

# Designing Policy Interventions for Increasing Adoption and Usage of Mobiles in Urban Slums in India

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## Introduction

Telecom is recognized as the driver of economic growth (Hardy, 1980, Roller and Waverman, 2001; Waverman, et al, 2005). In the recent past, there has been rapid proliferation of mobiles in most countries, including developing ones<sup>2</sup>. However, evidence suggests that in most developing countries this has been limited to mostly urban areas (Jain and Raghuram, 2009, Wilson, 2007, Fong 2009). Despite the rhetoric regarding ubiquitous availability and accelerating adoption rates<sup>3</sup>, adoption has not have percolated to the poorer urban areas, typically slums to the same extent as in other areas.

Since the benefits of mobile communications are quite significant and socio-economic in nature, it is important for policy makers to assess the extent of barriers to adoption and usage of mobile phones faced by vulnerable sections of society as otherwise this could exacerbate the economic divide. Further, as mobile become devices for accessing information especially that on the Internet, such exclusion could further worsen the situation.

While there have been studies, albeit a few, that have focused on adoption and usage of mobiles in developing countries, these have largely focused on rural areas. Appendix 1 gives an overview of several key studies in this context. With growing urbanization, and increasing urban poverty, it is important to understand the drivers and barriers to adoption and usage of mobiles, and how these factors may influence the economic aspects of work for people living in urban slums. Further, this should enable policy makers and regulators to design appropriate instruments for intervention. We take a step in that direction by conducting a large survey in urban slums in three metropolitan cities in India to understand the social and economic impacts of mobiles on the poor living there and the returns that they derive from their economic activities to suggest appropriate policy interventions. By comparing this study with earlier similar studies done in different parts of the world, we sought to outline the dimensions of similarity and differences across them, and the possible reasons for these.

For the poor, the social environment is closely intertwined with their economic context. Therefore, our study focused on both the social and economic aspects<sup>4</sup>. However, the present paper focuses more on the economic aspects. Past studies on economic aspects of mobiles rarely

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<sup>1</sup> Research Assistance provided by Mr. Prashaat Jain, Mr. Nitesh B. Bhimgade and Mr. Varun Chandra is gratefully acknowledged.

<sup>2</sup> [http://www.wikinvest.com/concept/Mobile\\_Phone\\_Adoption\\_in\\_Developing\\_Countries](http://www.wikinvest.com/concept/Mobile_Phone_Adoption_in_Developing_Countries) accessed on August 10, 2009

<sup>3</sup> (<http://video.google.com/videoplay?docid=2258898945526921067>, accessed on August 10, 2009)

<sup>4</sup> This is a modified version of the paper titled “A Survey of Usage of Mobiles in Urban Areas”, by Ankur Sarin and Rekha Jain, pp 34-50, in India: The Impact of Mobile Phones, The Vodafone Policy Paper Series, No 9, January 2009 ([www.vodafone.com/publicpolicyservices](http://www.vodafone.com/publicpolicyservices)).

identify the pathways by which economic benefits are derived. Further, they provide little support by way of quantification of benefits. The present study makes attempts towards covering both these gaps by identifying the pathways by which economic benefits are derived and collecting detailed measures of hypothesized pathways by which mobiles can have an impact as well as the outcomes indicating an impact. We recognize that it is difficult to quantify the economic benefits directly, and attribute them directly to the ownership and usage of mobiles. The availability of data presented in the paper may make it will be easier for regulators and policy makers to support relevant policy measures.

The primary research question we seek to answer is: *What has been the impact of mobiles on users living in urban slums?* Using survey data from 1774 households living in 84 slums in three large metropolitan cities of India-- Delhi, Ahmedabad and Kolkata, we try to:

- Understand determinants of usage and ownership
- Measure the perceived impact of mobiles
- Understand the process by which an impact is created

### ***Why Study Slums in Urban India?***

Several of the development policies have targeted rural areas and populations because a significantly large proportion of India's population lives in villages and a higher proportion of them are below the poverty line. However, the importance of the urban sector has been rapidly growing and despite the fact that only 28 percent of India's 1.2 billion people currently live in cities, the urban sector contributes to more than 60 percent to India's GDP – a far greater than the 29% share contributed in 1950-51.

Increasing urbanization in India is a consequence of large scale migration to cities in search of better work and life opportunities. This has put a tremendous presser on civic amenities, including housing. By 2025, 40 percent of India is projected to be urban (National Institute of Urban Affairs, 2000). Inadequate planning and pressure on the scarce existing urban infrastructure and jobs, low levels of skills and literacy in the migrating population has led to increasing urban poverty. Between 1983 and 2004-05, the total numbers of rural poor declined by 12.31 percent while the total number of urban poor increased by 13.89 percent (Chandrasekhar and Mukhopadhyay, 2008). Increasing proliferation of slums is a very visible and of concern to planners and policy makers. Of the nearly 300 million inhabitants that live in India's cities, 55 percent live in settlements that can be characterized as slums (UN-Habitat 2008).

### ***Understanding the Context – Slums in Urban India***

The living conditions and extent of poverty that characterize slums varies dramatically between and within cities. In general, the “notified” or authorized slums (the type of slums we collected data from in our survey) have significantly better living conditions and lesser poverty than non-notified or non-authorized slums. For example, in 2002, estimates of the proportion of total population living below the poverty line were 34 percent in the notified slums versus 41 percent in non-notified slums and 21 percent in non-slum area (Chandrasekhar and Mukhopadhyay,

2008). Most of the basic amenities (water, electricity) may not be available through a regular supply and water connections, for example, may be shared across several households. Usually a large number of people, a family or even an extended family live in a small room or adjoining open spaces. There is no or little personal space and household assets (TV, radio) are shared in a family.

Given the harsh living conditions, it is not surprising that the poor among urban residents are much more likely to inhabit urban slums. Many of the slum dwellers, lacking the skills and capabilities required in the new growth areas, are usually absorbed in the low paying informal sectors. Such jobs are not regular, offer little security, and are often exploitative. Most people have few assets and therefore rely on labor markets. As is the case in most Indian labour markets gender, caste, training, education are usually the determinants of access to jobs. The types of jobs available to them may be irregular, be dependent on the type of neighborhood (construction site, industrial area), and the availability of capital among the self-employed. Often people living in such areas may have to commute long distances for work, as several slums are on the periphery of cities.

### *Social Life in Slums*

Slum dwellers face a difficult social life, not only because of overcrowding but also possibly because of the high competition for shared resources (such as water), threat of eviction, insecure or non-existent job tenures, and the need to re-establish social linkages in a new environment as they move away from their roots. Options of support from family and community based networks and safety net systems (developed over generations in rural villages) may be limited and the precarious nature of their existence makes them even more vulnerable. Although some slum residents live in clearly defined occupational or caste based groupings, others do not. (Loughhead and Mittal, 2001)

For slum dwellers, it is often not only education, skills and health that determine their ability to cope with vulnerabilities, but also their own capacity to deal with emergent situations. For example, they may not be in a position to take a risk such as to forego present income earning opportunities in order to enhance skills for a potentially higher earning job in the future. This mind set also determines whether they can exploit new business opportunities. For example, their decisions regarding who to sell their services or goods to may be determined by the trust they share (hence low risk, rather than to new supplier who may be far away who they do not know and who may be willing to pay a higher price). A person who has a better provision for finances could take that risk.

Due to the vulnerabilities that the urban poor face, especially those living in slums, it is important to address the developmental needs of this segment of the population. It is not only from an equity and developmental perspective that the needs of this segment need to be examined, but also because any economic benefits available to the people in urban slums will drive the growth of the urban economy, furthering national GDP growth as identified above.

## ***The Socio-Economic Context of Mobile Usage in Urban Slums***

The social and economic context of slums would drive the adoption and usage of mobiles in ways that are different from other sections of the population. Due to the fact that there is so much sharing of space and other assets, we may expect that mobile may be used as a shared service, especially since the handset costs may be a deterrent to acquisition of a self owned service. We could expect that the communication patterns would be determined by migration as one of the factors. For example, where male migrants have moved to cities, there would be a need to communicate with their immediate families they may have left behind. There would be a need to communicate not only about their welfare, but also about the status of any remittances they may have made. Even when families migrate to cities, they may have roots in rural areas or smaller towns. They may also be involved in supporting the larger family at the place they migrated from.

Further, we expect that the type of economic activity they may be engaged in would determine the adoption and usage. Since many of them are involved in informal activities, the ability to be in touch with sources of job opportunities is critical. Competition for such activities (such as casual labor) is high. This further puts pressure on those seeking jobs to be in touch with the source of the opportunity. If they are self employed, or work as sub contractors, then the ability to coordinate with their suppliers and customers is important, as there may be no formal contracts to ensure service or payment, making them extremely vulnerable to competition. Further, since residents of slums may commute for their work, coordination could help them reduce transportation costs. Since slum dwellers are very susceptible to harsh financial situations and have poor living conditions, they may frequently need to contact sources of help to cope with these. The possible frequent need to address emergencies arising out of such a context could drive adoption and use of mobile.

## **Methodology**

### ***Research Design***

To assess the impact of mobile phones, we would ideally like to be able to measure changes in relevant outcomes for the same households with and without a mobile keeping all the other variables including the period of observation constant— a logically impossible ideal. Our choice of a comparison group that would provide the counterfactual: what would have happened without mobiles is therefore restricted to households that have not used mobile phones with the assumption being that experiences and outcomes of non-users serve as a proxy for those of the users had they not used mobile phones. In the absence of any baseline data regarding the users prior to ownership, we have to rely on the respondent's memory – therefore any findings would need to be qualified by the possibility of a recall bias. Second, even in the presence of baseline data, before-after comparisons do not allow us to isolate the impacts of mobiles from other changes affecting the outcomes being considered that have occurred simultaneously during the same time period.

Using this framework to assess impacts, the ideal comparison group should on average be identical to the intervention group (i.e. group using mobile phones) with the usage of mobile phones being the only difference between them. Since chance would be the determining factor, a prospective study that uses the luck of draw to decide which households use or have access to mobile phones and which ones don't would ensure comparable intervention and comparison groups. However among other reasons, the rapidity with which mobile phone usage has been increasing makes such a study hard to implement in practice. Short of restricting ourselves to a very selected and isolated population – very much unlike an urban slum, ensuring that the group of people assigned not to use a mobile do not in fact use one over a period long enough for us to observe impact would not only be impossible but perhaps also unethical. Instead, we compare the experiences and contemporaneous status of a group of self-selected users and non-users living in slums in the three cities.

The survey sought to compare the experiences and current status of a group of self-selected users and non-users living in slums in the three cities. Households in which there is at least one member who uses mobiles regularly – defined as using a mobile at least once a week – were classified as 'user' households and other households were classified as 'non-user' households<sup>5</sup>. Care should therefore be taken in interpreting the differences between users and non-users in the results reported below. Since the use of mobile phones is a choice that individuals make, the group of users and non-users could systematically differ from each other in more ways than just mobile usage. While some of these, like earnings and education can be controlled and accounted for, others, which are difficult to measure and observe, cannot. For example, people using mobiles are likely to have chosen to use them because of higher perceived or real impacts. Similarly people using a mobile phone might simply be more motivated to improve their life-conditions or be informed about how to do so than non-users. Therefore, attributing any observed difference in outcomes between users and non-users just to mobile use becomes problematic in the presence of other (possibly unobservable and immeasurable) attributes that are correlated both with mobile use and the outcomes being considered. However, differences between the two groups can be regarded as due partly to the impact of mobiles.

Given the constraints outlined above and acknowledging that our estimates of the impacts are descriptive and suggestive, we try to tease out potential impacts not only by comparing users and non-users and before-after comparisons but also by collecting detailed measures tracking the hypothesized pathways by which mobiles can have an impact as well as the outcomes indicating an impact.

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<sup>5</sup> Since users in developing countries are likely to share mobile phones within and between households, one of the complexities that researchers in the developing world have had to grapple with is defining and distinguishing between ownership and usage. Unfortunately, there has been no consistent definition of what constitutes a "user" in the existing literature. For example, (Zainudeen et.al., 2007) defines a "user" to be someone who has had used either their own phone or someone else's – paid for or free of charge – during the preceding three months. So, even if a user had made a single call, then he/she would qualify to be a user. In contrast, the study by Chabossou et.al.(2008) considers anyone above the age of 16, who owns a phone or has an active SIM card as a user regardless of whether s/he has been using the phone and all others as non-users. Samuel et.al. (2005) defines anyone who has never owned or used a phone to be a non-user, unlike the other two studies.

Using existing literature, as a starting point we identified several socio-economic dimensions that have either been empirically shown or conceptually believed to be determinants of mobile usage or be impacted by mobiles. We chose dimensions that tried to assess both intermediate as well as the longer term outcomes to understand the mechanisms by which the use of mobiles might create an impact. For example, we asked users to report on changes in the amount of inventory they hold, not because we care about it per se but because it might indicate how mobiles have an impact.

To assess change, we asked users about changes in their social and economic status since they started using mobiles. We asked non-users to use the last year as the reference period to answer questions on changes that could occur even without mobiles. The time period of comparison chosen for non-users was driven by the expectation that on an average, users in our sample are likely to have been using mobiles for a year.

The dimensions on which respondents were asked questions included

- Determinants and nature of ownership
- Determinants of usage between households, i.e. which households are more likely to be using mobile
- Usage within households, i.e. which members of the household are more likely to use mobiles
- Nature and pattern of usage
  - Expenditure
  - Purpose of usage
  - Calling patterns
  - Use of Services
- Change in nature and patterns of economic activity
- Change in returns to economic activity
- Change in work practices and behavior
- Social impact: Change in mode and intensity of contact
- Pervasiveness of mobile ownership in a) social network and b) economic network
- Barriers to mobile ownership

## ***Data and Sample Design***

Given the focus of the study on urban slums, we restricted attention to three large metropolitan cities: Delhi, Ahmedabad and Kolkata, located in the northern, western and southern parts of the country, respectively. Between them the three cities provide some degree of regional diversity and represent a population of approximately 21 million. Within each city, we stratified the slums into different geographic regions and used the method of probability proportional to size to select slums to survey. To the extent that slums differ from each other, we tried to get as many different slums as possible to ensure our sample is representative of the city slum population. However, the gain in statistical efficiency has to be balanced against the increased time and monetary costs of data collection.

From available lists of formalized slums, we selected slums in each city stratifying them by location – in Delhi and Ahmedabad this referred to the zone and ward in which the slums are located and in Kolkata this referred to the borough. The probability that a slum was selected was proportional to the reported number of households in the slums with some slums being selected more than once.

We selected 29 slums in Kolkata, 25 in Delhi and 30 in Ahmedabad. Twenty households were interviewed in most slums, with 40 interviewed in 4 slums and 60 in one. Within each slum, 70 percent of the interviewed households were to be “user” households and 30 percent were “non-user” households. The households within each slum were chosen purposively based on availability and willingness to participate. The number of user households was over sampled since that is the group we are more interested in and from whom detailed questions about how mobiles have impacted their lives were asked. The total number of households that we tried to interview was 1800 – 600 in each city. Of the 1800, 1260 were to be users and 540 non-users.

We collected data from both the primary user of the mobile phone as well as the person most knowledgeable about the household socio-economic status and practices, in case the two were different. The determinations of who were the primary and secondary users were left to the households and were not based on any pre-defined criteria.

## ***Description of the Sample***

Using the sampling methodology described, we were successful in surveying 1774 households, of which 1235 were “users” and 539 were “non-users”<sup>6</sup>. Table 1 provides further details of the sample. The average size of the household in our sample was 4.37 members with households in Ahmedabad and Delhi being larger than in the Kolkata sample.

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<sup>6</sup> Rather surprisingly, most respondents who owned a mobile in our sample -- own one exclusively. Only in Kolkata, did 17 percent of “users” not own a mobile but reported using one. However, this might have also been a consequence of the way data investigators screened households. Therefore, we might instead be looking at a comparison between owners and non-owners.

**Table 1: Description of the Sample***(No.)*

<b>Household Surveyed</b>	<b>All</b>	<b>Ahmedabad</b>	<b>Delhi</b>	<b>Kolkata</b>
<b>Total Number</b>	1774	597	575	602
User	1235	418	395	422
Non-Users	539	179	180	180
<b>Average Size of Household</b>	4.32	4.51	4.5	3.96

### **Findings from the Survey**

We report the findings under three separate major areas: Characteristics of Users and Non-Users, Factors affecting Ownership and Usage and Influence of Mobiles on Work Practices. As highlighted above, specific characteristics of users (education, income levels, type of economic activity adopted, understanding the economic value derived from mobiles) could be drivers in the adoption and use of mobiles. Further, these characteristics (type of employment, education) would influence the work practices and the value derived from mobile usage.

#### *Characteristics of Users and Non-Users*

##### *Economic Profile*

##### *Earnings*

As Table 2 illustrates, the survey corroborates the general perception and existing literature that user households are economically advantaged and more educated compared to non-user households (Souter et al., 2005; Samuel et al., 2005; Zainudeen et al., 2007; Barrantes, 2008; Chabossou et al., 2008). While some of the advantage in economic status could be a result of owning or using a mobile, it is more likely that pre-existing economic status is a strong predictor of usage with more economically better-off households likely to use mobiles. The total household earnings for users are Rs 6436 per month on average while that for non-users is Rs 4377 – a difference of more than Rs 2000. While users might be relatively better off financially than non-users, their incomes are fairly low. The per capita per day income among users, is around Rs 49 or approximately one dollar (US). To put this in some context, the monthly per capita poverty line for Delhi in 2004-05 was Rs. 612, in West Bengal (the state where Kolkata is located) was Rs. 449 and Gujarat (the state where Ahmedabad is located) was Rs.541. Using these poverty lines – which are controversial and generally believed to understate poverty considerably and adjusting for inflation, around 20 percent of non-user households and 15 percent user households would be below the official poverty line.

It should also be noted the difference between the average earnings of the highest earning members of user and non-user households is around Rs.1000 per month – half the difference between total earnings. This suggests that the differences in households' size and earnings per member might also explain some of the disparities in household earning. In fact, the per-capita earnings between users and non-users differ by Rs. 317 per month.

## Education

Consistent with the differential earnings, literacy status among users is higher than that of non-users. While 33 percent of non-user households did not have a single member who was literate, only 23 percent of user households were completely illiterate.

**Table 2: Comparison of Users and Non-Users** (%)

	Percentage of Households that are	
	User	Non-User
<b>Education</b>		
Not literate	23	33
Literate without formal Schooling	2	3
Literate but below primary School	4	7
Diploma/Graduate	66	56
	4	1
<b>Total household earning (From Roster) (Rs.)</b>	6436	4377
<b>Highest earning member of the Household (Rs.)</b>	4283	3204
<b>Average Size of Household</b>	4.32	3.73
<b>Type of Economic Activity</b>		
Self-Employed	36	27
Regular Wage	42	39
Casual Labour	21	33

## Economic Activities

Users are more likely to be engaged in self-employed activities. These activities (like running a shop, operating a public transportation vehicle like a taxi or auto-rickshaw or being a self-employed professional like plumber or electrician, are ones where mobile usage might be more productive and essential. 42 percent of the total activities that households were involved in provided them with regular wages while 36 percent were self-employed activities and the rest were largely engaged in activities categorized as daily or casual labor (21 percent). On the other hand, non-users were more likely to be engaged in daily or casual labor (33 percent) and less likely to be engaged in self-employed activities with only 27 percent engaged in self-employed activities. The proportion of regular wage activities carried out by users and non-users did not vary a lot.

Table 3 shows that nearly 80% of the user respondents fell in four income categories between Rs 2000 to Rs 10,000 per household per month. Table 4 gives the ownership of different assets and asset classes for the user and non-users respondent group. As would be expected, with increasing incomes, ownership of assets increases for both users and non-users. However, it is interesting to note that in the users category, the cable penetration is not universal it rises from 32.4% to nearly 81.8% across the four income categories that range from Rs 3000 – Rs 12,500 for users (For

non-users ,cable penetration increases from 23.3% to 60%). Owning a cable connection in India has no upfront payment costs (in most areas, as there is little CAS availability), whereas owning a mobile does. Users appear to make a choice in favour of mobile vis-à-vis any other information/entertainment asset.

**Table 3: Distribution of User Respondents by Income (%)**

<b>Income Categories (Rs.)</b>	<b>&lt;1000</b>	<b>1001-1500</b>	<b>1501-2000</b>	<b>2000-3000</b>	<b>3000-5000</b>	<b>5000-7500</b>	<b>7500-10000</b>	<b>10000-12500</b>	<b>12500-15000</b>	<b>&gt;15000</b>
<b>Percentage of people</b>	<b>0.2</b>	<b>1</b>	<b>2.9</b>	<b>13.6</b>	<b>29.2</b>	<b>23.5</b>	<b>13.7</b>	<b>5.7</b>	<b>4.1</b>	<b>4.5</b>

\*The total does not come to 100% as there were 1.6% respondents did not indicate their income category

Table 4 shows the Asset Ownership according to income categories for both users and non-users. An interesting highlight Table 4 is that percentage of non-users having landline was higher than users across all income categories (Although the penetration of landlines in relation to other asset ownership was very low ranging from 1.8% to nearly 12.0%). This is an indication of the possibility that since non-users of mobiles had a relatively higher penetration of landline, their propensity to own a mobile may be lower. It could also indicate that once users own a mobile, they may be giving up their landline connections.

**Table 4: Asset Ownership According to Income Category (%)**

		<b>Income Levels (Rs.)</b>	<b>&lt;3000</b>	<b>3001-5000</b>	<b>5001-7500</b>	<b>7501-10000</b>	<b>&gt;10000</b>
<b>Asset Ownership</b>	<b>Total Valid Response</b>	Users	219	359	290	169	176
		Non-users	210	191	75	35	15
	<b>Television</b>	Users	69.9	82.7	86.9	88.6	96.7
		Non-users	43.3	67.0	76.0	81.3	92.8
	<b>Cable Connection</b>	Users	32.4	52.6	64.8	71.6	81.8
		Non-users	23.3	35.6	52.0	62.9	60.0
	<b>Landline</b>	Users	1.8	3.3	4.1	7.7	11.4
		Non-users	3.3	3.7	9.3	8.6	33.3
	<b>Gas Connection</b>	Users	27.9	41.8	47.9	52.1	60.8
		Non-users	12.4	29.3	32.0	31.4	26.7
	<b>Water Connection</b>	Users	52.5	44.8	44.8	45.0	56.3
		Non-users	33.3	43.5	44.0	31.4	33.3
	<b>Electricity Connection</b>	Users	95.4	95.3	97.9	96.4	96.6
		Non-users	90.0	93.7	96.0	100.0	100.0

\*There are discrepancies in asset pertaining to Electricity Connections between users and non-users this is possibly due to the very low number of non-users sampled in this category.

What clearly emerges is that users tend to value the benefits from mobiles and prioritize it over other asset ownership. Possibly non-users need to be made aware of this to help drive adoption and usage, at least for the relatively higher income category. These findings are consistent with those reported in Samuel et.al., (2005) who found that ownership of mobile is related to a greater

variety of possession of durable goods, although it is less skewed than other goods towards better-off sections of society .

*Variations at Household Level: Gender, Education, Age and Earnings*

To get a sense of how mobile usage varies within a household, we asked respondents to classify each member of the household as either a "primary", "occasional" or a "non-user". Table 5 reports, an overwhelming 87 percent of all primary users of mobiles within a household were male, reflecting the male predominance in ownership and usage of most assets prevalent in the Indian society. Primary users were also more likely to literate and have attained higher formal education. The difference in education was highest at the secondary levels where 37% of primary users were likely to have completed this level compared with 14% of non-users. Secondary users were also likely to be more educated and earning more than non-users.

The average age of primary users was 32 years, while occasional and non-users were likely to be slightly younger at 28 years. Primary users on average earned over three times than secondary users and nearly 8 times than non-users. The higher age of primary users could contribute to the higher salary levels.

**Table 5: Characteristics of Primary Users** (%)

	<b>Primary users that are</b>	<b>secondary users that are</b>	<b>Non-Users that are</b>
Male	87	44	42
<b>Literacy level</b>			
Not literate	16	28	43
Can read and write local language	81	69	56
Can read local language only	3	3	3
<b>Highest level of Education</b>			
Not literate	12	25	38
Literate without formal schooling/below primary	5	6	10
Primary + Middle	38	31	37
Secondary/Higher Secondary	37	36	14
Diploma/ Certificate course/Graduate and Above	7	3	1
<b>Average age</b>	32	29	29
<b>Average earnings (Rs)</b>	3360	871	427

Our finding on gender skewed ness in ownership of mobiles is consistent with that of Sood (2006) who also identified far lower levels of ownership amongst women than men in India. However, the evidence is mixed across and within countries. For instance, although Samuel et al. (2005) finds men more likely to own and use a mobile in Tanzania, the difference is small. In contrast, he reports higher ownership and usage by women in the South Africa. Zainudeen et al. (2007) found that women’s use at the Bottom of the Pyramid in India, Sri Lanka, Philippines and Thailand (number of calls and duration) was similar to men. The usage pattern appears counterintuitive, given the culture in several of the Asian countries studied and our own findings.

***Factors Affecting Ownership and Usage***

### Affordability

Table 6 shows that on an average, respondents reported spending around Rs. 2700 to start using a mobile-- with Rs. 2385 (US \$48) being the average expenditure on a handset and Rs. 285 (US \$5.9) on talk time – the total being nearly forty percent of the average household earnings per month. However, more than 70 percent of households spend less than Rs.200 on their mobile per month – around 3 percent of their total monthly household earnings. Further, on analyzing this data by income categories (Table 7), both for first time purchase of handsets and average amount spent per month, we find that the total amount spent on handsets is almost half for those who reported a family monthly income of up to Rs 1500, and about 75% in the next income category.

Those in the lowest income category spent 75% of the average spent by those in the highest income category. So, while there are significant differences in amounts spent on handsets, the difference is not so marked as far as average monthly spends are concerned.

**Table 6: Spending on Mobile**

<b>Expenditure when started using a Mobile (Rs)</b>	
Average Cost of Handsets	2384
Average Cost of SIM/ Talk time	286
<b>Expenditure per Month on Mobile (Rs)</b>	<b>Percentage of Households (%)</b>
<50	11
50–100	24
100–150	20
150–200	17
200–250	11
250–300	9
>300	9

**Table 7: Average Cost of Handsets and Average SIM/Talk Time (Income Category) (Rs)**

<b>Income</b>	<b>Handsets costs</b>	<b>Average Monthly Expenditure</b>
<1500	1270	212
1500-3000	1969	214
3001-7501	2254	222
7501-12501	2747	257
>Rs.12500	2790	279

When the handset prices are compared to the earnings of the non-users (Table 2), the average handset cost for the lowest income category at Rs 1270, is nearly 25% of the monthly household earnings. This could be significant deterrent for owning a mobile.

There are two implications for this: As the economic benefits of owning a mobile are significant, and if policy makers wish to accelerate this process, there is a strong case for policy interventions that reduce handset prices and service prices in general. The other implication is for service providers to bundle handsets with service. This becomes more relevant when we examine data on payment mechanism for acquiring a mobile as shown in Table 8. This indicates that most users pay for their mobile handsets from their savings. Having innovative schemes where payments of handsets may be made in small installments over a period of time may lead to greater penetration and propensity to buy mobile phones.

**Table 8: How Did You Pay for Your Mobile** (%)

<b>Percentage of People Selecting</b>	<b>All</b>	<b>Ahmedabad</b>	<b>Delhi</b>	<b>Kolkata</b>
Own saving	89	90	94	82
Borrowed	2	2	3	1
Gift, Received for free	6	6	1	9
Employer provided it	2	2	1	3
Others, describe	2	0	1	5
<b>Total valid responses</b>	<b>1232</b>	<b>417</b>	<b>393</b>	<b>422</b>

Despite the growing spread of mobiles, a question that policy makers and researchers seek to answer is to what extent is mobile telephony affordable for the poor? A number of studies in developing countries indicate that the poor in developing countries spend a greater percentage of their income on telecommunications than poor in developed countries (Barrantes and Galperin, 2008). Souter et al. (2005) found the expenditure range to be 10-14% in Tanzania while Zainudeen et al. (2007) found this to be in the range of 4-8%. However, it is possible that since such surveys are conducted at a particular point in time, and may overestimate expenditure, as those in the informal economy tend to underreport their incomes or have fluctuating earnings. Some studies indicate that price and income elasticity's of demand are high (Coyle, 2005; Samuel et al., 2005) – suggesting that mobiles are perceived to be “luxury” items and not necessities. However, other studies (De Melo (2000) cited by Forestier (2003)) have indicated that costs for telecom use have been higher than what households have spent on essential services such as electricity and water. For example, the poorest households in Chile spent a little less than 4% on telecom, a little more than 2% on water and a little less than 4% on electricity. The study hypothesized that since the poor saw the benefits and saw telecommunication as a basic need, they were willing to incur high costs.

## *Barriers to Adoption and Usage of Mobiles*

*Costs:* Despite the rapid fall in handset prices, more than 50 percent of respondents who do not currently use a mobile identify the cost of a handset as the primary barrier to owning a mobile in the urban slums and nearly 90 percent state it as one of the top three reasons in Table 9. While 67 percent of non-users also report the cost of calls among the top three reasons, only 15 percent state that it is the primary reason why they do not use a mobile.

*Ease of Use of Instrument and Clarity of Call Plans:* Interestingly, about the same number report difficulty in using a mobile as the primary reason why they do not use a mobile and nearly half the non-users identify it among the top three reasons. The need for improvement in the design of handsets, clarity of charges for call-plans and information dissemination is evident from the fact that more than one in four “non-user” households were likely to report difficulty in understanding charges or call plans and not enough knowledge about value of mobiles were important barriers to their usage of mobiles.

**Table 9: Barriers to Mobile Usage**

<b>Non-Users Picking</b>	<b>Percentage of it among top three reasons</b>	<b>Percentage of non-users picking it as primary reason</b>
Cost of handsets	87.3	53.2
Cost of calls	68.9	15.5
Difficulty in using mobile	53.8	13.8
Difficulty in understanding charges/call plans	26.0	3.1
Not enough knowledge about value of mobile	28.8	4.9
Others	5.6	3.0

*Network Effects:* The survey results significantly indicate that the primary use of a mobile still remains a device to connect with others. Therefore, both the decision to invest in a mobile and the value derived from it are likely to depend on the behavior of others in the economic and social networks around the respondents. Survey results reported in Table 10 suggest that users and non-users in some sense inhabit different networks with users much more likely to be in networks with higher mobile usage. While 63 percent of users said that most or all of the people who they usually need to talk for work related purposes owned a mobile, the number was only 39 percent for non-users. The difference was even higher when it came to personal or social networks. 59 percent of users reported that most or all of the people who they needed to talk to for personal reasons owned a mobile, while only 33 percent of non-users reported the same.

**Table 10: User and Non-User Networks**

What Proportion of people to whom you usually need to talk for work?		Users	Non-Users
1	- 10% – Very Few of Them	2	8
2	- 25% – Some of them	10	24
3	- 50% – Around half of them	25	29
4	- 75% – Most of them	45	31
5	- 100% – All of them	17	7
Number of valid responses		<b>1220</b>	<b>532</b>

***SMS is a Low Usage Service***

Although SMS revenues constitute about 15% of operator’s revenue, among the urban poor, it is a low usage service. The usage of SMS may partly be driven by the level of comfort people have in sending and receiving SMS. Other factors that drive usage may be the relative cost vis-à-vis voice call and nature of communication supported by SMS (asynchronous, number of messages required for confirmation). In order to assess one dimension of usage drivers, respondents were asked their relative comfort in sending and receiving SMS (Table 11). A large percentage (45 percent) of user households were not comfortable in either receiving or sending SMS, while 36 percent were comfortable in both receiving or sending SMS and 19 percent were comfortable in receiving but not in sending SMS. This could have implications for developing new information based services, such as mobile banking, e health etc and could point to the need for more voice based and voice triggered services.

Table 11: SMS Usage

(*%*)

Not comfortable with either sending or receiving SMS	45
Comfortable with both sending and receiving SMS	36
Comfortable with receiving SMS but not comfortable sending SMS	19
Number of valid responses	<b>1234</b>

***Facilitators***

We also asked users to describe the two most important factors that would enable them to derive more value from mobiles and report these in Table 12. Not too surprising reduction in call charges – local (59 percent) and long distance (40 percent) figured most often. Interestingly, nearly 40 percent of respondents reported that reduction in handset costs as among the top two reasons that would increase the benefit they get from mobile phones. Only two percent of respondents described the provision of increased services like mobile banking, accessing government information. We believe this has to be interpreted carefully since the question was open ended and given the near absence of such services in India, users are unlikely to know of the potential of such services.

**Table 12: Factors that Would Enhance Value of Mobiles**

<b>Percentage of Users picking among Top Two Factors</b>	
Reduction in handset cost	38
Increased affordability for handsets with advanced features	15
Reduction in local call charges	59
Reduction in long distance charges	38
Reduction in SMS charges	6
Availability of SMS in languages other than English	3
Increased services like mobile banking, accessing government information	2
Better coverage	19
No of valid responses	1366

Table 12 along with Tables 6 and 7 that indicate the average price of handsets and services need to be seen in the context of average monthly household income which are low both for users and non-users.

### **Influence of Mobiles on Work Practices**

#### *Relative Focus of Social and Work Activities*

Mobiles are primarily used for work and social purposes and to some extent for emergencies; respondents found little use of them for entertainment, playing games or as an information device (Table 13). Nearly 60 percent of the user household reported highest or high use for work related use, while nearly 51 percent reported highest or high use for social interaction (talking to friends relatives in a non-work related context). Further, 24 percent of user households reported highest use of mobile for work, while only 19 percent have rated social interaction as the primary use.

**Table 13: Primacy of Use (%)**

<b>Social (Talking to friends and relatives for non-work)</b>	
Not used	5
Lowest and Low	12
Neither low nor high	31
High and Highest	51
<b>Work-related</b>	
Not used	8
Lowest and Low	12
Neither low nor high	20
High and Highest	60
<b>Entertainment, Playing, Games &amp; others</b>	
High & Highest Use	6,3,9
<b>Emergency</b>	
High & Highest	20
<b>Number of valid responses</b>	<b>1230</b>

Further on doing the analysis by income categories (Tables 14 and 15) we find that across all categories, primacy of usage of mobile for work is higher than for social purposes. The higher category income respondents tend to rate the mobile's social use higher than those with lower incomes possibly because of the higher income categories may have greater flexibility and propensity to spend for social purposes. However, the higher income category rate the primacy for work over that for social purposes.

**Table 14: Primacy of Mobiles for Social Use (By Income Categories) (%)**

<b>Income (Rs)</b>	<b>Not Used</b>	<b>Lowest or</b>	<b>Neither Low Nor High</b>	<b>High or Highest</b>
<1500	0.0	20.0	60.0	20.0
1500-3000	7.4	14.2	40.2	38.2
3001-7500	5.7	11.2	27.9	55.3
7501-12500	2.5	12.6	33.5	51.5
>12500	9.4	16.0	29.2	45.3

**Table 15: Primacy of Mobile for Work Use (By Income Categories) (%)**

<b>Income (Rs.)</b>	<b>Used</b>	<b>Lowest or</b>	<b>Neither Low Nor High</b>	<b>High or Highest</b>
<1500	0.1	11.5	18.7	60.3
1500-3000	4.2	8.3	9.2	78.3
3001-7500	9.2	11.0	16.8	63.0
7501-12500	7.5	10.5	18.0	64.0
>12500	5.7	5.7	13.2	75.5

These findings differ from those reported by Souter et al. (2005) and De Silva et al. (2008), where both studies report social purpose as the primary reason for calls. Further, the difference in number of social and business calls as a percentage of total calls is significant. For example, De Silva et al. (2008) report this difference to be 58% in the case of India and report 40-64% difference across Pakistan, India, Sri Lanka, Philippines and Thailand. One possible explanation for the variation between our findings and theirs is that as people have started recognizing the benefits of mobiles for work and organizing themselves to exploit it as mobile usage has become more pervasive. Another explanation might lie in the way we have defined a “user”. Unlike De Silva et al. (2008), where a user was defined as someone who had made even a single call in the last three months, we defined a user household as one where a member has used a mobile within the last week. If people who use a mobile primarily for work purposes are more likely to use it at least once a week and those who use it primarily for social purposes use it less frequently than once a week, our stricter definition could result in classifying the latter as non-users.

### **Influence of Mobile on Economic Activities**

*Improvement in Work Practices:* Responses reported in Table 16 suggest that mobiles change how people conduct their economic activities and do so in ways that are likely to increase the economic value of their work. We find rather strong evidence that mobiles improve the ability of people to plan, co-ordinate and search for better prices or lower costs. Over 70 percent of users for whom the question was applicable report that mobiles have improved their ability to plan and co-ordinate with people they work with. Similarly, while 43 percent of non-user households rarely or never plan and co-ordinate with their customers and suppliers, around 80 percent of user households use their mobiles for such planning and co-ordination at least sometimes.

The fact that mobiles confer a distinct advantage over public telephone booths is evident from the fact that while 35 percent of users report using the mobile to find new or better work either most of the times or always, and 26 percent of non-users report using telephone booths to do the same.

Mobiles also seem to enable the poor to do their work over a larger geographical area. For example, while 40 percent of users state that there has been no change in the geographical area (as measured by distance from home) over which they do work, 46 percent report that their mobile usage has either increased the area somewhat or a lot. The contrast with non-users, among whom only 18 percent report an increase over the prior year provide suggestive evidence for the hypothesis that mobiles help the poor overcome or lower the transaction costs of doing business beyond their immediate vicinity.

One of the striking ways in which mobiles appear to influence work practices is the ability of users to find work or jobs directly and without intermediaries. While only 39 percent of respondents say that their primary source of finding jobs or work was direct contact with the customer prior to using a mobile, 62 percent of respondents are now able to avoid the use of contractors or middlemen and no longer depend on personal friends and relatives. The finding is significant given that a third party intermediary still forms the primary source for 42 percent of non-users compared to 15 percent of users.

**Table 16: Effects on Work Practices** (%)

	Users	Non-Users
<b>Check/confirm prices of various materials from suppliers</b>		
Never or Rarely	31	35
Sometimes	44	44
Most of the time or Always	35	22
Number of valid responses	<b>384</b>	<b>108</b>
<b>Plan and coordinate with customers and suppliers</b>		
Never or Rarely	20	43
Sometimes	42	35
Most of the time or Always	37	22
Number of valid responses	<b>433</b>	<b>120</b>
<b>Trying to find work/improve work</b>		
Never or Rarely	30	41
Sometimes	35	34
Most of the time or Always	35	26
Number of valid responses	<b>889</b>	<b>355</b>
<b>Geographical Area (distance from home) where you do your work</b>		
Decreased a lot or somewhat	-	10
No change	46	67
Increased somewhat or a lot	54	22
Number of valid responses	<b>1065</b>	<b>434</b>

Further, on analyzing the data by income categories (Table 17), we find that the role of the contractor, middleman decreased across all income categories and direct contact became the predominant mechanism. This change was the greatest for those whose monthly family income was up to Rs 3,000 per month. This change needs to be seen in contrast to the modes of finding work among non-users (Table 18) who report a relatively higher role for contractors/middleman and personal friends and relatives in relation to direct contacts across all income categories. This makes a strong case for supporting the usage of mobiles at the bottom of the pyramid.

**Table17: Change in the Sources of Jobs Referrals Before and After having Mobile Phones (Income Categories)** (%)

Income (Rs.)	Contractor/ Middleman		Personal friends/ Relatives		Direct Contact		Referrals from past customers/suppliers	
	Before	After	Before	After	Before	After	Before	After
<1500	21.4	14.3	35.7	0.0	35.7	85.7	7.1	0.0
1500-3000	19.2	15.8	40.7	6.7	34.7	75.2	5.4	2.4
3000-7500	16.8	9.3	29.9	9.3	46.5	76.3	6.9	5.1
7500-12500	17.4	10.9	20.9	5.7	54.7	79.8	7.0	3.6
>12500	17.6	12.2	20.0	4.9	56.5	79.3	5.9	3.7

**Table 18: Source of New Jobs for Non-Users (By Income Categories)** (%)

<b>Income (Rs)</b>	<b>Contractor/ Middleman</b>	<b>Personal friends/ Relatives</b>	<b>Direct Contact</b>	<b>Referrals from past customers/supplie rs</b>
<1500	28.6	35.7	14.3	21.4
1500-3000	28.1	21.9	43.8	6.3
3001-7500	28.3	20.8	44.0	6.9
7501-12500	13.5	18.9	62.2	5.4
>12500	20.0	0.0	80.0	0.0

Several other studies have documented the role of mobiles in reducing the search costs for information on prices and availability of produce (Jensen, 2007; Aker, 2008; Donner, 2005), transaction costs in business (either due to reduced need to travel or/and better information), increase in productivity (Donner, 2005), especially for high mobility workers (such as cab drivers). While there are cost savings established for a number of groups in various studies, evidence on the usage of mobiles for new income generation is limited (Zainudeen et al., 2007).

*Improving Efficiency and Scope of Work:* Not only do mobiles change the work practices, they do it in ways that increases both the efficiency and scope of work for the better. For the use of mobiles to actually translate to higher earnings or income, the change in practices documented above should translate into either higher productivity, lower costs or higher returns or some combination of all three. We find some evidence for all three and report these in Table 19<sup>7</sup>. Around 65 percent of users report that their travel costs have decreased as a result of owning a mobile. In contrast for non-users, only 27 percent reported a decrease in travel related expenses. Similar differences were reflected in reduction of costs and time across different dimensions of business operations such as procurement, stocks/inventories management in responses between users and non-users. Accompanying the reduction in costs, around 58 percent of users state that their wages or prices for the products of services they sell have increased because of mobiles. Mobiles have not only increased access to existing suppliers/services/customers/place of work, with 60 percent of respondents reporting an improvement, but also enabled a proportion of users to find new ones.

A similar proportion of users for whom the question was relevant report a reduction in wastage of unsold stock and a decrease in the money tied up in stocks/inventories as a result of using a mobile. Assuming that easier access to credit translates into reduction in costs, around 57 percent of users also associate their usage of mobiles with increased access to sources of credit. Although much larger than the proportion (15 percent) of non-users who report a similar decrease in the year gone by, only about half the users report that there has been a decrease in the time it takes to procure goods or provide services. Most of the rest of the users reported no change.

<sup>7</sup> We acknowledge that whether or not a change qualified by the word “somewhat” is large enough to be meaningful is debatable. However, since respondents were given the option of “No Change”, we conjecture that even when respondents pick a response such as “Increased Somewhat”, they are probably reporting small but meaningful changes. While we often club all changes in the same direction together in the text, we distinguish between the magnitude of the perceived changes in the tables.

To derive these benefits, it is important to understand how the linkages between new information, exploiting new opportunities and saving costs work, otherwise the cost of service may outweigh the perceived economic benefits (Souter et al., 2005; Zainudeen et al., 2007). Our concerns are consistent with findings from previous studies that suggest mobiles are valued by the more educated and those belonging to middle or higher socioeconomic groups because of the economic benefits they provide (Souter et al., 2005). This might also be because these groups are able to link the efficiency gains for greater income generation or exploit new information to generate new opportunities or save expenditure

**Table 19: Reported Work Benefits** (%)

	<b>Users</b>	<b>Non-Users</b>
<b>Travel related expenditure</b>		
Decreased a lot or somewhat	65	27
No Change	35	53
Increased somewhat or a lot	-	21
<b>No. of valid responses</b>	<b>1208</b>	512
<b>Time taken to do work</b>		
Decreased a lot or somewhat	52	16
No Change	48	66
Increased somewhat or a lot	-	17
<b>No of valid responses</b>	<b>1163</b>	499
<b>Wastage of unsold stock</b>		
Decreased a lot or somewhat	69	20
No Change	31	66
Increased somewhat or a lot	-	15
<b>No of valid responses</b>	326	164
<b>Money tied up in stocks/inventory</b>		
Decreased a lot or somewhat	67	17
No Change	33	69
Increased somewhat or a lot	-	15
<b>Valid Responses</b>	317	154
<b>Time to procure materials/provide services</b>		
Decreased a lot or somewhat	89	28
No Change	48	73
Increased somewhat or a lot	-	11
<b>Valid Responses</b>	600	230
<b>Cost of procurement/providing the service</b>		
Decreased a lot or somewhat	44	16
No Change	56	66
Increased somewhat or a lot	-	18
<b>Valid Responses</b>	611	247
<b>Wages for your self, prices for the products or services you sell</b>		
Decreased a lot or somewhat	-	15
No Change	42	52

	<b>Users</b>	<b>Non-Users</b>
Increased somewhat or a lot	58	32
<b>No. of Valid Responses</b>	867	315
<b>Access to existing suppliers/service users/customers/place of work</b>		
Decreased a lot or somewhat	-	66
No Change	40	65
Increased somewhat or a lot	60	23
<b>No of valid responses</b>	850	340
<b>Finding new suppliers/service users/customers/place of work</b>		
Decreased a lot or somewhat	-	12
No Change	40	66
Increased somewhat or a lot	60	22
<b>No of valid responses</b>	847	353
<b>Access to sources of credit</b>		
Decreased a lot or somewhat	-	12
No Change	43	59
Increased somewhat or a lot	57	29
<b>No of valid responses</b>	844	350

*Improved Economic Status:* Given the changes in economic practices, increased efficiencies, lowered costs and higher returns reported above, it is not surprising that a majority of users believe that their economic status has improved because of owning a mobile (Table 18). Around 60 percent of users state that mobiles have made things either somewhat (48 percent) or a lot better (12 percent). Given the complex constraints that bind the upward economic mobility of the poor, we feel that this should not be underestimated.

**Table 20: Impact of Mobile Use on Overall Economic Situation (%)**

Made things worse	0
No effect	40
Made things somewhat better	48
Made things a lot better	12
Number of Valid Responses	1233

### ***Differential Effect of Mobiles on Various Activities***

Further to get a sense of who is impacted and what type of activities are likely to be affected more by mobiles, we asked users to report their perceptions of how different economic activities they engage in were affected by mobiles (Table 21). Self-employed activities were also the most likely to be positively impacted by mobiles, with nearly 61 percent of self-employed activities positively impacted as opposed to 45 percent of daily/casual labor activities. The least impacted were regular wage activities with only 36 percent being reported to be positively impacted.

As described earlier, it is possible that some of this difference in the change of economic status might be attributed to other characteristics that distinguish users and non-users. Indeed, since 36 percent of users started using a mobile within the last year, it is possible that mobile usage could be a result of improved economic status and not a cause for it. While acknowledging the possibility of the evidence being just co relational in nature, we believe the evidence of a positive association between improved economic status and mobile usage has to be interpreted along with the other findings described above that demonstrate how mobiles affect the way people do their work, where they do it, at what cost and the economic returns from it.

**Table 21: Impact of Mobile on Different Activities** (%)

	<b>Total Activities Accounted for by the Households</b>	<b>Households Stating it to be their Primary Activity</b>	<b>Households Stating that they are</b>		
			<b>Positively Impacted by Mobile Phones</b>	<b>Negatively Impacted by Mobile Phones</b>	<b>Not Impacted by Mobile Phones</b>
<b>Self Employed</b>	36	42	60	3	37
<b>Regular wage</b>	42	39	34	2	64
<b>Daily/Casual Labour</b>	21	19	44	1	55
<b>Other</b>	1	0	11	0	89

Our findings of a positive economic impact of mobiles is in correspondence with that of other studies where respondents claimed that use of mobiles increased their profits or productivity (Souter et al., 2005; Samuel et al., 2005; Zainudeen et al., 2007). For example, Samuel et al. (2005) indicated that the percentage of respondents who said that mobiles increased their profits was 59% in Egypt and 62% in South Africa.

*Change in Value Derived Over Time:* As reported in Table 20, nearly 50 percent of respondents have used a mobile for around a year or less and around 27 percent had been using it for more than two years. Users who had used a mobile for the longest were the most likely to report that the value they derive had increased a lot, with one out of every four respondent who had owned a mobile for more than two years reporting the same.

**Table 22: Change in Value Derived Over Time** (%)

<b>Value derived from mobile phones now compared to when started using it</b>	<b>For Last Month</b>	<b>For few Months</b>	<b>For Around a Year</b>	<b>In Between One and Two Years</b>	<b>For Around Two Years</b>	<b>For More than Two Years</b>
Decreased a little	24	6	3	8	9	8
Remained the same	24	29	18	18	30	21
Increased a little	52	44	59	53	45	44
Increased a lot	0	18	18	18	14	27
No of valid responses (1234)	21	167	369	208	128	341

### Discussion and Limitations

The differences between users and non-users detailed in the beginning of the section is important not only to understand what drives mobile usage but also to get a sense of the extent to which the experiences of users can be generalized to non-users. The differences also reinforce the caution expressed earlier about using the non-users as a comparison group to proxy for the counterfactual: what would have happened to the user group had they not used mobiles.

To understand how mobile usage has spread across economic groups over time, in Table 23 we looked at the relationship between duration of ownership and total household earnings. As is perhaps expected, households with higher earnings are more likely to have started using mobiles earlier. The group that has been using a mobile for the longest duration, (around or more than two years) has the highest earnings on average while the group that has been using mobiles for less than or around a year has the lowest earnings on average. However, the average earnings of the latter group are higher on average than of “non-user” households.

**Table 23: Relationship between Earnings and Duration of Ownership**

<b>Duration of ownership</b>	<b>Number of users</b>	<b>Average household earnings per month Rs</b>
Around a Year or Less	557	5566
Between one and two Years	208	6853
Around Two Years or More	469	7289

Not discounting the fact causation could run either way with increased mobile usage contributing to higher earnings, along with other pieces of evidence that point to a positive association between socio-economic status and mobile usage, does corroborate the popular perception that while using mobiles is becoming increasingly affordable, affordability still remains an important determinant of usage.

We do recognize that having a more precise measure of the economic benefit of owning a mobile would indeed be useful for policy makers to evaluate the benefits of programs or policies that promote mobile use and ownership vis-à-vis both the costs of the program and in comparison to other comparable interventions. However, in a study like the present one, which is based on respondent's perception of extent of benefits, such numbers if generated would not be accurate. Despite this limitation, reports of perceived (as opposed to actual) changes are important in their own right. The decision of whether a change is big, small or non-existent is left best to individuals since their welfare is our ultimate outcome of interest.

### **Policy Implications and Implementation Issues**

As has been brought out in the paper the urban poor face significant barriers to adoption and usage of mobiles. Those with lower literacy and educational profiles are likely to face greater challenges not only in adopting and using mobiles but also in leveraging the benefits derived from mobiles. The adoption and usage are primarily driven by affordability or incomes which are likely to be dependent on the educational profile and nature of activities. As has been shown, the ability to derive greater benefits from mobiles depends on the capability (both human and financial) to use the opportunities made available through mobiles (contacting a far off supplier for lower cost or better goods or finding markets with best prices etc). Therefore, in order to accelerate the adoption and usage among non-users and allow them to leverage the benefits to the same extent as for users, then simply making the handset and services available (at low costs) may not be sufficient.

***Changing the Scope of USOF:*** The Indian policy makers do recognize the positive impact of telecom services on economic growth. To accelerate the growth of mobiles, the government created the Universal Services Obligation Fund (USOF) in 2002<sup>8</sup>. By its mandate the fund focuses only on rural areas. So, if USOF has to be utilized for serving the urban poor, then its mandate would need to be changed. This would require legislative action.

Further, the plans for covering urban poor will need to be very different from those adopted for providing rural coverage (which has been the focus of USOF so far). While lack of geographic coverage is an issue in rural areas, in urban areas, affordability is a more significant issue. In urban areas, the issue of coverage is not very significant, as several operators (including both public and private) operate in most cities. Due to competitive pressures, coverage of metros appears adequate.

Under the current regime, by providing for coverage, USOF funded activities provide untargeted subsidies i.e., all people in the covered geographical area get the benefits of the subsidy, irrespective of their capacity to pay. However, if USOF is to be provided to urban poor, then a mechanism to target the poor has to be found. While there are government programs that seek to

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<sup>8</sup> All private operators contribute 5% of their aggregate gross revenues to this fund. With the rapid growth in revenues in the telecom sector, the fund had a corpus of US \$3.5 billion as of April 1, 2009. The USOF Administrator, DoT has rolled out various schemes for facilitating network and service expansion in rural areas. However, due to a variety of issues, there is a significant unused portion of the fund.

Target beneficiaries who have low income levels, providing them support for handset and call charges has a separate set of challenges. These arise as handsets have a significant value in the market and it is difficult to identify the user of calls, who may be different from the beneficiary.

Community based programs, such as self help groups could have significant role to play in the deployment of such schemes. Further, as identified above, programs to help the more disadvantaged in order to leverage the potential benefits would be necessary. So far, USOF has not worked through community programs. If the needs of the urban poor are to be addressed, then USOF Administrator must take steps in this direction.

***Reducing Overall Costs of Service Provision:*** Our study, like several others has highlighted the need to make handsets and services more affordable. The McKinsey report (2006) and the BCG report (Abraham et.al., 2007) among others have suggested coordinated action amongst industry players initiated both by regulators and operators, such as infrastructure sharing to provide coverage and reduction in prices as these are important driver of ownership and usage (Jain and Raghuram, 2005). Infrastructure sharing, reduction in taxes and duties will reduce costs and hopefully, prices, making it more affordable for the poor.

***Reduction in Taxes and Duties:*** These include reduction in duties and taxes for handsets and SIM cards and encouraging private sector to expand investments in infrastructure provision. Reduction in costs of duties, spectrum and license fee have been recommended by (Abraham et.al., 2007; Zainudeen et.al., 2007; McKinsey, 2006). Lower priced services, driven by lower costs could drive usage. Indian operators claim that they pay 30-40% of their revenues in taxes on equipment, octroi, VAT etc, whereas several countries have far lower rates of taxation (5-7% in Sri Lanka, Pakistan, and Malaysia). In contrast to the approach of lowering taxes, the government has increased the tax on mobile handsets over the past two years. Further, some state governments had increased the VAT on handsets in July 2009 (<http://www.business-standard.com/india/news/update-mobile-handset-sales-fall-75-in-maharashtra/67519/on> accessed on August 10, 2009). For example, Maharashtra, which accounts for a total of 10% handset sales in the country and also houses the world's largest slums, increased the VAT three folds, in July 2009. This resulted in a reduction in handset off takes.

Our study highlights the cost of handsets as one of the barriers to adoption. Both central and state governments need to recognize the critical role of telecom service in economic growth and recognize that higher adoption rate (catalyzed through lower duties and taxes) could enhance revenues to the state through service tax on usage. Thus the duty and tax regime needs to dovetail with the developmental objectives.

***Bundling Handsets and Services:*** As indicated in the report, cost of a handset in relation to the monthly earnings, is a major deterrent to adoption of mobile services. Bundling of handsets and services, a factor that could convert a one time fixed fee to a recurring cost for the subscriber is not prevalent in India, due to the existing structure of a license fee based on the revenue share. Yet, this mechanism has been used to drive adoption in several developed countries. A possibility is to have differentiated (including zero) revenue share for those customers who are poor. However, this would require a mechanism to identify such people and be able to attribute usage to them.

***Support for Other Value Added Services to Accelerate Adoption:*** Due to the low earnings among the urban poor, it may not be viable for telecom operators to provide services to them. However, if such revenues could be additional to other services that the poor could avail over the mobile phone, then these additional revenue streams could make it viable for operators.. For example, the BCG report (Abraham et.al., 2007) recommends extending the mobile services to cover m banking and government services. There could be a role for MVNOs (Abraham et.al., 2007) in bringing such services. But for m-banking and other government services to become available over the mobile, regulation in the banking sector would need to be reviewed to take in to account security and integrity of transactions. Given the highlighted benefits of mobiles, there is need for an integration across other sectors/developmental and telecom policy

***Communicating with Policy Makers/Regulators:*** The McKinsey report (2006) also suggests that operators must do a better job of communicating the benefits of mobile usage to regulators. We hope that a report such as this one, can play a facilitating role in supporting policy initiatives.

## **Conclusions**

Our report highlights the differences between households that use mobiles and those that do not in significant ways including earnings, household size, education and literacy status as well as the economic and social networks in which they are embedded in. This has implications for policy makers who are concerned with equitable growth issues. This may require changes in the scope of USOF. Further, it may not be just sufficient to provide access to non-users, specific interventions to help them derive enhanced benefits would be necessary. This may require changing the mechanisms adopted in the USOF, to include working with NGOs.

Since value derived from mobile increases over time, policy interventions need to be designed quickly, otherwise the ownership and usage of mobile could further exacerbate the differences between users and non-users.

Despite falling prices of handsets and services, affordability continues to be a concern. Policy measures that reduce costs of service provision and competition could help to further bring down prices. This suggests that policies like: Intervention in the credit market like subsidized loans; reduction in duties and taxes for handsets and SIM cards; providing incentives for companies to further reduce costs of handsets or design handsets friendly to the needs of the poor; bundling of handsets and services- a factor that could convert a one time fixed fee to a recurring cost; disseminating information on the value of mobiles and other such interventions that remove the barriers to usage that we have identified above are likely to result in tangible improvements in the lives of the poor. In order to make it commercially viable to operators to provide services to the urban poor (with lower propensity to pay), government must facilitate services such as m banking.

There are a different set of challenges in providing services in rural areas and we do not question the need for intervention in the rural sector. But by demonstrating the positive and social effects of mobiles among the urban poor, our study points to the advantages of intervening in the urban sector, albeit in different ways. For example, while we do not try to measure penetration in a

formal way as part of this study, we did face difficulty in locating users within slums especially since we desired that 70 percent of our total sample be from “user” households. Although only anecdotal, this could indicate that mobile penetration in slums is possibly far lower than the average urban penetration of nearly 80% as of December 31, 2008 and highlights the need for intervention (TRAI, 2008).

That the poor in cities are vulnerable is not in doubt, but a large number of them are also in a position to take advantage of the benefits of ICTs like mobiles. To the extent that experiences of current users can be generalized to non-users, the benefits of mobiles are likely to be greater than their costs.

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### Appendix 1: Essential Features of some of the Notable Studies Examining the Impact of Mobiles

No	Reference	Countries Covered	Methodology	Population Covered	Unit of Analysis
1	Abraham, J., Dean, D. & Subramanian, A. (2007). Ringing in the Next Billion Mobile Consumers, A Roadmap for Accelerating Telecom Growth in India, A BCG Report.	India	Varying number of respondents in different parts of the report ranging 1285-9174.	Urban, Rural	Individual
2	Barrantes, R. (2008). Substitution and Complementarities in Telecom Services Use: A Case Study of the Peruvian Urban Poor, 17th Biennial Conference of the International Telecommunications Society, Montreal.	Peru	1249 respondents	Urban (SEC D, E)	Household + Individual
3	De Silva, H., Zainudeen, A. & Ratnadiwakara D. (2008). Perceived economic benefits of telecom access at the Bottom of the Pyramid in emerging Asia, LIRNEAsia.	Pakistan, India, Sri Lanka, Philippines, Thailand	8662 respondents	(Urban, Rural (SEC D, E)) *	Individual
4	Goodman, J. (2005). Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania, The Vodafone Policy Paper Series, Number 3.	South Africa, Tanzania	South Africa 252 respondents, Tanzania 223 respondents	Rural	Individual
5	McKinsey Report, Wireless Unbound, The Surprising Economic Value and Untapped Potential of the Mobile Phone, McKinsey & Company, December 2006	India, China, Philippines	618 respondents	(Urban, Rural) *	Individual
6	Samuel, J., Shah, N. & Hadingham, W. (2005). Mobile Communications in South Africa, Tanzania and Egypt: Results from Community and Business Surveys, Africa: The Impact of Mobile Phones, The Vodafone Policy Paper Series, Number 3.	South Africa, Tanzania, Egypt	South Africa 252, Tanzania 223, Egypt 150	Rural	Individuals and Small Businesses
7	Sood A. (2006). The Mobile Development Report, The Socio-Economic Dynamics of Mobile Communications in Rural Areas and their. Consequences for Development.	India	80 spot interviews + Focus Group Discussions + 40 depth interviews	Small town, Urban Slum, Village, Remote village (SEC B, C, D, R1, R2, R3)	Individual
8	Souter, D., Scott, N., Garforth, C., Jain, R., Mascarenhas, O. & McKemey, K. (2005). The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction, A study of rural communities in India (Gujarat), Mozambique and Tanzania, Report of DFID KaR Project 8347.	Mozambique, Tanzania, India (Gujarat)	Focus Group Discussions+ 2292 respondents	Rural *	Household (to a small extent) + Individual +small businesses

No	Reference	Countries Covered	Methodology	Population Covered	Unit of Analysis
9	Chabossou, A., Stork, C., Stork, M. & Zahonogo, P. Mobile Telephony Access & Usage in Africa Retrieved December 9, 2008 from <a href="http://www.researchICTafrica.net">www.researchICTafrica.net</a>	17 African countries	Survey	Rural	Individual

\* In India the study was done on fixed lines.

\* The results of urban slums and rural are not separately available, unless one examines the raw data. The raw data is publicly available.