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*Special Issue 1.2018*

## URBAN TRAVEL BEHAVIOR IN THE MIDDLE EAST AND NORTH AFRICA

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**Editorial correspondence**

Laboratory of Land Use Mobility and Environment  
DICEA - Department of Civil, Architectural and Environmental Engineering  
University of Naples "Federico II"  
Piazzale Tecchio, 80  
80125 Naples  
web: [www.tema.unina.it](http://www.tema.unina.it)  
e-mail: [redazione.tema@unina.it](mailto:redazione.tema@unina.it)

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## TRAVEL BEHAVIOUR VARIATIONS ACROSS URBAN AND RURAL AREAS OF PAKISTAN

A NATIONAL MOBILITY ANALYSIS

MUHAMMAD ADEEL

LSE Cities, London School of Economics and Political Science, London WC2A  
2AE, UK.

e-mail: [m.adeel@lse.ac.uk](mailto:m.adeel@lse.ac.uk)

URL: <https://lsecities.net/>

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### ABSTRACT

This paper examines the 2007 Pakistan national time use survey to report the degree to which the national travel behaviour varies between urban and rural of Pakistan and how it is shaped by the socioeconomic and individual characteristics. Longitudinal analysis was performed on 37,830 time use diaries collected in the survey in Stata and the resulting travel behavior characteristics have been examined through household and individual socioeconomic variables. At the national level, walking remains the dominant mode of daily mobility across the country. Nearly 90 percent of daily travel is done by walk. However, the daily trip rate, mode choice and travel durations vary significantly across urban and rural geographies. Urban residents are slightly less mobile and exhibit greater use of personal automobile than rural residents. Rural residents make 4.6 trips per day as compared to 4.4 trips per day of urban residents. Similarly, rural population are found to travel 101 minutes per day as compared to significantly lower duration of 98 minutes among urban residents. While walking trips usually take same time, mean trip duration by automobiles is also much longer among rural population than urban (42.2 minutes vs 34.1 minutes). These differences become more pronounced across gender and urban women appear to be the least mobile while rural men appear most mobile as apparent from their daily trip rates of 2.6 and 5.7 per person, respectively. There exists slight local regional variation across provinces which are closely related to the local social and spatial drivers of mobility. The paper contends that the rural travel differences are mainly caused by difference in income levels. Urban built environment is more conducive to motorized mobility which results in greater automobile reliance in cities, particularly for women. Social and cultural environment also plays potentially significant and spatially explicit role which remains under addressed and calls for further research.

### KEYWORDS:

Travel behavior; Accessibility; Mode choice; Walking; Time use

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## 1 INTRODUCTION

Global population is rapidly urbanizing. While every second person was living in urban areas since year 2007, it is expected that the share of urban population will increase approximately 10 cars per 1000 persons to two thirds by year 2050 (United Nations, 2002). There also exists a great inter-continental and inter country difference in the share of urban population. In the developing countries, a significantly higher share of population still resides in the rural areas. Rural areas differ significantly from urban on the bases of their built environment in terms of the presence and arrangement of land uses (Morrill et. al., 1999). Urban areas usually exhibit higher densities and greater densities which are in sharp contrast to rural geographies. As a result, the mobility choices and travel behavior often varies subtly and significantly between these areas due to varying level of proximity and access to destinations (Millward & Spinney, 2011). Many studies have specifically examined these variations in travel behavior in the developed world which highlight that rural areas may have significantly different travel needs depending on their social, economic and spatial characteristics. For example, Pucher & Renne (2005) reported that the rate of car ownership and share of car based trips in daily travel was much higher in the rural areas of the United States as compared to the urban areas. See also Levinson, (2016), Houshmand, (2017) & Niglio et al., (2015) for more readings on it. This is linked with the lower level of accessibility and comparatively more 'dispersed' provision of services which results in higher mobility levels among rural population. Also the limited provision of public transport services and smaller levels of daily ridership also plays a significant role in increasing personal automobile reliance in rural areas (De Vos et. al., 2012). Pakistan is the most urbanized countries of south Asia where nearly forty percent of the population is estimated to live in urban areas. According to the latest population census, nearly two third of urban population is concentrated in ten large metropolitan areas (PBS, 2017). Until 1980s, urban mobility in Pakistan's was largely based on bus based urban public transport system and the British era intercity rail network. However, a consistent focus on road based transport policy since then has led to the deregulation of road based public transport system while the rail network saw a steep deterioration of its service (Imran, 2009). The country has steadily enlarged its network of inter and intra city urban roads over the years. A major share of ongoing investment in China Pakistan Economic Corridor is focused on highway development and related urban transport provision in cities. Increase in highway network has constantly favored the growing number of private automobiles, particularly in cities.

Currently, majority of urban transport demand is catered by privately owned fleet of buses and minivans which are often despised by the users for their poor quality service and lack of coverage (Adeel et al., 2016). While the government has prepared the Bus Rapid Transport network in few cities, it usually serves a limited number of urban travelers. In this scenario, personal automobile based mobility provides an ideal choice for the urban commuters (Haider & Badami, 2004). While the car ownership levels still remain low (approximately 10 cars per 1,000 persons in year 2015 when calculated from the official statistics. Metropolitan cities have higher car ownership than smaller cities due to their great dependent on automobility. Various studies have examined the travel behavior in the individual cities e.g. Russell & Anjum (1997) in Lahore, Qureshi & Lu (2007) in Karachi which state that nearly one third of trips are done by automobiles. A broader national level examination of the urban travel behavior is still missing from the policy discussions. Similarly, only a limited number of studies focus on rural mobility with a specific focus on transportation and urban planning. Due to lack of detailed knowledge, national urban and rural travel behavior remains understudied and largely over simplified. Secondly, a comparison between urban and rural areas within the same study will permit us more insights into the geographical variation that are usually not measurable but may be important for transport and development across the country.



Fig. 1 Bus based transport mobility remains the most popular mean of automobility in urban and rural areas of Pakistan

## 2 DATA AND METHODS

Travel behavior analysis and its surveys are not yet a common feature of transport policy analysis and data collection in Pakistan. The 2007 national time use survey is the first and the only national survey of its kind and it provides a useful opportunity to examine national travel behavior across urban and rural areas of the country (PBS, 2009). The survey was carried out during year 2007-08 and follows a multistage stratified random sampling procedure where sample households are selected randomly from a stratified list of national urban and rural areas. The data was collected through face to face, pen and paper based questionnaire survey by visiting the sample houses by the locally hired surveyors. Its data is statistically representative of the national population at the urban, rural and provincial level.

CODE	CATEGORY	DETAILS
180	Subsistence	Travel to/from work and seeking employment in establishments
280	Subsistence	Travel related to primary production activities (not for establishments)
380	Subsistence	Travel related to services for income and other production of goods (not for establishments)
780	Subsistence	Travel related to learning, examination
480	Maintenance	Travel related to household maintenance, management and shopping
581	Maintenance	Travel related to care of children
582	Maintenance	Travel related to care of sick and disabled adult
583	Maintenance	Travel related to care of elderly adult
680	Maintenance	Travel related to community services
880	Discretionary	Travel related to social, cultural and recreational activities
980	Discretionary	Travel related to mass media use and entertainment
80	Discretionary	Travel related to personal care and self-maintenance

Tab.1 Travel related activities and their survey code for Pakistan time use survey 2007

The time use diary files were provided publically free of cost in the Stata file format that were downloaded and analyzed in Stata software using the longitudinal data analysis techniques. The survey also noted if the activities were done simultaneously or one after another. Activity time was divided equally between all the activities in an episode if the activities were not carried out simultaneously. However, if the respondent participated in two activities at the same time, both the activities were given equal amount. For example, if a person was travelling while sleeping during an episode, thirty minutes were awarded to both sleep and travel activities. This ensured that the activity and travel time was not undercounted.

Location code 1	Location code 2
1 Own dwelling	1 Inside
2 Someone else's dwelling	2 Outside
3 Field, farm or other agricultural workplace	3 Travelling on foot
4 Other workplace outside private dwelling	4 Travelling by private transport (car, van, motorcycle)
5 Educational establishments	5 Travelling by taxi (Rickshaw, Quinqui or other)
6 Public area i.e. not in a private dwelling, workplace or educational establishment	6 Travelling by train
7 Travelling or waiting to travel	7 Travelling by bus
8 Other (specify)	8 Travelling by bicycle
	9 Travelling by other means (specify)

Fig. 2 The time use survey noted travel activity in location 1 while the mode of travel was noted as location 2

With a sample size of 19,600 households, this survey collected one day time use diary form nearly 38,000 persons. The diary section noted all the activities, including travel activity, carried out by the respondent on the day before the survey. The survey day was divided into forty eight half hour long activity episode and each respondent was asked to recall three activities it did during each half hour episode of the diary day. Travel was a part of the activity classification a total of twelve variables noted travel activity by activity type.

The activities were recorded in the format of International Classification of Activities for Time Use Surveys (ICATUS). Table 1 enlists the travel related activities noted in the survey. For travel related activity, a location variable noted the travel mode in one of the following seven choices: walking, private transport, taxi, train, bus, bicycle and other means (Figure 2). Each travel activity noted in the survey has been treated as one trip as the survey does not differentiate between the two trip legs.

#### Results and discussion

	TRIPS PER DAY		MINUTES TRAVELLED PER DAY	
	URBAN	RURAL	URBAN	RURAL
<b>Total non-motorized</b>	<b>3.7</b>	<b>4.3</b>	<b>74</b>	<b>89</b>
Walking	3.5	4.2	69	85
Bicycle & other	0.2	0.1	4	4
<b>Total Motorized</b>	<b>0.7</b>	<b>0.3</b>	<b>24</b>	<b>12</b>
Private automobile	0.5	0.2	15	6
Public transport	0.3	0.1	10	6
<b>All</b>	<b>4.4</b>	<b>4.6</b>	<b>98</b>	<b>101</b>

Tab. 2 Mobility levels across urban and rural areas

The time use survey measures a total of 122,673 trips and 2,632,480 travel minutes from 26441 mobile respondents who reported traveling on the dairy day. As the table 2 shows, walking remains the dominant mode of transportation across urban and rural areas. The share of walking trips is much higher in rural areas (93%) as compared to urban areas (84%). While motorized mobility accounts for the remaining 16 and 7 percent of total daily trips in urban and rural areas, respectively, public transport accounts for only one third

of motorized travel whereas personal automobile contribute the remaining two third of all motorized trips in the country. Mobility by 'Bicycle and other means' made a smaller share of up to 2 and 5 percent daily trips in rural and urban areas, respectively.

Time Period	1 to 3 Activities per time period	Activities S.No.	Code	Same time? Yes No	Location 1	Location 2
1	2	3	4	5	6	7
04h00		1001		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1002		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
04h30		1003		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
04h30		1004		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1005		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
05h00		1006		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
05h00		1007		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1008		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
05h30		1009		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
05h30		1010		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1011		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
06h00		1012		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
06h00		1013		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1014		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
06h30		1015		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
06h30		1016		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1017		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
07h00		1018		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
07h00		1019		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1020		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
07h30		1021		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
07h30		1022		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1023		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
08h00		1024		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
08h00		1025		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1026		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
08h30		1027		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
08h30		1028		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
To		1029		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
09h00		1030		1 <input type="checkbox"/> 2 <input type="checkbox"/>		
09h00		1031		1 <input type="checkbox"/> 2 <input type="checkbox"/>		

Fig. 3 Time use diary section noted three activities, their simultaneity and location codes in each activity episode

Mode disaggregated data highlights that the rural residents made 0.7 or 20 % more walking trips per person per day but their non-walking trips, including bicycle and motorized trips, were significantly lesser than urban households. Daily travel duration also exhibits similar but slightly wider geographical differences. Walking makes up to 70 percent of total daily travel time in urban areas (98 minutes) as compared to 84 percent (101 minutes) of that in rural areas. While the travel duration by 'Bicycle and other means' make only 4 percent across urban and rural areas, share of motorized travel duration is significantly higher in urban areas (24 percent) than rural areas (12 percent). Further, rural travellers exhibited equal share of daily travel duration

by public and private means of transport (6 percent, each), whereas urban travellers amassed 50 % more daily minutes by personal automobile than public transport (15 and 10 percent, respectively). Frequent walking trips in rural areas increase their overall mobility level as the motorized travel remain very low in the country.

TRAVEL MODE	URBAN	RURAL
<b>Non-motorized</b>	<b>21.8</b>	<b>22.3</b>
Walking	21.5	21.8
Bicycle & other	27.6	31.9
<b>Motorized</b>	<b>34.1</b>	<b>42.2</b>
Private automobile	30.3	38.9
Public transport	38.9	44.1
<b>All</b>	<b>24.0</b>	<b>23.5</b>
<b>Travel purpose</b>		
Subsistence	25.7	25.3
Maintenance	19.2	13.8
Discretionary	21	20.6

Tab 3. Mean trip duration in minutes across urban and rural areas of Pakistan

The analysis shows that nearly 30 percent of respondents did not report any travel activity on the diary day. However, this immobility was largely concentrated on the female side and only three percent immobile respondents were male. However, urban men and women exhibited significantly higher immobility rates than rural counterparts. While these high instances of immobility are important part of larger transportation behaviour in the country and are consistent with similar findings from other studies of urban mobility in the developing country context, discussion on it does not lie in the scope of this article.

Walking remains the most dominant mode of transportation in rural areas. Recent work by JICA (2012) indicates that motorized travel makes up to half of the daily mobility in metropolitan areas like Lahore. However, these metropolitan studies tend to ignore the day to day short trips in local neighbourhoods and focus on motorized demand estimation. The above results provides a broader picture of daily mobility across urban and rural areas of the country which remains predominantly walking based society. Secondly, the results also highlight that rural areas might not suffer from low accessibility as earlier expected. As the results show, rural residents travel only 3 minutes more overall. Rather, it can be said that motorization has shortened walking time in urban areas by 10 to 15 percent and that rural areas lag behind in motorization by the same margin, probably due to lack of access to automobiles and a possible high accessibility to day to day activities such as mosques, workplaces and social contacts due to small size of rural settlements.

The urban rural differences in accessibility to services are well researched in the existing literature. It is known that the rural face limited accessibility that might increase their average trip duration than urban residents. However, a national picture of trip duration by mode and purpose of travel remains missing so far, which is provided in Table 3 above. The results confirm that mean trip duration of rural residents is significantly higher. The differences are more pronounced for personal automobile and do not exceed more than eight minutes per trip for personal automobile and five minutes for public transport, whereas walking trip duration is almost similar. Surprisingly, if we examine the trip duration differences by purpose of travel, urban rural differences are significant only for maintenance purpose travel while subsistence and discretionary trip duration are almost

similar. Subsistence trips take the longest travel time, 25 minutes, followed by discretionary and maintenance travel. It shows that the spatial mismatch is more pronounced for work and educational activities than to the services such as markets or recreational places. Another surprising finding is that the maintenance purpose trip duration is shorter in rural areas than urban, showing that urban accessibility to public services might be decreasing with time due to outward spatial expansion of cities and limited supply of new urban services for rising urban population.

	TRIPS PER DAY				MINUTES TRAVELLED PER DAY			
	FEMALE		MALE		FEMALE		MALE	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Subsistence	1.3	1.4	2.4	2.5	32	34	57	62
Maintenance	0.6	0.7	0.7	0.7	13	11	12	14
Discretionary	0.8	0.8	2.4	2.5	19	19	43	44
All	2.6	2.9	5.4	5.7	65	65	114	120

\* Figures may not add correctly due to decimal rounding

Tab 4. Mobility by purpose of travel

Table 4 presents mobility levels in urban and rural areas by gender and purpose of travel. Male mobility levels, both in terms are daily trip rate and travel duration, are nearly twice than that of female. Majority of trips among Pakistani men are made for sociocultural activities such as prayers or socializing with family and friends. Female mobility is dominated by subsistence travel. Learning remains the dominant purpose of travel among urban female that make up to 37% of all daily trips, followed by sociocultural activities and household maintenance purpose travel making up to 29% and 14% of their total trips, respectively. Whereas, mobility of rural female is dominated by work travel followed by sociocultural and learning purposes that make up to 32%, 27% and 18% of all daily trips, respectively. Increased involvement of rural women in farm related activity tends to differentiate their mobility patterns from their urban counterparts, who are not required to work in the fields. However, the urban women make more learning trips as they are more likely to be enrolled in school and college education than rural female, due to issues related to poverty, time availability and physical distance to educational institutions in rural areas. Among Pakistani men, sociocultural trips remains the dominant purpose of travel across urban and rural areas, that constitute up to 45% daily trips, followed by work and learning purpose mobility that make up to 37% and 10% of total daily trips, respectively. A higher level of rural mobility is caused by more frequent work related and sociocultural trips in the rural areas. For rural men, built environment might facilitate their frequent short trips to nearby fields and seeing relatives or friends which is often not the case in urban areas as workplaces and relatives might be located at increased distances in cities. Urban rural differences of daily travel duration among Pakistani men and women follows a similar pattern but the gaps are slightly more pronounced than daily trip rate (Adeel et al., 2017). Figure 4 describes the variation in mobility levels across ten different age groups. Generally, female mobility levels decrease while male mobility levels increase with the age, both across urban and rural area. Across each stage of life, both the trip rate and travel duration remain significantly higher in rural areas than those in urban areas, both for men and women. Rural women appear to be less effected by the mobility issues due to their increased familiarity with local environment and relatively fewer chances of facing unknown men in villages. On the other hand, urban women seem to be more conscious in making discretionary trips which is potentially shaped by their safety and security concerns in urban areas. Lack of accessibility to female friendly activities in cities might also be influential in reducing mobility of urban women. Table 5 describes gendered mobility levels by personal and household income of the respondents across urban and rural areas. Income also exhibits a significant yet often contrasting effect across gender and geography of residence. For men, increasing personal income tends to increase mobility levels, both in urban and rural areas, as persons without income make fewer daily trips and travel fewer minutes than those with some personal income. On the other hand,

for women, increasing personal income has a differential effect across geography. In urban areas, female trip rate decreases but travel duration increases slightly with rising personal income. However, in rural areas, daily trip rate and travel duration both decrease with personal income as rural women are less likely to continue participating in farm activities with higher incomes.

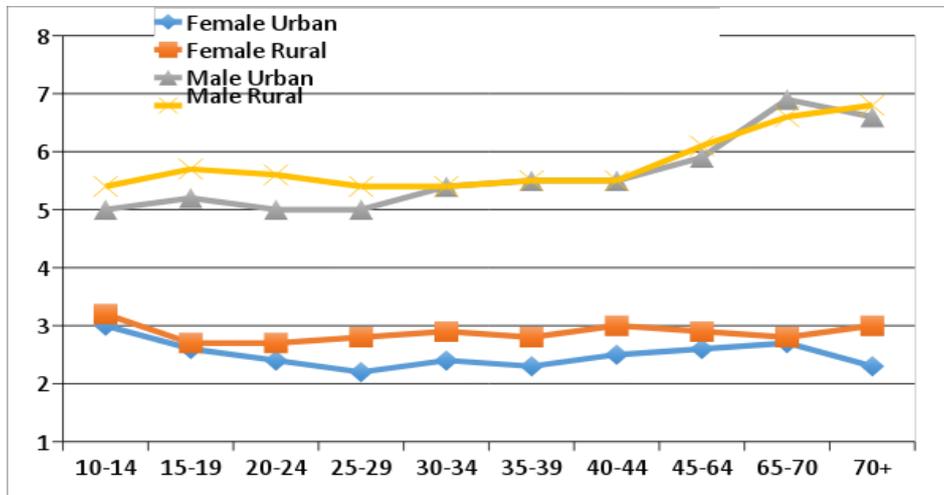


Fig 4. Mobility by age of respondent across urban and rural Pakistan

	TRIPS PER DAY				MINUTES TRAVELLED PER DAY			
	FEMALE		MALE		FEMALE		MALE	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
<b>Personal</b>								
Zero	2.7	2.9	5.1	5.4	63	63	110	114
up to 4000	2.6	3.0	5.6	6.0	62	65	112	122
4000-7000	2.5	2.9	5.2	5.6	68	69	112	121
7001-10000	2.5	2.8	5.5	5.4	60	74	121	123
Above 10000	2.6	2.4	5.7	5.9	80	59	120	134
Overall Change	-	-	+	+	+	-	+	+
P-value								
<b>Household</b>								
Up to 4000	2.7	3.2	5.4	5.6	60	66	109	115
5001 - 5000	2.7	2.9	5.3	5.6	59	64	107	117
5001-7000	2.7	2.9	5.3	5.6	62	63	111	120
7001-10000	2.6	2.7	5.4	5.5	63	63	117	122
Above 10000	2.6	2.8	5.4	6.0	66	62	115	128
Overall Change	-	-	~	+	+	-	+	+
P-value								

Note: + increased significantly, - decreased significantly ~ change is insignificant

Group differences by one way ANOVA; Urban rural difference within gender: bold cells are significant at  $p < .05$

Tab 5. Mobility by income level across urban and rural Pakistan

However, urban women tend to travel for work or education and if their households can afford to pay for transportation and activity costs, they might also travel longer distances, particularly in bigger metropolitan cities like Karachi, which results in increasing their daily travel duration in cities. Similarly, increasing household income tends to increase male mobility levels in rural areas as the men from well-off rural families increase traveling outside their villages for various purposes. On the other hand, household income does not change

daily trip rate in urban men and their travel duration also increases only marginally showing that the increasing income may not necessarily change mobility levels in urban men as they already get desired services from same locations, rather they might reduce their trips as their servant are able to perform minor household tasks such as grocery shopping. Increasing household income negatively affects female mobility levels for the same reasons as the honour related concerns become more important among rich rural families. In urban areas, female trip rates slightly decrease but travel duration increases suggesting that women might also be travelling farther from home, as they are more likely to get better quality education which is often at greater distance than normally available schools in residential areas.

MODE	HOUSEHOLD INCOME QUINTILES				PERSONAL INCOME QUINTILES			
	LOWEST (BELOW 4000)		TOP (ABOVE 10,000)		LOWEST (WITHOUT INCOME)		TOP (ABOVE 10,000)	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Total non-motorized	91	94	72	88	85	94	65	80
Walking	87	91	70	86	83	92	64	78
Bicycle and other	3	3	2	2	2	2	2	2
Total motorized	7	4	26	10	13	4	32	18
Personal automobile	3	1	19	7	8	2	28	14
Public transport	4	2	6	4	4	2	5	3
All	100	100	100	100	100	100	100	100

Tab 6. Mode choice by income level across urban and rural Pakistan

Table 6 above describes the urban-rural differences in mode choice by household and personal income quintiles. Walking remains the dominant mode of transportation across all income groups. Automobile reliance increases with income, particularly in urban areas, resulting in a widening urban-rural gap of auto-mobility with rising income. Share of public transport based trips remain very low, even among the poorest, but still remains higher than personal automobile based trips, showing that lack of access to private vehicle and lack of affordability limits the automobility of majority of population. With increasing incomes, personal automobile based mobility increases rapidly while the public transport usage increase marginally. Automobility with income increases more rapidly in urban areas as the urban residents from top personal income quintiles made approximately one third of their trips by personal automobile as compared to only 18 percent automobile trips by their rural counterparts. Fewer number of earning members per household means that the automobility of every household member is not affordable for the poor and some personal income becomes necessary for daily mobility. This observation has an important implication for programs that aim to facilitate mobility and access to services among women and poor through household based financial support. Women have less control over the funds transferred to households which limit their automobile based accessibility to services such as hospitals and educational centres. Direct fare subsidies to individuals seem more effective than household based financial support as the individuals have greater autonomy in selecting appropriate mode of travel. Household vehicle ownership is presented in Figure 5. Nearly half of the sample did not report having any vehicle in household. Nearly 32 percent urban households reported having a bicycle as compared to 23 percent urban households. Other than this, rural households were less likely to be a zero vehicle household or report any motorized vehicle, car or motorcycle, than urban households. However, motorcycle and 8 percent reported owning a car as compared to only 14 and 2 percent rural households reporting so. Widespread rural poverty and somewhat limited demand of automobile mobility in rural areas prevents rural households from buying up automobiles.

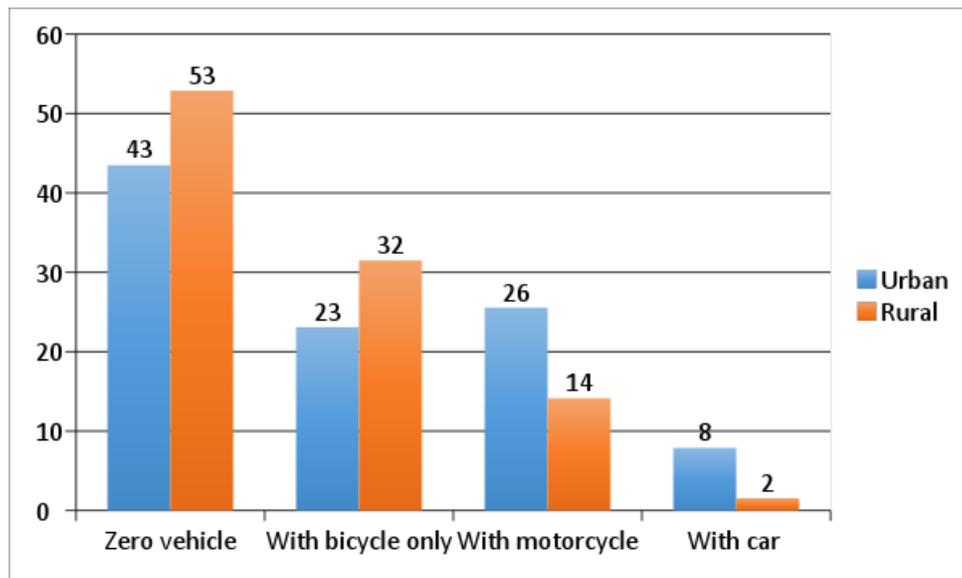


Fig 5. Household vehicle ownership

However, with increasing population and expansion in rural areas seem to increase automobile based travel in future as school enrolment is increasing gradually in rural area. Lack of personal automobiles make rural areas more dependent on public transport. Keeping in view the fact that the mean trip durations are also high in rural area, provision of public transport becomes more important for increasing accessibility and connectivity of rural settlements with marketplaces and bigger towns. Table 7 describes the modal split in urban and rural areas by household vehicle ownership. As evident, walking dominates the travel behaviour regardless of automobile ownership. Availability of car or motorcycle significantly increases share of motorized trips and that also more significantly in urban areas. Surprisingly, vehicle ownerships does not change the share of public transport based trips considerably, showing that the walking trips are converted into car or motorcycle trips. Keeping in view the fact that motorcycles are driven only by men and cars usually by head of households, almost mostly men, automobile ownership generally favours the mobility of male members of the household.

MODE	ZERO VEHICLE		WITH BICYCLE ONLY		WITH MOTORCYCLE		WITH CAR	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Total non-motorized	87	93	90	93	72	84	52	86
Walking	86	92	82	87	69	80	51	85
Bicycle and other	1	1	8	6	3	3	1	1
Total motorized	11	5	8	5	25	14	46	13
Personal automobile	4	2	3	2	21	12	39	9
Public transport	7	3	5	3	4	2	6	3
All	100	100	100	100	100	100	100	100

Tab 7. Share by trips by mode and household vehicle ownership across urban and rural Pakistan

Share of motorized trips among households with bicycles is also higher than all motorized trips by these households showing the importance of bicycles for daily mobility of poor in the country. The discussion above presents the mobility and travel behaviour information across broader urban rural context in the country and the regional variation at sub national levels remain unexamined. Due to strong provincial differences in socioeconomic status and level of physical development, it is important to explore the provincial variation in urban rural mobility in the country.

	PUNJAB		SINDH		KPK		BALUCHISTAN	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Non-motorized	3.3	3.9	3.4	4.4	5.8	6.1	3.1	3.4
Walking	3.1	3.7	3.3	4.3	5.7	6.0	2.9	3.3
Bicycle & other	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Motorized	0.8	0.3	0.9	0.3	0.6	0.3	0.6	0.3
Private automobile	0.5	0.2	0.5	0.1	0.3	0.2	0.5	0.2
Public transport	0.2	0.1	0.3	0.1	0.3	0.2	0.1	0.0
All	4.2	4.4	4.3	4.7	6.5	6.5	3.7	3.7

Tab 8. Provincial variation in daily trip rate

As table 8 describes below, KPK province exhibits the highest mobility levels while Baluchistan province exhibits least mobility. Urban residents nearly twice more automobile trips than rural residents. Urban residents in Punjab and Sindh make 0.8 to 0.9 automobile trips while those from KPK and Baluchistan make 0.6 trips per person per day. Rural residents make only 0.3 trips per day across every province, showing that the rural automobile is almost similar across the country while urban areas exhibit slight variation. As the walking remains the most common mean of mobility, it creates largest mobility differences across provinces as well. Residents of KPK make the most number of walking trips, while Baluchistan make the least, which largely shapes their overall mobility. Similarly, share of personal automobile and public transport based trips remain nearly similar across rural areas (0.1-0.2).

#### 4 CONCLUDING REMARKS

This paper aims to provide a comprehensive examination of daily travel behaviour at the urban and rural geographies. The nationally reliable dataset of 2007 Pakistan time use survey provides a unique opportunity for this study as a leading example in a developing country context where walking still remains the most dominant mode of travel. Although rural areas make slightly more daily trip, their vehicle ownership and automobility is comparatively lower than urban areas. For the same income levels, urban residents are disproportionately more automobile dependent than their rural counterparts. There exists a significant geographical effect on automobility as the residents of richer provinces rely on personal automobiles slightly more than those from poor provinces. It implies that the rural population may not be essentially covering longer distances. Cross gender analysis finds that rural female appear to be more mobile than urban female. This finding has an important implication as well: it does not show a relatively smaller accessibility in the everyday lives of the rural population as compared to urban residents. More research is needed for examining the experiences for everyday accessibility at the individual and social group levels. Such studies are very useful for exploring the role of transport in ensuring access to services in urban and rural areas across the country.

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## IMAGE SOURCES

Fig. 1 – Fig. 2 : Muhammad Adeel (Original image taken in 2017)

Fig. 3: Pakistan Bureau of Statistics –Time Use Survey 2007- Final report, PBS (2009)

Fig. 4: Pakistan Bureau of Statistics – Time Use Survey 2007- Final report, PBS (2017)

## AUTHOR'S PROFILE

**Muhammad Adeel** is postdoctoral research officer at LSE Cities at the London School of Economics, United Kingdom. He holds a bachelor in City & Regional Planning (UET, Pakistan), Masters in Remote Sensing (NUST, Pakistan) and PhD in Urban Planning (University of Hong Kong, Hong Kong). In November 2017, his PhD dissertation, titled 'Transportation disadvantage and social exclusion in Pakistan' was declared as the joint winner of the inaugural 'CODATU prize of best PhD thesis on urban mobility in cities of developing countries'.