

# Prevalence of Tools of Digital Communications Among Population: A Ground Study in Tribal, Rural and Urban Slum.

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## Abstract

### Background

Means of communication with the users were explored in the ICMR Task force study of Health Account Scheme- generating authentic, utilizable, real-time, consumer generated e-health information. Hence to get information of distribution of resources in the study area, baseline availability of electronic tools among study population was evaluated, along with factors affecting their availability.

### Materials and Methods

The cross sectional door to door survey was conducted between the years 2013-2016 to explore what mode of e-communication is available in households so that feasibility check of community generated health information using digital tools can be initiated. Information of availability of modes of e-communication i.e.internet, television, phone and computer at household level was elicited. After ethical approvals and informed consent, in depth interviews were conducted in all the houses of study blocks and a total of 2479 heads of houses from the north and northeast India were covered.

### Results

A population of 7484 was covered among 2479 houses at 3 sites-528 Tribal, 1011 slum and 940 rural houses. Among modes of e-communication, Internet was found available in 8.5% houses in rural, 13.4% slum in metropolitan, 7.8% in tribal houses while Television was more available at rural, slum, and tribal site 44.8%, 88.2%, 86.6% respectively. Mobile phones were highest available mode in Rural (n - 563, 60.1%), Urban slum (n-897, 88.2%), Tribal site (n-292, 55.3%). Community knowledge of information technology (IT) based health program in the study area was abysmal in study area. Literature Review shows low acceptability (6%) of IT-based health programs like Mother and Child Tracking program. Factors like infrastructure, affordability, family income, education and occupation were affecting availability of e-mediums.

### Conclusions

Digital tools of communication with community as partner in health programs is necessary/required. However the heterogeneity in distribution of electronic mediums and ground situation of IT tools indicate the need for strengthening the logistics where it is beyond reach of masses. Meanwhile hybrid solutions are recommended for setting channel of communication and continuous situation analysis to assess health program's impact, acceptability and availability in community.

## Keywords

electronic tools in health care, e-communication in health programs

## Introduction

One of the key recommendations from Committee on the Quality of Health Care in America, Institute of Medicine (IOM), in 1998, was to identify strategies for improving the quality of health care in the United States and information and communication technology (IT) was

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identified as integral intervention in achieving substantial quality improvement [1] and support evidence-based decision making. The committee called for a national commitment to build an information infrastructure to support health care delivery to consumer, research, and imparting health education [1]. In India efforts are being done for IT-infrastructure and its use for health. **Digital tools** are increasingly relied to implement National Health Mission and Stack in India. Currently over four sixty millions internet users make India the 2<sup>nd</sup> largest online market ranked only behind China. Internet penetrations are constantly changing, in urban India it increased from 60.6% in 2016 to 64.8% in 2017. Rural

internet penetration is expected reaching 80% in 2018 while it was 20.62% in December in 2017 [2]. TRAI (*Telecom Regulatory Authority of India*) and research data showed Digital divide and reported urban India with 61.6 internet subscribers per 100 people, while rural India gets just 13.7% [3]. Yawning gap in connectivity are reported as city of Delhi alone boasts 2.2 crore internet connections, the entire north east has just 4.3 lakh, Fatehpur, Jagdalpur and Imphal are on the bottom for connectivity among the list of over 170 cities [4].

Rural urban divide was also shown in census 2011 where out of 455 million urban, 295 million are using the internet, but out of 918 million rural populations, only 186 million use internet [6] Chinn, Menzie D. and Robert W. Fairlie. *ICT Use in the Developing World: An Analysis of Differences in Computer and Internet Penetration*. Official statistics showed 28% of the Indian population using internet [6]. The TRAI reported 36.74 crore (367.48 million) Internet subscribers in September 2016, based on a population count of 127.7 crore, it translates this into 28.77 Internet subscribers per 100 population [7] but it captures the number of Internet connections not the number of households with Internet access. There is a big difference due to “**Double-Counting**”, one family in a metro is likely to own at least five Internet connections per house while there is none in rural/ poor houses. Hence, 36.7 crore Internet subscriptions don't equal 36.7 crore houses connected to the Internet. Census 2011 reported only 2,467 lakh households (3%) with actual Internet. 3% to 28% is a pretty wide range [8]. Issue of **gender difference** (71% Man, 29% women have internet) and slow **speed of internet** in remote areas (47.6 % connection are narrow band) is also there [9]. Hence this survey reported here for the duration 2013-16 (part of baseline under Task force study - Health

Account Scheme)[10] to know the pattern of resources so that outreach can be ensured for “Health for all”.

## Methods

This cross sectional, door-to-door survey was part of baseline situation analysis [11] to explore availability of mediums of electronic communications-Internet, Computer, Phone and Television. After institutional ethical approval, one pre tested in-depth interview of the head of the family in each house at their door step, after verbal explanation and written informed consent was conducted. Information related to education, occupation and income profile was part of demographic profile. A total of 940 houses in Rural (Hardoi, UP), 528 houses in Tribal site - Doimukh, Arunachal Pradesh and 1011 Houses in Slum Delhi, Kalyanpuri were covered. 2479 houses harboring 7484 persons were covered. The period of survey was different at all 3 sites since study was not started simultaneously at all 3 sites. Data was entered in excel sheet analyzed in SPSS version 20. Statistical significance-chi square test and Fisher's exact test of significance is applied for data value less than 5.

## Results

Study assumed a homogenous distribution of electronic mediums among various groups. On running the  $\chi^2$  (Chi-squared test) with level of significance @5%, data is found heterogeneously distributed.

Availability of television, mobile phone was good, Internet connections found beyond the reach of masses. Availability of Internet in Delhi slum dwelling was highest (13.4%) as compared to 0.3% in rural, and 7.8% in tribal area. Logistics for uninterrupted internet supply was not available at all the sites. Table 1 shows distribution pattern for all e-mediums at 3 sites.

**Table 1:** Availability of various e-communication mediums in study sites

Variable	Tribal (Arunachal Pradesh) (AP) N =528, %	Slum- Delhi N=1011, %	Rural- Hardoi N = 940, %	P value
Family Head-Male	221, 41.9	817, 80.8	819, 87.1	0.001* at rural and slum site
Female	307, 58.1	194, 19.2	121, 12.9	
Computer	84, 15.9	86, 8.5	44, 4.7	0.001*
Radio	28, 5.3	31,3.1	26, 2.8	0.05
Television	457, 86.6	897, 88.7	420, 44.7	0.001*
Phone	292,55.3	897, 88.7	653, 60	0.001*
Internet	41, 7.8	135,13.4	3, 0.3	0.001*

\*p<0.05=statistically significant, p < 0.001=highly significant, p>0.05= Not significant

**Table 2:** Prevalence of e-mediums according to family income (Kuppuswamy scale<sup>1</sup>) N %

Family income Rs. Per month	<6297	6298-10495	10496-15705	15706-20991	>20992	Total 100%	P value
<b>Total houses n,%</b>							
Rural	569,60.6	88, 9.4	68, 7.2	56, 6.0	158,16.8	939	
Tribal	75,14.2	129, 24.4	112, 21.2	100, 18.9	112,21.2	528	
Slum	176, 21	276,32.9	161,19.2	486,10.3	140,16.7	839	
<b>Computer</b>							
Rural	5,11.6	4,9.3	4,9.3	3,7.0	27, 62.7	43	0.0*F
Tribal	3, 3.5	11, 13.1	19, 22.6	20, 23.8	31, 36.9	84	0.00
Slum	8, 11.59	13,18.84	12,17.39	9,13.04	27, 39.13	69	F0.0*
<b>Radio set</b>							
Rural	12, 46.1	3,11.5	3,11.5	4,15.3	4, 15.3	26	0.15F
Tribal	8, 28.6	7,25.0	5,17.9	4,14.3	4,14.3	28	0.24F0.
Slum	9,36.0	5,20.0	2,8.0	3,12.0	6,24	25	13F
<b>Television set</b>							
Rural	111, 26.49	56,13.37	56,13.37	52,12.41	144,34.3	419	0.0*
Tribal	53,11.6	104, 22.7	103,22.5	90,19.6	107,23.4	457	0.00*
Slum	144, 19.59	237, 32.2	148, 20.1	75, 10.2	131,17.8	735	0.1
<b>Phone</b>							
Rural	276, 49	62, 11.0	51, 9.1	48, 8.5	126,	563	0.0*
Tribal	27,9.2	66,22.6	75,25.6	63,21.5	22.4	292	0.00*0.
Slum	153, 20.48	243, 32.5	146, 19.5	78, 10.4	61,20.8	747	02*
					27, 17		
<b>Internet</b>							
Rural	nil	nil	nil	nil	3, 100	3	0.03*F
Tribal	3,7.32	5,12.2	11,26.8	8,19.5	14, 34.1	41	0.77 F
Slum	16, 15.53	23, 22.3	17, 16.5	10, 9.7	37, 35.92	103	0.03*

\*p<0.05=statistically significant, p < 0.001=highly significant, p>0.05=Not significant, =Fisher's exact test

**Table 3:** Prevalence of e-mediums as per Education level of Family Head

Education n	Illiterate, N, %	Primary middle N, %	& High school, N, %	Graduate N, %	Post Graduate & above N, %	Total N, 100%	P value
<b>Total n,%</b>							
Rural	42,4.5	265, 28.2	126,13.4	128,13.6	377,40.1	940	
Tribal	70,13.3	154,29.2	180,34.1	97,18.4	27,5.1	528	
Slum	270,26.7	353,34.9	209,20.7	92,9.1	87,8.6	1011	
<b>Computer</b>							
Rural	nil	nil	1, 2.3	3, 6.8	40,90.9	44	0.00*F
Tribal	3,3.6	8,9.5	32,38.1	33,39.3	8,9.5	84	0.0*F
Slum	11,12.8	21,24.4	18,20.9	19,22.1	17,19.8	86	0.00*
<b>Radio set</b>							
Rural	nil	3,11.5	2,7.7	4,15.4	17,65.3	26	01*F
Tribal	7,25.0	7,25	5,17.9	8,28.6	1,3.5	28	0.2F
Slum	5,16.1	8,25.8	11,35.5	5,16.1	2,6.5	31	0.2F
<b>TV set</b>							
Rural	2,0.5	46,10.9	42,10.1	51,12.1	279,66.4	420	0.00*F
Tribal	54,11.8	133,29.1	163,35.7	84,18.4	23,5	457	0.06
Slum	229,25.7	302,33.9	192,21.5	86,9.6	83,9.3	892	0.01*
<b>Phone</b>							
Rural	10,1.8	97,17.2	70,12.4	80,14.2	306,54.3	563	0.00*
Tribal	33,11.3	92,31.5	99,33.9	51,17.5	17,5.8	292	0.42
Slum	231,25.8	308,34.3	190,21.2	85,9.5	83,9.3	897	0.05
<b>Internet</b>							
Rural	nil	nil	nil	nil	3,100	3	0.05F
Tribal	4,9.8	4,9.8	17,41.5	13,31.7	3,7.3	41	0.05F
Slum	20,14.8	40,29.6	35,25.9	19,14.1	21,15.6	135	0.00*

\*p<0.05=statistically significant, p < 0.001=highly significant, p>0.05=Not significant, =Fisher's exact test

**Table 4:** Prevalence of e-mediums as per occupation of Family Head

Occupation	Housewife	Skilled work	Unskilled work	Business	Unemployed	Private service	Government job	Pension	Total	Sig.
Total n, %										
Rural	1,0.1	38,4.0	478,50.9	113,12.0	2,0.2	58,6.2	177,18.8	71,7.6	940	
Tribal	118,12.1	260,26.6	262,26.8	172,17.6	30,3.1	29,3.0	104,10.2	62,0.4	528	
Slum	8,1.5	68,12.9	55,10.4	136,25.8	47,8.9	27,5.1	185,35.0		977	
<b>Computer</b>										
Rural	nil	3,6.8	3,6.8	4,9.1	1,2.3	3,6.8	27,61.4	3,6.8	44	0.00
Tribal	3,3.6	6,7.1	3,3.6	23,27.4	6,7.1	3,3.6	40,47.6	Nil	84	*F0.
Slum	11.5	26,33.3	14,17.9	17,21.8	1,1.3	2,2.6	nil	9,1.5	78	03* F0. 55F
<b>Radio</b>										
Rural	1,3.8	1,3.8	13,50.0	1,3.8	Nil	3,11.5	3,11.5	4,15.4	26	0.00
Tribal	1,3.6	5,17.9	8, 28.6	10,35.7	1,3.6	Nil	3,10.7	Nil	28	*F
Slum	4, 14.3	8, 28.6	8, 28.6	5, 17.9	1, 3.6	1, 3.6	nil	1,3.6	28	0.01 *F 0.98 F
<b>TV set</b>										
Rural		21,5.0	68,16.2	72,17.1	1,2	44,10.5	155,36.9	59,14.0	420	0.0*F
Tribal	7,1.5	59,12.9	44,9.6	114,24.9	40, 8.8	22,4.8	9	2, 4	457	0.37
Slum	104, 12	228,26.4	230,26.6	156,18.1	24, 2.8	28, 3.2	169,37.0	92,10.6	864	0.62
<b>Phone</b>										
Rural	2,0.4	29,5.2	219,38.9	71,12.6	1,2	40,7.1	141,25.	60,10.7	563	0.00
Tribal	5,1.7	35,12.0	20,6.8	65, 22.3	31,10.6	16,5.5	120,41.	92,10.6	292	*F
Slum	100,11.5	233,26.9	232,26.8	158,18.2	25,2.9	24,2.8	1		866	0.00 *F 0.55
<b>Internet</b>										
Rural	nil	Nil	Nil	1,	Nil	1,	1,	Nil	3	
Tribal	1,2.4	3,7.3	2,4.9	33.3	5,12.2	33.3	33.3	Nil	41	0.69
Slum	16, 12.5	39,30.5	22,17.2	12,29.3 31,24.2	4,3.1	1,2.4 2, 1.6	17,41.5 nil	14,10.9	128	F 0.14 F

\*p<0.05=statistically significant, p < 0.001=highly significant, p>0.05=Not significant, =Fisher's exact test

Distribution of electronic mediums in different income groups (Table 2), education (Table 3) and occupation (Table 4) is presented to understand the pattern of availability of e-mediums and demographic profile. Computers, television and phones show significant levels of difference with respect to income whereas radio set and Internet do not follow any such trend and show over all low availability. Availability of phone is higher in middle income group at tribal site.

The availability of internet - 7.8% & radio-5.3% in Arunachal Pradesh was not statistically significantly affected by income (p<0.07). Availability of computer (p<0.0), TV (p <0.0), phones (p<0.0) was affected by income significantly. 2-3% information of education and occupation was not available.

At Tribal site, Internet and computer showed increasing availability with increasing education. Radio sets were

more prevalent among less educated groups. The distribution of modes of e communications, namely computers, radio, television, telephone, internet all show great level of heterogeneity across the sites with Delhi slum showing highest availability across all mediums and rural area showing least.

At slum site in Delhi where mobile (88.7%) and internet availability (13.4%) was good enough, the people were given the password and user-id for online updating of health status, however only 38 out of 1011 houses opted for online entry option.

## Discussion

Internet users rose from 0.7% in 2001 to 2.8 % in 2006, 7.5% in 2010, 18% in 2014, 27% in 2015, 34.8% in 2016, [1] still developing countries user's share is only 8% [13]. When compared to China with 0.7% internet users in

1999 rising to world's 2nd largest user in 2009, just within 10 Years. India too has potential [2] however said to be marred by four major hurdles:

- 1) **illiteracy, poverty and unemployment** [3,4].
- 2) **Infrastructure**-routers, fiber optic links, public Wi-Fi spots,
- 3) **Speed**-South Korea tops with speed 26.7 Megabits per Second ( MBPS), Japan 17.4 MBPS, India is at 2.8 MBPS & 48% users on narrowband, download speeds below 512 kilobits per second (kbps)<sup>55</sup> Number of Smartphone users in India 2015-2022. Statistic. Available at <https://www.statista.com/statistics/467163/forecast-of-smartphone-users-in-india/>,
- 4) **Affordability** - average Global System for Mobile (GSM) subscribers barely can afford spending of Rs. 28 per month on mobile data, 50% are still on 2G<sup>31</sup>. 82% low-income people don't use Internet; 56% of households have no Internet users [6]. With good quality smart phones below Rs.2,700, JioPhone's launched by Reliance in 2016 these factors may have improved and require updating.

There is also a need to assess user's acceptability for e-health programs as it has been reported low in past i.e. Mother and Child Tracking System (MCTS) found 6% acceptability [7].

In this paper, only 38 (3.8%) houses opted for online entry in urban slum site. In view of hybrid heterogeneous availability of resources, hybrid solutions are required to establish channel of communication with community.

### Combination is the key?

Combination of television, radio, social media, and print channel have been shown effective rather than one single medium [8]. In view of existing digital divide this paper suggests to use logistically feasible, available tools like personal health diary as medium to connect with one & all. Current Bharatnet project is digitally connecting 2.5 lakh Gram Panchayats, however Health Diary may give opportunity improving human links too.

### Conclusion

Despite surge of availability of electronic mediums, remote rural and tribal areas are still not having complete access. In view of existing digital divide improved infrastructure, continuous situation analysis, hybrid solutions are warranted to connect with people for health care.

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