHAPTER 1

## INTRODUCTION

Time is one of the main resources for every individual. It is a limited resource as an individual has only twenty four hours in a day to perform all kind of activities. The most important question arises here is how to utilize this limited resource (time)? Time has a lot of implications for economic as well as social well-being. Becker (1965) introduced "theory of the allocation of time" in which he described time as a cost akin to cost of goods and services available in the market.

As, an individual has only twenty four hours in a day. So, in these available twenty four hours he/she has to manage all of his/her personal as well as mutual/collective activities. Activities are considered/performed according to the priorities of an individual's frame of time. Some activities are more important in individual's daily routine life on the basis of his/her own choices *i.e.*, liking, disliking or responsibilities. While some activities are least desirable (as an individual thinks those are just loss of time) but they are forced to perform them due to some constrains. We can say that there is trade-off among activities. To manage all activities habitually in limited hours in a day is a serious challenge for an individual. Deviations in activities from individual to individual are due to gender, age, occupation and region *etc*.

A well-known list of most important activities of an individual's daily routine life can be enveloped into main activities: activities about production and services for earning income/money, activities related to household management and with household members (called household based activities), social and cultural activities, personal care and self-maintenance related activities and last but not the least one is activities of daily travel or daily commute.

From the above mentioned list of most important activities, the daily commute is most debated among researchers. The term "commuting time" is defined and measured as the "sum of travel time for all purposes from dwelling to workplace and vice versa". Commuting behavior in Pakistan is moving towards personal automobile. Car and motorbike are replacing bicycles and use of four wheelers vehicles like van/bus has also decreased since 2007 (Nazli *et al*., 2012). Commuting reduces national income, as more time is wasted in journey to work and less time is available to work (Morgenroth 2002). There is an intuition that lengthy commute causes decrease in life satisfaction because of less time available for social interaction and physical activities while, long commute also results in greater level of anxiety due to vehicles' noise and pollution (Kozaryn 2011). As commuting plays a significant role in happiness and satisfaction of individual's daily routine life (Kahneman *et al.*, 2004).

It is assumed that an individual has to do a job/work (to earn income/money) for a fixed number of hours in a day, therefore, if daily commute takes more time, then an individual has less amount of time available for other activities *e.g.*, personal care and self-maintenance related activities, social and cultural activities and household based activities *etc*. The importance of least commute can be judged from its inclusion in human well-being index as a significant factor[1]. Human well-being index measures the quality of life. It has many factors *e.g.*, commuting time, housing, mental and physical health, availability of good quality of food and quality of leisure hours *etc*.

Well-being is the state of living comfortable, healthy and happy life. Therefore, it is not fairly justifiable to measure the well-being of common citizens with numbers/digits like Gross National Product (GNP) or Gross Domestic Product (GDP).

[1] World happiness report 2013 Edited by Helliwell, J., Layard, R. and Sachs, J.

As, Stiglitz[1] said "GDP doesn't take into account distribution, sustainability or well-being. Chasing growth of GDP results in low level of living standards. There is need of better indicators to capture sustainability and well-being". He highlighted the need for an alternative measure of human well-being at 4th OECD World Forum. He further said that; "GDP and GNP both measure the busyness of an economy. But the big question arises that whether our effort is for right things." Layard[2] and Emeritus[3] said "the quality of life must be grounded on quality of life as public experience it. That must be the democratic concept of the quality of life, not the quality of life as policymakers may define it."

The Stiglitz commission appealed for highlighting economic production as a measurement of an individual or general public well-being (Stiglitz *et al.,* 2009). Sen and Stiglitz advocated the implementations of some new and most relevant assessment tools that include a broader concern of human welfare than just considering economic growth[4]. They said "If we don't measure the right thing, we don't do the right thing". The commission stated that quality or well-being of any individuals' life depends on health status, quality level of education, everyday activities and their involvement in the political process, the natural and the social environment in which they live and many other factors that influence their economic as well as personal security. The quality of time is main factor of human well-being index[5].

The System of National Accounts (SNA), calculates the GDP which does not measure productive activities precisely. But the studies about time use provide

[1] Stiglitz, E. J. (Nobel laureate) from Columbia University.
[2] Richard Layard, the Founder Director of Centre for Economic Performance (CEP)
[3] Professor Emeritus is an economist at London School of Economics (LSE)
[4] The Stiglitz-Sen-Fitoussi Commission
[5] Compendium of OECD Well-being indicators (2011)

information on such activities that are key to the socio-economic well-being of society. The use of time as an indicator for Gross National Happiness (GNH) and the human well-being index provides worthwhile information; which is missing in conventional economic accounts. So, the studies on individuals' daily routine life through the use of daily diary dataset provide better approximation about the well-being particularly for the common citizens of urban areas. As, the daily routine life of urban citizens is more discussable now-a-days because cities' growth leads to boosting up economy of a country.

By 2050, the total population of world will expand up to 6.25 billion, out of which 5.10 billion people would be living in urban areas or cities especially, in developing world (UN Habitat 2013). Pakistan is sixth most populous country of the world and it would retain the same position by 2050 (Government of Pakistan, 2014). In Pakistan people are moving quickly from rural areas to urban developed areas. Pakistan is urbanizing at an annual rate of 3 percent, which is fastest speed in South Asia (The UN Population Division, 2012).

Urban areas or cities were shaped to bring things together. Cities (engine of growth) are the places where individuals can enjoy work balance life, equal opportunities of employment, health facilities, educational institutes, parks, free and open public spaces for enjoying social and leisure time, entertainment facilities such as: theaters, art galleries and restaurants, better transportation facilities, and improved quality of living standard *etc.* Idealistically, cities are the places where people have workplaces at doorstep or at walk able distance, where they can walk in their neighborhood, where they are not vehicle dependent for mobility and where life lives with its full bloom and glory. Cities are always easing their citizens. The charms of city life attract to individuals, people who lived in countryside communities always try to

move towards the city centre for sake of employment and for improving their living standard.

Today, majority of the common citizens of the urban areas are forced to move at the edge/suburban areas of the city. The possible reason may be unavailability of affordable houses at the center of the city. This scenario shows that urban planners or local government has failed to provide affordable houses to common citizens at the center or near to the center of city.

Currently, the mega cities of Pakistan are expanding awkwardly without proper planning which leading to urban sprawl. The term "urban sprawl is featured as rapid geographic extension of urban areas in a leapfrog development, low density pattern, heavy dependence on personal vehicle, widespread construction of roads, social and architectural homogeneity, shift of capital investment and economic opportunity from city centre to the edge of city (called suburban areas) and also relatively weak regional planning" (Howard 2001).

Sprawl has been related with physical inactivity, obesity, vehicle dependence, greater traffic congestion and poor air quality (due to fatal smoke of vehicles), teenage driving, single purpose land usage and travel trip, lack of social capital, and last but not the least the long daily commuting time or lengthy daily commuting distance. Height limits in most mega cities of Pakistan leading to unnecessary spatial expansion of cities. If cities are not allowed to grow vertically then automatically they will expand horizontally as demand for space increasing day by day. By increasing height limits in urban areas we can decrease average area of city size and the cost of daily commute will decrease for suburban residents when the limit is relaxed (Brueckner e*t al.,* 2012).

Compactness (contrary to sprawl) is the situation that is equally suitable. If the cities are in compact form then demand for personal vehicles especially car automatically decreases (due to shorter distance between places) and demand for physically active mode *e.g.*, bicycle and walk increases. The compactness of urban areas has a strong direct relationship to inexpensive and economical mobility as people spend less income on the combined expenses of housing and transportation. Compactness of urban areas provides not only affordable housing but also complete street network and better transportation facilities to its inhabitants. The transportation costs are lower in more compact areas due to less distance between places and shorter time is required to reach towards destination/workplace. The people in more compact and inter connected areas have longer, healthier and safer lives because they are physically active[1].

Most of the individuals prefer to use personal vehicle than of public transport in more sprawling areas. The more and more number of vehicles on roads means greater challenge for smooth mobility of traffic. The heavy/huge traffic congestion in the cities has added a high degree of uncertainty in arrival to and from workplace at due time. Long commute towards workplace is miserable. The lengthy commuting time is also reason of unsound sleep which increases the level of obesity leading to abdominal diseases. Generally, due to lengthy daily commuting time, there is tendency that an individual does not reduce the timing of leisure activities; instead he/she deteriorates the time available for health-related activities. So, it's commuting time which affect the sleeping hours that cause obesity.

Gender differences exist in case of journey to work. Previous studies explained that men commute longer than women of the same age group. The majority of females

[1] Report to the EUROPEAN COUNCIL (EU): The Compact for growth and jobs (2013)

reside in homes for care of children and other household responsibilities. Those who desire to work but due to long distance between home and workplace they forgo job opportunities to serve their families. The females who are in job, always try their best to find a job located near to their homes as the less time would be wasted in daily commuting and more time would be available for serving their family members. On the other hand, males are going, even to distance work places on daily basis for earning livelihood due to having fewer household responsibilities like child care *etc*.

As, the daily performed main activities of both male and female are greatly affected by the presence of sprawl. Because sprawl increases the distance between house/dwelling and workplace. It means more and more time would be required for commuting so, the most part of life would be wasted on the journey to and from workplace so-called wasteful journey. As more and more pieces of time are wasted in commuting then people have surely less time for other daily responsibilities/activities. So it is of great importance to assess the association between commuting time and other activities affecting the well-being of masses of urban areas or in mega/big cities.

This study is design to explore gender specific, region specific, age specific travel behavior and its trade-off among other daily performed main activities for big cities of Pakistan as till now it remained unexplored due to the non-availability of suitable dataset. The big cities that we analyzed in this study are: Islamabad, Karachi, Peshawar, Quetta, Lahore, Rawalpindi, Gujranwala, Sargodha, Faisalabad, Multan, Bahawalpur, Sukkur and Hyderabad. This study provides preliminary evaluations of trade-off among personal care related activities, social activities and household based activities in response to several daily commuting time.

## 1.1 DELIMITATION OF THE STUDY

This study is limited to include only most important three activities: household based activities (both household maintenance and care for children), social and cultural activities and personal care and self-maintenance related activities. Present research will not incorporate the detail analysis of many other daily performed activities.

## 1.2 OBJECTIVES OF THE STUDY

- Exploratory data analysis and econometric modeling among daily commuting time, personal care related activities, social activities and household based activities using SUR.
- To determine the impact of major factors influencing daily commuting time.

## 1.3 RESEARCH QUESTION

- Whether daily commuting time adversely affect the personal care related activities, social activities and household based activities across the big cities of Pakistan on urban and rural level for gender and age specific groups.

## 1.4 HYPOTHESES

- Is there any association between daily commuting time and time spent in personal care and self-maintenance related activities?
- Is there any association between daily commuting time and time spent in household based activities?
- Is there any association lies between daily commuting time and time spend in social and cultural activities?

## 1.5 SIGNIFICANCE OF THE STUDY

In this study we are trying to explore how daily commuting time affects an individual's routine activities in available twenty four hours in a day. This study is one of its own type that uses daily time use diary *i.e.*, Pakistan Time Use Survey (2007). The findings of this study will assist urban planners as well as researchers to understand

individuals' time constraint and its impact on household based activities, personal care and self-maintenance related activities, social and cultural activities and other important daily activities.

## 1.6 ORGANIZATION OF THE STUDY

The remaining study is organized as: The review of the existing related literature is discussed in Chapter 2. The sources of data and methodology is included in Chapter 3. The results and their interpretations are given in Chapter 4 while Chapter 5 includes conclusion of the study and policy recommendations.

# CHAPTER 2

# REVIEW OF LITERATURE

There are hardly any studies available in Pakistan, that use the Pakistan Time Use Survey (PTUS) 2007 data to explore the relation between daily commuting time and other daily performed main activities: personal care and self-maintenance related activities, social and cultural activities and household based activities *etc.* The most relevant studies are described in the literature review.

Gorsuch (2014) examined allocation of time by men on child care using Linked Current Population Survey (LCPS) and American Time Use Survey (ATUS) during the recession period of 2007-09. She examined worst changes in employment opportunities of men than women due to the recession in the United States. She found an increase in the average time spent by men on childcare (physical) as result of sudden change in employment opportunities. By dividing the total change in average time spent by men on child care in to compositional, behavioral and group. She determined that the increase in the average time spent on childcare among employed men is due to the behavioral changes while, among out of labor force this increase is attributed to the compositional changes.

Kimbrough (2014) compared three types of data sets *i.e.,* ATUS with 14,000 respondents per year, the American Community Survey (ACS) and National Household Transportation Survey (NHTS) with 150,147 households on the basis of aggregate commuting measures. This study combined ATUS and NHTS data and estimated OLS linear regression model with commuting time as the endogenous variable and a set of respondent characteristics: age, gender, presence of life partner, wage and presence of children at house as the exogenous variables. And differences between the ATUS and NHTS was tested on the bases of commuting time.

Berrigan *et al* (2014) found the associations between urban sprawl and cancer mortality in suburban and urban counties of the United States (US). A cross-sectional, country level analysis from Surveillance Epidemiology and End Results (SEER) program along with data from the National Center for Health Statistics (NCHS), 2002-06 dataset was used. Data-set described that obesity related to cancers was high in more sprawling areas. Regional associations between the mortality rate and sprawl index were statistically significant. Reported results for cancer mortality from 21 and 19 most common types of cancers in women and men respectively, and for six types of cancers for which obesity is a major risk factor.

Humphreys *et al* (2013) examined affiliation among active commuting, mental well-being and physical wellbeing. A cross-sectional postal questionnaire was conducted in 2009. The Recent Physical Activity Questionnaire (RPAQ) and the Medical Outcomes Study Short Form Survey (SF8) were used for examining the travel behavior and physical activities of seven days commuting to work from working adults aged sixteen years and above. Multivariable linear regression methods (MLRM) were used to test associations. They concluded that greater amount of time spent in active commuting is highly associated with mental and physical wellbeing.

Ettema *et al* (2013) explored the effects of walking on physical as well as mental wellbeing. They found how walking environment promotes well-being effects. This study was conducted by using a mobile data collection method. The whole study continued in two periods, during the month of June July of 2011 and during September October of the same year. Linear regression models of happiness and activation were regressed on several main factors: trip purpose, walking and place evaluations *i.e.*, varied, exiting, friendly and safe.

Subbarao *et al* (2013) designed survey instrument called activity travel diary. Which was analyzed through activity travel behavior for developing countries. A pilot survey was conducted from Mumbai Metropolitan Region (MMR) by Stratified Random Sampling (SRS) technique. The respondents were requested to fill the diary section of questionnaire in a continuous duration of fifteen days. A sample of 350 households was considered and their response rate was thirty six percent. A Multinomial Logit (MNL) model was used for understanding the travel mode choice behavior. The study had predicted the influencing variables: travel time and travel cost are related to mode choice.

Delmelle *et al* (2013) examined the association between individuals' level of satisfaction and social relations. The study came from a Social Scientific Survey (SSS) on several characteristics of individual's life like personal characteristics, housing and residential neighborhood characteristics as well as questions about transportation and commuting. A multivariate ordered probit regression (OPR) was employed on 6515 individuals of Vienna city. They concluded that individuals having one-way commuting time more than or equal to thirty minutes had lower level of social satisfaction. The mode of transportation like personal vehicle *i.e.* car ownership had positive impact on social relations or social satisfaction.

Christian (2012) explored the reallocation of time away from their spouse, own children and friends due to daily commuting time. A sample of adults, full time workers and living in the urban areas respondents was drawn from the ATUS (2003-10). The SUR modeling was used to calculate gender wise adjusted mean minutes spent with own children, spouse and friends at several groups of daily commuting durations. A sixty minutes increased in daily commuting time was associated with 21.8 minutes and 6.7 minutes decreased time spent with their life partner for both male and female

respectively. A 18.6 minutes and 7.2 minutes decreased in time with their own children for male and female respectively. And a 7.2 minute and 11.9 minutes decreased in time with friends for male and female respectively.

McQuaid *et al* (2012) demonstrated that in developed countries like UK male (especially fathers) commute longer than female (especially mothers). Binary Multiple Logistic Regression (BMLR) model was used. Commuting time (as an endogenous variable) took the value one if the worker commute more than thirty minutes and zero if less than thirty minutes. This study used UK Labor Force Survey (LFS), which was collected by Office of National Statistics (ONS) having a sample of 53,000 households. They determined different factors that affects commuting times including age, gender, presence of children, occupation, weekly pay of workers, total working hours, mode of transportation and location of residence.

Kozaryn (2011) investigated the relationship between livability (quality of life as infrastructure) and satisfaction with city. He measured subjective quality of life through Urban Audit Perceptions Survey (UAPS) conducted in 2006. He concluded that the citizens are happy with livable cities and unhappy with unlivable cities.

Hansson *et al* (2011) used a cross-sectional Public Health Survey (PHS) by post accomplished in 2004 and 2008 at Scania, Sweden. A total of 21,088 respondents, working thirty hours per week were selected and the response rate was fifty six percent. They determined negative relationship between mode of transportation and the six health outcomes: self-reported health, everyday stress level, poor quality of sleep, mental health and absence from work due to illness in last twelve months with the help of binary logistic regression modeling.

Sandow (2011) used the data on individuals, derived from the Comprehensive Longitudinal Database ASTRID.[1] The aim of this study was to reveal prerequisites for consequences of long-distance commute in Sweden. Special attention had been given to prerequisites for distance commuting in sparsely populated areas. Moreover, using a MLR[2] model allowed the identification of the extent to which socio-economic factors had an impact on women and men with different durations of long distance commuting. The conclusion of this study demonstrated that for long distance commute it might be more economically and socially sustainable to encourage commuting by car.

Ommeren *et al* (2010) examined the effect of workers daily commuting on workers' productivity. They used German Socio-Economic Panel (GSOEP) survey 1999-2008. The data described that 41,165 German workers had total mean number of absenteeism 6.75 per year and the total mean working hours per week were 38.85. They used absenteeism as a proxy of workers' productivity. Unconditional and conditional fixed-effects negative binomial model for panel data concluded that, the daily commuting distance stimulated absenteeism with an elasticity of 0.07 to 0.09. While mean number of absenteeism was found 15 percent to 20 percent less if workers have a shorter daily commuting time.

Travisi *et al* (2010) tried to explore the association between commuting time and urban sprawl in 739 cities of Italy for the period of 1981-91. A Causal Path Analysis (CPA) and multivariate cross-section regression analysis was applied by using the Mobility Impact Index (MII). The results confirmed that the change of individual

[1] The data have been collected and updated in its composition and calculations by Statistics of Sweden on the entire population of Sweden.

[2] Several studies employed Event History Analysis, Binary Logistic Regression Models and Multiple Linear Regression Models to identify the effects of these different socio-economic characteristics on the duration of long-distance commuting.

preferences towards private motorized travel modes came from 1981-91. They concluded that quality of public transportation services affect individuals' mode choices.

Kwasniewska *et al* (2010) investigated the association among physical active commute, lifestyle characteristics and socio-demographic characteristics. A cross-sectional National Multicenter Health Survey (NMHS) for a period of 2002 to 2005 was conducted in Poland among 7280 arbitrarily selected persons, consisted of 3747 men and 3533 women. This study concluded that only 36 percent of the respondents were physically active commuters. Only 55.4 percent of respondents spent at most fifteen minutes per day on cycling or walking. Respondents living in large urban areas, having university education with low occupational physical activity and highest income group in both male and female were observed at highest risk of commuting physically inactive. The results revealed that smoking as well as leisure hours were not significantly associated with physical activity commute.

Gottholmseder *et al* (2009) determined the level of stress of workers with daily commuting time while controlling for work-related and personal characteristics: gender, age, education, employment status, weekly income *etc.* A survey from Austrian at the year 2005 based on socio-economic characteristics was used. A total of 1029 workers aged 18 to 60 years, drawn out of the 360,000 residents of Vorarlberg, were used in this empirical analysis. They used ordered logistic regression model and concluded that commuting had significant influence on the perceived stress level.

Eid *et al* (2008) examined the association between presence of urban sprawl and level of obesity. They utilized the confidential geocode dataset of National Longitudinal Survey of Youth (NLSY) through United State Bureau of Labor Statistics (USBLS). Body Mass Index (BMI) for 6000 individuals was used as measurement of obesity

level. They strongly suggested that urban sprawl did not cause the obesity. People who are more likely to be obese (*e.g.,* because they did not like to walk or it depends on their own discretion) were also more likely to move to suburban (*e.g.,* because they could easily move around through personal vehicles like car). On overall level, they found no evidence that neighborhood characteristics have any causality on weight gain.

Brown *et al* (2007) used ATUS based on 2003. They proposed different methods for calculating daily commuting time, daily grocery travel time and daily shopping travel time. Results per trip per person showed the median of average commuting time was twenty five minutes and median time spent grocery shopping was thirty minutes.

Makinen *et al* (2007) studied socioeconomic trends in leisure-time and commuting physical activity from the period of 1978 to 2002. A Cross-sectional Finnish Adults Health Behavior Survey (FAHBS) conducted by the National Public Health Institute (NPHI). The final dataset included 25,513 female and 25,302 male. They concluded that people having lowest income and lower amount of leisure-time were physically active commuters. While among females, low occupational status as well as income status were physically active commuters.

Smith *et al* (2007) studied the association among daily commuting time, leisure time, total physical activity and the biological risk factors for cardiovascular disease (CVD). It was a cross-sectional study of 30 to 60 years old individuals, who took part in a health screening program. The response rate was fifty three percent. They concluded that time spent on daily commuting, leisure and total physical activities were positively linked with high density lipoprotein cholesterol and negatively related with low density lipoprotein cholesterol.

Besser *et al* (2007) suggested that in the presence of urban sprawl there is declining trend in social capital (social interaction) among Americans due to long commuting time. A cross-sectional telephone based survey, National Household Travel Survey (NHTS) 2001 was applied for US households in all 50 states and the District of Columbia had 54,747 respondents. This study concluded that higher daily commuting time (greater than 20 minutes) was significantly associated with zero number of social trips.

Ewing *et al* (2003) determined the association among urban sprawl, physical health and health related behaviors. A self-reported Behavioral Risk Factor Surveillance System (BRFSS) survey was conducted for 448 U.S counties. The sprawl index had minor but significant relationships among walking time, obesity, BMI and hypertension. Hierarchical linear modelling (HLM) and non-linear modeling (HNLM) approaches were used to control for covariates. Three types of econometric models were analyzed on *i.e.,* any physical activity, recommended physical activity and walking minutes. The study concluded that residents of more sprawling counties were likely to walk less time during leisure hours, having more weights and also having more prevalence of hypertension than residents of compact counties.

Schwanen *et al* (2002) utilized the concept of travel time ratio to explore the relationship between total working duration and daily commuting time. A self-reported Dutch National Travel Survey (DNTS) 1998 contained information on household and personal characteristics. The respondents were requested to complete a trip diary for 24 hours. The four-level random-intercept model with one dependent variable is employed. The study acknowledged that workers spent 8 hours on work then they had on average 10.5 percent of their time available travel on commuting time, which corresponds to 28 minutes (one-way trip) commuting time.

Chen and Mokhtarian (2002) reviewed the different methodologies: utility maximization, single linear equations, duration analysis and structural equations used by the researchers to model the allocation of time between travelling and other activities performed by the individuals. They argued that allocation of time between travel and activities is not always free choice for the people as there are 30 and 20 minutes of travel might be required for going to work and dine respectively. To deal with this issue they proposed a model based on the Almost Ideal Demand System (AIDS). The time budget as well as monetary budget was incorporated in the constraints of the model. They recommended travel time and activity duration can be estimated simultaneously with this model using structural equations.

Corti *et al* (2002) examined association among environmental factors, lifestyle factors and obesity. A cross-sectional survey having 1,803 respondents, between 18 to 59 years, concluded that obesity was associated with either living on a highway or street with no sidewalks within walking distance. They argued that absence of sidewalks on street increased the obesity.

Catherine (1998) took the data collected from 4,451 households, using a region-wide, two day activity survey *i.e.,* Oregon and Southwestern Washington (1994) through Activity and Travel Behavior Survey (ATBS). This study was based on microeconomic foundations to investigate the decision to travel, using new home economics and related home production approaches mainly addressing the choice of traveling arise out of the choice to be conducted either in or out of the home. After employing logit model[1] all of the variables were statistically significant. Being a male, presently employed, having an income greater than $60,000 and the number of vehicles

[1] The logit model was introduced by Berkson, J. in 1944, who coined the term. The term was borrowed by analogy from the very similar Probit Model developed by Bliss, I.C. in (1934).

in the household all have a positive influence. While age of respondent, household size and the number of years that a household has lived in the same house have a negative influence.

Young *et al* (1998) took into account sample[1] of the individuals from twenty-eight churches that were randomly selected from 250 predominately African American churches in the community to assess physical activity patterns. A large sample of urban African Americans accessed in churches regarding participation in regular, leisure-time activities and time spent on walking was assessed from 365 adults (69% women). They found that there is a relationship among leisure-time physical activity, age, education and employment status. They concluded that people usually perfumed physical activity in leisure hours.

[1] The sample was primarily middle-aged, employed, and had at least a high school diploma. There was a low frequency of cigarette smokers. Among participants who were employed, the majority (66%) was laboring in professional or technical/sales jobs.

# CHAPTER 3

# DATA SOURCES AND METHODOLOGY

This chapter includes sources of data and the methodology used for the analysis. In this study we have applied Pakistan Time Use Survey (PTUS) conducted by Pakistan Bureau of Statistics (PBS). PBS is involved in collection of nationwide statistical data, analysis of statistical data, national censuses and variety of many other surveys regularly thought the year in Pakistan. PBS has not carried out time use survey before this dataset with the help of local experts and some pieces of advice of GRBI project staff across the four quarters of reference year 2007. The detail information about PTUS is given below:

## 3.1 PAKISTAN TIME USE SURVEY (PTUS)

PTUS (2007) is the first of its own kind ever carried out in Pakistan. The questionnaire of PTUS (2007) was formulated by incorporating the recommendations of Gender Responsive Budgeting Initiatives (GRBI) and the approval of local experts[1]. The enumeration has been carried out across the four quarters of the mention year 2007. The first nationwide PTUS (2007) has 19,600 households enumerated through January to December. The PTUS (2007) estimates sum of all services set of round the clock activities (such as twenty four hours activities). The PTUS (2007) contains all aspects of the respondents' life such as household characteristics, personal characteristics and time use diary listed activities in detail (Report of PTUS published in 2009).

PTUS (2007) collects information on all human activities performed in a day. In particular, it provides a lot of information on employment for establishment, primary production activities, services for income, household maintenance, care for own

[1] Local experts rendering services in Pakistan Bureau Statistics (PBS)

children, community services, social as well as cultural activities, mass media use and personal care and self-maintenance activities. This type of information is missing in other household survey datasets.

Overall dataset was completed in three stages. First stage was the selection of the enumeration blocks in urban domain and mouzas/villages in rural domain; which were taken as Primary Sampling Unites (PSU). Next stage was the selection of households within sample; PSU were taken as section of Secondary Sampling Units (SSU). A quantified number of households *i.e.,* twelve with in urban sample and sixteen with in rural sample was selected. Method of the selection of PSU was systematic sampling technique with equal probability of selection in sample. In the last stage Third Stage Sampling Units (TSU) were selected *i.e.,* individuals. From the sampled households, two individuals from each household (aged at-least ten years) were selected and taken as TSU.

### 3.1.2 DATA MINING

The questionnaire of PTUS (2007) had five sections. The detail description of each section is given below. First section was about the identification. This section contained complete information about detail of field visits, identification of the area and staff entrusted with supervision, coding and editing of respondents' address *i.e.,* province, district, tehsil, city, mouzas *etc.* The second section was about the household characteristics. List of total members of household and their complete demographic information was specified in this section. It also contained information about the availability of mode of transportations at dwelling *i.e.,* motorcycle, cycle, car *etc.,* and detail of other household items can be obtained in this section. The third section contained information about individual characteristics *i.e.,* their employment status,

year of education, personal monthly income *etc.* The fourth and fifth sections of the questionnaire were about detail diary information of two randomly selected persons of same household *i.e.,* first selected person's diary for last twenty four hours and second selected person's diary for the last twenty four hours (the condition was that both selected persons must be at-least ten years old).

As, two persons were selected from each successive household for reporting their daily routine of last twenty four hours. So, total amount of time *i.e.,* twenty four hours (of last day) were divided into forty eight slots and each slot represents thirty minutes. Respondents were requested to enter the name of activities that were performed in last twenty four hours for every thirty minutes slots. Maximum three activities can be reported in each slot. If single activity was entered in a slot it means that person has performed single activity at that time of slot (thirty minutes are consumed on that particular activity). If two activities were entered in a slot it means that person has performed two activities (may be given same amount of time to that particular two activities). Similarly in case of putting three activities in a slot means that person has performed all three activities in that particular slot (time may be equally distributed amount that particular three activities). Experts had formulated a list of one hundred and forty four activities that were performed by selected persons and entered in the last two sections in questionnaire of PTUS (2007). A complete list of all 144 activities and their codes are given in appendix (B). Originally, these one hundred and forty four activities are gathered into ten main groups. But we have constructed another group of daily travel time by gathering all the activities that relate to travel time (travel related to all purpose) on reference day.

Each group represents the amount of time spend by respondents in last twenty four hours on that particular activities. One more binary question was asked in the

questionnaire either the activities were performed inside the household or outside of the household and daily on the same time and the response was in the form of yes or no.

After eradication of missing observations finally, we have a total of 18,915 households, in other words, we have day diary information of 37,830 individuals throughout Pakistan. As, in each thirty minute slot respondent has put maximum three activities and minimum one activity. So, by firstly, taking into account all activities in each thirty minute slot, we have computed time for all 144 activities. Then again we have put them into eleven groups. The range of time for any particular activity must be less than 1440 minutes. Because whole reference day means a total of 1440 minutes. More quantitative analysis and description of activities and their relation with personal and household characteristics are given in next Chapter 4.

## 3.2 METHODOLOGY

This section consists of the econometric model and theoretical background of econometric model:

### 3.2.1 BINARY LOGIT MODEL

A binary logit model is used to understand the main factors that effects daily commuting time. Daily commuting time is defined as total time spend on travel in a whole day. The variable daily commuting time was itself continuous variable. But treated as binary variable by having two possible categories *i.e.,* daily commuting time greater than or equal to 60 minutes and daily commuting time less than 60 minutes. An extensive variety of factors that affect daily commuting time includes: age, marital status, number of children under seven year old, dwelling status and employment status

*etc.* The following econometric form of model describes the most important determinants of daily commuting time.

The mathematical form of the model is as follow:

$$V_j = \alpha_j + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_6 X_{6t} + \beta_7 X_{7t} + \varepsilon_j \quad \text{(1)}$$

$$log\left[\frac{P_i}{1-P_i}\right] = \alpha_j + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \ldots\ldots\ldots + \beta_7 X_{7t} + \varepsilon_j \quad \text{(2)}$$

Where $P_i$ represents the probability of individual $i$ having daily commuting for 60 minutes or more, $log\left[\frac{P_i}{1-P_i}\right]$ is the logarithm odds ratio of the outcome is modeled as a linear combination of the exogenous variables (the ratio of the probability of success and failure), and $X_{it}$ ($\forall\, i$ = 1, 2, 3, .. … 7 and t = 1, 2, 3,.....37,830) are the independent variables which may influence the probability that individual *i* will daily travel time 60 minutes or more, in conjunction with the parameter vector $\beta$ while $\varepsilon_j$ is a normally distributed random variable, (error term of the model). And $\alpha_j$ is the intercept/constant term in model. The description of used variables is given below:

**Table 3.1: DESCRIPTION OF VARIABLES OF BINARY LOGIT MODEL**

Description of variables is given in following table:

| **Variables** | **Description** |
|---|---|
| Commuting time | $V_j$ = 1 if commuting time greater than or equal to 60 minutes |
| | $V_j$ = 0 if commuting time less than 60 minutes |
| $X_{1t}$ | Age of the respondent |
| $X_{2t}$ | Highest class that passed or year of education |
| $X_{3t}$ | Respondent's marital status |
| $X_{4t}$ | Respondent's monthly household income |
| $X_{5t}$ | Occupation or employment status |
| $X_{6t}$ | Respondent gender |
| $X_{7t}$ | Respondent's dwelling status |

### 3.2.2 SEEMINGLY UNRELATED REGRESSION MODEL (SUR)

Seemingly Unrelated Regression (SUR) model was suggested by Zellner (1962). The model explains the variation of not just in one dependent variable, as in the univariate multiple regression model, but the variation of a set of "k" dependent variables. The model itself consists of several multiple linear regression equations, each equation has its own dependent variable and different sets of explanatory variables. Each equation can be estimated separately that is why the system is called SUR. The main difference between Simultaneous Equation Models (SEM) and SUR model is that SEM contains both endogenous and exogenous regressors while SUR model contains only exogenous regressors. SUR model can be used to gain efficiency in estimation by combining information on different equations. The parameters in the SUR model generally vary from equation to equation. While regressors may or may not vary from equation to equation depending on the model.

If we have a system of equations that is not simultaneous in nature. Let us consider, a case of three dependent variables that have conceptual relationship with each other and they are considered as a group. If three equations actually are unrelated to each other, then we should estimate them one by one. But in our case there is a correlation among the error terms of each equation. So, in this case we are unable to use SEM. The best one way to deal with these three equations is to apply SUR model. The general mathematical form of the econometric model is as follow:

$$Y_{it} = X_{jt}\beta_{jt} + \varepsilon_{it} \quad \text{(3)}$$

$$\forall\, i = 1, 2, 3 : \forall\, t = 1, 2, \ldots n \; and \; \forall\, j = 1, 2, \ldots 8$$

$Y_{it}$ is the matrix of endogenous variables, $X_{jt}$ is the matrix of exogenous variables

Here, *i* represent the number of equation, *j* is the number of exogenous variables and *t* is the number of observations in each equation. In this study we have three equations, eight exogenous variables and 37,830 observations. Since we know that each equation *i* has its own single dependent variable. If we load these three equations, the system will take the following matrix form:

$$\begin{bmatrix} y_{1t} \\ y_{2t} \\ y_{3t} \end{bmatrix} = \begin{bmatrix} X_{11} & X_{12} & \dots & X_{18} \\ X_{21} & X_{22} & \dots & X_{28} \\ X_{31} & X_{32} & \dots & X_{38} \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ . \\ . \\ . \\ \beta_8 \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix}$$

It is assumed that the error terms are independent across time, but may have cross equation correlations. Thus $E\{\varepsilon_{ik}\varepsilon_{jl}|X\} = 0$ if k ≠ l, and $E\{\varepsilon_{ik}\varepsilon_{jl}|X\} = \sigma_{ij}$ if k = l. $\sigma_{ij}$ the 8*8 matrix and the covariance matrix of the error terms will be

$$\Omega = \begin{bmatrix} \omega_{11} & \omega_{12} & \cdots & \omega_{18} \\ \omega_{21} & \omega_{22} & \dots & \omega_{28} \\ \vdots & \vdots & \ddots & \vdots \\ \omega_{81} & \omega_{82} & \cdots & \omega_{88} \end{bmatrix} \equiv E\{\varepsilon_i \varepsilon_j |X\} = \sum \otimes I_K$$

$I_K$ is the 8-dimentional identity matrix and ⊗ denotes the matrix of kronecker product. The SUR model estimated using the feasible generalized least squares (FGLS) method. The FGLS is two-stage method of estimation. At first stage we estimate OLS regression. The residuals in this stage are estimated through ∑.

$$\hat{\sigma}_{ij} = \frac{1}{K} \hat{\varepsilon}_i^T \hat{\varepsilon}_j$$

While in the second stage we run the generalized least square (GLS) regression by using the variance matrix $\hat{\Omega} = \hat{\sum} \otimes I_K$ (measured in first stage)

$$\hat{\beta} = (X^T(\hat{\sum}^{-1} \otimes I_K)X)^{-1} X^T(\hat{\sum}^{-1} \otimes I_K)y$$

The $\hat{\beta}$ estimator in case of large samples will be consistent and asymptotically normally distributed with limiting distribution.

$$\sqrt{K}\left(\hat{\beta}-\beta\right) \xrightarrow{d} N\ (0, (\frac{1}{K} X^T (\hat{\sum}^{-1} \otimes I_K) X)^{-1})$$

Another way to estimate the SUR model is maximum likelihood (ML) method under the assumption that the residuals are normally distributed. Initial assumptions on the SUR model are:

i. All the independent variables are weakly exogenous
ii. There is no issue of autocorrelation
iii. No time hetroskedasticity
iv. The $\varepsilon_i$ are normally distributed

In our estimation section we have estimated SUR model with second approach (MLE). Gender-specific, age-specific, region-specific and city wise adjusted means can be calculated using SUR (taking error correlations among individuals' time usage) *i.e.*, total daily commuting duration, total time spend on household based activities, social and cultural activities and personal care and self-maintenance activities, by Pakistani, adult, full-time employed, residents of urban big cities or rural areas through PTUS (2007). General form of the econometric model:

$$Y_{1t} = \alpha_{1t} + \beta_{11}X_{1t} + \beta_{12}X_{2t} + \beta_{13}X_{3t} + \beta_{14}X_{4t} + \beta_{15}X_{5t} + \beta_{16}X_{6t} + \beta_{17}X_{7t} + \beta_{18}X_{8t} + \varepsilon_{1t} \quad (4)$$

$$Y_{2t} = \alpha_{2t} + \beta_{21}X_{1t} + \beta_{22}X_{2t} + \beta_{23}X_{3t} + \beta_{24}X_{4t} + \beta_{25}X_{5t} + \beta_{26}X_{6t} + \beta_{27}X_{7t} + \beta_{28}X_{8t} + \varepsilon_{2t} \quad (5)$$

$$Y_{3t} = \alpha_{3t} + \beta_{31}X_{1t} + \beta_{32}X_{2t} + \beta_{33}X_{3t} + \beta_{34}X_{4t} + \beta_{35}X_{5t} + \beta_{36}X_{6t} + \beta_{37}X_{7t} + \beta_{38}X_{8t} + \varepsilon_{3t} \quad (6)$$

**Table 3.2: DESCRIPTION OF VARIABLES OF SUR MODEL**

The description of variables is given in the following table:

| **Variables** | **Description** |
|---|---|
| $Y_{1t}$ | Total time spend in household maintenance and are of children activities |
| $Y_{2t}$ | Total time spend in social and cultural activities (in minutes) |
| $Y_{3t}$ | Total time spend in personal care and self-maintenance (in minutes) |
| $X_{1t}$ | Total time spend in daily travel/ daily commuting time (in minutes) |
| $X_{2t}$ | Age of the respondent |
| $X_{3t}$ | Highest class that passed/ year of education |
| $X_{4t}$ | Marital status |
| $X_{5t}$ | Number of children under aged 7 years at household |
| $X_{6t}$ | Monthly household income |
| $X_{7t}$ | How did respondent feel about the day he/she described |
| $X_{8t}$ | Employment status |

# Chapter 4

## RESULTS AND THEIR INTERPRETATIONS

The results and their interpretations are discussed in this chapter.

### Table 4.1: Percentage Distribution of Respondents' Characteristics

| Groups | Frequency | Percentage |
|---|---|---|
| **Province** | | |
| Punjab | 17,092 | 45.18 |
| Sindh | 9,039 | 23.89 |
| KPK | 6,814 | 18.01 |
| Balochistan | 4,885 | 12.91 |
| Region | | |
| Urban | 14,917 | 39.43 |
| Rural | 22,913 | 60.57 |
| **Gender** | | |
| Male | 18,321 | 48.43 |
| Female | 19,509 | 51.57 |
| **Personal main source of income or support to meet your daily expenses** | | |
| Wage/salary/piecework pay/commission | 17,051 | 18.64 |
| Earnings from own business/farm | 5,939 | 15.7 |
| Other | 4,460 | 11.79 |
| No personal income | 20,380 | 53.87 |
| **Highest year of education** | | |
| No formal education | 17,014 | 44.97 |
| K.G. but below primary | 3,850 | 10.18 |
| Primary but below middle | 6,037 | 15.96 |
| Middle but below matric | 3,730 | 9.86 |
| Matric but below intermediate | 3,573 | 9.44 |
| Inter. but below degree | 1,842 | 4.87 |
| Degree and above | 1,784 | 4.72 |
| **Current marital status** | | |
| Never married | 14,820 | 39.18 |
| Currently married | 21,423 | 56.63 |
| Widow/widower | 1,471 | 3.89 |
| Divorced | 116 | 0.31 |
| **Day of the week for which activities recorded** | | |
| Monday | 6,049 | 15.99 |
| Tuesday | 6,227 | 16.46 |
| Wednesday | 6,178 | 16.33 |
| Thursday | 5,606 | 14.82 |
| Friday | 5,119 | 13.53 |
| Saturday | 3,419 | 9.04 |
| Sunday | 5,232 | 13.83 |
| **Feel about the day you described** | | |
| Too much busy that day | 10,191 | 26.94 |
| Comfortable that day | 14,528 | 38.4 |
| Not busy that day | 13,111 | 34.66 |

| | | |
|---|---|---|
| **Dwelling ownership** | | |
| Owned House | 33,411 | 88.32 |
| Rented/Hired House | 3,107 | 8.21 |
| Others | 1,312 | 3.47 |
| **Number of children under 7 years** | | |
| One child | 29,451 | 77.85 |
| Two children | 4,542 | 12.01 |
| Three children | 2,782 | 7.35 |
| Four or more children | 1,055 | 2.79 |
| **Total monthly household income** | | |
| Less than Rs.2000 | 844 | 2.23 |
| Rs.2001 – Rs.3000 | 2,048 | 5.41 |
| Rs.3001 – Rs.4000 | 3,566 | 9.43 |
| Rs.4001 – Rs.5000 | 4,427 | 11.7 |
| Rs.5001 – Rs.6000 | 4,289 | 11.34 |
| Rs.6001 – Rs.7000 | 3,861 | 10.21 |
| Rs.7001 – Rs.8000 | 3,346 | 8.84 |
| Rs.8001 – Rs.9000 | 2,542 | 6.72 |
| Rs.9001 – Rs.10000 | 2,426 | 6.41 |
| Rs.10001 or more | 9,514 | 25.15 |
| Don't know | 763 | 2.02 |
| Refusal | 204 | 0.54 |
| **Age** | | |
| 10-18 | 10,867 | 28.73 |
| 18-28 | 8,815 | 23.3 |
| 28-40 | 9,090 | 24.03 |
| 40-65 | 7,650 | 20.22 |
| 65 < | 1,408 | 3.72 |

Author's own calculation based on PTUS (2007)

Table 4.1 describes the respondents' characteristics like age, gender, year of education, household monthly income, source of personal income, marital status, number of children under age seven at dwelling and diary day. Variables along their respective categories are briefly described in the table 4.1. Overall, table has three columns, first column represents the categories of variables, second column represents frequencies of each category and last column represents percentage frequencies. Province wise categories describe that, 45.18 percent respondents belong to Punjab, 23.89 percent respondents belong to Sindh, 18.01 percent respondents belong to KPK and 12.91 percent respondents belong to Balochistan. Region has two categories *i.e.*, urban (39.43 percent) and rural (60.57 percent). Main sources of personal income are: wage (18.64 percent) and own business (15.70 percent) while 53.87 percent

respondents have no personal income. The range of respondents' age is from 10 to 99 years. Which is grouped into five categories. A 28.73 percent respondents have age between 10 and 18. While 23.30 percent respondents' belong to 18-28 age group. Here 24.03 percent respondents are those who belongs to age group that is 28 to 40. It is also clear that 20.22 percent respondents have age between 40 and 65. Similarly 3.72 percent are over 65 years old. Table also describes the percentage distribution of dwelling ownership. Here, 88.32 percent respondents reported that they have own house. While 8.21 percent respondents don't have own houses or they lived in rented houses. And remaining of them that is 3.47 percent respondents have other status.

The categories of respondent's marital status show that most respondents are currently married *i.e.,* 56.63 percent followed by never married 39.18 percent. A small portion 3.89 percent is composed of widows/widowers and divorced. In case of year of education majority of the respondents 44.97 percent have no formal education. Among the rest, below primary are 10.18 percent, below middle are 15.96 percent, below matric are 9.86 percent and below intermediate are 9.44 percent. While below-degree education and above-degree education are 4.87 percent and 4.72 percent respectively.

The diary day feeling about the strenuousness are presented in terms of three choices: too much busy, comfortable/normal and not busy. In table 4.1 it is clear that 38.40 percent of the total respondents subscribe to "normal response", 34.44 percent respondents answer that they are "not busy enough". But 26.94 percent respondents reported that "too much busy that day". The total number of female response is 51.57 percent while 48.43 percent respondents are male.

**Table 4.2: Percentage Distribution of Vehicle Ownership**

(Percent)

| Vehicle Ownership | Yes | No |
|---|---|---|
| Has car at respondent's dwelling? | 6.62 | 93.38 |
| Has cycle at respondent's dwelling? | 34.56 | 65.44 |
| Has motorcycle at respondent's dwelling? | 18.61 | 81.39 |

Author's own calculation based on PTUS (2007)

Table 4.2 express the percentage distribution of availability of mode of transportation at dwelling. Respondents were asked either they have car, cycle or motorcycle at their dwelling. The response in table 4.2 is in the form of binary categories *i.e.* 6.62 percent respondent replied that they have car, while 93.38 percent respondent denied that they don't have car. Similarly in case of having cycle or motorcycle, the response is given in the table 4.2.

**Table 4.3: Percentage Distribution of Households Collecting Wood/Dung and Drinking Water by Distance**

| Groups | How far is the wood/dung from the dwelling? | | How far is the main source of drinking water? | |
|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent |
| **less than 100 M** | 5,680 | 23.41 | 2,664 | 38.23 |
| **100 M-200 M** | 2,889 | 11.9 | 991 | 14.22 |
| **200 M-500 M** | 3,531 | 14.55 | 1,035 | 14.85 |
| **500 M-1 KM** | 4,040 | 16.65 | 937 | 13.45 |
| **1 KM or more** | 8,128 | 33.49 | 1,341 | 19.25 |
| **Total** | 24,268 | 100 | 6,968 | 100 |

Author's own calculation based on PTUS (2007)

The table 4.3 presents either access to basic necessaries is at doorstep/walkable distance from dwelling or not. It is clear that table 4.3 shows percentage distribution of households collecting water and wood/dung by location. In case of less than 100 meter, 23.41 percent and 38.23 percent respondents have access of wood/dung and drinking water respectively. Distance between 200M-500M there are 14.55 percent and 14.48 percent respondents those having the access of wood/dung and drinking water

respectively. While 33.49 percent and 19.25 percent respondent replies that they have no access (within one km) of wood/dung and drinking water respectively.

**Table 4.4: Percentage Distribution Availability of Basic Necessaries by Distance**

(Percent)

| Variables | | Total |
|---|---|---|
| **Mode of transportations** | | |
| Train available within 30 minutes' walk or within 2 km from the dwelling | No | 78.98 |
| | Yes | 21.02 |
| Bus available within 30 minutes' walk or within 2 km from the dwelling | No | 25.81 |
| | Yes | 74.19 |
| Minibus/taxi available within 30 minutes' walk or within 2 km from the dwelling | No | 15.32 |
| | Yes | 84.68 |
| Rickshaw/quinqui available within 30 minutes' walk or within 2 km from the dwelling | No | 33.88 |
| | Yes | 66.12 |
| **Schools** | | |
| Govt. Primary School available within 30 minutes' walk or within 2 km from the dwelling | No | 03.19 |
| | Yes | 96.81 |
| Govt. Secondary School available within 30 minutes' walk or within 2 km from the dwelling | No | 32.78 |
| | Yes | 67.22 |
| **Dispensary** | | |
| Dispensary/Basic Health Unit available within 30 minutes' walk or within 2 km from the dwelling | No | 33.33 |
| | Yes | 66.67 |
| **Market** | | |
| Market (where basic food items) available within 30 minutes' walk or within 2 km from the dwelling | No | 24.33 |
| | Yes | 75.67 |

Author's own calculation based on PTUS (2007)

Table 4.4 presents percentage distribution of the availability of basic necessities: Govt. primary and secondary schools, basic health units (dispensaries) and markets (where basic food items can be bought) in binary response. The table 4.4 presents concept of availability of goods and services at doorstep (within easy reach for respondent). The use of mixed land, in the surrounding of respondent's dwelling can be examined through information given in table 4.3 and table 4.4. If respondent has access to basic necessaries: wood/dung, main source of drink water, Govt. primary and secondary schools, basic health unit (dispensary), modes of transportation (*i.e.*, train,

bus, minibus/taxi and rickshaw) and market (where basic food items can be bought) at doorstep or 30 minutes' walk or within 2 km then we can say that use of land is multi-purpose. Majority of respondents replied that they have no access to train within 30 minutes' walk. But access to other necessities like school, dispensary and market most of respondents replied "yes".

**Table 4.5: Percentage Allocation of Time upon Daily Performed Main Activities**

| **Total time spend in household maintenance, management and shopping for own household** | | |
|---|---|---|
| **Groups** | **Frequency** | **Percent** |
| **0 minutes** | 16,890 | 44.65 |
| **0-60 minutes** | 4,962 | 13.12 |
| **60-240 minutes** | 5,797 | 15.32 |
| **240-450 minutes** | 8,000 | 21.15 |
| **450 plus minutes** | 2,181 | 5.77 |
| **Total time spend in care for children, the sick, elderly and disabled for own household** | | |
| **0 minutes** | 25,771 | 68.12 |
| **0-60 minutes** | 4,742 | 12.54 |
| **60-150 minutes** | 4,166 | 11.01 |
| **150 plus minutes** | 3,151 | 8.33 |
| **Total time spend in household maintenance and care for children** | | |
| **0 minutes** | 14,202 | 37.54 |
| **0-60 minutes** | 5,985 | 15.82 |
| **60-120 minutes** | 2,558 | 06.79 |
| **120-300 minutes** | 5,062 | 13.38 |
| **300 plus minutes** | 10,023 | 26.49 |
| **Time spend in community services and help to other household** | | |
| **No** | 37,431 | 98.95 |
| **Yes** | 399 | 1.05 |
| **Total time spend in social and cultural activities** | | |
| **0-60 minutes** | 10,729 | 28.36 |
| **60-150 minutes** | 13,442 | 35.53 |
| **150-240 minutes** | 7,873 | 20.81 |
| **240 plus minutes** | 5768 | 15 |
| **Total time spend in personal care and self-maintenance activities** | | |
| **less than 660 minutes** | 7,250 | 19.16 |
| **660-750 minutes** | 9,968 | 26.35 |
| **750-850 minutes** | 9,920 | 26.22 |
| **850 plus minutes** | 10,692 | 28.26 |
| **Total time spend in mass media use related activities** | | |
| **0 minutes** | 20,106 | 53.15 |
| **1-60 minutes** | 6,969 | 18.42 |
| **60-90 minutes** | 3,677 | 9.72 |
| **90-180 minutes** | 5,140 | 13.59 |
| **180 plus minutes** | 1,938 | 5.12 |
| **Total time spend in daily travel/commuting** | | |

| | | |
|---|---|---|
| **0-60 minutes** | 22,521 | 59.53 |
| **60-120 minutes** | 8,704 | 23.01 |
| **120-180 minutes** | 4,206 | 11.12 |
| **180-240 minutes** | 1,657 | 4.38 |
| **240 plus minutes** | 742 | 1.96 |

Author's own calculation based on PTUS (2007)

The first column of table 4.5 express categories of different activities. Second and third column present frequency and percentage frequencies respectively. It describes the allocation of time spend on some daily performed main activities. Every respondent have to perform above activities at-least once in a whole day. What amount of time, a respondent consumes in any particular activity is shown in table 4.5. Each activity is categories into several groups according to variations in the series. It is clear that only 5.27 percent respondents spend more than 450 minutes in household based activities. While 44.65 percent respondents spend zero amount of time on household related activities. Only 13.12 percent respondents spend up to 60 minutes on household based activities.

Similarly, table 4.5 shows that 68.12 percent respondents spend zero amount of time on care of children related activities (both male and female). Only 12.54 percent respondents spend up to 60 minutes on care of children related activities. While only 8.33 percent respondents spend more than 150 minutes per day for care of children and related activities. Almost 98.95 percent respondents have described that last day they didn't spend time on community services. And only 1.05 percent respondents have spent some piece of time on community services.

It is also clear that 28.36 percent respondents have low level of social interaction or they spend minimum amount of time on social activities as compared to remaining respondents. Only 35.53 percent respondents spend 60 to 150 minutes on social and cultural activities. And only 15.00 percent respondents spend more than 240 minutes of a day on social and cultural activities. On the other hand 19.16 percent respondents

spend less than 600 minutes in personal care and self-maintenance activities (it includes sleeping hours). While just 28.26 percent respondents spend maximum amount of time on personal care related activities.

Table 4.5 presents that 59.53 percent respondents spend up to 60 minutes per day on daily travel or commute. While 23.01 percent 11.12 and 4.38 percent respondents spend 60-120 minutes, 120-180 minutes and 180-240 minutes respectively on daily travel. And 1.96 percent respondents have maximum commuting time that is greater than 240 minutes (*these commuters are at an alarming rate as they waste more than 4 hours out of 24 hours on wasteful journey*).

**Table 4.6: Summary Statistics, Time of Daily Performed Main Activities**

(n=37,830)

| **Variable (activities' total time in minutes)** | **Summary Statistic** | | |
|---|---|---|---|
| | **Mean** | **Min** | **Max** |
| **Household maintenance, management and shopping** | 131.64 | 0 | 1185 |
| **Care for own children** | 36.67 | 0 | 705 |
| **Total household/ family based activities** | 168.37 | 0 | 1185 |
| **Community services and help to other households** | 1.09 | 0 | 1080 |
| **Social and Cultural Activities** | 140.80 | 0 | 1080 |
| **Mass media use** | 47.40 | 0 | 735 |
| **Personal care and self-maintenance** | 790.01 | 135 | 1440 |
| **Daily travel related to all activities** | 68.31 | 0 | 1045 |
| **Total working time** | 167.89 | 0 | 1170 |

Author's own calculation based on PTUS (2007)

Table 4.6 gives summary statistics of time spend on daily performed main activates. It is clear that the range of time, spend on different activities must be 0 to 1440 minutes. Personal care and self-maintenance that contains sleeping hours that's why its minimum point is equal to 135 minutes. The mean minutes of time spend on personal care and self-maintenance is 790.01 and the range of this activity is from 135

minutes to 1440 minutes. Average amount of time spend on mass media use is 47.40 minutes. It is clear that each respondent on average spend 68.31 minutes in commuting in each day. Each respondent on average spend 140.80 minutes on social and cultural activities. Similarly, both male and female respondents on average spend 58.67 minutes on care of their own children.

**Figure 4.1: Percentage Distribution of Commuting Time vs Province**

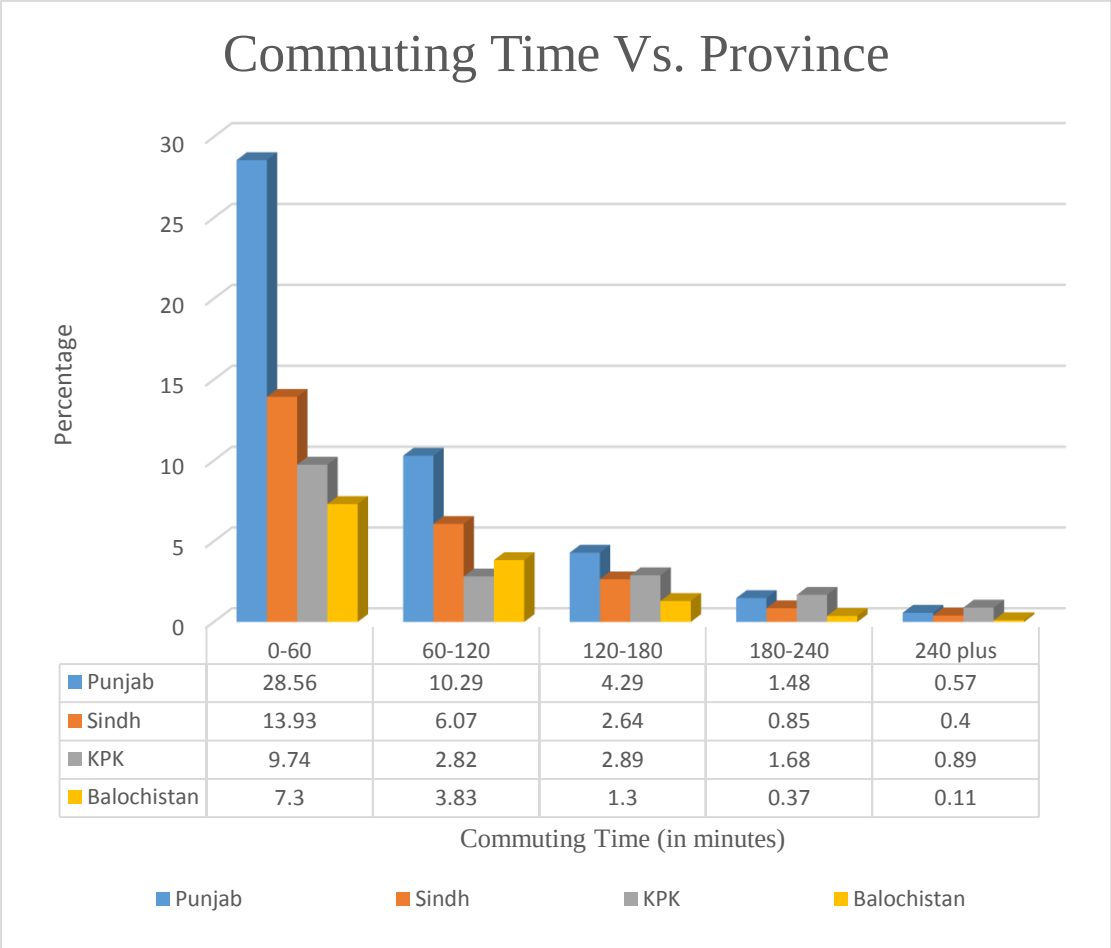



Figure 4.1 presents the bivariate analysis of daily commuting time and respondents' province or we can say that a province wise distribution of daily commuting time. It is clears that 28.56 percent, 10.29 percent, 4.29 percent, 1.48 percent and 0.57 percent respondents from province Punjab spend on average 0-60

minutes, 60-120 minutes, 120-180 minutes, 180-240 minutes and more than 240 minutes in daily commute respectively. Also it is clears that 13.93 percent, 06.07 percent, 2.62 percent, 0.85 percent and 0.40 percent respondents from province Sindh spend on average 0-60 minutes, 60-120 minutes, 120-180 minutes, 180-240 minutes and more than 240 minutes in daily commute respectively. Similarly, the distribution of time spend on commute for other provinces can be extract from the figure 4.1.

**Figure 4.2: Percentage Distribution of Commuting Time vs Region**

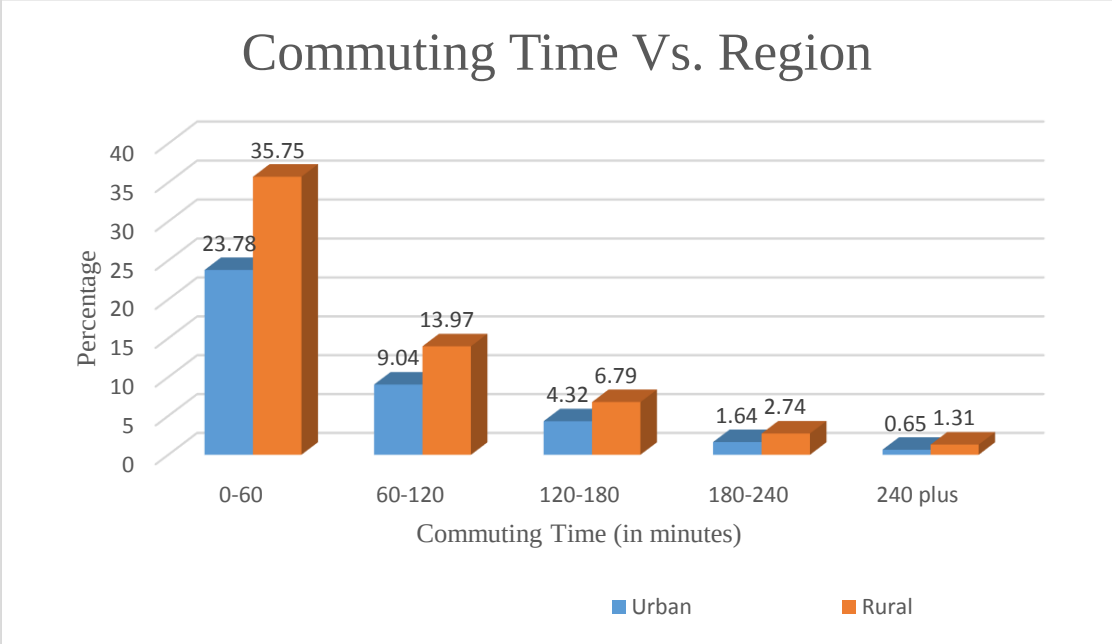



Figure 4.2 presents the cross analysis of commuting time and region. Region is combination of two categories: urban areas and rural areas. While daily commuting time has five categories: 0-60 minutes, 60-120 minutes, 120-180 minutes, 180-240 minutes and more than 240 minutes. The vertical axis of figure 4.2 shows the percentages and horizontal axis represents the commuting time (in minutes). It is clear that 23.78 percent and 35.75 percent respondents from urban areas and rural areas commute less than 60 minutes in each day respectively. Only small number of respondents *i.e.,* 0.65 percent and 1.31 percent respondents from urban and rural areas

of Pakistan commute more than 4 hours each day. The average commuting time of urban areas is 67.04 minutes while average daily commuting time of respondents in rural areas is 69.14 minutes. From the figure 4.2 it is clear that respondents from rural areas commute extra minutes as compared to respondents of urban areas. The reason may be non-availability of basic necessities at walkable distance in rural areas. So, they have to move towards nearest market on daily bases.

**Figure 4.3: Percentage Distribution of Commuting Time vs Gender**

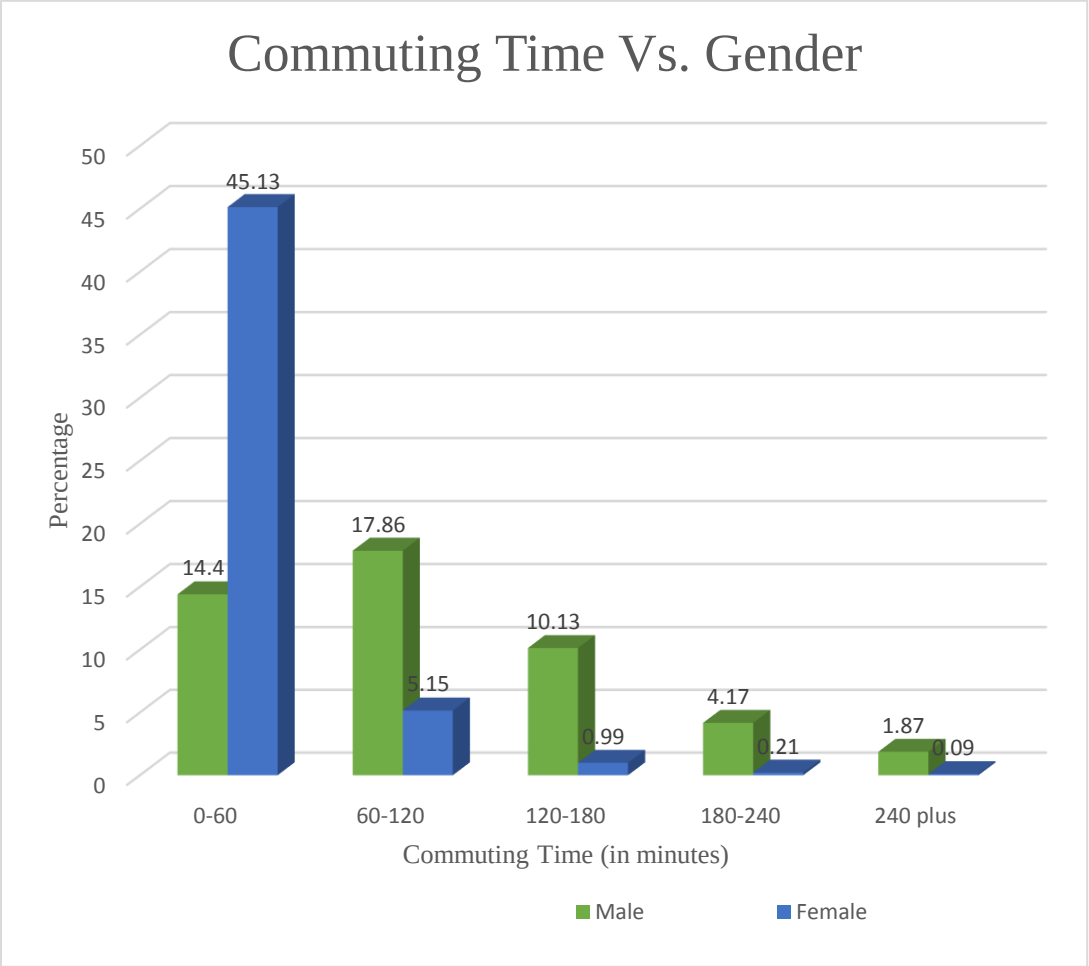
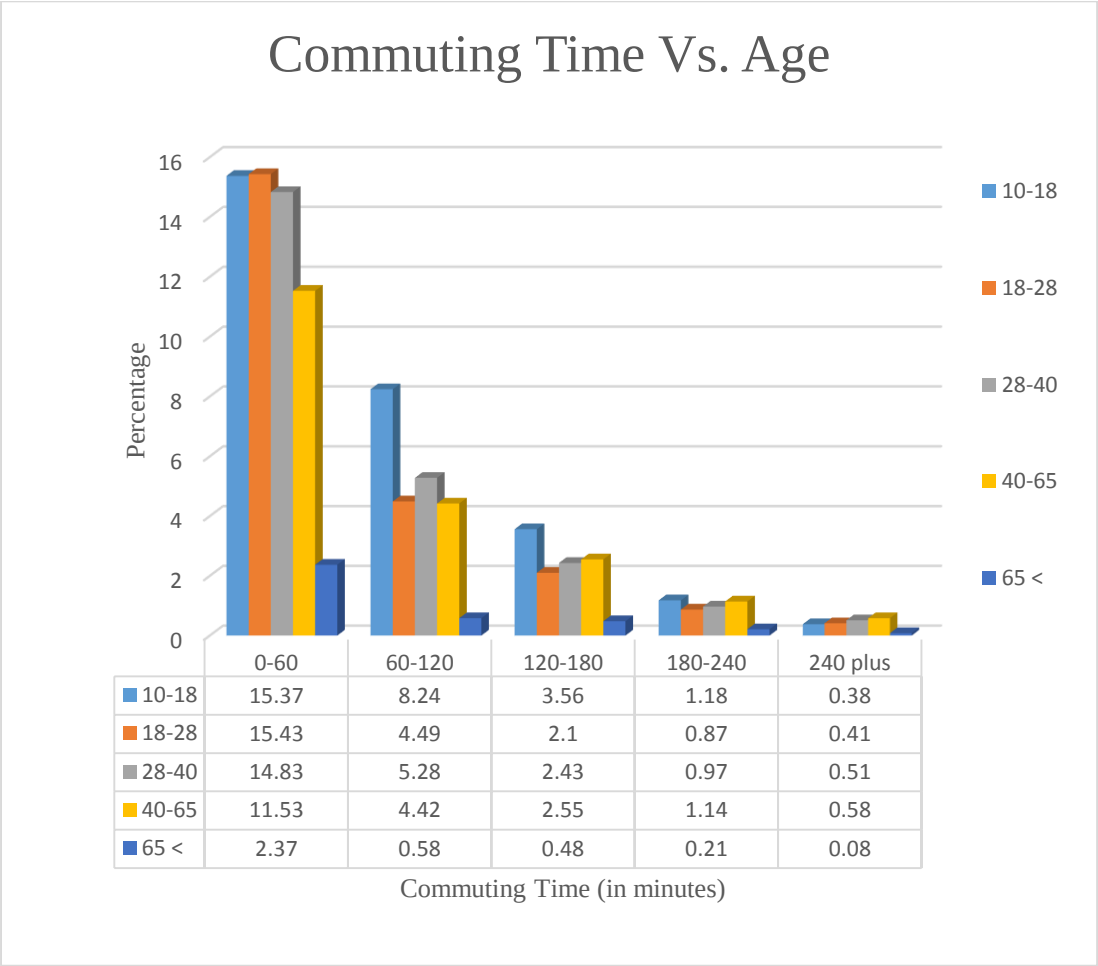



Figure 4.3 represents the comparison of daily commuting time (in minutes) *i.e.*, 0-60 minutes, 60-120 minutes, 120-180 minutes, 180-240 minutes and 240 plus minutes. The categories of gender *i.e.*, male and female. From the PTUS (2007) dataset it is clear that male respondents spend on average more time *i.e.*, 111 minutes on daily

commuting. While female spend on average fewer minutes on daily commuting *i.e.*, 28.22 minutes. From the figure 4.3 it is clear that most female prefer to commute shorter length that's why their share in first category *i.e.*, 0-60 minutes is high as compare to male and lower in reaming all categories of daily commuting time.

**Figure 4.4: Percentage Distribution of Commuting Time vs Age**




| | 0-60 | 60-120 | 120-180 | 180-240 | 240 plus |
|---|---|---|---|---|---|
| 10-18 | 15.37 | 8.24 | 3.56 | 1.18 | 0.38 |
| 18-28 | 15.43 | 4.49 | 2.1 | 0.87 | 0.41 |
| 28-40 | 14.83 | 5.28 | 2.43 | 0.97 | 0.51 |
| 40-65 | 11.53 | 4.42 | 2.55 | 1.14 | 0.58 |
| 65 < | 2.37 | 0.58 | 0.48 | 0.21 | 0.08 |

Figure 4.4 presents cross graphical analysis of daily commuting time vs. different age groups. Horizontal axis of the graph shows the five categories of daily commuting time and vertical axis shows the percentages. The age of respondents is divided into five categories *i.e.*, 10-18 years, 18-28 years, 2840 years, 40-65 years and more than 65 years. It is clear from the figure 4.4 that 15.37 percent respondents of 10-18 age group have 0-60 minutes commuting time. And 8.24 percent, 3.56 percent, 1.18

percent and 0.38 percent respondents having age 10-18 years commute 60-120 minutes, 120-180 minutes, 180-240 minutes and 240 plus minutes respectively.

**Figure 4.5: Mean Minutes Spends on Commuting Time vs Different main activities**

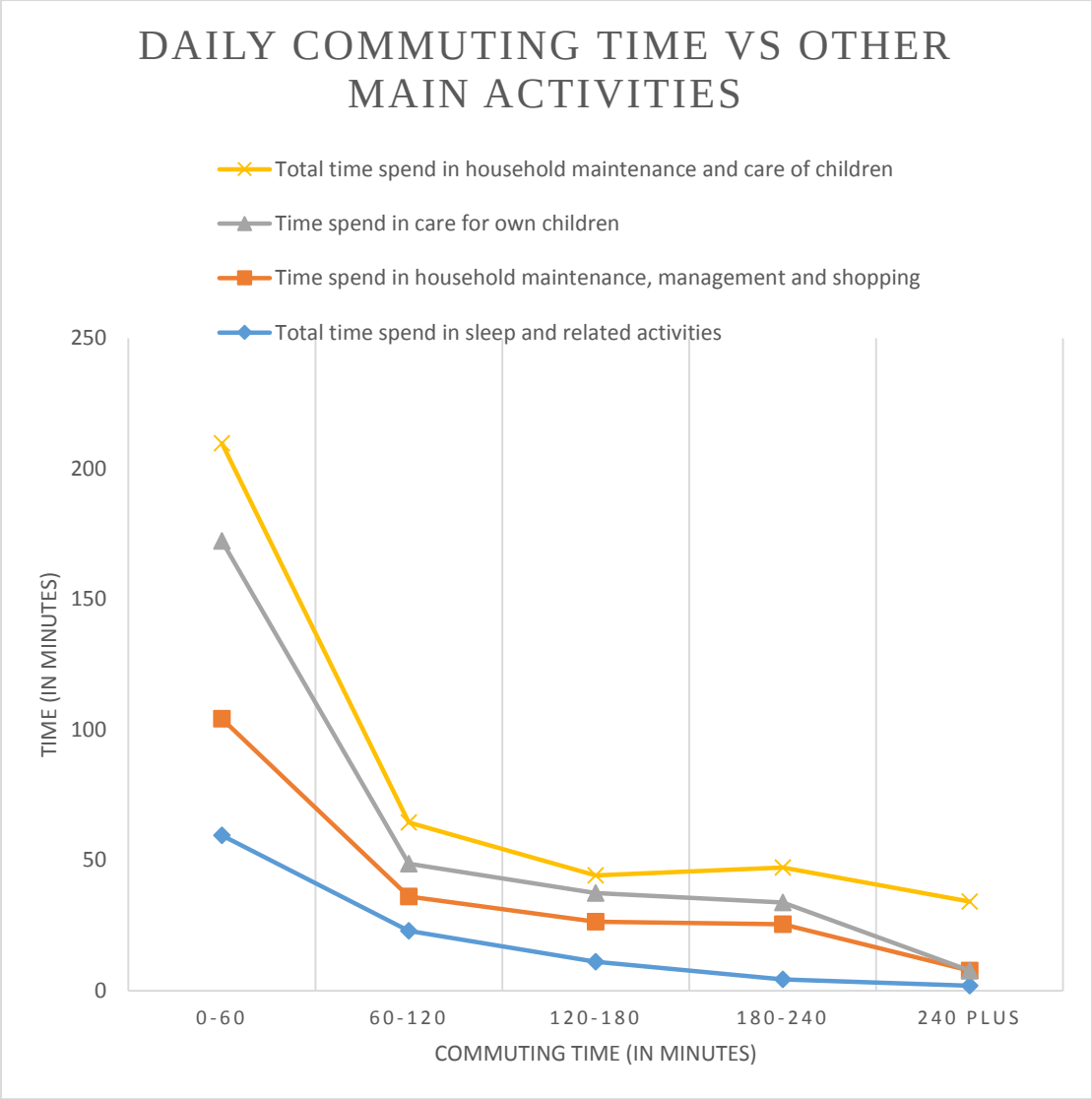



Figure 4.5 presents the graph of mean minutes spend on daily commuting time vs time spend on household based activities, care for children related activities and total daily sleeping time. As commuting time increase from 0-60 minutes the time spend on all other activities decreases. From the figure 4.5 it is clear that there is negative relationship or trade-off between activities. If commuting time required more and more minutes therefore, respondent have least amount of time to spend on other activities

*i.e.*, time spend on time spend on care of children, time spend on household maintenance and most important personal care and self-maintenance especially, daily sleeping hours *etc.*

**Table 4.7: Percentage Distribution of Daily Commuting Time vs. Daily Performed Different Main Activities**

(Percent)

| Time on Main Activities | | Commuting Time (in minutes) | | | | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | 0-60 | 60-120 | 120-180 | 180-240 | 240 plus | |
| Time spend in personal hygiene and health related activities | <30 | 12.90 | 3.92 | 1.65 | 0.53 | 0.27 | 19.28 |
| | 30-60 | 18.42 | 7.69 | 3.88 | 1.56 | 0.75 | 32.29 |
| | 60-90 | 15.01 | 6.15 | 3.34 | 1.37 | 0.51 | 26.39 |
| | 90-150 | 11.31 | 4.62 | 2.06 | 0.86 | 0.40 | 19.25 |
| | 150 < | 1.90 | 0.63 | 0.18 | 0.06 | 0.03 | 2.79 |
| Total time spend in mass media use related activities | 0 | 31.39 | 11.80 | 6.02 | 2.59 | 1.36 | 53.15 |
| | 1-60 | 10.06 | 4.61 | 2.45 | 0.94 | 0.37 | 18.42 |
| | 60-90 | 5.68 | 2.49 | 1.10 | 0.36 | 0.08 | 9.72 |
| | 90-180 | 8.62 | 3.19 | 1.26 | 0.39 | 0.13 | 13.59 |
| | 180 < | 3.79 | 0.92 | 0.29 | 0.10 | 0.02 | 5.12 |
| Time spend in personal care and self-maintenance | < 660 | 9.00 | 4.65 | 3.02 | 1.56 | 0.93 | 19.16 |
| | 660-750 | 13.82 | 6.94 | 3.61 | 1.45 | 0.52 | 26.35 |
| | 750-850 | 15.50 | 6.68 | 2.83 | 0.89 | 0.33 | 26.22 |
| | 850 < | 21.21 | 4.73 | 1.66 | 0.49 | 0.18 | 28.26 |

Author's own calculation based on PTUS (2007)

Table 4.7 provides cross analysis of daily commuting time and other daily performed main activities. Columns of table 4.8 show different categories of daily commuting time. And row wise we have different daily performed main activities *i.e.*, each activity is further divided into several groups (each group explain amount of time spend on particular activity). The minimum amount of time spend on personal care and self-maintenance is 660 minutes. Only 28.26 percent respondents are those who spend

more than 850 minutes of their day on personal care and self-maintenance. Similarly Table 4.7 shows the cross analysis between personal hygiene, health related activities and daily commuting time.

**Table 4.8: Correlation Analysis of Daily Commuting Time vs. Daily Performed Main Activities**

| Activities | r | P-value |
|---|---|---|
| **Household based activities and daily commuting time** | -0.5109 | 0.000 |
| **Social, cultural activities and daily commuting time** | 0.1039 | 0.000 |
| **Personal care and self-maintenance and daily commuting time** | -0.2730 | 0.000 |

Author's own calculation based on PTUS (2007)

**Table 4.9: Partial Correlation Analysis of Daily Commuting Time vs. Daily Performed Main Activities**

| Activities | Partial and semi partial correlations of daily travel time with | | | | |
|---|---|---|---|---|---|
| | Partial Corr. | Semi partial Corr. | Partial Corr.^2 | Semi partial Corr.^2 | Sig. Value |
| **Social and cultural activities** | -0.0406 | -0.0317 | 0.0016 | 0.001 | 0.0000 |
| **Personal care and self-maintenance** | -0.4191 | -0.3602 | 0.1756 | 0.1298 | 0.0000 |
| **Household/ family based activities** | -0.5792 | -0.5545 | 0.3354 | 0.3075 | 0.0000 |

Author's own calculation based on PTUS (2007)

Figure 4.8 presents Pearson correlation coefficient that show direction and strength of the linear association between pair of variables. First relation is between the daily commuting/travel time (in minutes) and daily time spend on household based activities (in minutes) *i.e.,* r = -0.5109 shows that there is a negative correlation and also suggests as a strong correlation between daily travel time and daily time spend on household based activities *i.e.,* $r^2$ = 0.26102 this can be expressed as a percentage *i.e.,* 26.102%. From table 4.9 the partial correlation is -0.5792 and semi partial correlation value is -0.5545. The level of statistical significance (p-value) of the correlation

coefficient is p = 0.0000, which means that there is a statistically significant relationship between these two variables.

The second relationship between daily commuting time and social activities, Pearson correlation coefficient *i.e.,* r = 0.1039 shows that there is a linear positive correlation between daily commuting time and social activities. As, $r^2$ = 0.01079 this can also be expressed as a percentage (*i.e.,* 1.079%). The table 4.9 shows partial correlation *i.e.* -0.0406 and semi partial correlation value *i.e.,* -0.0317. The level of statistical significance (p-value) of the correlation coefficient is p = 0.0000, which means that there is a statistically significant relationship between the two variables: daily travel time and daily time spend in social and cultural activities.

The third relationship between daily commuting time and daily time spend in personal care and self-maintenance activities Pearson correlation coefficient r = -0.2730 shows that there is a negative correlation and also suggested as small correlation between daily commuting time and personal care activities. As, $r^2$ = 0.074529 this can also be expressed as a percentage (*i.e.,* 7.4529%). The table 4.9 shows the partial correlation is -0.4191 and semi partial correlation value is -0.3602. The level of statistical significance (p-value) of the correlation coefficient is p = 0.0000, which means that there is a statistically significant relationship between the two variables: daily travel time and daily time spend in personal care related activities.

## MAIN DETERMINANTS OF COMMUTING TIME

### Table 4.10: Output of Binary Logistic Regression Model

| Variables | Odds Ratio | Std. Err. | Z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| **Age** | 1.00 | 0.00 | -1.89 | 0.06** | 1.00 | 1.00 |
| **No formal education** | 0.77 | 0.05 | -4.32 | 0.00* | 0.68 | 0.87 |
| **K.G. but below primary** | 1.12 | 0.08 | 1.61 | 0.11 | 0.98 | 1.29 |
| **Primary but below middle** | 0.93 | 0.06 | -1.12 | 0.26 | 0.81 | 1.06 |
| **Middle but below matric** | 0.84 | 0.06 | -2.42 | 0.02* | 0.73 | 0.97 |
| **Matric but below intermediate** | 0.91 | 0.06 | -1.36 | 0.17 | 0.79 | 1.04 |
| **Inter. but below degree** | 0.92 | 0.07 | -1.07 | 0.29 | 0.78 | 1.07 |
| **No of children under aged 7 years** | 0.97 | 0.01 | -1.77 | 0.08** | 0.95 | 1.00 |
| **Never married** | 1.50 | 0.37 | 1.67 | 0.10 | 0.93 | 2.42 |
| **Currently married** | 1.08 | 0.26 | 0.32 | 0.75 | 0.67 | 1.74 |
| **Widow/widower** | 1.12 | 0.28 | 0.46 | 0.65 | 0.68 | 1.84 |
| **Rs. (up to 2000)** | 1.25 | 0.25 | 1.14 | 0.25 | 0.85 | 1.84 |
| **Rs. (2000 to 3000)** | 1.49 | 0.28 | 2.18 | 0.03* | 1.04 | 2.14 |
| **Rs. (3000 to 4000)** | 1.37 | 0.25 | 1.74 | 0.08** | 0.96 | 1.95 |
| **Rs. (4000 to 5000)** | 1.36 | 0.24 | 1.70 | 0.09** | 0.95 | 1.93 |
| **Rs. (5000 to 6000)** | 1.41 | 0.25 | 1.90 | 0.06** | 0.99 | 2.00 |
| **Rs. (6000 to 7000)** | 1.40 | 0.25 | 1.86 | 0.06** | 0.98 | 1.99 |
| **Rs. (7000 to 8000)** | 1.49 | 0.27 | 2.19 | 0.03* | 1.04 | 2.12 |
| **Rs. (8000 to 9000)** | 1.49 | 0.27 | 2.17 | 0.03* | 1.04 | 2.13 |
| **Rs. (9000 to 10000)** | 1.45 | 0.27 | 2.04 | 0.04* | 1.02 | 2.08 |
| **Rs. (10000 or more)** | 1.50 | 0.27 | 2.28 | 0.02* | 1.06 | 2.12 |
| **Don't know** | 1.46 | 0.29 | 1.93 | 0.05* | 0.99 | 2.16 |
| **Wage/salary/piecework pay** | 1.46 | 0.06 | 9.56 | 0.00* | 1.35 | 1.58 |
| **Earnings from own business/farm** | 1.76 | 0.08 | 12.9 | 0.00* | 1.62 | 1.92 |
| **Govt. grants/support** | 1.02 | 0.16 | 0.10 | 0.92 | 0.75 | 1.38 |
| **Investment** | 2.03 | 0.72 | 2.01 | 0.05* | 1.02 | 4.05 |
| **Money from other hh members** | 1.25 | 0.06 | 4.59 | 0.00* | 1.14 | 1.38 |
| **Remittance** | 1.16 | 0.17 | 1.00 | 0.32 | 0.87 | 1.55 |
| **Compensation (father etc.)** | 0.90 | 0.32 | -0.29 | 0.77 | 0.45 | 1.80 |
| **Other** | 1.17 | 0.15 | 1.20 | 0.23 | 0.91 | 1.50 |
| **Male** | 12.60 | 0.42 | 76.3 | 0.00* | 11.80 | 13.44 |
| **Owned House** | 0.81 | 0.06 | -3.03 | 0.00* | 0.70 | 0.93 |
| **Rented/Hired House** | 0.75 | 0.06 | -3.45 | 0.00* | 0.64 | 0.88 |
| **Constant** | 0.12 | 0.04 | -6.70 | 0.00* | 0.06 | 0.22 |
| **Log likelihood** | -18278.46 | | | | | |
| **LR chi-square** | 14503.23 | | | | | |
| **Pseudo $R^2$** | 0.284 | | | | | |
| **Probability > chi2** | 0.000 | | | | | |
| **Number of observations** | 37830 | | | | | |

Author's own calculation based on PTUS (2007) (P values with * and ** show significant at 5 percent and 10 percent level of significance)

Table 4.10 presents output of binary logistic regression model. The dependent variable (daily commuting time) is grouped into two categories *i.e.,* daily commuting time less than or equal to 60 minutes and daily commuting time greater than 60 minutes. The first column presents the categories of different covariates. The second column of table 4.10 express the odds ratio. Conceptually, the odds ratio is the probability of particular success over the probability of failure. It is interpret as the effect of a one unit of change in one covariate (say X) in the predicted odds ratio by keeping other variables constant. The third and fourth columns show the z-calculated values and p-values respectively. The last two column represents the 95 percent confidence interval. The covariates age, gender and dwelling status are significant at five percent level of significance. Some categories of education are insignificant at 5 percent level of significance. Number of children under seven years old is significant at 10 percent level of significance. Similarly some categories of income and age of respondents are significant at 10 percent level of significance. Some categories of education are overall not significant. Also some categories of marital status are insignificant. The output of binary logistic regression model shows that age, gender, marital status, no of children under seven years old and monthly income are key variables of daily commuting time. The logistic regression gives the LR chi-square is equal to 14503.23 with a p-value 0.000 which tells us that our binary logistic regression model as a whole fits significant results. The output of binary logistic model is obtained by using a total of 37,830 male and female observations from urban and rural areas of Pakistan.

## Table 4.11: Age Specific Groups, Region Specific Groups and Gender Specific Groups Vs Main Activities

**(Time in minutes)**

| Variables | Mean Time Spend in Main Activities | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Household maintenance management and shopping | Care for own children | Household maintenance and Care for own children | Social and Cultural Activities | Mass media use | Personal care and self-maintenance | daily Travel related to all activities | Total working hours |
| **Province** | | | | | | | | | |
| **Punjab** | 17092 | 133.63 | 37.86 | 171.49 | 130.49 | 53.94 | 782.73 | 62.48 | 175.16 |
| **Sindh** | 9039 | 124.11 | 34.08 | 158.19 | 159.92 | 52.95 | 782.24 | 67.95 | 181.25 |
| **KPK** | 6814 | 134.56 | 43.20 | 177.77 | 141.81 | 30.61 | 813.34 | 83.33 | 131.26 |
| **Balochistan** | 4885 | 134.50 | 28.20 | 162.69 | 140.02 | 37.70 | 797.27 | 68.42 | 168.78 |
| **Region** | | | | | | | | | |
| **Urban** | 14917 | 122.621 | 32.58 | 155.20 | 134.89 | 72.83 | 782.89 | 67.04 | 154.81 |
| **Rural** | 22913 | 137.511 | 39.33 | 176.84 | 144.64 | 30.851 | 794.64 | 69.14 | 176.40 |
| **Gender** | | | | | | | | | |
| **Male** | 18321 | 12.69 | 9.53 | 22.21 | 151.46 | 47.43 | 765.59 | 111.00 | 274.32 |
| **Female** | 19509 | 243.35 | 62.16 | 305.50 | 130.78 | 47.38 | 812.94 | 28.22 | 67.93 |
| **Age (in years)** | | | | | | | | | |
| **10–18** | 10867 | 72.17 | 9.60 | 81.77 | 158.28 | 61.79 | 799.7 | 75.26 | 85.12 |
| **18-28** | 8815 | 183.10 | 61.21 | 244.30 | 124.55 | 50.43 | 755.79 | 58.10 | 184.46 |
| **28-40** | 9090 | 183.79 | 59.01 | 242.80 | 119.93 | 38.30 | 744.43 | 64.99 | 227.36 |
| **40-65** | 7650 | 112.26 | 22.86 | 135.12 | 152.24 | 38.52 | 826.49 | 75.00 | 210.94 |
| **65 <** | 1408 | 37.06 | 22.79 | 59.85 | 180.14 | 24.51 | 1025.47 | 63.74 | 84.99 |
| **Big Cities of Pakistan** | | | | | | | | | |
| **Islamabad** | 802 | 132.03 | 38.06 | 170.09 | 130.97 | 56.04 | 780.75 | 59.51 | 174.51 |
| **Rawalpindi** | 1168 | 137.36 | 39.67 | 177.02 | 124.85 | 67.72 | 774.53 | 62.35 | 166.22 |
| **Gujranwala** | 1266 | 123.26 | 36.86 | 160.12 | 134.19 | 64.19 | 781.82 | 61.78 | 160.31 |
| **Sargodha** | 1009 | 132.01 | 35.37 | 167.38 | 130.35 | 64.40 | 774.08 | 60.89 | 173.20 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Faisalabad** | 1416 | 136.96 | 42.43 | 179.38 | 127.72 | 63.02 | 773.33 | 62.81 | 166.65 |
| **Lahore** | 1489 | 130.28 | 37.64 | 167.92 | 133.33 | 71.05 | 782.73 | 58.46 | 154.95 |
| **Multan** | 1056 | 127.71 | 33.74 | 161.45 | 127.86 | 64.76 | 779.62 | 60.16 | 187.06 |
| **Bahawalpur** | 911 | 128.91 | 37.66 | 166.58 | 129.75 | 60.15 | 784.85 | 62.46 | 166.96 |
| **Karachi** | 1779 | 118.44 | 28.65 | 147.09 | 149.00 | 75.84 | 779.66 | 69.08 | 172.18 |
| **Sukkur** | 1230 | 118.37 | 33.40 | 151.77 | 153.12 | 67.90 | 778.98 | 68.30 | 173.20 |
| **Hyderabad** | 1393 | 121.94 | 32.24 | 154.18 | 154.80 | 69.56 | 773.68 | 68.50 | 172.88 |
| **Peshawar** | 1182 | 117.03 | 42.20 | 159.23 | 135.32 | 44.68 | 813.76 | 85.06 | 124.38 |
| **Quetta** | 1256 | 129.18 | 25.52 | 154.70 | 135.02 | 45.46 | 802.68 | 67.11 | 158.59 |

Author's own calculation based on PTUS (2007)

The table 4.11 presents mean minutes spend in different daily performed main activities with respect to individuals' characteristics. The first column of table 4.11 presents the sample size or total number of respondents for each case. Second column represents mean minutes spend on household maintenance, management and shopping. The third column presents the time spend on care of children. Fourth column presents household based activities (*i.e.,* combination of household management and care of children). Fifth column is about the time spend on social and cultural activities. Sixth column presents time spend on mass media. Seventh column shows the time spend on personal care and self-maintenance related activities. Similarly the second last column shows the average time spend in daily commute and last column presents the time spend in total working hours. While rows represents the gender (*i.e.,* male and female), region (*i.e.,* urban and rural areas), age specific groups (*i.e.,* 10-18 years, 18-28 years, 28-40 years, 40-65 years, and more than 65 years) and at the last part of table (row wise) presents the thirteen big cities of Pakistan.

The table 4.11 shows the respondents from Punjab, Sindh, KPK, and Balochistan spend daily 62.0 minutes, 67 minutes, 83 minutes and 68 minutes in commuting respectively. The table 4.11 shows that on average men commute 111 minutes daily while women spend 28.22 minutes per day on commuting. Men spend 12.69 minutes on household based activates while women spend 244.35 minutes per day. Men spend 9.53 minutes in care of children while women spend 62.16 minutes per day. Men spend 151.46 minutes on social activities and women spend 130.78 minutes on care of children per day. Men spend 765.59 minutes on personal care and self-maintenance while women spend 812.94 minutes per day. The further detail for respondent's other characteristics and for big cities is clarified in the table 4.11.

**Table 4.12: Main Output of Seemingly Unrelated Regression Model**

| Seemingly unrelated regression Equation | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Variables** | **Coeff.** | **$R^2$** | **$Chi^2$** | **P** | **RMSE** | **[95% Conf. Interval]** | |
| **Household maintenance and care of children** | -0.44 | 0.62 | 62525.97 | 0.00* | 129.16 | -0.46 | -0.42 |
| **Social and Cultural Activities** | 0.16 | 0.11 | 4699.38 | 0.00* | 105.68 | 0.14 | 0.18 |
| **Personal care and self-maintenance** | -0.62 | 0.29 | 15529.28 | 0.00* | 131.46 | -0.64 | -0.59 |

Author's own calculation based on PTUS (2007) (P values with * mean significant at 5 percent level of significance)

Table 4.12 presents the output of seemingly unrelated regression model. Two techniques are discuss in methodology section about the estimation of SUR model *i.e.*, maximum likelihood method (MLM) and feasible generalized least square (FGLS) method. The output of SUR model that is presented in table 4.12 is estimated by MLM. The first column of the table 4.12 presents the name of activities or name of dependent variable of all three equations. The second column presents root mean square of error. Third column shows the values of R-square. The estimated values of coefficients are also reported in table 4.12. Last two column represents the 95 percent confidence interval. Row wise we have list of daily performed main activities. From the table it is clear that one unit change in covariates (say X) there will -0.4387 unit change in household maintenance and care of children based activities. It represents the negative relationship between daily commuting time and household based activities. Also one unit change in covariates (say X) there will be 0.1592 unit change in social and cultural activities. And there is positive relationship between daily commuting time and social, cultural activities. Similarly one unit change in covariates (say X) there will be -0.6177 unit change in personal care and self-maintenance activities. And there is negative relationship between daily commuting time and personal care related activities Table 4.12 just express the major equations, the effects of covariates and their output in SUR model is given in appendix (B).

## Table 4.13: Age Specific Groups Vs Main Activities

| Commuting Time | Social and Cultural Activities | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **10-18** | | **18-28** | | **28-40** | | **40-65** | | **65 plus** | |
| **60 min baseline** | 151.276 [148.954,153.599] | - | 124.400 [122.989,125.81] | - | 117.104 [115.50,118.71] | - | 135.815 [133.68,137.947] | - | 158.729 [155.147,162.31] | - |
| **60-120** | 170.855 [168.484,173.226] | 12.94 | 140.904 [139.36,142.449] | 13.27 | 119.957 [118.13,121.79] | 2.44 | 134.392 [132.238,136.55] | -1.05 | 166.527 [163.427,169.63] | 4.91 |
| **120-180** | 184.554 [181.9,187.207] | 21.99 | 150.252 [148.418,152.08] | 20.78 | 127.765 [125.60,129.93] | 9.10 | 141.638 [139.142,144.13] | 4.29 | 182.886 [179.34,186.438] | 15.22 |
| **180-240** | 193.626 [190.422,196.829] | 27.99 | 160.686 [158.158,163.21] | 29.17 | 135.334 [132.49,138.18] | 15.57 | 157.202 [154.04,160.361] | 15.75 | 182.359 [178.61,186.107] | 14.89 |
| **240 plus** | 210.647 [206.111,215.182] | 8.791 | 178.224 [173.92,182.526] | 10.91 | 152.533 [148.08,156.99] | 12.71 | 164.283 [159.813,168.75] | 4.50 | 190.648 [185.81,195.489] | 4.54 |
| | **Personal care and self-maintenance related Activities** | | | | | | | | | |
| **60 min baseline** | 867.482 [864.561,870.404] | - | 803.788 [802.013,805.56] | - | 776.665 [774.64,778.69] | - | 810.678 [807.99,813.359] | - | 868.773 [864.268,873.28] | - |
| **60-120** | 837.14 [834.157,840.122] | -3.50 | 760.16 [758.22,762.103] | -5.43 | 708.557 [706.26,710.86] | -8.77 | 735.506 [732.797,738.22] | -9.27 | 798.068 [794.169,801.97] | -8.14 |
| **120-180** | 812.562 [809.224,815.9] | -6.33 | 735.966 [733.66,738.272] | -8.44 | 674.908 [672.18,677.63] | -13.10 | 701.453 [698.314,704.59] | -13.47 | 773.326 [768.859,777.79] | -10.99 |
| **180-240** | 785.541 [781.512,789.57] | -9.44 | 705.373 [702.193,708.55] | -12.24 | 641.570 [637.99,645.15] | -17.39 | 679.590 [675.617,683.56] | -16.17 | 722.979 [718.264,727.69] | -16.78 |
| **240 plus** | 727.683 [721.978,733.388] | -16.11 | 639.380 [633.97,644.79] | -20.4 | 579.567 [573.96,585.17] | -25.37 | 608.085 [602.46,613.707] | -24.99 | 676.325 [670.24,682.414] | -22.15 |
| | **Household Based Activities** | | | | | | | | | |
| **60 min baseline** | 140.073 [137.204,142.943] | - | 282.169 [280.426,283.91] | - | 322.406 [320.421,324.391] | - | 269.383 [266.749,272.016] | - | 228.444 [224.02,232.869] | - |
| **60-120** | 21.788 [18.8583,24.717] | -84.44 | 48.339 [46.4304,50.247] | -82.88 | 135.536 [133.276,137.796] | -57.96 | 123.869 [121.208,126.529] | -54.02 | 105.053 [101.223,108.882] | -54.01 |
| **120-180** | -32.6077 | -123.3 | 1.97794 | -100.701 | 81.2207 | -74.81 | 60.3455 | -77.60 | 50.2036 | -78.02 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [-35.8858,-29.329] | | [-4.2430,.28717] | | [78.55,83.8946] | | [57.26,63.429] | | [45.816,54.5904] | |
| **180-240** | -71.13 | -150.8 | -26.005 | -109.22 | 59.542 | -81.53 | 29.159 | -89.18 | 21.156 | -90.74 |
| | [-75.08,-67.1726] | | [-29.1278,-22.88] | | [56.036,63.054] | | [25.2569,33.061] | | [16.525,25.7863] | |
| **240 plus** | -110.664 | -179.0 | -73.141 | -125.92 | 10.587 | -96.72 | -3.969 | -101.47 | -15.356 | -106.72 |
| | [-116.267,-105.06] | | [-78.454,-67.827] | | [5.084,16.0905] | | [-9.492,1.55231] | | [-21.335,-9.375] | |

Author's own calculation based on PTUS (2007)

All estimates for age-specific groups are time in minutes. Adjusted means are computed using SUR model. Covariates are age, dwelling status, gender, province, education, marital status, employment status, household income and number of children under seven year old, and the diary date day of the week.

Square brackets *i.e.* [ ] contains the 95 percent confidence interval

1 (% Change from 60 minutes) contains percentage changes relative to estimates at the baseline 60 minute daily commuting time. Asterisks indicate statistical difference at the $\alpha = 0.05$ level of significance with the estimate at baseline commuting time.

The table 4.12 presents the adjusted minutes, 95 percent confidence interval and percentage change in minutes from 60 minutes baseline for several age-specific groups. Respondent having age between 10 and 18, if they commute one hour daily then a 60 minutes increase in daily commute it leads to an increase 19.58 minutes in social and cultural activities, 30.34 minutes decrease in personal care and self-maintenance activities, and 118.28 minutes decrease in household based activities. For respondent having age between 18 and 28, if a 60 minutes increase in daily commute leads to results in 16.50 minutes increase in social and cultural activities, 43.63 minutes decrease in personal care and self-maintenance activities, and 223.83 minutes decrease in household based activities. Respondent having age between 28 and 40, if they commute one hour daily then a 60 minutes increase in daily commute it leads to an increase 2.85 minutes in social and cultural activities, 68.11 minutes decrease in personal care and self-maintenance activities, and 196.87 minutes decrease in household based activities. For respondent having age between 40 and 65, if a 60 minutes increase in daily commute leads to results in 1.42 minutes increase in social and cultural activities, 75.17 minutes decrease in personal care and self-maintenance activities, and 145.51 minutes decrease in household based activities.

**Table 4.14: Region Specific Groups, Gender Vs Main Activities**

| Commuting Time (in minutes) | Male | % Change [1] from 60 min | Female | % Change [1] from 60 min | Urban | % Change [1] from 60 min | Rural | % Change [1] from 60 min |
|---|---|---|---|---|---|---|---|---|
| | **Social and Cultural Activities** | | | | | | | |
| **60 min baseline** | 144.69 [142.708,146.67] | - | 129.40 [127.917,130.885] | - | 133.21 [131.822,134.594] | - | 133.03 [131.7,134.353] | - |
| **60-120** | 147.91 [146.356,149.464] | 2.23 | 140.36 [138.347,142.362] | 8.47 | 147.39 [145.964,148.813] | 10.64 | 145.46 [144.169,146.753] | 9.35 |
| **120-180** | 156.60 [154.884,158.315] | 8.23 | 146.94 [144.074,149.801] | 13.55 | 157.61 [155.826,159.398] | 18.32 | 154.55 [152.842,156.264] | 16.18 |
| **180-240** | 164.46 [162.022,166.895] | 13.66 | 156.83 [152.974,160.693] | 21.20 | 164.34 [161.814,166.861] | 23.37 | 163.94 [161.46,166.41] | 23.23 |
| **240 plus** | 174.69 [170.591,178.788] | 20.73 | 162.41 [156.31,168.509] | 25.51 | 175.94 [171.597,180.278] | 32.08 | 173.26 [169.117,177.401] | 30.24 |
| | **Personal Care and Self-maintenance related Activities** | | | | | | | |
| **60 min baseline** | 807.4 [804.911,809.894] | - | 820.59 [818.719,822.453] | - | 815.61 [813.865,817.353] | - | 818.59 [816.917,820.254] | - |
| **60-120** | 769.03 [767.077,770.987] | -4.75 | 782.75 [780.226,785.276] | -4.61 | 772.72 [770.924,774.507] | -5.26 | 771.71 [770.083,773.334] | -5.73 |
| **120-180** | 740.17 [738.011,742.327] | -8.33 | 747.61 [744.007,751.21] | -8.89 | 739.84 [737.592,742.084] | -9.29 | 741.46 [739.307,743.611] | -9.42 |
| **180-240** | 707.00 [703.933,710.062] | -12.44 | 705.88 [701.021,710.73] | -13.98 | 704.91 [701.739,708.088] | -13.57 | 708.16 [705.049,711.276] | -13.49 |
| **240 plus** | 634.27 [629.11,639.421] | -21.44 | 606.18 [598.51,613.853] | -26.13 | 625.67 [620.213,631.132] | -23.29 | 636.64 [631.427,641.847] | -22.23 |

| | Household Based Activities | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 min baseline** | 50.94 | - | 314.69 | - | 235.16 | - | 261.35 | - |
| | [48.4945,53.3885] | | [312.86,316.527] | | [233.448,236.873] | | [259.711,262.989] | |
| **60-120** | 26.81 | -47.37 | 241.07 | -23.40 | 58.19 | -75.25 | 85.52 | -67.27 |
| | [24.8927,28.7328] | | [238.589,243.548] | | [56.4342,59.9532] | | [83.9285,87.121] | |
| **120-180** | 5.23 | -89.73 | 204.85 | -34.90 | 12.31 | -94.76 | 29.70 | -88.64 |
| | [3.11076,7.34999] | | [201.316,208.39] | | [10.1041,14.5167] | | [27.5823,31.8094] | |
| **180-240** | -12.65 | -124.83 | 195.32 | -37.93 | -5.84 | -102.49 | -0.46 | -100.18 |
| | [-15.6587,-9.639] | | [190.553,200.088] | | [-8.96422,-2.7287] | | [-3.51908,2.5963] | |
| **240 plus** | -44.97 | -188.28 | 162.8 | -48.27 | -39.19 | -116.67 | -34.02 | -113.02 |
| | [-50.0331,-39.91] | | [155.262,170.331] | | [-44.555,-33.8315] | | [-39.1388,-28.90] | |

Author's own calculation based on PTUS (2007)

All estimates for region-specific and gender-specific groups are time in minutes. Adjusted means are computed using SUR model. Covariates are age, dwelling status, gender, province, education, marital status, employment status, monthly household income, number of children under seven year old, and the diary date day of the week.

Square brackets *i.e.* [ ] contains the 95 percent confidence interval

1 (% Change from 60 minutes) contains percentage changes relative to estimates at the baseline 60 minute daily commuting time. Asterisks indicate statistical difference at the $\alpha = 0.05$ level of significance with the estimate at baseline commuting time.

Table 4.13 displays adjusted means for diary date time spend in different main activities like household based activities, social and cultural activities and personal care and self-maintenance related activities. Means are evaluated at different commuting duration *i.e.,* 60 minutes daily commuting time, 120 minutes daily commuting time, 180 minutes daily commuting time, 240 minutes daily commuting time, and more than 240 minutes on daily commuting time. From the baseline 60 minutes commuting time among gender (*i.e.,* male and female), region (*i.e.,* urban and rural areas). For men a 60 minutes increase in daily commuting duration is associated 24.13 minutes decrease in household based activities, 3.22 minutes increase in social activities and 38.37 minutes decrease in personal care and related activities. For women a 60 minutes increase in daily commuting duration is associated 73.62 minutes decrease in household based activities, 10.95 minutes increase in social and cultural activities and 37.84 minutes decrease in personal care and related activities. The presented calculations are based on single day data set of PTUS (2007). For residents of urban areas a 60 minutes increase in daily commuting duration is associated 176.97 minutes decrease in household based activities, 14.18 minutes increase in social and cultural activities and 42.89 minutes decrease in personal care and related activities. For residents of rural areas a 60 minutes increase in daily commuting duration is associated 175.82 minutes decrease in household based activities, 12.43 minutes increase in social and cultural activities and 46.88 minutes decrease in personal care and related activities. The further detail of trade-off in time among main three activities for each case is given in the table 4.14.

**Table 4.15: Age Specific, Gender Specific, Region Specific and Province Vs Adjusted Minutes of Three Activities**

| Commuting Time (in minutes) | Age Specific Groups | | | | | Gender | | Region | | Province | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 18-Oct | 18-28 | 28-40 | 40-65 | 65 plus | Male | Female | Urban | Rural | Punjab | Sindh | KPK | Balochistan |
| | Social and Cultural Activities | | | | | | | | | | | | |
| 0-60 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 60-120 | 19.58 | 16.50 | 2.85 | -1.42 | 7.80 | 3.22 | 10.95 | 14.18 | 12.43 | 11.22 | 7.61 | 20.66 | 14.25 |
| 120-180 | 33.28 | 25.85 | 10.66 | 5.82 | 24.16 | 11.91 | 17.54 | 24.40 | 21.53 | 19.56 | 17.73 | 31.43 | 20.22 |
| 180-240 | 42.35 | 36.29 | 18.23 | 21.39 | 23.63 | 19.77 | 27.43 | 31.13 | 30.91 | 25.73 | 26.30 | 41.00 | 27.49 |
| 240 plus | 59.37 | 53.82 | 35.43 | 28.47 | 31.92 | 30.00 | 33.01 | 42.73 | 40.23 | 37.73 | 33.32 | 47.37 | 46.84 |
| | Personal Care and Self-maintenance | | | | | | | | | | | | |
| 0-60 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 60-120 | -30.34 | -43.63 | -68.11 | -75.17 | -70.71 | -38.37 | -37.84 | -42.89 | -46.88 | -44.70 | -53.85 | -34.65 | -38.38 |
| 120-180 | -54.92 | -67.82 | -101.70 | -109.22 | -95.45 | -67.23 | -72.98 | -75.77 | -77.13 | -83.38 | -88.78 | -72.24 | -76.18 |
| 180-240 | -81.94 | -98.42 | -135.10 | -131.09 | -145.79 | -100.40 | -114.71 | -110.70 | -110.40 | -129.32 | -127.30 | -107.74 | -113.30 |
| 240 plus | -139.80 | -164.41 | -197.10 | -202.59 | -192.45 | -173.14 | -214.40 | -189.80 | -181.90 | -200.95 | -193.20 | -193.80 | -193.50 |
| | Household Based Activities | | | | | | | | | | | | |
| 0-60 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 60-120 | -118.30 | -233.83 | -196.87 | -145.51 | -123.39 | -24.13 | -73.63 | -176.90 | -175.80 | -158.09 | -180.30 | -192.88 | -193.40 |
| 120-180 | -172.70 | -284.15 | -251.18 | -209.04 | -178.24 | -45.71 | -109.84 | -222.80 | -231.60 | -205.83 | -230.60 | -279.48 | -228.50 |
| 180-240 | -211.20 | -308.17 | -272.86 | -240.22 | -207.28 | -63.59 | -119.37 | -241.00 | -261.80 | -224.03 | -254.30 | -311.56 | -250.80 |
| 240 plus | -250.70 | -355.31 | -321.82 | -273.35 | -243.80 | -95.91 | -151.89 | -274.40 | -295.40 | -267.90 | -276.80 | -335.98 | -308.60 |

Author's own calculation based on PTUS (2007)

# CHAPTER 5

# CONCLUSION AND RECOMMENDATIONS

In present study we applied PTUS (2007), which was first time conducted in the history of Pakistan w.e.f. 2007. PTUS (2007) was originally designed to calculate gender based total working hours and the daily commute/travel information was not the focal point of this data collection strategy. However, the results are expected to be sufficiently reliable in their level of detail and convey a meaningful picture of daily commuting time and time spend on other daily performed main activities. Studying travel behavior and its trade-off among other daily performed main activities through time use data can provide a useful bench mark for measuring the impact of daily commuting time, and it can enhance the utility of expensive time use surveys well beyond the calculation of time use in paid and unpaid work activities only in developing countries like Pakistan.

Descriptive statistics of individual characteristics and household characteristics captured as part of the PTUS (2007) include: age, sex, year of education, marital status, employment status, number of children under seven years old, households monthly income, mode of transportation at dwelling *etc.* By quantifying, the daily time use behavior through a nationally representative diary use dataset, the results provide a comprehensive set of information. First of all we determined the key factors of daily commuting time: gender, marital status, presence and number of children in household, total monthly income of the household *etc.* The assessment of mixed land use is evaluated through access to basic necessities at doorstep, within 2 km or walkable distance. The precise way to judge the assessment of multipurpose land use around the respondent's dwelling we must know either the respondent has access to basic necessities at doorstep or not. This implies that whether respondent is vehicle dependent for availing the basic necessities or can get these

goods and services at walkable distance. The 33.49 percent respondents informed that they have no access of wood/dung at walkable distance. 19.25 percent respondents reported that they have no access of drinking walk within one km. The 8.98 percent, 25.81 percent, 15.32 percent, 3.19 percent, 32.78 percent 33.33 percent and 24.33 percent respondents described that they have no access of train, bus, minibus/taxi, Govt. primary school, Govt. secondary school, dispensary and market within 2 km respectively.

Gender wise detail analysis of daily performed set of main activities is design across urban and rural areas of country. In this study we have calculated adjusted minutes which explains that how much amount of time for a particular activity increase or decrease in response of increased in daily commuting time. We found that household based activities and personal care related activities have negative association with daily commuting time. However, social and cultural activities have positive association with daily commuting time. If an hour increase in daily commuting then household based activities decrease by 24.13 minutes and 73.63 minutes for male and female respectively. The study shows that female are more sensitive for household based activities as compared to men. An hour increase in daily commuting then social and cultural activities increased by 3.22 minutes and 10.95 minutes for male and female respectively. An hour increase in daily commuting then personal are and self-maintenance decreased by 38.37 minutes and 37.84 minutes for both male and female respectively. Findings are consistence with hypotheses that long daily commute inhibit household based activities, social and cultural activities as well as for personal care and self-maintenance activities. Previous studies suggested that such type of behavior adversely impact a commuter's health. Similarly the adjusted minutes are calculated region wise *i.e.* urban and rural and for age-specific groups.

This study found that daily commuting time and social and cultural activities has positive association. Individuals with longer daily commutes have access to social capital, as indicated by larger number of socially-oriented trips. But study found that daily commuting time and time spend with household members (especially own children) showed negative association. The results indicate that lengthy daily commutes are increasingly related with behavioral patterns which over the time may contribute to poor relation especially with household members. Average daily commuting times are related with lower reductions in household based activities. The larger percentage of daily commuting time is derived from decrease in household activities as well as personal care and self-maintenance related activities.

Active travel like bicycle or walk in more sprawling areas is most of the time inconvenient or infeasible due to the larger the distance between places. Longer commute always highly associated with vehicle dependence. In other words lengthy daily commute increases the number of vehicles on roads which leads to traffic congestion. And traffic congestion not only affect our mood but also it is the wastage of time (limited resource). While in compact developed areas we have complete street network, access of necessaries at walkable distance and fewer amount of the expenditure of transportation. This type of phenomena encourage physically active travel mode like bicycle and walk.

On the bases of findings of present study we recommend for public policy perspective, the development at the edge of cities like construction of new colonies as well as near to newly developed highways that are far from city should be discouraged. Masses should make utmost efforts to search job closer to their dwelling. The use of personal vehicles like car should be discourage within city for daily use. People should use public transit/transportation like bus, wagon, Suzuki etc., instead of personal vehicle like car. If they are unwilling to leave the use of

car they should think about concept of carpooling or vanpooling etc. Physically active modes of transportation *i.e.,* bicycle and walk should be encouraged, as these are not only economically suitable but also having better impact on health. Since, physically active modes use shorter time spend on daily commute then people would have more time for family members and social activities *etc.*

To the best of my knowledge, the analysis of trade-off among daily performed activities has not been yet explored in case of Pakistan. However, this is fairly justifiable approach to assess the time allocation as certain activities are highly affected by commuting. There are certain limitations of this study. In future, this dataset can be used to evaluate the link between daily commuting time and health related activities with the help of more sophisticated and advance econometric techniques.

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# Appendix A

## List of 144 activities:

| CODE | Name of Activities |
|---|---|
| | **Employment for Establishment** |
| 111 | Wage & salary employment |
| 112 | Out workers, contractors for establishment |
| 113 | Home-based work for an establishment |
| 114 | Paid domestic work |
| 115 | Unpaid employment in establishment |
| 116 | Work as employer/self-employed |
| 117 | Construction work/infrastructure |
| 130 | Work in apprenticeship, internship & related activities |
| 140 | Short breaks from work |
| 150 | Seeking employment & related activities |
| 188 | Waiting for employment for establishment |
| 190 | Employment in establishment not elsewhere classified |
| | **Primary Production Activities Not For Establishment** |
| 211 | Crop farming & market gardening |
| 212 | Kitchen gardening-backyard cultivation |
| 220 | Tending animals & fish farming |
| 230 | Hunting , fishing, gathering wild products |
| 236 | Collecting fuel, fire wood or dung |
| 240 | Digging, stone cutting, splitting & carving |
| 250 | Collecting water |
| 261 | Purchase & sale primary production |
| 262 | Sales of products from primary production |
| 288 | Waiting for primary production not for establishment |
| 290 | Primary production not elsewhere classified |
| | **Services For Income And Other Production Of Goods Not For Establishment** |
| 310 | Food processing & preservation activities |
| 321 | Preparing food & beverage |
| 322 | Selling food & beverage, baking, confectionery |
| 331 | Making & selling textiles & craft |
| 332 | Leather and other craft |
| 340 | Building & extension of dwelling |
| 350 | Petty trading & door-to-door vending |
| 360 | Fitting, maintaining tools & machinery |
| 370 | Provision of services for income |
| 388 | Waiting for services for income & other production not for establishment |
| 390 | Services for income non-establishment production not els where classifie |
| | **Household maintenance management and shopping for own household** |
| 410 | Preparing food and cooking |
| 411 | Preparing food (e.g. grinding, milling etc.) |
| 412 | Cooking, making drinks & serving |

| | |
|---|---|
| 413 | Cleaning up after meal |
| 420 | Cleaning & upkeep of dwelling |
| 430 | Care of textiles |
| 441 | Shopping for personal & household goods |
| 442 | Accessing government services |
| 448 | Waiting to access government services |
| 450 | Household management: planning & supervising |
| 460 | Do it yourself home improvements & maintenance |
| 470 | Pet care |
| 491 | Household maintenance, management not elsewhere classified |
| 492 | Chopping wood for heating not for cooking |
| | **Care For Children the Sick Elderly And Disabled For Own Household** |
| 510-511 | Physical care of children |
| 520 | Teaching of household children: spontaneously |
| 530 | Accompany children to places |
| 541 | Physical care of sick or disabled adult |
| 542 | Physical care of elderly adult |
| 551 | Accompany sick & disabled |
| 552-553 | Accompanying elderly adults |
| 561 | Supervising children |
| 562 | Supervising sick & disabled adult |
| 563 | Supervising elderly adult |
| 588 | Waiting to care for own household members |
| 590 | Care of household member not elsewhere classified |
| | **Community Services And Help to Other Households** |
| 610 | Community organized construction |
| 615 | Cleaning of classrooms mosque etc. |
| 621 | Community organized work |
| 622 | Cooking for school nutrition program |
| 630 | Volunteering with or for an organization |
| 650 | Participation in meetings of local & informal groups |
| 660 | Involvement in civic responsibilities |
| 671 | Caring for non-household children |
| 672 | Caring for non-household sick and disabled adult |
| 673 | Caring for non-household elderly adults |
| 674 | Other informal help to other households |
| 688 | Waiting for community services and to help to other households |
| 690 | Community services not elsewhere classified |
| | **Learning** |
| 710 | General education: School/ college/ university attendance |
| 720 | Homework related to general education |
| 731 | Non-formal education public sector adults education program |
| 732 | Other non-formal education programs |
| 733 | Additional study & courses |
| 734 | Preparation for examination etc. |
| 740 | Work-related training |
| 788 | Waiting for learning |

| | |
|---|---|
| 790 | Learning not elsewhere classified |
| | **Social And Cultural Activities** |
| 810 | Participating in cultural activities |
| 820 | Participating in religious activities |
| 831 | Socializing with family or/and non-family |
| 832 | Socializing with family & non-family at public places |
| 840 | Arts, making music, hobbies and related courses |
| 850 | Indoor & outdoor sports participation |
| 860 | Games & other pastime activities |
| 870 | Spectator to sports, exhibitions, concerts |
| 888 | Waiting for social & cultural activities |
| 890 | Social, cultural & recreational activities not elsewhere classified |
| | **Mass Media Use** |
| 911 | Reading other than newspaper & magazine |
| 912 | Reading newspaper & magazine |
| 920 | Watching TV & Video |
| 930 | Listening to music/radio |
| 940 | Accessing information by computer |
| 950 | Visiting library |
| 988 | Waiting for mass media use |
| 990 | Mass media use & entertainment not elsewhere classified |
| | **Personal Care And Self Maintenance** |
| 011 | Sleep & related activities |
| 012 | Lying down/rest related to illness |
| 020 | Eating & drinking |
| 030 | Personal hygiene & health |
| 041 | Receiving medical/personal care from professionals |
| 042 | Receiving medical/personal care from household member, |
| 043 | Receiving medical/personal care from non-household non-professionals |
| 048 | Waiting for medical/personal care |
| 050 | Doing nothing, rest & relaxation |
| 060 | Individual religious practice & meditation |
| 090 | Personal care & self-maintenance not elsewhere classified |
| | **Daily travel time** |
| 080 | Travel related to personal care & self-maintenance |
| 980 | Travel related to mass media use |
| 880 | Travel related to social & cultural |
| 780 | Travel related to learning, examination |
| 680 | Travel related to community services |
| 581 | Travel related to care of children |
| 582 | Travel related to care of sick & disabled adult |
| 583 | Travel related to care of elderly adult |
| 480 | Travel related to household maintenance |
| 380 | Travel related to non-establishment |
| 180 | Travel to/ from work seek employment in establishment |
| 280 | Travel related to primary production |

# Appendix B

| Variables | Coef. | Std. Err. | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|
| | Household maintenance and care for children | | | | |
| **Daily travel** | -0.439 | 0.012 | 0.000 | -0.463 | -0.416 |
| **Age** | -2.068 | 0.066 | 0.000 | -2.197 | -1.939 |
| **No formal education** | -0.949 | 3.311 | 0.774 | -7.439 | 5.540 |
| **K.G. but below primary** | -34.649 | 3.832 | 0.000 | -42.159 | -27.139 |
| **Primary but below middle** | -23.569 | 3.582 | 0.000 | -30.590 | -16.548 |
| **Middle but below matric** | -12.974 | 3.802 | 0.001 | -20.426 | -5.522 |
| **Matric but below intermediate** | 4.968 | 3.779 | 0.189 | -2.440 | 12.376 |
| **Inter. but below degree** | -4.213 | 4.310 | 0.328 | -12.661 | 4.236 |
| **No of children under aged 7 years** | 30.808 | 0.743 | 0.000 | 29.351 | 32.265 |
| **Punjab** | 20.970 | 2.215 | 0.000 | 16.629 | 25.311 |
| **Sindh** | -2.918 | 2.353 | 0.215 | -7.529 | 1.693 |
| **KPK** | 17.394 | 2.531 | 0.000 | 12.434 | 22.354 |
| **Never married** | -114.841 | 12.184 | 0.000 | -138.721 | -90.962 |
| **Currently married** | 23.403 | 12.064 | 0.052 | -0.242 | 47.049 |
| **Widow/widower** | -41.749 | 12.539 | 0.001 | -66.325 | -17.173 |
| **Rs. (up to 2000)** | 1.257 | 10.084 | 0.901 | -18.508 | 21.022 |
| **Rs. (2000 to 3000)** | 0.101 | 9.493 | 0.991 | -18.504 | 18.706 |
| **Rs. (3000 to 4000)** | -4.480 | 9.306 | 0.630 | -22.718 | 13.759 |
| **Rs. (4000 to 5000)** | -3.653 | 9.256 | 0.693 | -21.794 | 14.488 |
| **Rs. (5000 to 6000)** | -4.581 | 9.261 | 0.621 | -22.732 | 13.569 |
| **Rs. (6000 to 7000)** | -3.132 | 9.283 | 0.736 | -21.327 | 15.062 |
| **Rs. (7000 to 8000)** | -4.675 | 9.318 | 0.616 | -22.939 | 13.589 |
| **Rs. (8000 to 9000)** | -2.427 | 9.401 | 0.796 | -20.852 | 15.999 |
| **Rs. (9000 to 10000)** | 0.411 | 9.420 | 0.965 | -18.052 | 18.873 |
| **Rs. (10000 or more)** | -4.364 | 9.143 | 0.633 | -22.284 | 13.556 |
| **Don't know** | -5.770 | 10.182 | 0.571 | -25.728 | 14.187 |
| **Wage/salary/piecework pay/commission** | -85.714 | 2.165 | 0.000 | -89.956 | -81.471 |
| **Earnings from own business/farm** | -94.821 | 2.407 | 0.000 | -99.539 | -90.103 |
| **Govt. grants/support** | -7.312 | 9.240 | 0.429 | -25.422 | 10.797 |
| **Investment** | 0.783 | 18.904 | 0.967 | -36.268 | 37.835 |
| **Money from other household members** | -10.624 | 2.473 | 0.000 | -15.470 | -5.777 |
| **Remittance** | 9.278 | 6.955 | 0.182 | -4.354 | 22.911 |
| **Compensation (father etc.)** | 21.705 | 18.701 | 0.246 | -14.948 | 58.358 |
| **Other** | -39.530 | 7.386 | 0.000 | -54.007 | -25.054 |
| **Too much busy that day** | 51.240 | 1.821 | 0.000 | 47.671 | 54.808 |
| **Comfortable that day** | 33.983 | 1.597 | 0.000 | 30.852 | 37.114 |
| **Monday** | -6.611 | 2.441 | 0.007 | -11.395 | -1.827 |

| | | | | | |
|---|---|---|---|---|---|
| **Tuesday** | -6.528 | 2.425 | 0.007 | -11.280 | -1.775 |
| **Wednesday** | -9.171 | 2.428 | 0.000 | -13.929 | -4.412 |
| **Thursday** | -8.079 | 2.486 | 0.001 | -12.950 | -3.207 |
| **Friday** | -4.383 | 2.541 | 0.085 | -9.363 | 0.598 |
| **Saturday** | -6.634 | 2.849 | 0.020 | -12.217 | -1.050 |
| **Male** | -182.245 | 1.972 | 0.000 | -186.111 | -178.379 |
| **Owned House** | -5.134 | 3.658 | 0.160 | -12.304 | 2.035 |
| **Rented/Hired House** | -1.747 | 4.286 | 0.683 | -10.147 | 6.653 |
| **Constant** | 378.746 | 16.262 | 0.000 | 346.872 | 410.619 |
| | **Social and Cultural Activities** | | | | |
| **Daily travel** | 0.151 | 0.010 | 0.000 | 0.132 | 0.170 |
| **Age** | 0.446 | 0.053 | 0.000 | 0.342 | 0.551 |
| **No formal education** | 4.629 | 2.680 | 0.084 | -0.624 | 9.882 |
| **K.G. but below primary** | 3.407 | 3.102 | 0.272 | -2.673 | 9.486 |
| **Primary but below middle** | -7.916 | 2.900 | 0.006 | -13.599 | -2.232 |
| **Middle but below matric** | -11.956 | 3.078 | 0.000 | -17.988 | -5.923 |
| **Matric but below intermediate** | -5.565 | 3.059 | 0.069 | -11.562 | 0.431 |
| **Inter. but below degree** | -2.371 | 3.489 | 0.497 | -9.210 | 4.468 |
| **No of children under aged 7 years** | -9.486 | 0.602 | 0.000 | -10.666 | -8.307 |
| **Punjab** | -19.774 | 1.793 | 0.000 | -23.288 | -16.260 |
| **Sindh** | 15.984 | 1.904 | 0.000 | 12.251 | 19.716 |
| **KPK** | -12.054 | 2.049 | 0.000 | -16.069 | -8.039 |
| **Never married** | 31.154 | 9.863 | 0.002 | 11.824 | 50.485 |
| **Currently married** | 24.320 | 9.766 | 0.013 | 5.179 | 43.461 |
| **Widow/widower** | 24.696 | 10.150 | 0.015 | 4.802 | 44.590 |
| **Rs. (up to 2000)** | -0.498 | 8.163 | 0.951 | -16.498 | 15.502 |
| **Rs. (2000 to 3000)** | 1.530 | 7.684 | 0.842 | -13.531 | 16.591 |
| **Rs. (3000 to 4000)** | 4.923 | 7.533 | 0.513 | -9.841 | 19.687 |
| **Rs. (4000 to 5000)** | 4.930 | 7.493 | 0.511 | -9.756 | 19.615 |
| **Rs. (5000 to 6000)** | 0.916 | 7.497 | 0.903 | -13.777 | 15.609 |
| **Rs. (6000 to 7000)** | 3.845 | 7.515 | 0.609 | -10.883 | 18.574 |
| **Rs. (7000 to 8000)** | 6.094 | 7.543 | 0.419 | -8.691 | 20.878 |
| **Rs. (8000 to 9000)** | -1.201 | 7.610 | 0.875 | -16.117 | 13.714 |
| **Rs. (9000 to 10000)** | -0.019 | 7.625 | 0.998 | -14.964 | 14.927 |
| **Rs. (10000 or more)** | 2.128 | 7.401 | 0.774 | -12.378 | 16.634 |
| **Don't know** | 1.834 | 8.243 | 0.824 | -14.321 | 17.989 |
| **Wage/salary/piecework pay/commission** | -41.621 | 1.752 | 0.000 | -45.055 | -38.187 |
| **Earnings from own business/farm** | -39.988 | 1.949 | 0.000 | -43.807 | -36.169 |
| **Govt. grants/support** | 28.721 | 7.480 | 0.000 | 14.061 | 43.380 |
| **Investment** | -22.604 | 15.303 | 0.140 | -52.597 | 7.389 |
| **Money from other household members** | 1.291 | 2.002 | 0.519 | -2.632 | 5.214 |

| | | | | | |
|---|---|---|---|---|---|
| **Remittance** | 23.204 | 5.630 | 0.000 | 12.169 | 34.239 |
| **Compensation (father etc.)** | -18.613 | 15.138 | 0.219 | -48.284 | 11.057 |
| **Other** | -26.486 | 5.979 | 0.000 | -38.205 | -14.767 |
| **Too much busy that day** | -45.692 | 1.474 | 0.000 | -48.581 | -42.804 |
| **Comfortable that day** | -34.261 | 1.293 | 0.000 | -36.795 | -31.726 |
| **Monday** | -18.629 | 1.976 | 0.000 | -22.501 | -14.756 |
| **Tuesday** | -20.594 | 1.963 | 0.000 | -24.442 | -16.747 |
| **Wednesday** | -18.814 | 1.965 | 0.000 | -22.665 | -14.962 |
| **Thursday** | -17.415 | 2.012 | 0.000 | -21.359 | -13.472 |
| **Friday** | -11.034 | 2.057 | 0.000 | -15.065 | -7.002 |
| **Saturday** | -11.978 | 2.306 | 0.000 | -16.498 | -7.458 |
| **Male** | 32.529 | 1.597 | 0.000 | 29.399 | 35.658 |
| **Owned House** | 6.415 | 2.961 | 0.030 | 0.611 | 12.219 |
| **Rented/Hired House** | 2.181 | 3.469 | 0.529 | -4.618 | 8.981 |
| **Constant** | 133.885 | 13.164 | 0.000 | 108.083 | 159.687 |
| | **Personal care and self-maintenance** | | | | |
| **Daily travel** | -0.617 | 0.012 | 0.000 | -0.641 | -0.593 |
| **Age** | 3.310 | 0.067 | 0.000 | 3.178 | 3.442 |
| **No formal education** | 24.871 | 3.371 | 0.000 | 18.264 | 31.478 |
| **K.G. but below primary** | 20.276 | 3.901 | 0.000 | 12.630 | 27.923 |
| **Primary but below middle** | 16.050 | 3.647 | 0.000 | 8.902 | 23.199 |
| **Middle but below matric** | 3.780 | 3.871 | 0.329 | -3.808 | 11.368 |
| **Matric but below intermediate** | 0.704 | 3.848 | 0.855 | -6.839 | 8.246 |
| **Inter. but below degree** | 3.976 | 4.389 | 0.365 | -4.626 | 12.578 |
| **No of children under aged 7 years** | -15.516 | 0.757 | 0.000 | -17.000 | -14.033 |
| **Punjab** | -46.263 | 2.255 | 0.000 | -50.683 | -41.843 |
| **Sindh** | -24.630 | 2.395 | 0.000 | -29.324 | -19.935 |
| **KPK** | 3.505 | 2.577 | 0.174 | -1.545 | 8.555 |
| **Never married** | -25.503 | 12.405 | 0.040 | -49.817 | -1.189 |
| **Currently married** | -84.139 | 12.284 | 0.000 | -108.214 | -60.063 |
| **Widow/widower** | -19.303 | 12.767 | 0.131 | -44.326 | 5.720 |
| **Rs. (up to 2000)** | 5.210 | 10.268 | 0.612 | -14.915 | 25.335 |
| **Rs. (2000 to 3000)** | -2.312 | 9.665 | 0.811 | -21.256 | 16.631 |
| **Rs. (3000 to 4000)** | 1.654 | 9.475 | 0.861 | -16.917 | 20.224 |
| **Rs. (4000 to 5000)** | -1.906 | 9.424 | 0.840 | -20.377 | 16.565 |
| **Rs. (5000 to 6000)** | 1.548 | 9.429 | 0.870 | -16.933 | 20.029 |
| **Rs. (6000 to 7000)** | -0.265 | 9.452 | 0.978 | -18.791 | 18.260 |
| **Rs. (7000 to 8000)** | 0.429 | 9.488 | 0.964 | -18.168 | 19.025 |
| **Rs. (8000 to 9000)** | 2.681 | 9.572 | 0.779 | -16.079 | 21.442 |
| **Rs. (9000 to 10000)** | 4.460 | 9.591 | 0.642 | -14.338 | 23.258 |
| **Rs. (10000 or more)** | 2.732 | 9.309 | 0.769 | -15.514 | 20.978 |

| | | | | | |
|---|---|---|---|---|---|
| **Don't know** | 6.566 | 10.368 | 0.527 | -13.754 | 26.886 |
| **Wage/salary/piecework pay/commission** | -59.432 | 2.204 | 0.000 | -63.752 | -55.112 |
| **Earnings from own business/farm** | -52.412 | 2.451 | 0.000 | -57.216 | -47.609 |
| **Govt. grants/support** | 9.264 | 9.408 | 0.325 | -9.175 | 27.703 |
| **Investment** | -15.587 | 19.248 | 0.418 | -53.312 | 22.139 |
| **Money from other household members** | -7.536 | 2.518 | 0.003 | -12.471 | -2.601 |
| **Remittance** | -14.845 | 7.082 | 0.036 | -28.725 | -0.965 |
| **Compensation (father etc.)** | -10.948 | 19.041 | 0.565 | -48.268 | 26.371 |
| **Other** | 25.775 | 7.521 | 0.001 | 11.035 | 40.515 |
| **Too much busy that day** | -69.027 | 1.854 | 0.000 | -72.661 | -65.393 |
| **Comfortable that day** | -41.729 | 1.626 | 0.000 | -44.916 | -38.541 |
| **Monday** | -11.315 | 2.485 | 0.000 | -16.186 | -6.444 |
| **Tuesday** | -11.147 | 2.469 | 0.000 | -15.986 | -6.308 |
| **Wednesday** | -7.567 | 2.472 | 0.002 | -12.412 | -2.722 |
| **Thursday** | -13.420 | 2.531 | 0.000 | -18.380 | -8.459 |
| **Friday** | -7.140 | 2.587 | 0.006 | -12.211 | -2.068 |
| **Saturday** | -16.485 | 2.901 | 0.000 | -22.170 | -10.799 |
| **Male** | 32.702 | 2.008 | 0.000 | 28.766 | 36.639 |
| **Owned House** | 2.072 | 3.725 | 0.578 | -5.229 | 9.372 |
| **Rented/Hired House** | -9.824 | 4.364 | 0.024 | -18.377 | -1.271 |
| **Constant** | 854.274 | 16.558 | 0.000 | 821.821 | 886.728 |