A COMPARISON STUDY OF COVID-19 IMPACT ON SMARTPHONE USAGE BEHAVIOR

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled **"A comparison study of Covid-19 impact on smartphone usage behavior"**, submitted by Md. Shohanur Rahman, ID No: 171-15-8775 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 3rd June 2021.

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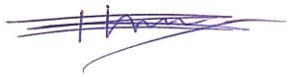

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DECLARATION

I hereby declare that, this research has been done by me under the supervision of **Mr. Asif Uz Zaman Asif, Department of CSE** Daffodil International University. I also declare that, neither this research nor any part of this research has been submitted elsewhere for award of any degree or diploma.

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Finally, I must acknowledge with due respect the constant support and patients of my parents.

ABSTRACT

Smartphone has been an integral part of our daily life. Modern life has become much easier with its presence. The usage has varied with the pace of time. But, as covid-19 struck, which made the most dramatic shift in almost every aspect of life, had its direct effect on smartphone usage too. Revealing this effect in a profound manner is the main theme of this research. Which hasn't been done yet, particularly from the perspective of Bangladesh. This research can help to identify the usage behavior of people during a global pandemic like covid-19. In association with that, it can also be used to generate a pattern by collecting a huge number of data sets. Which can accurately predict people's smartphone usage in a pandemic like this. It can also be helpful for the Market researcher as well. The network & app-related data & behavior can also be used by mobile operators to read customers more based on their age, place & occupation. Consequently, It can be helpful for them to deliver more timely & accurate promotional offers.

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CHAPTER 1
INTRODUCTION

1.1 Introduction of The Research

The outbreak of the Covid-19 pandemic has been a major health concern all over the world. As required by the nature of this virus atypical measures like the shutdown of the public institution, travel restriction & non-emergency trading ban were imposed from time to time. These were implied just to maintain the social distancing and restraining the spread of the virus. This social isolation also made people alter the usage behavior of their smartphones.

In this research, the changes that took place in smartphone usage behavior are going to be demonstrated. The reference point to this change would be the usage behavior prior to the covid-19 pandemic. These changes are to be presented in a depth manner. Changes include screen time, data usage, network speed, most used category of apps, etc. These are also to be evaluated considering independent variables which can drastically alter the usage behavior. Along with this, other behavioral changes relating to smartphone usage are also to be analyzed.

This would be HCI-based quantitative research, which would express how people changed their most intimate digital device's usage behavior.

1.2 Motivation for This Research

Smartphone usage behavior has been associated with a large number of factors of this contemporary society. It's not just a slab of glass which use case has been confined to revolutionizing communication only. But, it has also put its effect on various factors like our economy, education, entertainment, self-expression, psychology, etc. The usage behavior of this particular device has changed vastly over the past decade. Leveraging this, we have seen a significant change amidst the covid-19 pandemic.

There has been a lack of profound research based on this very topic. The research which has already been done are mostly expressing only raw data and very few consequences relating to it. This research will cover that very gap. It would use raw

data given by authentic smartphone users and rely on that many co-relations shall be established.

Covid-19 has shifted the world in an unusual direction. It has forced us to change our lives tremendously. As social beings we like to communicate, but, maintaining social distancing was an obligation for us amidst the Covid-19 pandemic. So, for maintaining our social interaction smartphone was our leading medium. As a result of this, the rise of smartphone usage was inevitable.

The initial motivation was my own curiosity on this evident change. I wanted to provide a profound view on this very change. Where, it would be demonstrated how distinct variables like age, place altered the usage behavior. I wanted to check if there were any significant data or screen time surge during this pandemic & if it had any effect on the network connection and speed. I also wanted to identify if any particular group of apps were used mostly or any new groups were installed or not.
I also wanted to inspect if the usage had any effect on people's mental health & also if there had any sleep issues interconnection with smartphone usage. As this is a data driven research, I wanted to make sure these data comparisons can be used by related fields like mobile operators to provide more personalized offers. Which would serve both the customer and the operator itself. Moreover, the app categorization usage data can help in advertising.

1.3 Rationale of The Study

This HCI-based study was done as an attempt to analyze the way people used their smartphones in the course of the covid-19 pandemic. Demonstrating one of the biggest changes that took place in our usage of smartphones, the usage prior to this covid-19 pandemic was used as a reference point.
Along with this very change, the effect it had on various issues was covered up by analyzing some behavioral data provided by the participants. Besides, the part that would be played by different variables like age & place was also perceived. Ultimately, the goal is to showcase smartphone usage behavioral alteration before and after this covid-19 pandemic.

1.4 Research Questions

This research raise and attempt to solve these following questions:

• How much data usage was differed?

• Did the screen time was adjusted?

• Which category of apps were used mostly?

• Were any new category of apps were installed newly on the very basis of this pandemic?

• Was there any effect on network & internet speed?

• How differently village & urban people used their smartphone?

• Did age played any role in terms of the way people use their smartphone?

• Is there any association to mental health with different age groups smartphone screen time?

• Had there been any interconnection with sleep issues and smartphone usage?

1.5 Expected Outcome

This research was conducted to get some insight on smartphone behavior in association with covid-19. The outcomes which are expected in context with this research are noted down.

• The Data surge that took place during the covid-19 pandemic is much more likely to cause negative effects on internet speed.

• Urban users mostly use broadband/wifi networks & consequently they will an unambiguous upturn in terms of screen time & data consumption rate.

On the other hand, villagers tend to use the mobile network more & their screen time & data consumption is much less than their counterparts.

• Due to the flourishing of the "Work from home" culture there's more likely to have a significant rise regarding installation & screen time of office-based communication tools & distance learning apps.

• As a part of maintaining social distancing, participants should show a greater interest in using more communication apps thus increasing their installation & screen time.

• For the purpose of eradicating monotonous life & boredom people are much more prone to spend a greater amount of time on entertainment streaming apps compared

to pre-covid-19 era.

• To maintain social distancing a greater rise in online shopping is expected thus increasing their installation specially for urban participants.

• For the lessening of outdoor activities, exercise & health apps should make more appearance in people's smartphone.

• As a social being, people are much more likely to prefer a direct face-to-face working environment than functioning online.

• Participants who are teenagers & in their early twenties tends to spend more time on their smartphone & prone to show negative response in terns if mental health.

• People are much more likely to face sleep issues & consequences relating to it amidst covid-19 due to the high smartphone usage.

1.6 Report Layout

Chapter 1: This contains the introduction of my research work, which includes, the introduction of the research, motivation, rationale of the study, research questions, expected outcome & report layout.

Chapter 2: In this chapter, I discussed the background studies of my research that includes, the background studies itself, literature review, the Scope of the problem, & challenges.

Chapter 3: Here I talk over the research methodology which comprises, research subject & instrumentation, data collection procedure, statistical analysis & the proposed methodology

Chapter 4: This chapter has experimental results and discussion which are general survey findings.

Chapter 5: It incorporates experimental results and discussion from the survey findings on the basis of variables & mental health scenarios with regards to smartphone usage during the covid-19 pandemic.

Chapter 6: This final chapter cover the summary, conclusion, recommendation & implication for future research.

CHAPTER 2
BACKGROUND STUDIES

2.1 Background Studies

Pandemic has shifted the world in a new direction, a smartphone which has been a fundamental part of our modern-day life has also seen a change in its usage behavior. Revealing this tremendous change was the main theme of this research.

This change is seen in many aspects of smartphone usage behavior. From data usage, speed, screen time, particular groups of apps usage, and in consequence users' mental & physical well-being was also to be changed. This research addresses these aspects in a comparison manner by using the data from participants based on before the Covid-19 pandemic. During this pandemic, as a part of maintaining social distancing, many apps were needed more, or newly installed. This research contemplates that issue.

2.2 Literature Review

The covid-19 pandemic has been a hot topic in recent research areas. Tons of research are being conducted & consequently, numerous papers are being published. Smartphone usage-related research in association with the covid-19 pandemic is also being conducted from the very beginning of lockdown in March 2020. This research has covered straight-out smartphone usage and also mental/physical consequences related to it.

The most profound research on this very topic was done by UK's official communication regulator Ofcom[1]. This research was at the initial lockdown period in 2020 based on the United Kingdom. It showed how network data was shared based on different place, network type, operators & their reliability of performance.

Smartphone apps also address how physical activity was lessened during the

lockdown period [2]. But, it was done on people who were already unstable.

Santiago Tejedor, Laura Cervi, Ana Pérez-Escoda, Fernanda Tusa, did a study based on three countries student where they compared their smartphone usage during this COVID-19 pandemic[3]. In this study their number of participants were pretty low.

Borja Sañudo, Curtis Fennell, Antonio J. Sánchez-Oliver assessed physical activity, sedentary behavior, smartphone use, and sleep patterns during-COVID-19 quarantine in young adults from Spain[4].This study was done considering before and after Covid-19 situation, so their research is dense.

Tong Li,Mingyang Zhang; Yong Li,Eemil Lagerspetz, Sasu Tarkoma, Pan Hui conducted the study titled "The Impact of Covid-19 on Smartphone Usage" where they addressed the resource utilization stats on a smartphone during this pandemic[5].

Jon D.Elhai, HaiboYanga, Dean McKay, Gordon J.G. Asmundsone wrote a paper on "COVID-19 anxiety symptoms associated with problematic smartphone use severity in Chinese adults", where they tested and found covid-19 anxiety didn't predict PSU severity[6].

Herbert Wanga, Thobius Joseph,Mauna Belius Chuma, reported how Social Distancing was easier with the role of Smartphone during COVID–19[7].

Meredith E. David and James A. Roberts paper "Smartphone Use during the COVID-19 Pandemic: Social Versus Physical Distancing" finds that the covid-19 social distancing emotional complexity was moderated with the usage of smartphone. Before this pandemic the smartphone was a barrier for social connection but amidst this pandemic it has fostered social connection [8].

2.3 Scope of the problem

There has been some research on this very topic but, none of them are based on the context of Bangladesh. Going through related research it was understandable that none of them did comprehensive research addressing the prominent changes. Also, the category apps which were mostly used weren't determined by direct time range. So, this research going to ensure that these matters are well aggregated. Also, an in-depth look will also be performed based on some variables like age & place. Alongside, these mental health aspects based on smartphone usage are also to be addressed in this research.

2.4 Challenges

Conducting this research was a bit challenging as these data were very personal for the participants. In fact, many participants tried to communicate with me after I sent them the survey. They wanted to participate but, wanted to remain anonymous. They even suggested removing some sections as it was too personal for them. Few people didn't even participate as they didn't want to share their personal data.

So, finding enough participants who were willing to give this data was a bit challenging. Also, finding variety in terms of profession and variety was another challenge too. I wanted this study to be as authentic as possible. Alongside this, I had to conduct the survey in the Bengali language for a better understanding of the participants, so, I had to rewrite these data in English. And normalizing these data was a time-consuming and big challenge too.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Subject & Instrumentation

The research subject of this study was educated individuals based in Bangladesh. Both males & females participated in the study. The individuals belong to both Urban & Village are. The age group starts from 13 years and goes above 40. Most of the participants were young adults. These participants were from different professions, but the majority of them were students. They participated in the research voluntarily. No email was collected and putting their name was made optional. Any participants could put their data anonymously. Almost half of the participants didn't put their names & some of them even put emoji.

Among the instrumentation, a questionnaire was prepared for the participants including relevant questions.

3.2 Data Collection Procedure

Data collection is a fundamental part of quantitative research. This being quantitative research, the collection of authentic & appropriate data was an obligation. For getting such data, I organized a survey through the use of Google Forms. The questionnaire was prepared considering the objective of this research. Enough time was taken to choose the questions. Only significant ones were taken and others were ditched to save time for the participants. Finally, 33 questions were selected in 3 separate sections. Which, eventually made the participants feel engaged. After the data collection for over a week, the data was then fetched into Google sheets for the purpose of analysis. Where the data was then rearranged & normalized in accordance with the goal of this research. In the end, relevant graphs were generated.

3.3 Statistical Analysis

In the HCI questionnaires survey, 201 people participated. Both males and females participated in the Survey. Among them 72.1% were male & 27.9% were female.

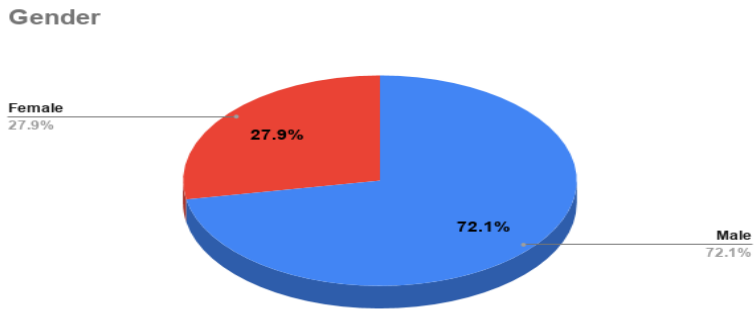

Figure 3.3.1: Participants Gender

The participants were mostly under 25 years old. Their age range is shown in the pie chart below.

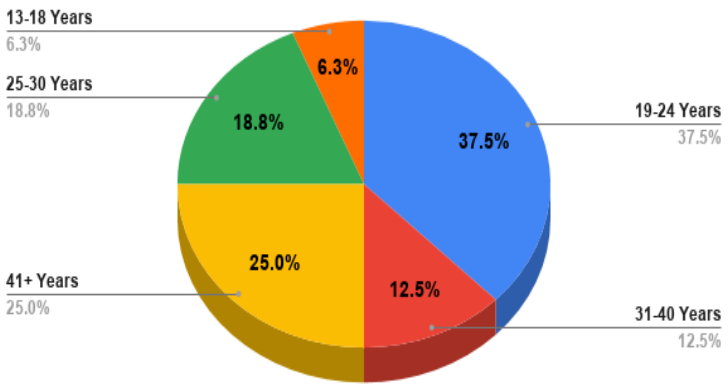

Figure 3.3.2: Participants Age

Participants were from both Village & Urban area. Among them 70.6% were currently living in city whereas 29.4% participants lived in Village Area.

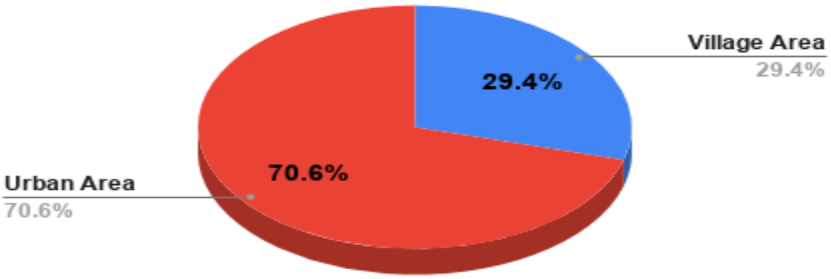

Figure 3.3.3: Participants Location

Participants belong to different Occupations. But, most of the participants were students.

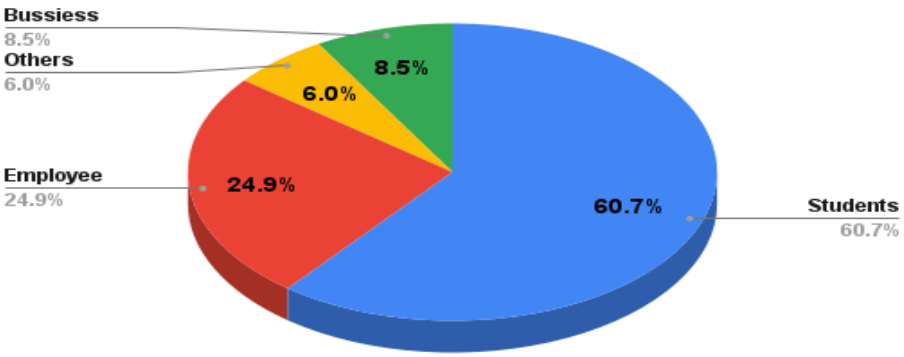

Figure 3.3.4: Participants Occupation

3.4 Proposed Methodology

The first step was to collect data on Google form & then after a certain period of collecting data it was fetched in Google sheets.

Then these data were cleaned to remove any ambiguity & also normalized for the improvement of the data quality.

Then this data was grouped & evaluated on the basis of different data entities & variables. Using this reorganized data different graphs were generated. In some aspects, statistical means were considered too.

CHAPTER 4
EXPERIMENTAL RESULTS AND DISCUSSION
(General Survey Findings)

4.1 Mobile Data VS Broadband

People these days either uses mobile data or broadband which is generally referred to as wifi. People generally prefer wifi for its limitless data consumption advantage. But, people who require data on the go opt for mobile data which is a bit costly. From the data of our participants 69.7% users mostly used wifi & the rest 30.3% used mobile data.

In this pandemic, the educational institutions are conducting their usual activities online, & also in the professional arena "Work from home" has been a regular sight. Besides, many businesses went online. So, for this very reason, people are opting for broadband connection more & more, as it's comparatively cost-effective when it comes to high data usage.

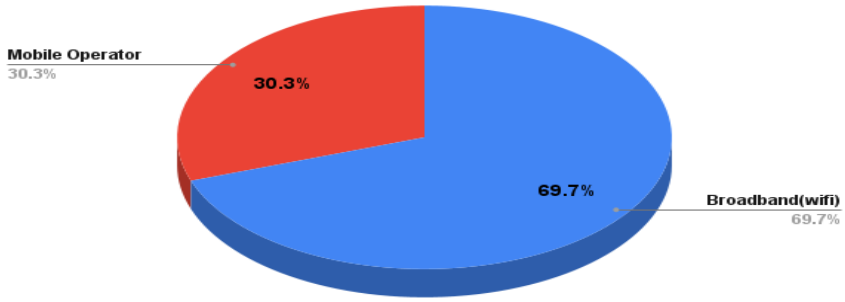

Figure 4.1.1: Participants Most Used Internet Type

4.2 Internet Speed Variation

Internet speed has always been a negative aspect of our country. According to Speedtest.net Bangladesh has ranked 132nd in terms of mobile internet speed and 99th in broadband speed [9]. With data surge & more people engaging online it was thought that the internet speed would decrease. But, to our finding majority (51.8%) of people found the speed to be unchanged. While 36.7% of users reported that the

speed was indeed slowed down. But, surprisingly, 11.6% of people found the speed to be increased.

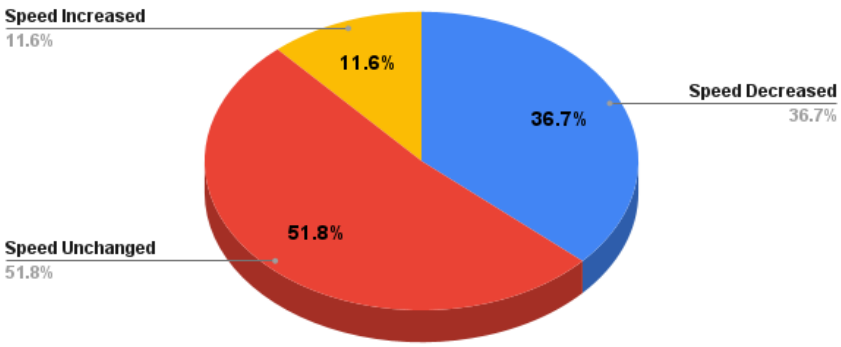

Figure 4.2.1: Participants Internet Speed Experience

4.3 Data Usage Variation (Before and After covid-19 Pandemic)

The covid-19 pandemic has caused the biggest jump in terms of data usage than anything we have ever seen. This data surge has been a necessity and a demand of time. People used their digital devices vigorously (especially smartphone) since the Covid-19 pandemic situation has arrived. In this modern era, we spend most of our time on the internet. & as this time has increased during the covid-19 pandemic the data surge was inevitable. According to pcmag & their mid-2020 data, the online Data usage has increased 47% during covid-19.[10]

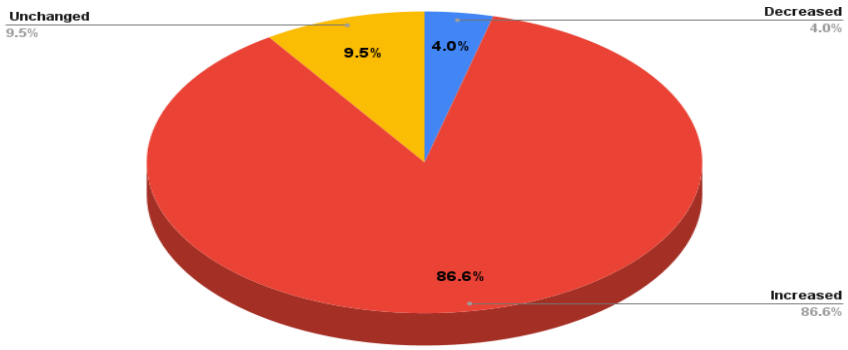

Figure 4.3.1: Participants Data Usage Experience after covid-19 Pandemic

Among all the participants in this study, an undisputed majority of participants (86.6%) admit that their data usage has increased. While few tagged it as unchanged (9.5%) & decreased(4%)

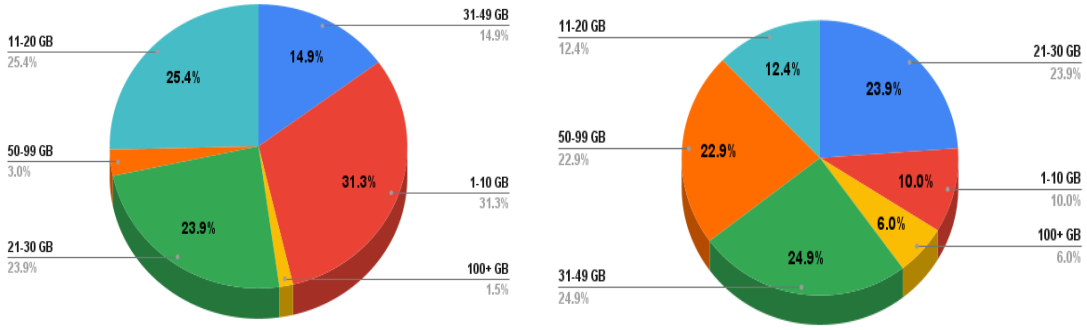

Figure 4.3.2: Participants Data Usage Range (Before vs After) covid-19 Pandemic.

It's prominent from the pie chart that, the majority of participants (31.3%) data usage before the pandemic was around 1-10 GB, but, after the pandemic, the highest usage range was the 31-49 GB group.

4.4 Screen Time Variation (Before and After covid-19 Pandemic)

Screen time of smartphones has been increasing with the pace of time. But, after the covid-19 pandemic struck it rose to a new summit. People were mostly staying home compared to before pandemic time, as a result, their screen time took a bigger shift. This could have some harmful effects too. Research estimating it may cause myopia (a condition where close objects are apparently clearer but far ones aren't)[11]

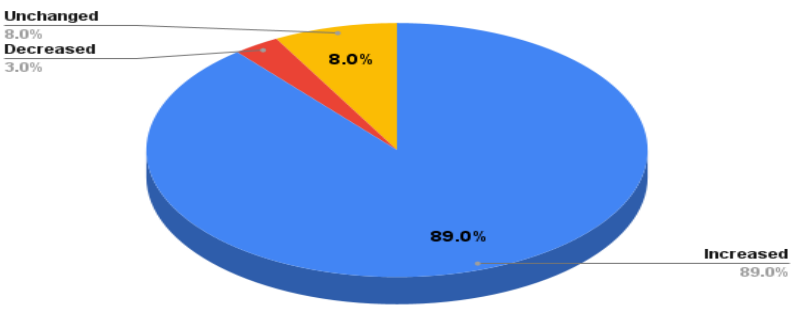

Figure 4.4.1: Participants Screen time after covid-19 Pandemic

Among the participants, 89% reported that their screen time was increased while rest few percentages of people considered their screen time was unchanged (8%) or decreased(3%).

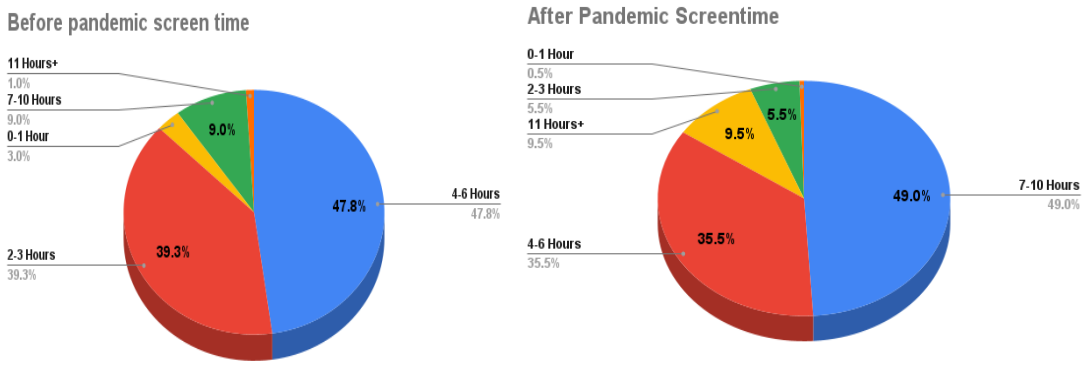

Figure 4.4.2: Participants Screen Time Range (Before vs After) covid-19 Pandemic

The pie chart represent that before the covid-19 pandemic the majority (47.8%) participant's average screen time was 4-6 Hours. But, after the pandemic, majority of people's screen time increased to 7-10 Hours. Which is also portrayed in other pie slices.

4.5 Types of App usage before & after Covid-19 Pandemic

As with the attempt of maintaining Social distancing people, people mostly engaged in their phone's app for entrainment, socializing, work, or even to keep themselves fit. Here's an understanding of this term where two different liner graphs would show what type of apps were used mostly amidst the Covid-19 pandemic & prior to that.

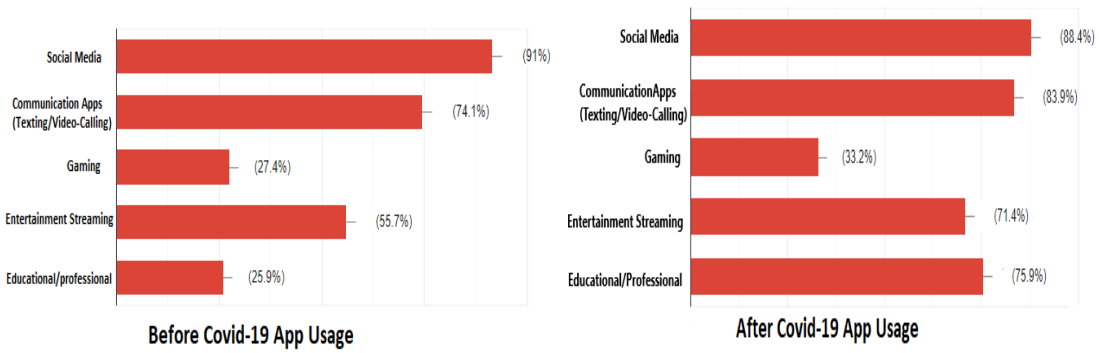

Figure 4.5.1: Types of Apps Mostly Used (Before vs After) covid-19 Pandemic

From the graph, it's evident that the use of Educational/professional app had its biggest upturn (50% increase) As culture like "Distance Learning" & "Work From Home" was a common sight. Besides, that there's an increase in entertainment streaming apps too. This was because people mostly were staying at home & to remove their monotony it was quite a handy option.

4.6 Social Media Usage Time Variation (Before and After covid-19 Pandemic)

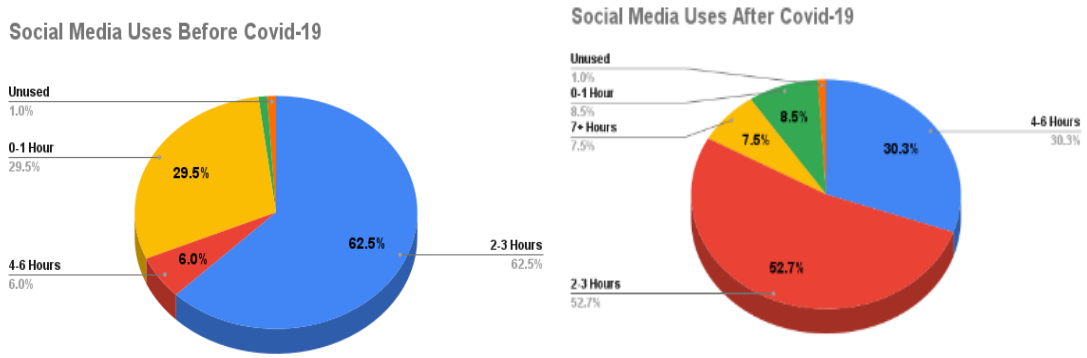

Figure 4.6.1: Social Media App usage (Before vs After) covid-19 Pandemic

Social media usage is always higher regardless of any situation partially because of its addictive design philosophy. From, the pie chart it's expressed that the majority of usage time was 2-3 hours before the Covid-19 pandemic, and also after covid-19, the majority of participants stayed in that time range. Although the 2nd most majority of users has seen a jump in this regard.

4.7 Gaming & Communication Apps (Before and After covid-19 Pandemic)

Gaming can remove monotony in an isolated environment. Some of the users may increase the usage time of such apps. Although in this study, the usage time wasn't altered much. In terms of communication apps, there was a notable surge, the time range of 2-3 hours was only used by 13.5% of people before the Covid-19 pandemic. But, after the pandemic, 35.3% of participants used this apps for 2-3 hours daily. It is

mostly due to the fact that, people are using calling/video calling more than ever before.

4.8 Entertainment Streaming Apps Usage Time Variation (Before and After covid-19 Pandemic)

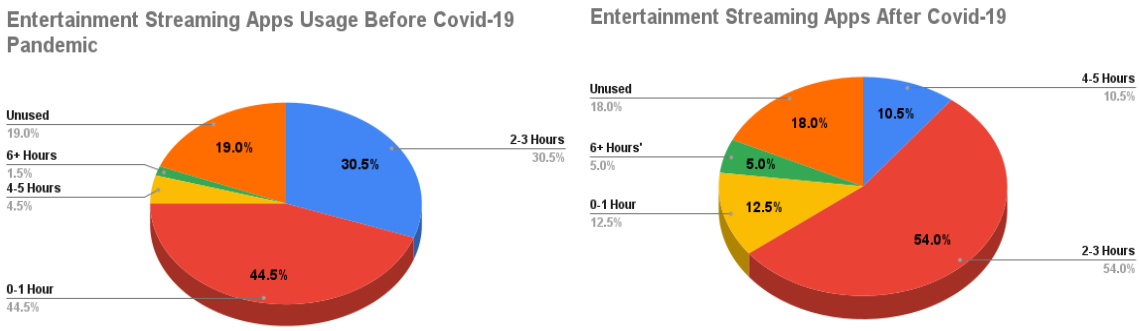

Figure 4.8.1: Entertainment Streaming App usage (Before vs After) covid-19 Pandemic

Entertainment streaming apps like Youtube, Netflix, Spotify, etc are a big part of our modern-day people's leisure activity. But, with the arrival of covid-19, it's usage time has seen a big uprise. As the need for Social distancing has lessened real-life entertainment activities outside the home. In this study majority (44.5%) of people used to consume entertainment streaming apps for about 0-1 hour before the Covid-19 pandemic. But, after the Covid-19 scenario majority of the participants (54%) are using these apps for 2-3 hours. Which clearly demonstrates the actual scenario.

4.9 Educational/Occupational Apps Usage Time Variation (Before and After covid-19 Pandemic)

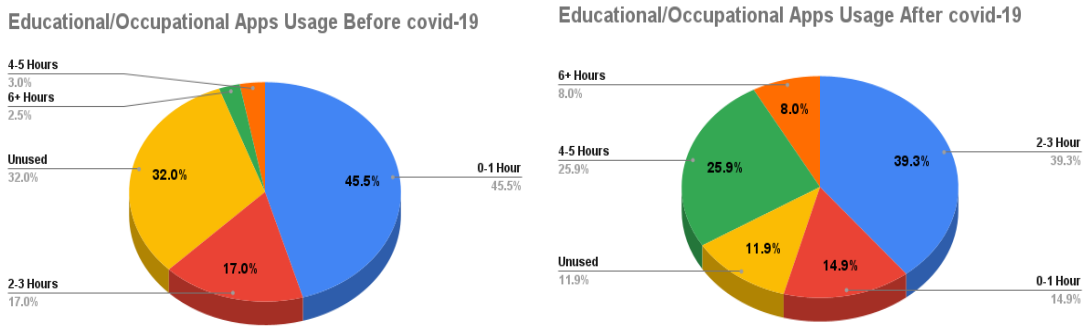

Figure 4.9.1: Educational/ Occupational App usage (Before vs After) covid-19 Pandemic

The office and classroom have moved into our living rooms these days through the usage of these apps. No other category of apps has seen a rise like this prior to the covid-19 pandemic.

This phenomenon is well reflected in this study too. Before the Covid-19 pandemic, 32% said they don't use such apps. But, after the pandemic, it drove down to only 11.9%.

The majority of people (45.5%) used these kinds of apps for only 0-1 hour. But, after covid-19 the majority (39.3%) are using these apps for 2-3 hours. 25.9% of participants are using it for 4-5 hours amidst the covid-19 pandemic.

But, after all of this, the participants still preferred to conduct their usual occupational work in Classrooms/Offices. Among all the participants 69.2% wanted to conduct their occupational work in Classrooms/Offices. Whereas, 30.8% preferred online occupational work.

This is mostly because we are social beings & many think the quality of offline education/work is simply better.

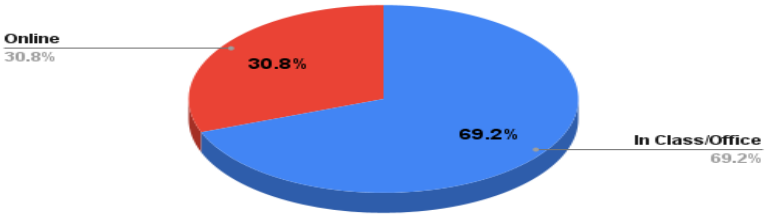

Figure 4.9.2: Participant's preferred medium for conducting Educational/ Occupational work

4.10 Newly Installed Apps During The Covid-19 Pandemic

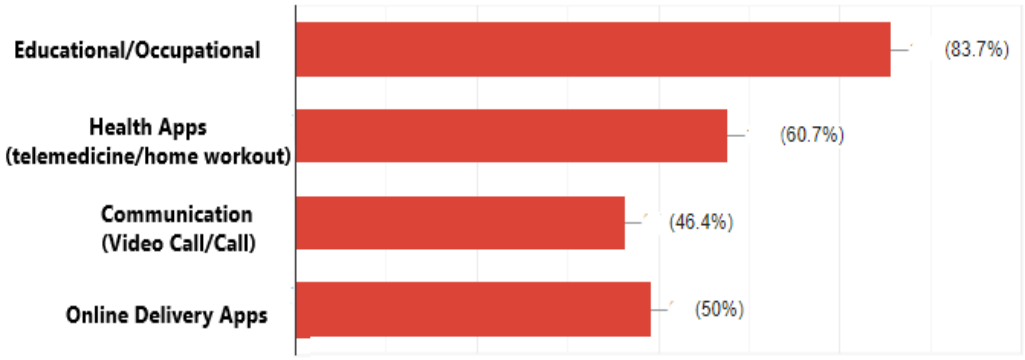

Figure 4.10.1: Newly Installed Apps during covid-19 Pandemic

As changes took place in the way we use our smartphones, some new apps were also installed.

Educational/Occupational apps were newly installed most. 83.7% of participants admit they installed new educational/Occupational apps. Health apps such as telemedicine & home workout were also installed. According to this research, 60.7% of people installed them.

New communication apps & online delivery apps were installed by 46.4% & 50% respectively.

4.11 Tendency to Shop Online Before & After Covid-19 Pandemic

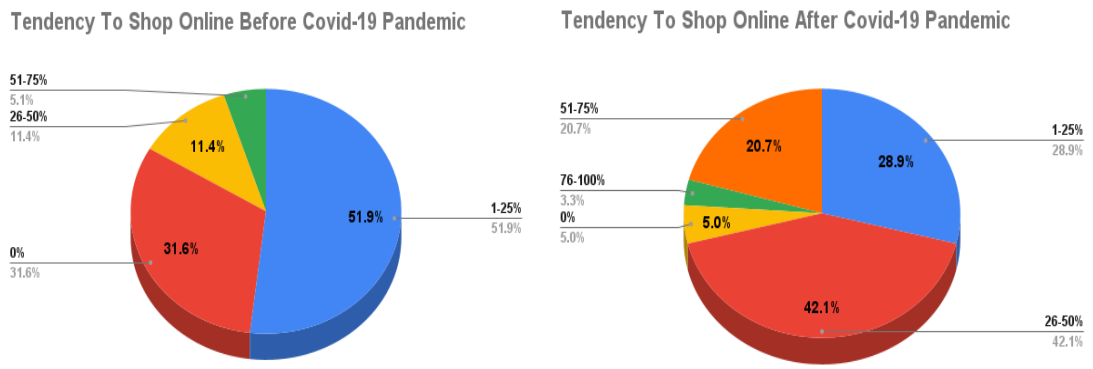

Figure 4.11.1: Tendency to Shop Online before & After covid-19 Pandemic

The delivery app was already popular among today's digitalized society, but, with the appearance of covid-19, its usage skyrocketed. People found it safe & convenient in this hostile environment, even the government only allowed these services to run during the initial strict lockdown.
Among the participant's majority of users (51.9%) tendency to shop online before the covid-19 pandemic was 1-25%. But, after the pandemic majority of users (42.1%) tendency rose to 26-50.

Delivery App Download Trend was a common scenario for this. It was extensively researched by Indian multinational mobile advertising company Inmobi where they found in the initial lockdown period of March 2020 the growth of new installation on smartphones compared to January 2020 was about 166%.
Food delivery app Uber Eats had 30% new installation during March 2020.[12]

CHAPTER 5
EXPERIMENTAL RESULTS AND DISCUSSION
(Survey Findings On The Basis Of Variables & Mental Health Scenario With Regards To Smartphone Usage During Covid-19)

5.1 Variable

In this research among few variables, **Place & Age** were the two most important aspect which could alter the smartphone usage behavior in an acute manner. More importantly, these two variables can be manipulated to generate quantifiable results. Both of these are independent variables that are supposed to be the core of every experimental research. Especially, for quantitative research similar to this.

5.2 Place (Village vs Urban)

Smartphone, Internet, Apps these were once a landmark of the urban population. But, things have changed vastly. At the pace technology is going, the villagers also got the taste of it a decade back. Now, both are at least comparable. Although, there still is going to a prominent alteration in their smartphone usage behavior compared to their urban counterparts. These could mean their internet medium, internet speed experience, data consumption rate, screen time, category of app usage is going to vary. And, as a quantitative comparison study, I would reveal these changes gradually

5.3 Mobile Data VS Broadband Usage between Villagers & Urban People During Covid-19 Pandemic

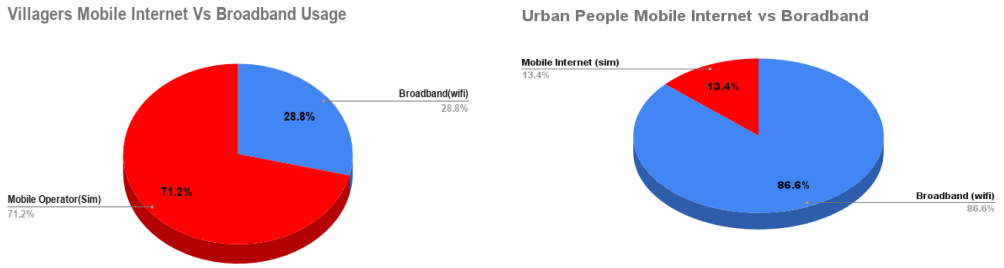

Figure 5.3.1: Mobile Data VS Broadband Usage between Villagers & Urban People

Villagers generally use mobile data. Broadband access isn't always available there. And, it is reflected on our study well & truly. The majority (71.2%) of participants from the village use mobile data as default. Only, 28.8% of village participants were using broadband.

On the contrary, urban people mostly use broadband data. In this particular research, 86.6% of urban participants used broadband & only 13.4% of people were on mobile data.

It is seen that many users had gotten broadband in this covid situation, before that they were using mobile data. The rise is due to the fact that, nowadays, educational & occupational work is done online, so, for high data usage broadband is the way to go as it's much more affordable in regards to high data usage compared to mobile data.

5.4 Internet Speed Experience Between Villagers And Urban People During Covid-19 Pandemic

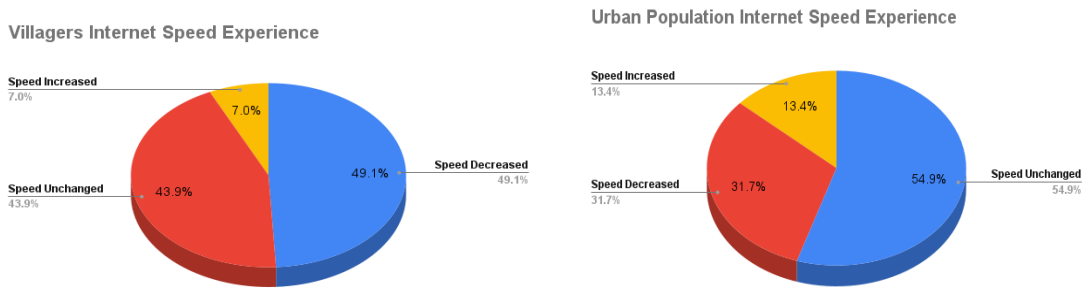

Figure 5.4.1: Internet Speed experience comparison between Villagers and Urban people

Amidst covid-19 the online traffic has vastly increased as people are spending more time online. In this conducted research the majority of village participants (49.1%) experienced decreased speed while the majority of urban participants believe the speed remained unchanged.

The village network infrastructure has always been subpar. When the traffic increased there may not have been any attempt of improvement in their network at that area as the number of users are low compared to urban area. The urban area may have got the boost it needed during this extra traffic.

5.5 Data Usage Variation Between Villagers and Urban People During Covid-19 Pandemic

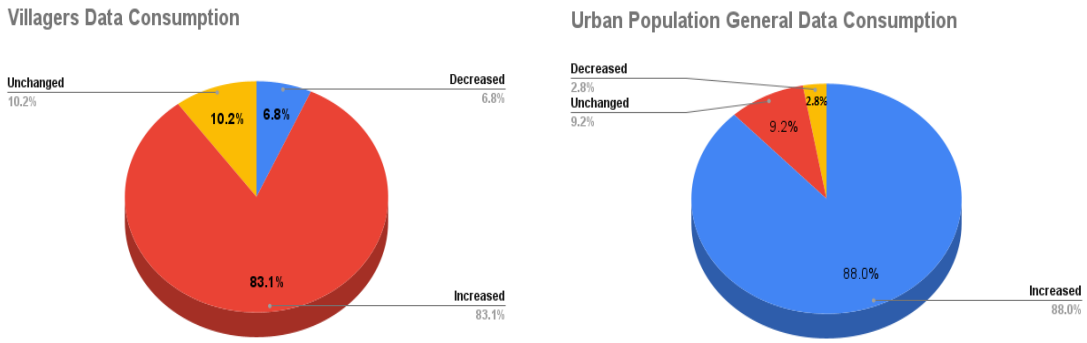

Figure 5.5.1: General Data Usage Variation between Villagers and Urban people During covid-19

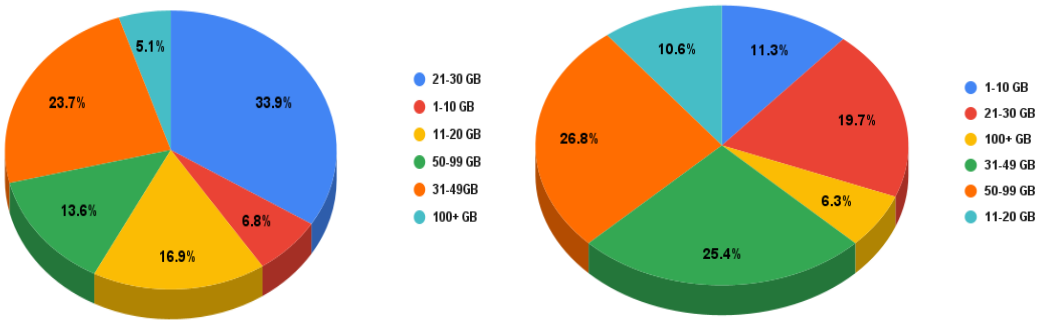

Figure 5.5.2: Data Usage Range Variation between Villagers and Urban people During covid-19

As with covid-19, many aspects of our lives were running online, the data had to be increased regardless of the village or urban area. The participants who were villagers reported that the majority (83.1%) had an increase in their data usage. Conversely, the majority of the urban population (88%) also believed that their data usage was increased in general.

In the data usage range, the greater number of village participants (33.9%) reported that they used 21-30 GB of data. On the contrary, a greater part of urban participants (26.8%) reported that their data usage range was between 50-99 GB during this covid-19 pandemic.As villagers mostly usage mobile network hence their data usage was less than their counterparts urban participants who mostly uses broadband internet.

5.6 Screen Time Variation between Villagers And Urban People During Covid-19 Pandemic

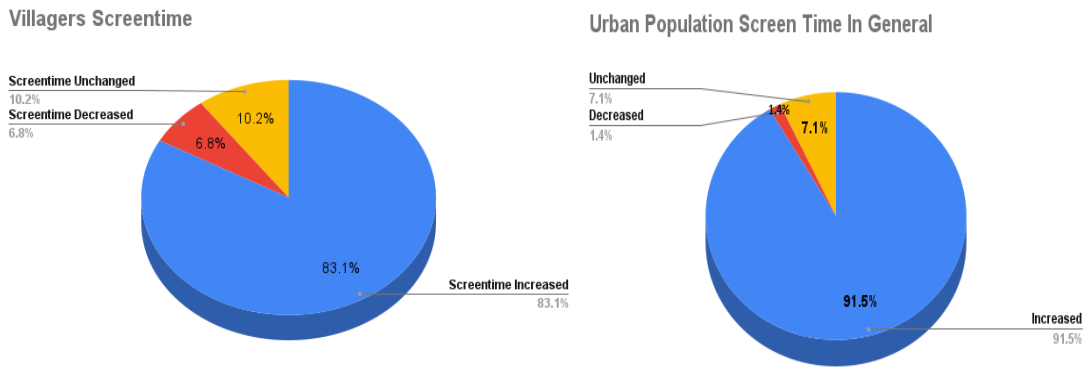

Figure 5.6.1: General Screen Time Variation between Villagers and Urban people During covid-19

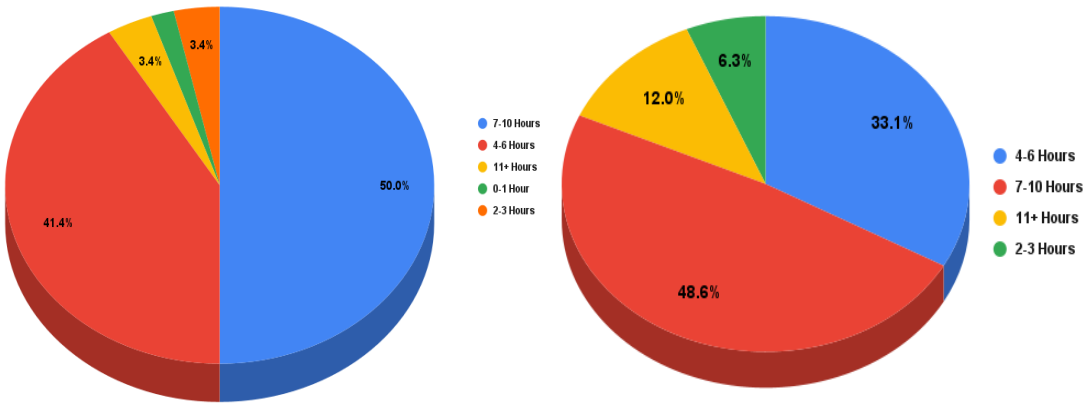

Figure 5.6.2: Screen Time Range Variation between Villagers and Urban people During covid-19

5.7 Tendency to Shop Online Between Villagers and Urban People During Covid-19 Pandemic

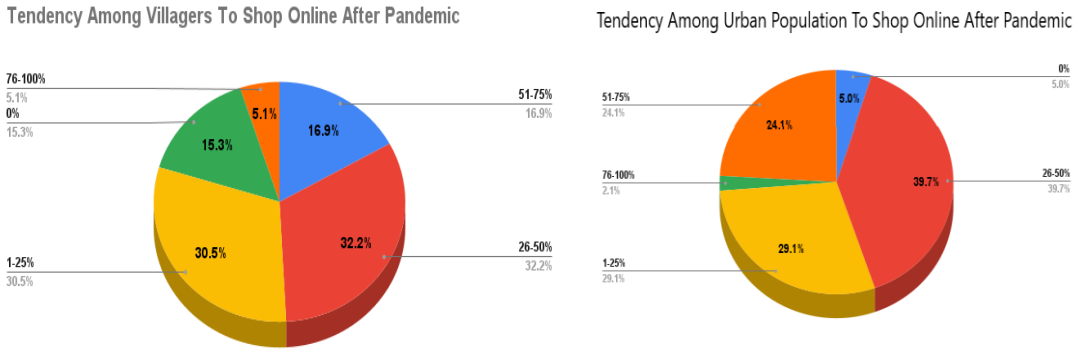

Figure 5.7.1: Tendency To Shop Online Between Villagers and Urban People During Covid-19

Covid-19 obliged us to conduct our many day-to-day functions before the screen. Thus, increasing our overall screen time. In a general sense, 83.1% of village participants reported that their smartphone screen time was increased. For the urban participants, it was 91.5%.

As for screen time range, the majority of village participants (50%) reported that their average screen time range was around 7-10 hours. On the contrary, 48.6% admitted that their average screen time range was also 7-10 hours

5.8 Age(Teenagers & Early 20s VS 25+)

Age is a variable that has the biggest impact on smartphone usage than any other common variable which could bring out quantifiable data. Teenagers and people who're in their early 20s use the smartphone excessively than people who are 25+ in their age. Also, it is stated in many research studies that people who're teenagers & in their early 20s faced more mental health issues than their counterparts.[13]

5.9 Screen time Variation Between Age (13-24) Vs 25+

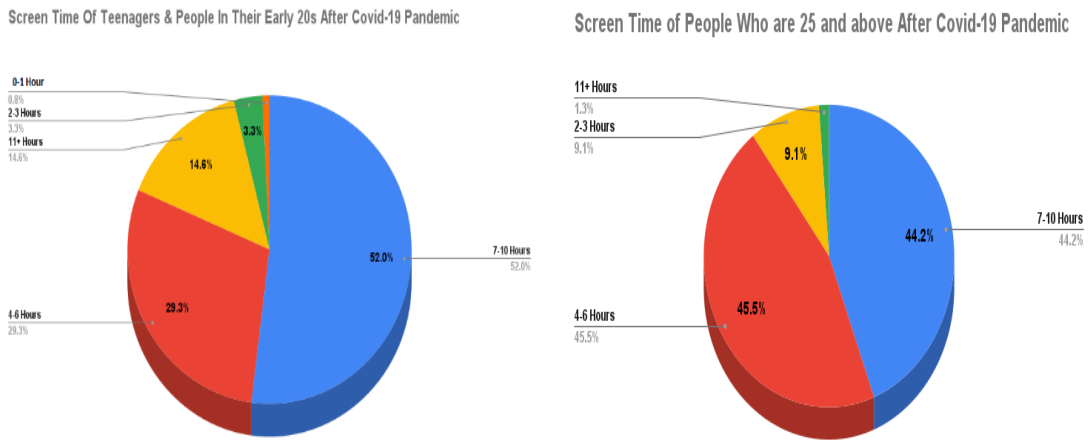

Figure 5.9.1: Screen time Variation between age (13-24) vs 25+ People During Covid-19

Maximum participants (52%) aged (13-24) average screen time range was 7-10 hours.

Whereas, majority of 25+ aged participants (45.5%) average screen time range was 4-6 hours.

5.10 Mental Health Condition During Covid-19 Pandemic Between Age (13-24) vs 25+

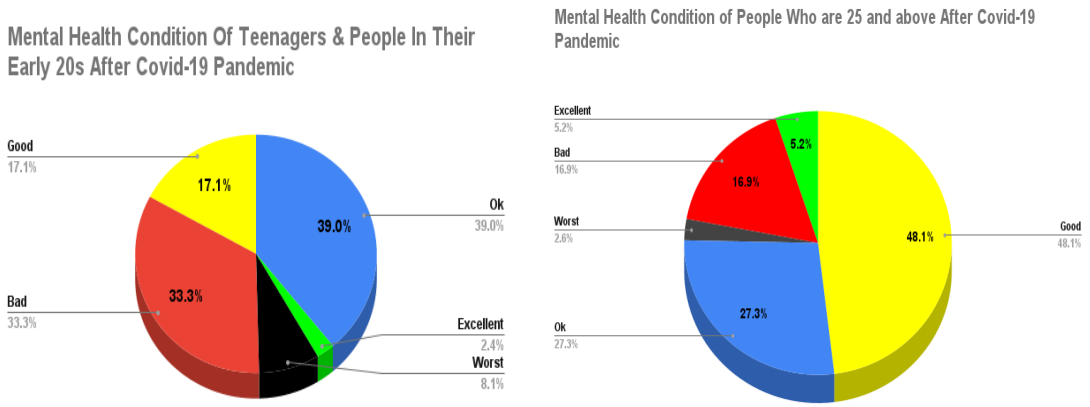

Figure 5.10.1: Mental health condition during covid-19 pandemic between age (13-24) vs 25+

Mental health has been a big concern in this covid situation. As people are more isolated than before and they lack that social support like before. Also, the sheer amount of covid affected people & its related news is contributing towards that.
In our study majority of participants aged (13-24) struggled with their mental condition. As 33.3% of them reported it was bad. While 39% found it to be moderately ok.

But, for the age range of 25+, the majority (48.1%) stated that their mental health was in a good position. Although, 27.3% found them to be moderately ok.
In terms of the worst mental health condition, the age group of (13-24) had a percentage of 8.1%, on the flip side, for the age group who are 25 & above it was only 2.8%

This may have been related to high smartphone screen time usage as the majority of age group (13-24) had a significantly higher smartphone screen time (7-10) hours, compared to the age group of 25 and above who had an average smartphone screen time of around (4-6) hours. This phenomenon of higher screen time may slightly contribute to the degradation of mental health is also backed by research conducted by Samantha Tang & Helen Cristensen titled "The relationship between screen time and mental health in young people: A systematic review of longitudinal studies" [13]

5.11 Sleep Issues Interconnection with Smartphone Usage Before and After Covid-19 Pandemic

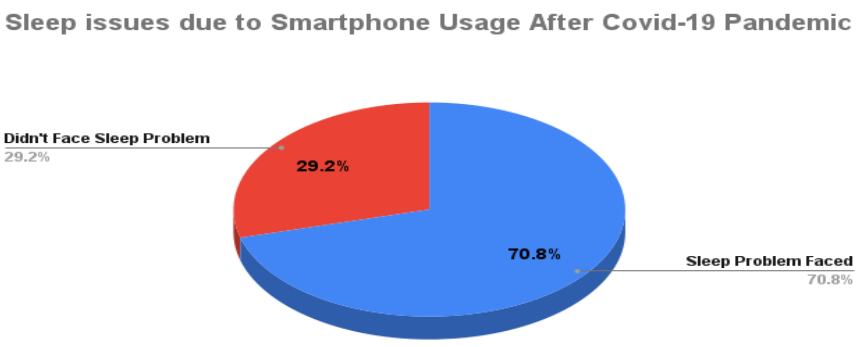

Figure 5.11.1: Sleep issues due to Smartphone Usage After Covid-19 Pandemic.

Quality sleep is an essential element for our well-being. But with the greater rise of smartphone usage during the covid-19 pandemic, many people seem to face sleep issues nowadays. In this research, most of the participants (70.8%) stated that they're having sleep issues due to smartphone usage during the covid-19 pandemic. While 29.2% didn't face such issues.

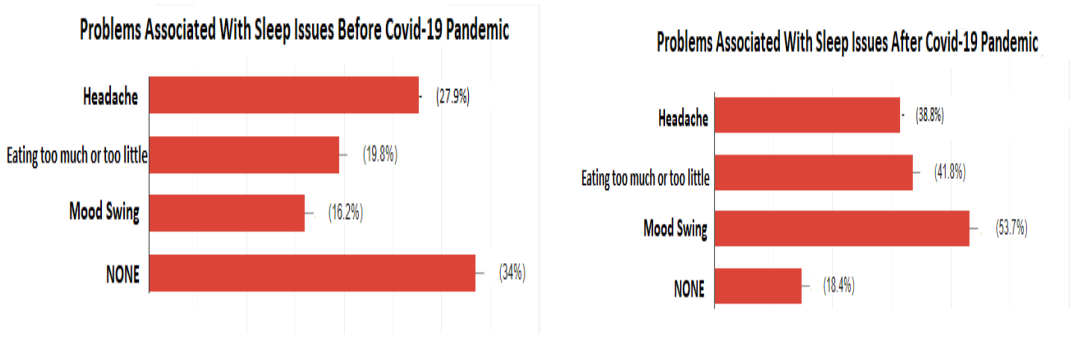

Figure 5.11.2: Problems Associated with Sleep issues Before & After Covid-19 Pandemic.

Other than having long-term serious health problems, issues with sleep can cause many problems which can be felt on day to day basis. The participants of this study reported that before the covid-19 pandemic, due to issues with sleep 27.9% of them experienced headache, that number rose to 38.8% after the pandemic.

Sleep issues can also make people too much or too little before the Covid-19 pandemic 19.8% of participants were eating too much or too little, it was raised to 41.8% after the Covid-19 pandemic.

Mood swings had the biggest jump in this regard, before the Covid-19 pandemic 16.2% experienced this, but the number went to 53.7% after the Covid-19 pandemic. 34% participants didn't experience such issues before covid-19 pandemic but, the number lowered to 18.4%. Which shows how lack of sleep due to excessive use of smartphone during covid-19 pandemic had it's effect on us. But we also have to consider, these sort of problems can be attributed to other circumstances of life too or vice versa.

CHAPTER 6

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

6.1 Summary & Conclusion Of The Study

Unveiling the shift that took place in people's smartphone usage behavior was obvious to consider. Now, this research also has evidence that revealed the utmost variation that took place amidst the covid-19 pandemic. The participants from different ages, places & occupational backgrounds established that over 89% had increased their smartphone screen time with an average of 4-6 hours to 7-10 hours during this covid-19 pandemic. In terms of smartphone data usage over 86% had increased their usage with an average from 1-10 GB to 31-49 GB. Over half of the users didn't experience any internet slow down. People mostly increased their usage of educational/office-based apps on their smartphones. Communication & Entertainment based apps have also seen a rise. People are also installing new apps like delivery & distance learning/work. Despite all of this, people still prefer to go back to the usual offline educational/occupational workspace.

The village users are catching up with urban users but still lags behind in terms of their smartphone usage & amenities.

People's mental health also took a slightly negative turn which is much more common in younger people & it can be associated with their higher smartphone usage. Which has also caused sleep issues & problems regarding to that.

6.2 Implications for Further Study

This research has tried to present the apparent scenario of this covid situation compared with the pre-covid period. The data sets were a bit limited too. If this research can be conducted over a vast amount of people, there is a great potential of

developing an unerring pattern. Which could accurately predict people's smartphone usage behavioral pattern. This research's limited number of participants was a big obstacle for generating a credible pattern. Alongside this, with the cue of this research and a large amount of data set, an usage pattern can be established that is actually conducive to people's mental health and overall well-being.

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Covid impact

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