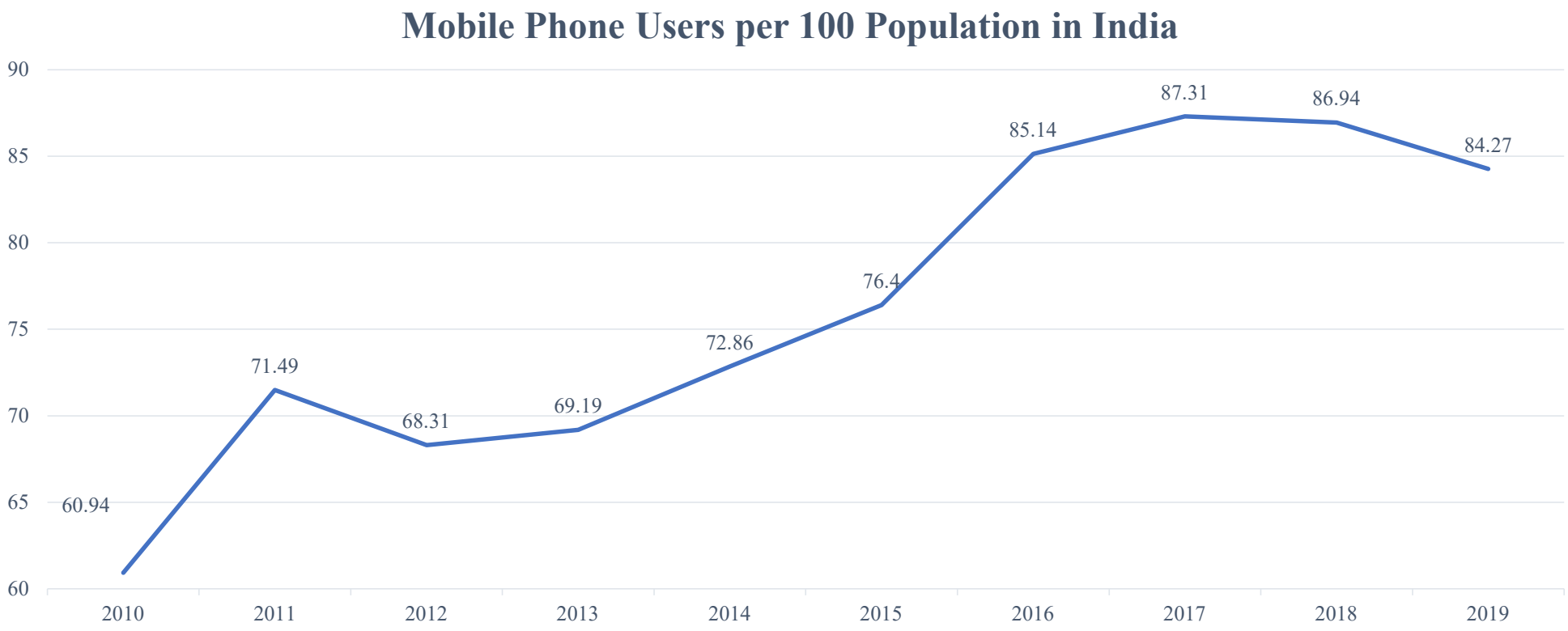
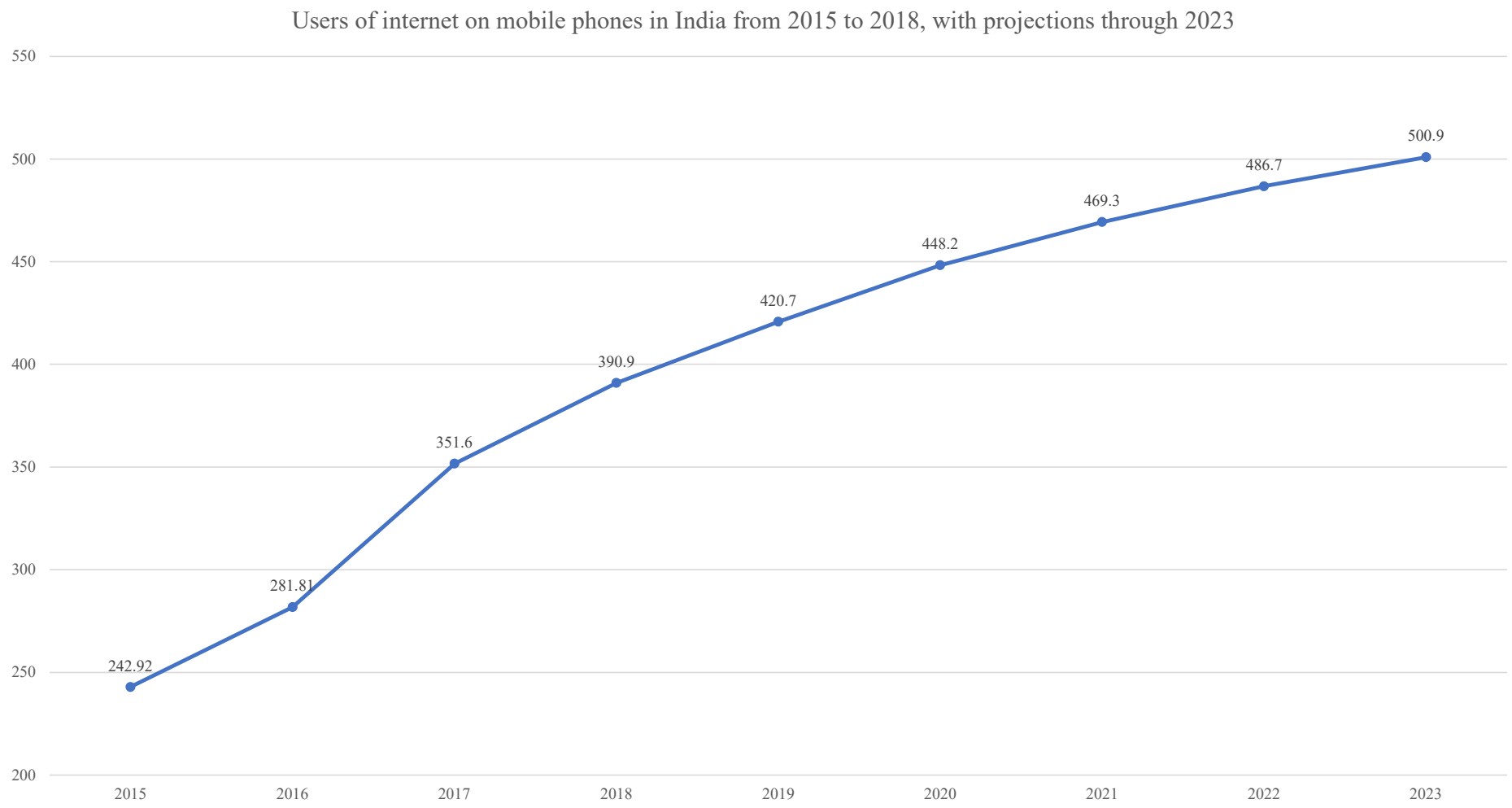
Knowledge, attitude and use of mHealth technology among students aged 18 and above in India: A Cross Sectional Study

INTRODUCTION

- mHealth has been recognized by WHO as an effective public health tool. It defines mHealth to be “medical and public health practice supported by mobile devices, such as cell phones, patient monitoring devices, personal digital assistants, and other wireless devices
- There are over 8.2 billion wireless subscribers (WHO, 2021) with about 4.6 that is around 60% of world population, have access to the Internet.
- 92.6 percent access internet through their Cell Phones.
- With 1.15 billion cell phone customers, India is the world's second largest cell phone market, after China’s which has 1.47 billion cell phone users.
- As of December 2020, India has approximately 75 Crore wireless data subscribers, out of which 72.6 Crore i.e., 96.5 percent have access to high-speed mobile broadband internet (TRAI, 2021)


Mobile Phone Users per 100 Population in India
90
85
80
75
70
65
60
60.94
71.49
68.31
69.19
72.86
76.4
85.14
87.31
86.94
84.27
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Users of internet on mobile phones in India from 2015 to 2018, with projections through 2023
550
500
450
400
350
300
250
200
242.92
281.81
351.6
390.9
420.7
448.2
469.3
486.7
500.9
2015
2016
2017
2018
2019
2020
2021
2022
2023

INTRODUCTION

In 2010, 61 persons among every 100 persons were having a mobile phone, which has increased to 87.37 persons among every 100 persons in 2020.

With increased cell phone users, the use of Internet through mobile has also grown leaps and bound in India. There are more than 450 million mobile internet users currently in India.

The number was just around 90 million a decade ago. With so many Internet users in India, it comes as an opportunity for Public Health professionals as they can use this in various ways in solving public health issues.

The growth can be largely attributed to cheap Internet and free voice calls introduced by Jio in the market.

Around 35 per cent of the Indian Internet user base was between 20 to 29 years of age, the highest among all age groups (Diwanji, 2020b)

Though with increasing cell phone subscribers increased internet usage, particularly in the age group 20-29 , there is not much literature and data available suggesting that how do people use Cell Phone for seeking health related information

BROAD OBJECTIVE

The study's objective is to assess the present level of knowledge, attitude, and use of mHealth technology among students aged 18 and above in India.

SPECIFIC OBJECTIVES:

- To assess the current usage of mobile for mHealth services/ mHealth apps among students, for seeking health information and health services.
- To assess current level of knowledge regarding various mHealth related apps
- To evaluate attitude regarding usage of mHealth apps.
- To assess challenges faced by end user in using mobile phones for using mHealth services /mHealth apps.

REVIEW OF LITERATURE

In study titled Mobile Phone Usage and Willingness to Receive Health-Related Information Among Patients Attending a Chronic Disease Clinic in Rural Puducherry, India by Ramachandran et al., 2015. Findings of the author were as follows:

- 108 (38%) patients were found to have personal mobile phone whereas for 124 (43.5%), their family members possessed cell phones.171 (60%) of the patients reported their willingness to receive health information through their Mobile Phones.
- Out of 171 patients, 90 patients (52.6%) of the patients responded that they prefer voice calls; 72 (42%) of them said that they prefer SMS, and only 9 (5%) said that they were okay with both the options; 160 (93.6%) patients said that they want health tip to be in local language.
- The three most common topics of interest were Dietary Habits (38.6%), lifestyle modification (25.2%), and proper use of medication (21.6%).
- Lower age group, Male gender, work level and formal education, are all factors that were found to be associate with mHealth use in bivariate regression analysis.
- In a multivariate analysis, it was discovered that having a personal mobile phone and having a mobile phone with a family member were both independently linked with

REVIEW OF LITERATURE

In study titled Using mHealth to enhance TB referrals in a tribal district of India by Chadha, Trivedi, Nagaraja and Sagili, 2017. Findings of the authors were as follows:

- Out of the 171-total trained RHCP, 30 were trained on mobile application.
- RHCP trained on ComCare referred 35 patients, whereas there were only 4 referrals by RHCP not trained on Mobile Application
- mHealth technology was found to be highly effective and it helped increase accountability and effectiveness of both private as well as public RHCPs.

REVIEW OF LITERATURE

In study Knowledge, attitudes, and intention regarding mHealth in generation Y: evidence from a population based cross sectional study in Chakaria, Bangladesh by Rahman et al., 2017. Findings of the author were as follows:

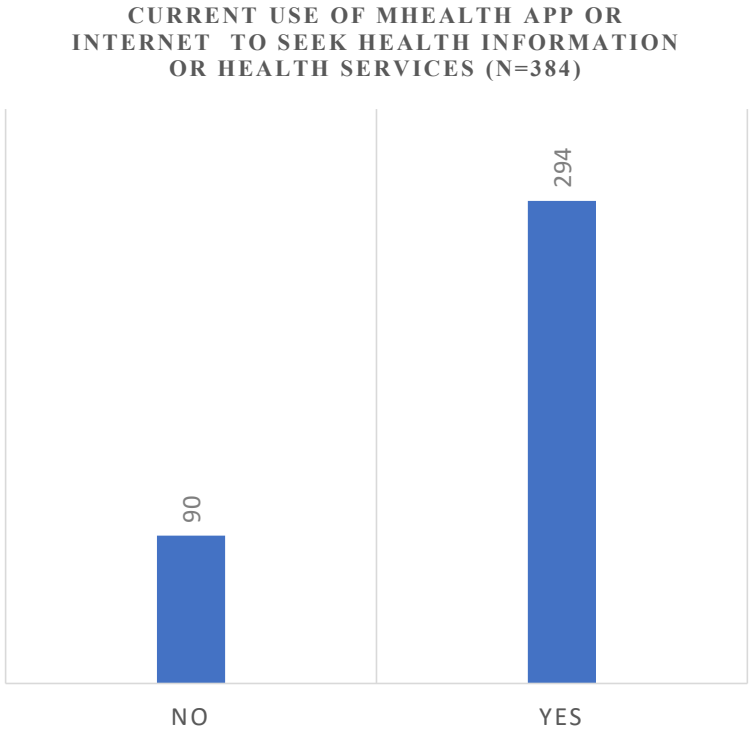
- Gen Y was found to have greater access to Cell Phones, and they had better knowledge regarding use of Mobile for accessing healthcare services.
- Gen Y also had significantly higher knowledge about mHealth services as compared to older counterparts
- Authors concluded that there is huge potential for mHealth services among younger population.

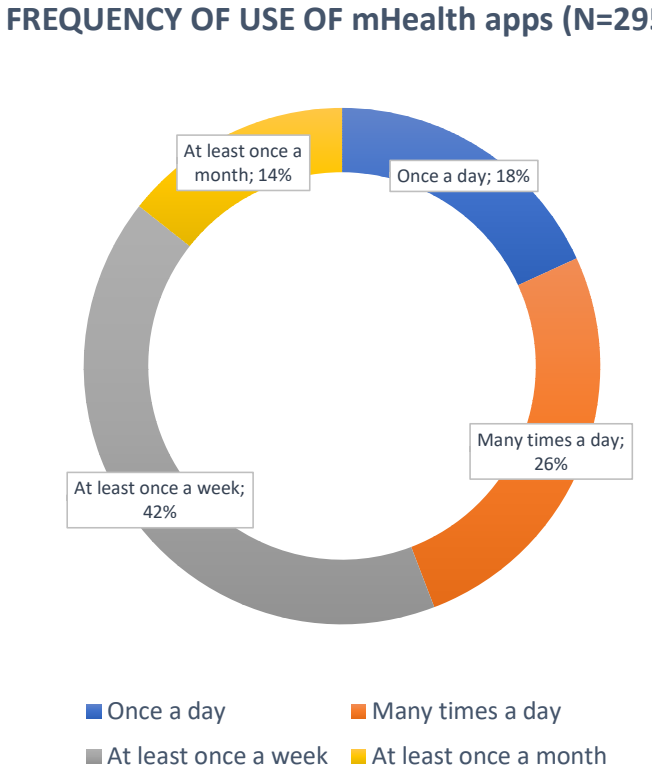
RESEARCH METHODOLOGY

Research Question	**What is the level of current usage, existing knowledge, attitude, and barriers faced, by students aged 18 and above regarding use of mobile for mHealth applications or seeking health information through Internet in India?**
Study Design	Cross Sectional Study
Study Setting	India
Study Duration	22nd March to 19th June 2021
Inclusion Criteria	Any student above 18 years of Age having smartphone and willing to be part of the study.
Sample Size Calculation	$n = Z^2_{1-\alpha/2}\ p\ (1-p)/\ d^2$ {*where (p = 50% =0.5, α = 0.05, d = 5%)*} $n = 1.96^2 * 0.5\ (1-0.5)/0.05^2$ $n = 384$
Sampling Technique	Convenience Sampling
Data Type	Primary Data
Study Tool	Online Survey Form designed on SurveyMonkey
Data Collection Method	A semi structured Questionnaire was sent through WhatsApp and Email to 118 friends/peers and they were then requested to forward it to at least 5 of their friends or cousins who are student as well as above 18 years of age. After regular follow up and reminders, was able to collect desired 384 responses.

FINDINGS OF THE STUDY

CURRENT USE OF mHEALTH





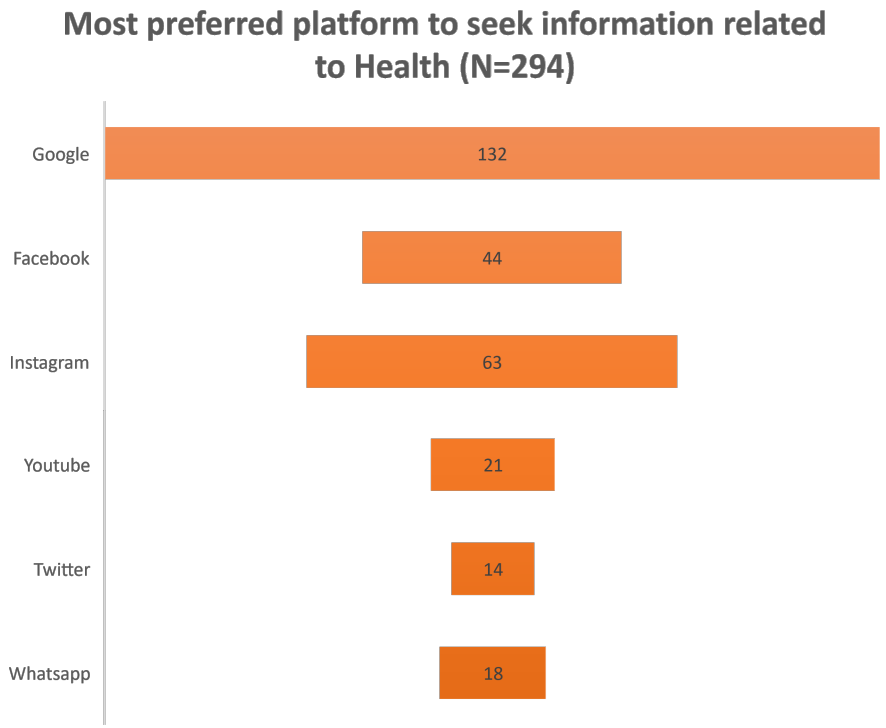
CURRENT USE OF mHEALTH

Variable	Responses	Knowledge of use of mHealth technology or internet for Health-Related Information			p-value
		Yes	No	Total	
		N (%)	N (%)	N (%)	
Gender	Male	118 (80.2%)	29 (19.8%)	147	0.216
	Female	177 (74.6%)	60 (25.4%)	237	
	Total	295 (100%)	89 (100%)	384 (100%)	
Age	18-21 Years	97 (33.6%)	32 (36.0%)	129 (33.6%)	0.596
	22-25 Years	164 (55.6%)	50 (56.2%)	214 (55.7%)	
	26 & Above	34 (11.5%)	7 (7.9%)	41 (10.7%)	
	Total	89 (100.0%)	295 (100.0%)	384 (100%)	

*statistically significant at $p<0.05$

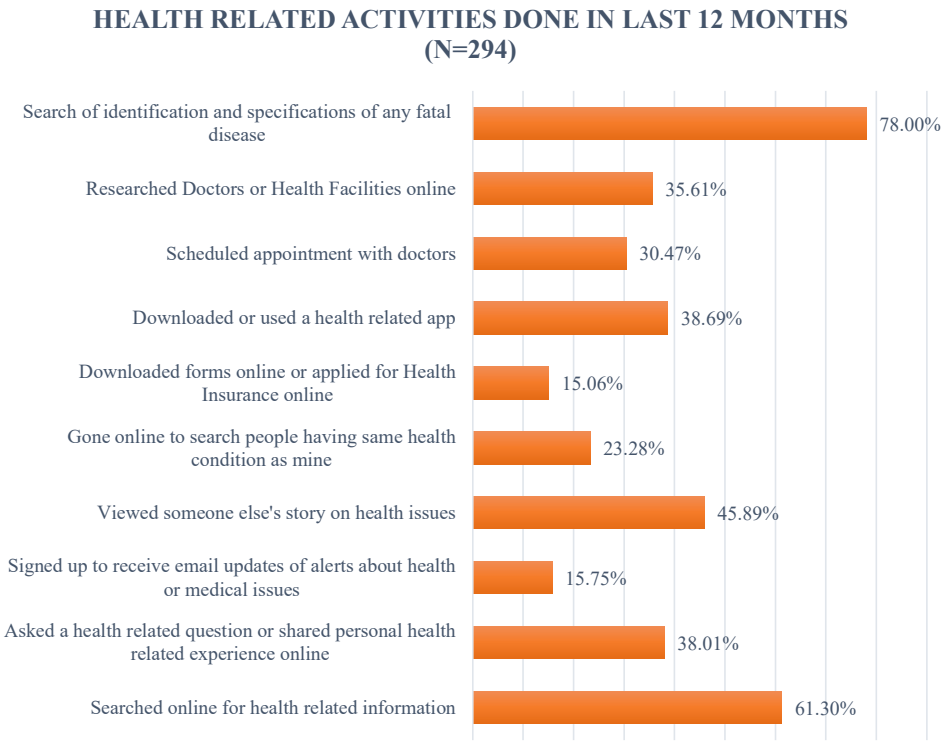
- Bivariate Analysis was done on student's knowledge on the Knowledge of use of mHealth technology or internet for accessing Health-Related Information with regards to age and gender.
- The overall knowledge about mHealth technology was high as 384,76.8 percent students have knowledge about use of mHealth Technology. Male Students (118, 80.2%) were more aware than females (177, 74.6%) regarding use of mHealth technology.
- The knowledge about mHealth was highest in 22-25 years Age Group (164, 55.6%) compared to 18-21 (97 33.6%) years and 26 (34, 11.5%) & Above years Age group. Though the result didn't reach significance level.

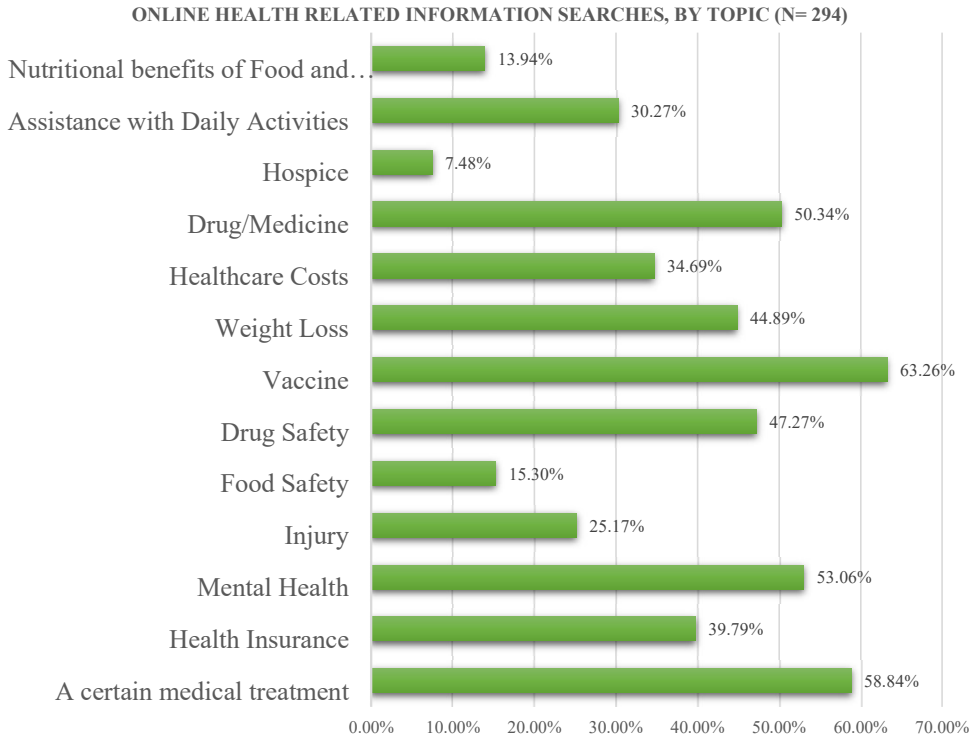
CURRENT USE OF mHEALTH



- Google is the most used platform for health-related information (132, 44.7%)
- Followed by Instagram (72, 24.4%) and Facebook (44, 14.9%). Some other commonly used online platform for health-related information is (17, 5.8%)
- YouTube (15, 5.1%) and Twitter (14, 4.7%).
- There was no significant difference among Males and Females and their choice of Online Platform for online Health Information search.

CURRENT USE OF mHEALTH





PATTERN OF mHEALTH USE BY GENDER AND AGE

Variable	Responses	Gender			
		Male	Female	Total (n= 384)	p- value
Use of mHealth or Internet to seek Health Information	No	29 (19.7%)	60 (25.3%)	89 (23%)	0.216
	Yes	118 (80.3%)	177 (74.7%)	295 (77%)	
		Male n = 118	Female n= 177	Total (n =295)	
Frequency of use of mHealth	Once a day	7 (5.9%)	11 (6.2%)	18 (6.1%)	0.868
	Many times, a day	27 (22.9%)	48 (27.1%)	75 (25.4%)	
	At least once a week	51 (42.1%)	70 (39.5%)	121 (41%)	
	At least once a month	33 (28.0%)	48 (27.1%)	81 (27.5%)	
Health Topic Searched on Internet in last 12 month	About a specific disease	70 (59.3%)	90 (50.8%)	160 (54.2%)	0.189
	Vaccine	82 (69.5%)	105 (59.3%)	187 (63.4%)	0.085
	Weight Loss	62 (52.5%)	76 (42.9%)	138 (46.8%)	0.022*
	Drug/Medicine	61 (51.7%)	74 (41.8%)	135 (45.8%)	0.121
Technology Currently using for Health Management Activities other than mHealth apps	Medical Devices	69 (58.5%)	90 (56.6%)	159 (53.9%)	0.233
	Health Related Website	33 (28.0%)	36 (20.3%)	69 (23.4%)	0.160
	Social Media Applications	51 (43.2%)	62 (21.0%)	113 (38.3%)	0.179
Most preferred Online Platform for information related to Health	Facebook	16 (13.6%)	28 (15.8%)	44 (14.9%)	0.850
	Google	53 (44.9%)	79 (44.6%)	132 (44.7%)	
	Instagram	32 (44.4%)	40 (22.6%)	72 (24.4%)	
	Twitter	5 (4.2%)	9 (5.1%)	14 (4.7%)	
	WhatsApp	8 (6.8%)	9 (5.1%)	17 (5.8%)	
	YouTube	4 (3.4%)	11 (6.2%)	15 (5.1%)	
*statistically significant at $p < 0.05$					

- Males (118, 80.3%) use mHealth technology more than Females 177 (74.7%).
- The frequency of use is similar among Males and Females. The most searched Health Topic online was Vaccine (187, 63.3%) ($p = 0.022$), followed by search for a specific disease (160, 54.2%) and Weight Loss (138, 46.8%) which was found to statistically significant with Gender.
- Medical Devices are the most used technology for Health Management Activities and is used more by Males (69, 58.5%) as compared to Females (90, 56.6%).
- Male (51, 43.2%) tend to use Social Media Applications more than Females (62, 21.0%) for obtaining Health Related Information.

ATTITUDE TOWARDS mHEALTH APPLICATIONS

Variable	Responses	Male (29,32.6%)	Female (60,67.4%)	Total 89	p- value
I don't use any mHealth Technology because I am concerned about my privacy	Completely Agree	2 (6.9%)	13 (21.7%)	15 (16.9%)	0.429
	Somewhat Agree	9 (31.0%)	20 (33.3%)	29 (32.6%)	
	Neutral	6 (27.0%)	8 (15.0%)	15 (16.9%)	
	Somewhat Disagree	4 (13.8%)	6 (10%)	10 (11.2%)	
	Completely Disagree	8 (27.6%)	12 (20%)	20 (22.5%)	
I don't use any mHealth technology because I am concerned that what others might do with my data	Completely Agree	7 (24.1%)	12 (20%)	19 (21.3%)	0.754
	Somewhat Agree	10 (34.5%)	25 (41.7%)	35 (39.3%)	
	Neutral	3 (10.3%)	4 (6.7%)	7 (7.9%)	
	Somewhat Disagree	4 (13.8%)	6 (10%)	10 (11.2%)	
	Completely Disagree	6 (20.7%)	14 (23.3%)	20 (22.5%)	
I don't want to put any information online that may personally identify me	Completely Agree	9 (31.0%)	12 (20%)	21 (23.6%)	0.312
	Somewhat Agree	10 (36.7%)	22 (36.7%)	29 (32.6%)	
	Neutral	4 (13.8%)	3 (5.0%)	7 (7.9%)	
	Somewhat Disagree	1 (3.4%)	5 (8.3%)	6 (6.7%)	
	Completely Disagree	5 (17.2%)	18 (30%)	23 (25.8%)	
	*statistically significant at $p < 0.05$				

- Bivariate Analysis was done with respect to Gender, and it was found that both Males and Females (44, 49.5%) were in concerned about the Privacy and it is one of the reasons that they don't use any mHealth apps currently.
- The students were also concerned about the fact that what others may do with their data (54,60.6%), and they are also concerned to put any data or information online that may personally identify them (50, 56.2%).
- Females (53, 55%) are more concerned about their privacy than Males (11, 37.9%).
- Whereas Males (19, 67.7%) are privier about putting any information online that may personally identify them, than Females (34, 56.7%).

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- The students were also concerned about the fact that what others may do with their data (54,60.6%), and they are also concerned to put any data or information online that may personally identify them (50, 56.2%).
- Females (53, 55%) are more concerned about their privacy than Males (11, 37.9%).
- Whereas Males (19, 67.7%) are privier about putting any information online that may personally identify them, than Females (34, 56.7%).

ATTITUDE TOWARDS mHEALTH APPLICATIONS

Variable								
	Gender	Completely Agree	Somewhat Agree	Neutral	Somewhat Disagree	Completely Disagree	Total	p-value
I think my mHealth apps have adequate data protection measures and my data is safe with them	Male	21	35	12	23	27	118	0.252
		17.7%	29.6%	10.1%	19.4%	22.8%		
	Female	29	74	13	24	37	177	
		16.3%	41.8%	7.3%	13.4%	20.9%		
I will be okay if my Healthcare Providers use my mHealth app data	Male	12	69	23	23	50	118	0.065
		11.0%	58.4%	19.4%	19.4%	21.2%		
	Female	13	61	8	11	25	177	
		7.3%	34.4%	4.5%	6.2%	14.1%		
I think using mHealth technology is convenient	Male	30	35	11	9	7	118	0.362
		25.4%	29.7%	9.3%	7.6%	4.0%		
	Female	51	40	19	7	60	177	
		28.8%	22.6%	10.7%	4.0%	33.9%		
	*statistically significant at $p < 0.05$							

- Bivariate Analysis was done with respect to Gender and it was found that more Females (103, 58.1%) than Males (56, 47%) are in the opinion that their information is safe with their mHealth.
- Males (81, 68%) are agreeing more to share their data with their healthcare providers than Females (74, 41%).
- When asked about convenience to use mHealth technology Males (65, 55.1%) find it more convenient than females (91, 51.4%).

BARRIERS FACED IN USING mHEALTH APPLICATIONS

- The students currently not using any kind of mHealth Technology were asked about the reasons which led them to not use an mHealth technology. Bivariate Analysis was done with respect to Gender and Age, and it is presented.
- It is found that Lack of understanding of benefits of mHealth is the most common reason of not using any mHealth technology. It was seen in both Males (15, 51.7%) and Females (53.3%).
- Price was another big factor that inhibits students from using mHealth applications as both Males (18,62%) and Females have shown apprehension regarding that.
- Privacy is also another major factor, and females 42 (70%) are more concerned about their Privacy as compared to Males (15, 51.7%). Another factor includes Credibility, Internet Issues, and Lack of scientific evidence.

DISCUSSION

- The overall usage of mHealth was found to be high as more than 76 % respondents are currently using or have recently used any kind of mHealth technology. Among Male 118 (80.3%) and Female (177, 74.7%) respondents there was no statistically significant difference found in use and knowledge, which is indeed good sign., but it is quite different to studies earlier done in Ghana (Peprah et al., 2019) and Bangladesh (Rahman et al., 2017).
- The research respondents' ideal knowledge and awareness of the use of mHealth also correlates to its optimal use, as more than 72 % of the students who used mHealth use it on a regular basis used, that is almost half of them only use it once a month. This is quite opposite to a study done among University students in Ghana (Peprah et al., 2019).
- Though this current study doesn't focus on this issue, but it was found that there was a high search frequency regarding Vaccine among respondents, and it was even found statistically significant with Age of the respondents.
- In a previous study done in India regarding mHealth in Puducherry, India (Ramachandran et al., 2015), three most common topics of interest were Dietary Habits (38.6%), lifestyle modification (25.2%), and proper use of medication (21.6%) In this study among students' similar results were found as Weight loss (44.89%), Drug/Medicine (50.34%), Nutritional Benefits of Food and Nutraceuticals (13.94 %) were found to be the most common topic of Interest.

DISCUSSION

- Significant difficulties with students' attitudes toward and perceptions of mHealth were discovered. Students have assessed mHealth services and can grade their efficacy, convenience, safety, and information sharing capability, according to the research.
- Students who currently use mHealth, find it to be a convenient option for getting healthcare information, they are ready to share their information with their healthcare providers and they are relieved that their data is safe with their mHealth application providers according to the research.
- Privacy was found to be the main barrier towards not using mHealth applications among the students who do not currently use any mHealth application.
- Findings of this study can help programmers and implementers develop future mHealth policies to enhance mHealth Knowledge and Use. It can also be suitable to launch mHealth programmes that can reach and be used by students.

LIMITATIONS OF THE STUDY

- This study has certain limitations, such as its use of a cross-sectional survey methodology among college going students. Different circumstances may exist outside of the academic community, such as higher access and knowledge of mHealth technology.
- The other drawback is that the findings may be vulnerable to response bias and social desirability bias because they were obtained from respondents' self-reports of mobile health.

CONCLUSION

- In conclusion this study shows that mHealth knowledge is widespread among college students and that it does not differ between boys and females.
- The survey discovered a significant frequency of mHealth use among Indian college students. The use of mHealth to search for Vaccine, Weight Loss and Mental Health suggests that adult students require more information regarding these topics.
- The general attitude and perception regarding mHealth is good among the respondents who use mHealth apps currently but the apprehensions regarding the privacy of their information and data is still there, and it is also becoming a barrier to its use in many cases.
- More studies are needed to be done in this area to find more evidence regarding correlation of Sociodemographic factors and use of mHealth applications.

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THANK YOU