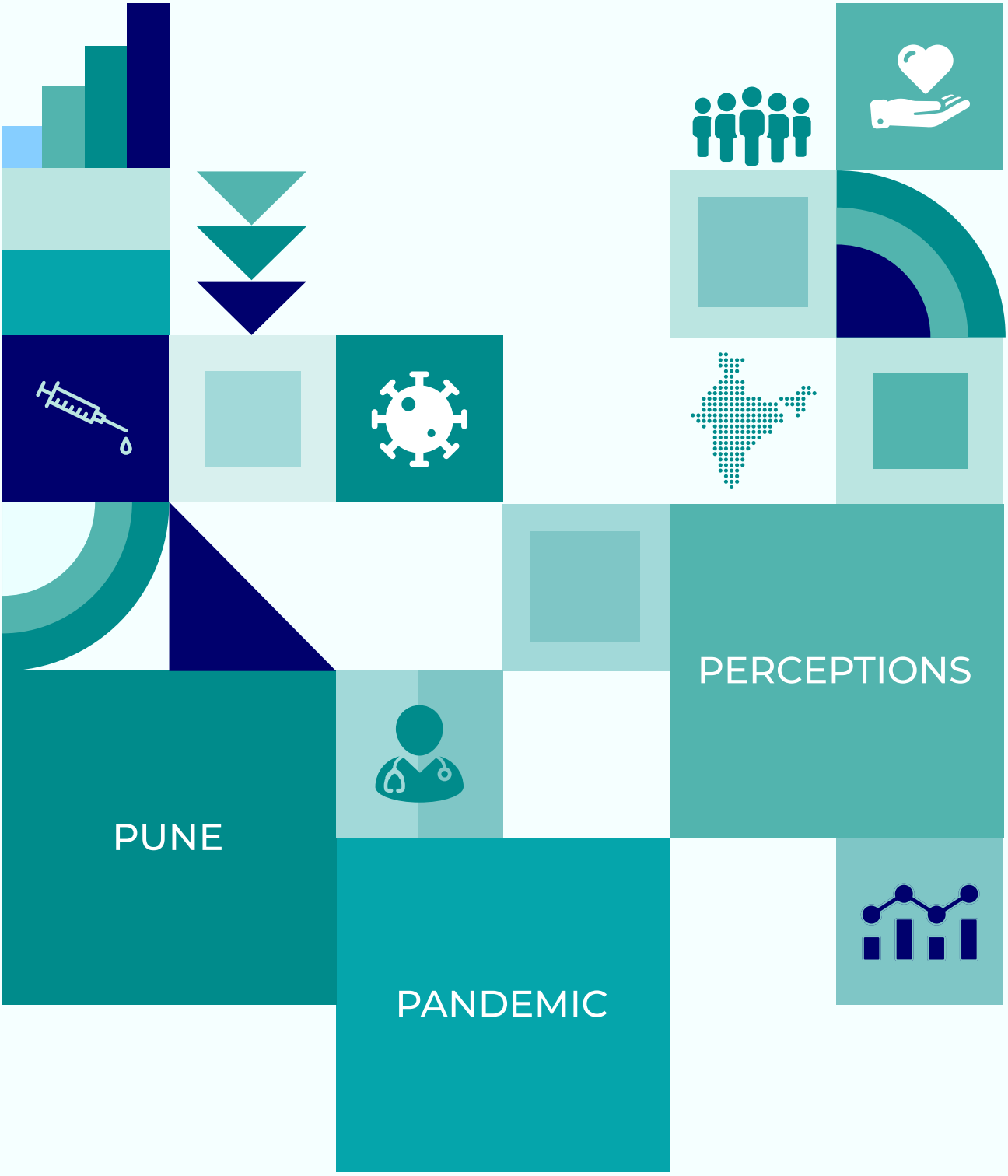
JNANA PRABODHINI
FOUNDATION

Carnegie
Mellon
University

PANDEMIC, PUNEKARS, AND PERCEPTIONS

Preliminary findings of a COVID-19-related Knowledge, Attitudes, Practices, and Wisdom survey



DRAFT REPORT

Table of Contents

Acknowledgements

Introduction

Section 1: Demographics

Section 2: Socioeconomic status

Section 3: Medical impact of the pandemic

Section 4: Economic impact of the pandemic

Section 5: Fighting the pandemic

Section 6: Fighting the infodemic

Section 7: Perceptions of the andemic

Conclusion

Acknowledgements

Akanksha Foundation

Jnana Prabodhini

Khelghar

Kishkindha

Lend-A-Hand-India (LAHI)

Niramay Foundation

PMC schools

Samidha Bahuddeshiya Sanstha

Surajya Sarvangin Vikas Prakalp

Seva Arogya Foundation

Seva Sahayog Foundation

Suprabhat Mahila Mandal

'Swa'-Roop Wardhinee

Swanand Jankalyan Pratishthan

Survey Monkey

Carnegie Mellon University

Johns Hopkins University

Dr. Suneeta Kulkarni

Introduction

107 million cases, 2.33 million deaths[1], 4.2% decrease in global GDP [2], 1.5 billions students out of school[3], varying masking mandates, and contentious vaccine rollouts. As the COVID-19 pandemic rages on, pushing us into now infamous “unprecedented times'', lives all over the globe have changed drastically with lockdowns, physical distancing, overloaded medical infrastructures, and significant social, psychological, and economic challenges. But even as we struggle with this new normal, it is important to remember that our response to this pandemic, and any future pandemic, ought to be more than mere ‘firefighting’ or ‘crisis management’. There is an extensive number of lessons to be learned from the pandemic, determining and modelling the public response to the pandemic, and consolidating these ‘findings’' for our ongoing fight against this pandemic, and all other pandemics to come.

That being said, it should come as no surprise that the effect of many of the aforementioned challenges are further exacerbated in the developing world, especially in low-income settlements, with poor access to medical resources, low literacy rates, and generally lower socioeconomic status. With heightened vulnerability to such disasters, the citizens of such communities find themselves at a higher risk than their urban or suburban counterparts, which evidently increases the importance of producing appropriate countermeasures against future calamities.

Our Knowledge, Attitude, and Practices (KAP) survey was launched in the informal urban settlements of Pune, which are low-resource neighborhoods faced with challenges such as poor sanitation, high-density settlements, low literacy rate, and low socioeconomic status. The 90 question survey was aimed at mapping a *diverse* community’s response to this multifaceted disaster. Covering topics from the medical to the economic to the social impact of the pandemic, our survey aimed to address behavioral and psychological attitudes relevant to public health guideline compliance (such as mask usage, handwashing, etc.). These data were then correlated to the variety of demographics reached by our survey, producing a critical opportunity to identify and document the far-reaching impact of the COVID-19 pandemic as a function of factors including, but not limited to, age, gender, socioeconomic status, geographical location, and medical history.

---

[1] NYT
[2] https://www.oecd.org/economic-outlook/
[3] https://blogs.worldbank.org/voices/2020-year-review-impact-covid-19-12-charts

The motivation for these carefully worded, meticulously structured questions came from the need to prompt answers that were multifaceted in nature, as in, dependent *and* independent, quantitative *and* qualitative, discrete *and* continuous. This allowed for easy identification of trends that would otherwise be difficult to capture, such as the average age of mask-wearing women who had lost their jobs in the pandemic, or the confidence of medium-income coronavirus skeptics in news obtained from social media.

The survey further collects information regarding the dissemination and news regarding the pandemic. These data were then used to to understand and even control the *infodemic*, which stems from the rapid spread of partially incorrect, uncontextualized, or even completely fabricated news. This was accomplished by collecting data on both actual and perceived avenues of news consumption and productions, public awareness about misinformation, and public response to misinformation, and then correlating these to the variety of COVID-19 pandemic behaviors and practices reflected in the survey results.

In an effort to make the data and results more accessible for academics, policy-makers, NGOS, or even the general public, the survey data have been retrofitted in the form of a geospatial map, as an attempt to provide the first such tool. Pune City used ward-specific geospatial mapping for the first time during the COVID-19 pandemic, and so by combining the results of existing open-source data about cases and lockdown zone history with the data from our survey, we offer interactive and exciting ways to engage with the data.

Section 1: Demographics

1.1 Introduction

A crucial cornerstone of any survey is the profile of the population being studied. In a city like Pune that has a population of over 50 lakh people, drawing from a large and diverse sample is necessary to get a comprehensive understanding of the COVID-19 pandemic. As such, there have been numerous initiatives undertaken to assess the impact of the ongoing pandemic on Pune. These include PMC's large-scale door-to-door contact tracing surveys that reached lakhs of citizens via the vast resources and widespread reach of the government. Smaller initiatives with focused goals provided additional epidemiological insights such as the Pune Serological Survey undertaken to estimate the seroprevalence of COVID-19 antibodies in particularly hard-hit parts of the city. Finally, there were also a handful of Knowledge, Attitudes, and Practices surveys conducted to gauge the perceptions of specific demographics such as medical workers and patients. While all of these approaches had their own strengths and drawbacks, their differing survey methodologies as well as their focus on diverse geographical areas and demographics have helped paint a nuanced picture of the ever-evolving and uncertain pandemic in Pune.

Our Knowledge, Attitudes, Practices, and Wisdom survey focused on a diverse demographic pool that varied in terms of gender, age, language opted for in the survey, education, occupation, socioeconomic status, geographic location, and the impact they had due to the pandemic. Our field resources were limited, and hence we took three main approaches to maximize our outreach: (1) Leveraging the existing network of NGOs in Pune in order to reach various parts of the city. These NGOs work with disadvantaged populations and cover diverse geographical areas. We thus employed a purposive sampling approach. (2) Utilizing social media platforms in order to reach out to the general public. We thus employed a convenience sampling approach. (3) Leveraging the Pune-based personal contacts of our large volunteer-driven team to disseminate the survey using word-of-mouth. We thus employed a snowball sampling approach.

1.2 Demographic profile

In the current section, we describe the demographic profile respondents who took our survey. While our survey approach was based on non-random sampling, here we compare it with existing government statistics including the 2011 Census of India, as well as with the more recent Pune Serological Survey. Our survey was carried out from the 18th of November 2020 to the 31st of December 2020. Because we employed

a voluntary response method, participants were not obliged to complete the entire survey. A total of 4125 participants filled out at least one question of our survey. In this policy report, we present the data of 2245 participants who completed all the COVID-19-related questions in our survey. For two further questions, 157 participants dropped out and we thus present data from 2088 participants for those questions. The data from the remaining 1880 participants who partially filled out the survey will be presented in an upcoming scientific report. The decision to exclude these participants from the current analysis was taken to ensure uniformity of sample size across questions.In the following paragraphs, we describe 5 types of demographic data that were collected in our survey. They are: gender, age, survey language, education, and student status.

Gender

Responses to our survey showed a balance between female (52%) and male (48%) individuals (Figure 1.1). There was one respondent identifying as “other”. In order to protect their anonymity, as well as for ease of analysis, we included them in our group of females. According to the 2011 Census, 49% of Pune’s population is female, and 51% is male. We consider it to be a mark of pride that our survey has a strong female representation.

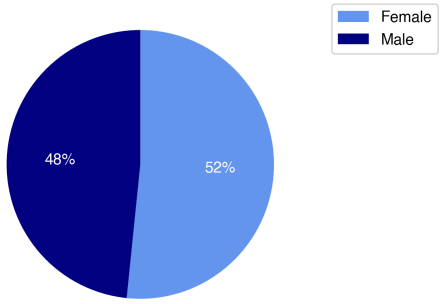


Figure 1.1. Gender

Age

Our survey respondents represented a wide range of age groups from young to old (Figure 1.2). The average age was 37, with 50% of respondents being less than 35 years of age. According to the 2011 Census, 65% of Pune's population was under the age of 35. While we did not carry out random sampling, the age structure across genders was fairly balanced except for senior citizens (65+) where a higher proportion of males was observed.

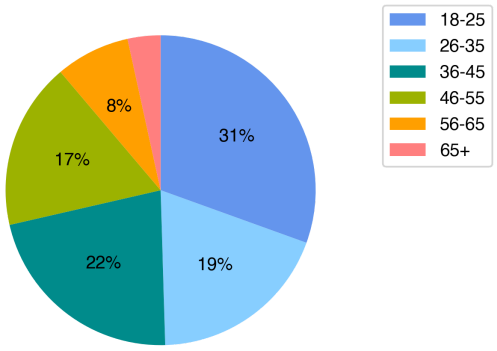


Figure 1.2. Age

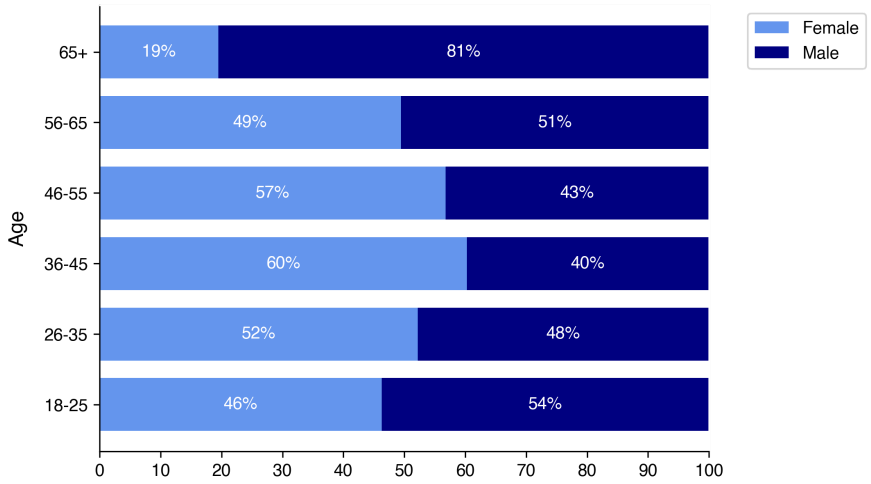


Figure 1.3. Gender by age

Survey language

Multilingualism is a reality of Indian society. While we could not cater to all linguistic groups residing in Pune, we provided respondents with the option to take the survey in either English or Marathi. 59% opted for Marathi (Fig. 1.3). The split was even among the 18-25 age group, while in all the remaining age groups, at least 60% chose to fill the survey in Marathi (Fig. 1.4).

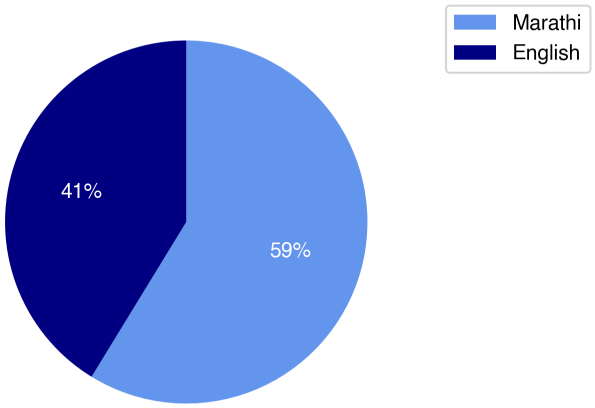


Figure 1.4. Choice of survey language

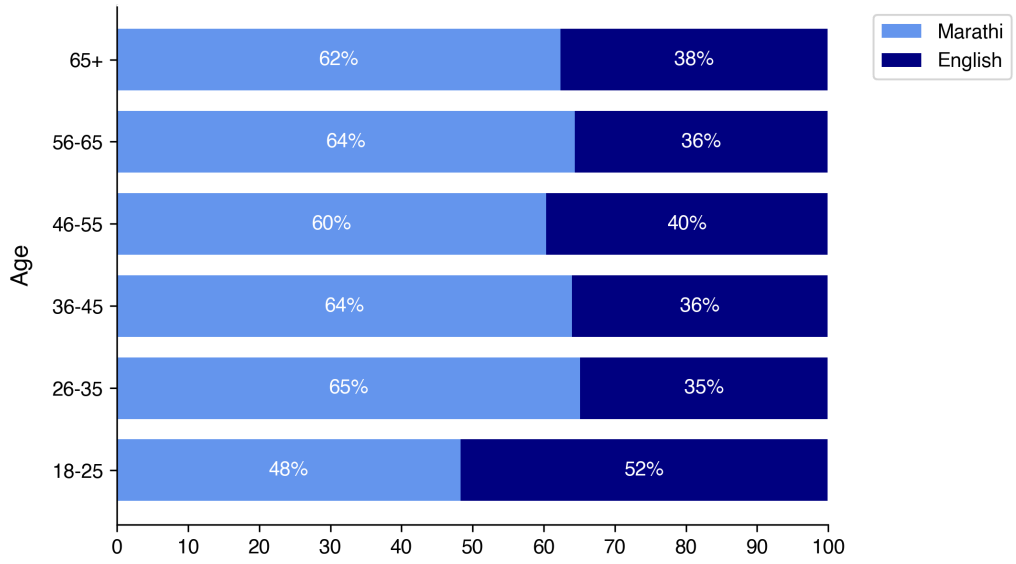


Figure 1.5. Choice of survey language by age

Education

Most of our respondents (62%) reported being college graduates. At least 75% of our respondents had graduated from high school (12th standard), while more than 80% had completed education upto and beyond 10th standard (Fig. 1.6). While we cannot directly compare this metric with data from the 2011 Census, the literacy rate of Pune was 79.8% at the time. The breakdown of education and gender shows an interesting U-shaped trend. Females are more represented at both the lowest and highest levels of education (Fig. 1.7). While this may reflect the non-random sampling nature of our survey, this fits sociological data about the gender disparity seen in the education sector where females often are forced to drop out early from school.

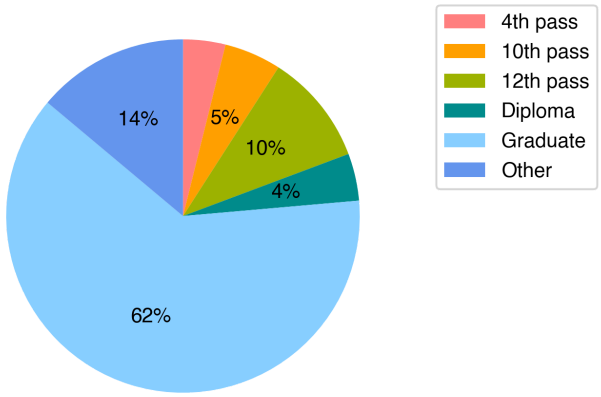


Figure 1.6. Education

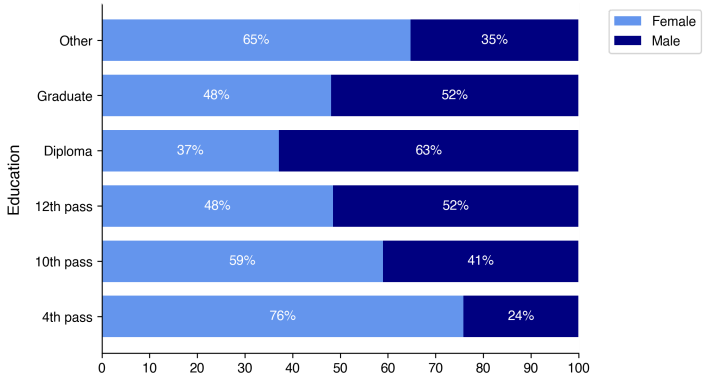


Figure 1.7. Gender by education

Students

A quarter (25%) of our respondents were students (Fig. 1.8). This large proportion may reflect the preeminent status of Pune in the field of education; the city is home to over a 100 educational institutes and is popularly referred to as the Oxford of the East. The non-random sampling methodology of our survey may play a role here; most of our volunteer-driven 40+ member team consisted of young students from Pune. Our social network is likely to have been mirrored among our survey respondents. The gender disparity seen in Fig. 1.7 is also reflected in the gender makeup of the student and non-student population. There are more male students than female students, whereas our overall survey sample has more females than males. Thus, the education sector is slightly more male dominated.

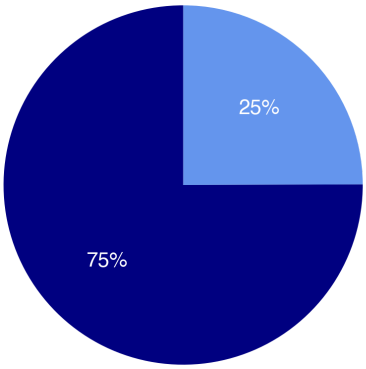


Figure 1.8 Students

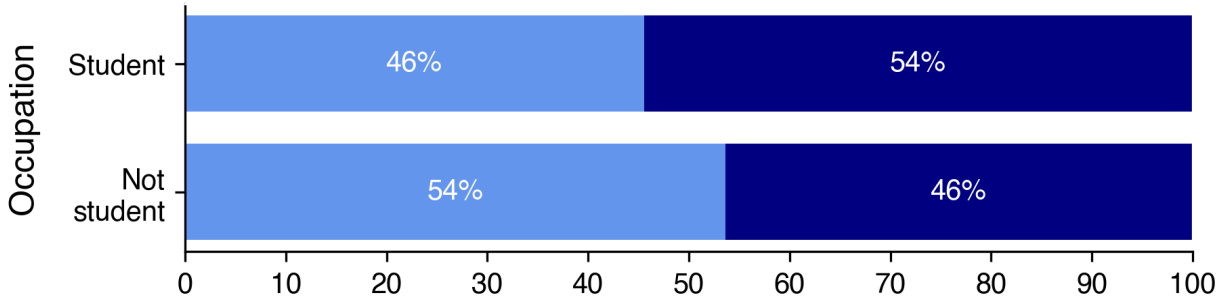


Figure 1.9 Gender by student status

1.3 Conclusion

In this section, we provided a brief overview of some of the key demographics gauged in our survey: gender, age, gender, age, survey language, education, and student status. Further demographic data such as medical occupation and employment status have also been gathered. They are presented in further sections. Please refer to the Appendix for detailed breakdown of the demographic profile. An important feature of our survey is that none of the demographic data is considered to be personally identifiable information. In other words, respondents mentioned their age but not their birth date. They were not asked to provide their name, phone number, or address. This is an important safeguard taken to ensure the privacy of the respondents will be preserved, and that these responses cannot be used to trace them down

Section 2: Socioeconomic status

Introduction:

The socioeconomic status of a person is an important predictor of their health, education, access to resources, etc (Sweeney, 2015). In our survey, we aimed at ensuring fair representation of responses from all socioeconomic strata of Pune. Over 40% of the population of Pune resides in over 400 slums (well above the national average population) and it is important to note their opinions. This was ensured in our survey through the help of various NGOs who maintain an active presence in slums. The network of these NGOs was leveraged in order to reach around a dozen different slums in Pune.

In order to gauge the socioeconomic status of a given respondent, we utilized a set of simple questions that included information about their ration cards, living conditions, and other relevant material possessions. We were able to use this information in order to create a metric of socioeconomic status, which was utilized in further analyses. The following represents the responses to the questions used to construct this metric.

Households:

As seen in Fig. 2.1-2.3 represents information about the household size (family members), number of rooms in their house, and the calculated room density, which is the number of rooms divided by the household size, respectively. As seen in Fig. 2.3, there are prominent responses for room density between 0-1.5. A relatively lower number of respondents reported room density of 1.5 and higher.

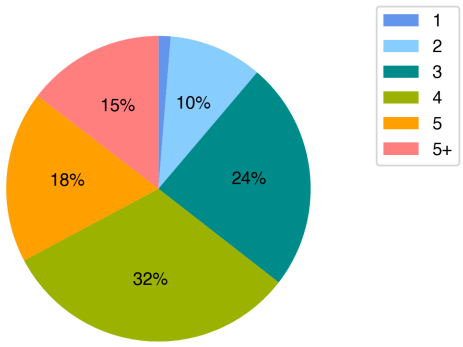


Figure 2.1 Household size

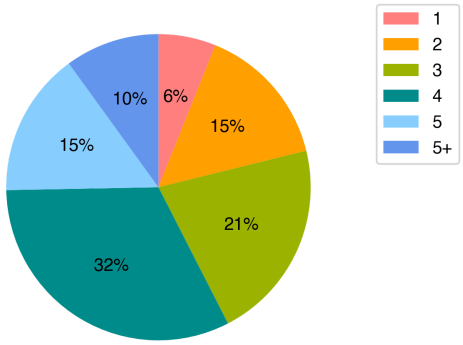


Figure 2.2 Household rooms

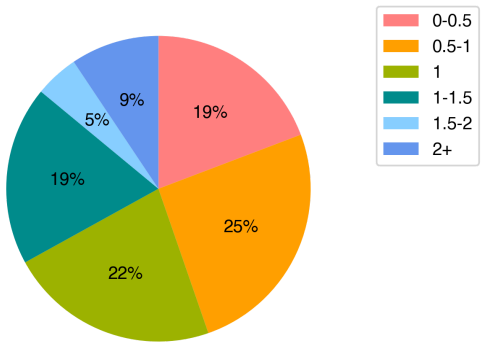


Figure 2.3 Room density

Basic amenities

Ration card ownership and household toilets are robust predictors of socioeconomic status. In our survey, we asked our respondents whether they owned ration cards, and the colour of their ration cards. We also asked them whether they had household toilets. The latter not only functions as a socioeconomic indicator, but also is a factor for public health, especially given the transmission of COVID-19. As seen in Fig. 2.4, we saw a fair representation from respondents with Orange and White ration cards, representing annual incomes of ₹15,000 to 1 Lakh, and 1 lakh and above respectively.

Similar responses were observed with respondents who either did not own a ration card, or were unaware about their ration cards. Only 5% of our respondents carried yellow ration cards, which represents Below Poverty Line (BPL) individuals. A high proportion of our survey respondents also reported having household toilets. However, 8% percent of our respondents did not report having household toilet amenities.

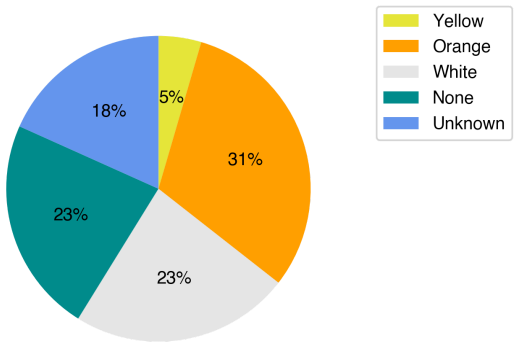


Figure 2.4 Ration card ownership

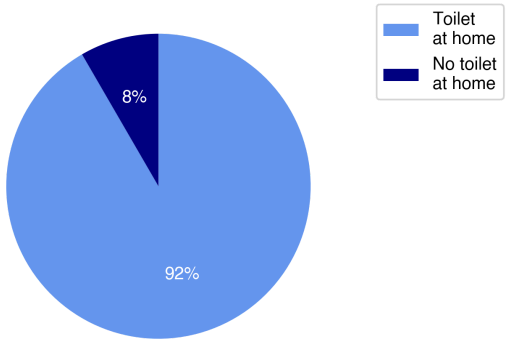


Figure 2.5 Toilet ownership

Material possessions

Possessions such as air conditioning (AC) units, radios, TVs, etc. also correlate with one's socioeconomic status. Not only do they correlate with one's earnings, they also act as tools for information, mobility, and so on. Fig. 2.6-2.10 display the numbers relating to the ownership of AC, Radio, TV, Laptop, and Vehicle by our respondents.

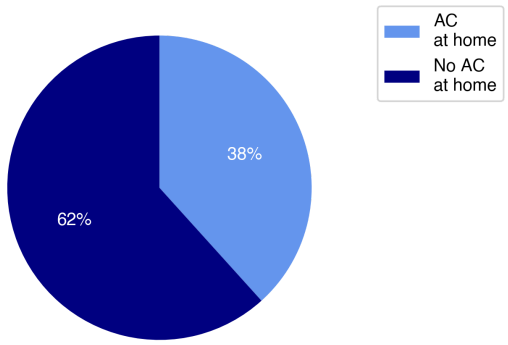


Figure 2.6 AC ownership

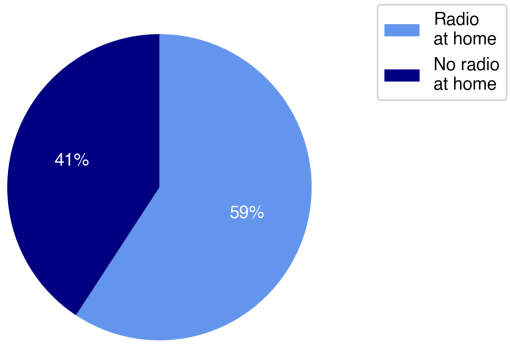


Figure 2.7 Radio ownership

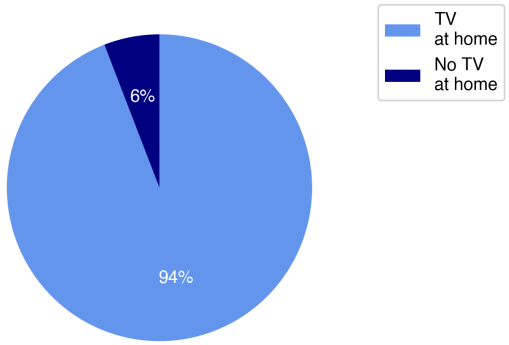


Figure 2.8 TV ownership

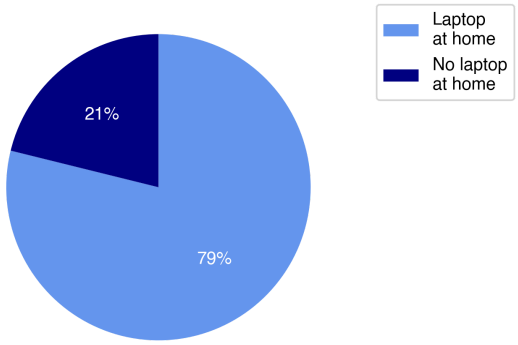


Figure 2.9 Laptop or computer ownership

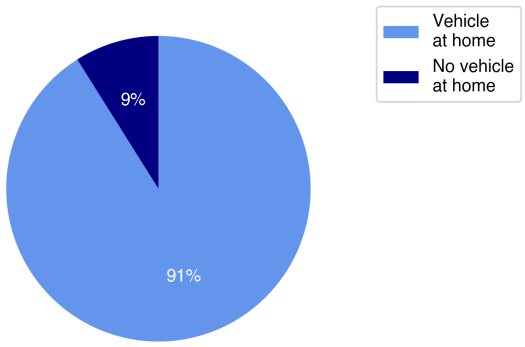


Figure 2.10 Vehicle ownership

Socioeconomic status: Construct

Socioeconomic status is a construct dependent upon many things such as monetary earning, social stature, total wealth, education, and so on. Various studies synthesize different constructs for measuring socioeconomic status of their cohorts, and it depends upon what aspect of the study population is of importance to the study. For the purpose of analysis of our survey data, we constructed a metric for socioeconomic status using the information obtained from specific questions of our survey. The responses to these questions were used to construct a hierarchical model, consisting of ration card information, sanitary amenities, and other material possessions. Fig. 2.11 shows the flowchart for this hierarchical model that was used to classify our respondents into 5 socioeconomic classes. As seen Fig. 2.12, we received equivalent representation from ‘Middle’ and ‘Upper-middle’ class (30%). 21% of our respondents were classified as lower middle class, whereas respondents classified as ‘High’ and ‘Low’ class constituted 11% and 8% of the survey population respectively.

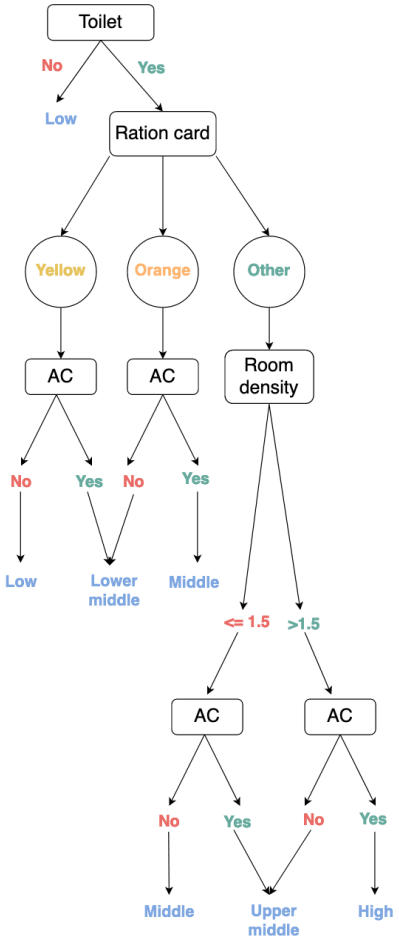


Figure 2.11 Socioeconomic status: a metric

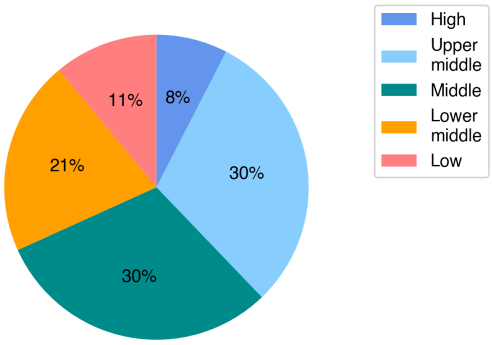


Figure 2.12 Socioeconomic status

Conclusion

In order to extract accurate information from a population based survey, it is imperative to obtain corresponding representation from various strata of the population. Socioeconomic status represents a major factor in stratification of the population of a city, from geography, to education, to civic and health amenities. Therefore it is important to form a robust socioeconomic metric to analyse population data, and more importantly to obtain a fair representation of socioeconomic classes from a given population. Our survey data reflects both of these things, by ensuring a robust classification, and a representative population that is diverse in nature despite the lack of true random sampling.

Section 3: Medical Impact

Introduction: medical impact of the pandemic

With over 100 million cases worldwide and more than 2 million dead, the COVID - 19 pandemic has led to a drastic loss of human life worldwide. The virus presents an unprecedented challenge to the medical community all over the world and India is not an exception.

Of the 1,12,70,231 cases recorded in India as of 20/03/2021 (*MoHFW | Home*, 2021), about 20% were recorded from Maharashtra, making it the state with the highest number of cases in the country. Ever since Maharashtra's first coronavirus case was detected on 9th March 2020, the brunt of the pandemic has been disproportionately borne by vulnerable areas such as urban slums. It is the nature of any virus to spread quickly. In particular, the urban slums face challenges of high population density, scarce resources, poor sanitation, and inadequate information access. With over 40% of Pune's population residing in slums (Census of India, 2011), the city is well above the national average of 17%. This is reflected in the number of COVID-19 cases recorded, with Pune leading this disastrous race in Maharashtra.

The most immediate effect of the pandemic has been the disruption of Indian cities' public health systems. During the pandemic, the primary focus of these systems laid on treating affected COVID-19 patients and arresting the spread of the disease. As a result, treatment of patients with other diseases took a back seat. It was reflected in outpatient departments being shut down and medical staff being diverted to COVID-19 response. Among the socioeconomically disadvantaged people, the burden of anxiety was high. During the pandemic, the hospital beds had been reserved for COVID-19 patients. As a result, patients with non-COVID-19 related easily treatable medical conditions are avoided healthcare to reduce the risk of COVID-19 exposure (Kim et al., 2020). With the medical impacts of the pandemic stretching far wider than the virus itself, in this section, we attempt to gauge the medical impact of the pandemic on Punekars.

To address the ease to return to normalcy, apart from the 'visible' medical impacts; we need to consider the 'invisible' impacts of the pandemic as well. In order to assess the psychological impact of the pandemic, we asked a few prediction questions such as - 'when will the overall situation return to normal?' , 'when will you be able to leave the home without even thinking about the virus?' A majority of the responses are clustered around 2022. More detailed analyses of these and other similar questions can be found in the section titled - ' Perceptions of the pandemic'.

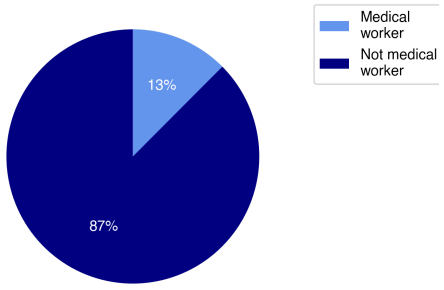


Figure 3.1 Occupation: medical workers

Much like the soldiers in a war, the pandemic had a high medical impact on doctors, nurses, frontline workers etc. 13% of our survey respondents were medical workers. Medical workers tend to have disproportionate impact due to the pandemic in terms of health, fear, awareness etc.- as described in the further sections of the report.

The WHO has expressed concern over the pandemic's mental health and psycho-social consequences (WHO, 2020a). The Indian Psychiatry Society reported a 20% increase in mental illness cases during the pandemic (Kumar & Nayar, 2020). In order to measure the medical impact of the pandemic, we classified the data in four sections. i) there were 8% respondents who had been tested positive for the coronavirus by December 2020, ii) 13% respondents had a family member (other than themselves) who was affected by COVID-19, iii) almost everyone, ie 87% of the respondents knew people who were tested positive for the coronavirus, and iv) 43% of the respondents have had a death in their close circle. This is bound to have some negative psychological manifestations.

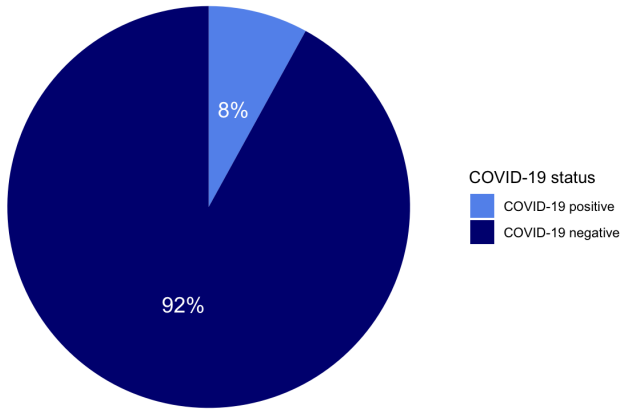


Figure 3.2 COVID-19 infection history: persona

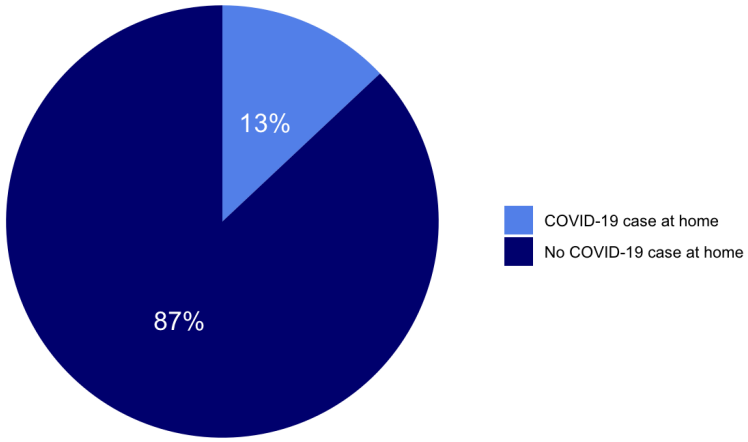


Figure 3.3 COVID-19 infection history: household

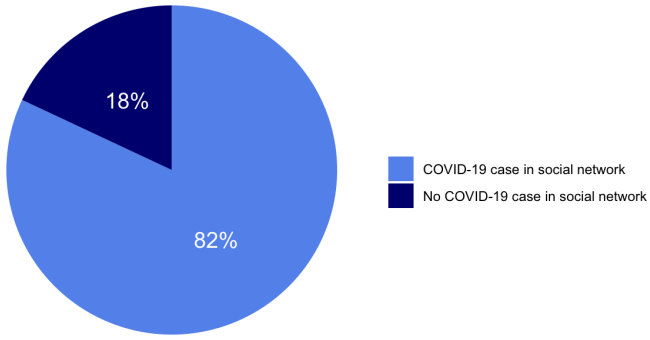


Figure 3.4 COVID-19 infection history: non-household

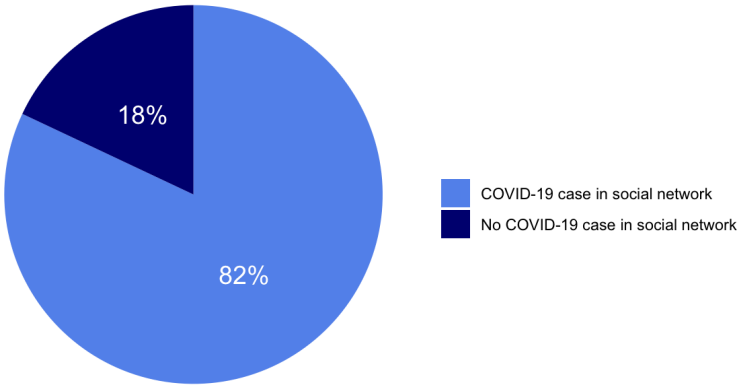


Figure 3.5 COVID-19 infection morbidity

Description of medical impact metric

To define medical impact, we looked at the physical and psychological impact of the virus on those affected and the resulting changes in their attitudes and practices. Medical impact takes into account the direct impact of the virus on the person affected and its indirect impact on those caring for him. This involves the physical impact of the disease on the body, impact of being quarantined or admitted to a hospital and the high risk involved in sharing living spaces and taking care of the person affected. It also takes into consideration the high mental and physical toll faced by frontline workers working long hours providing care to COVID-19 patients despite exhaustion, personal risk of infection and a fear of transmission to family members. Finally, it also considers the strong psychological impact of a death of a close one and the fear of the virus itself.

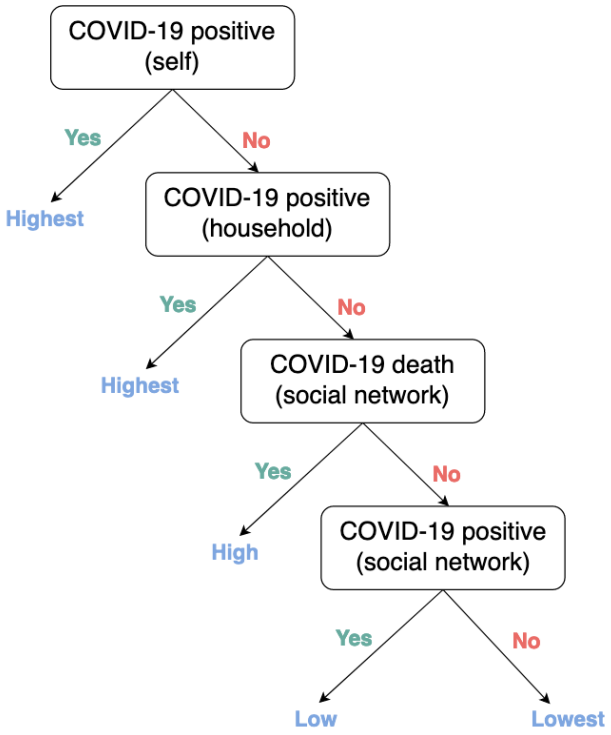


Figure 3.6 Medical impact: a metric

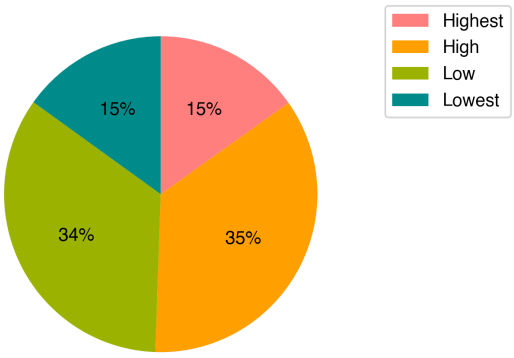


Figure 3.7 Medical impact
This figure shows that COVID-19 had a significant medical impact on almost 50% of our respondents.

Description of the state of the pandemic

Since the beginning of the pandemic everyone is waiting for the prediction about its end, but there is no definite answer to that yet. In the survey, people were asked when they think the pandemic will end. Only 38% people think the pandemic will end in 2021. This shows that people are aware of the situation and appreciate that the pandemic might take time to end completely. Interestingly, 75% of people believe that the situation can get to a pre-pandemic normal without the pandemic actually ending. This contradicts the perception about return normalcy. A deep psychological impact of the pandemic can be seen in the future timeline of psychological normal perceived by people. People seem to be less optimistic. Less than half of the respondents think that a psychological normal can be achieved in 2021, and majority (71%) of the respondents think that can happen in 2023. The disparity in the perceived time taken for reaching a pre pandemic situation, and the time taken to get to a psychological normal or to change behaviors like mask wearing emphasize the prominent psychological impact of the pandemic. When this data is superimposed on the socio-economic status of the respondents, we see that those in the lower strata are more optimistic about the pandemic ending early. Since these were the people who were the most affected by the pandemic, it is but natural that they are the ones who are waiting eagerly for things to get back to normal.

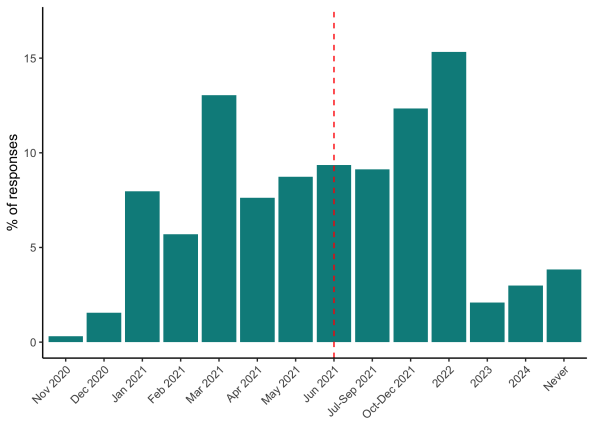


Figure 3.8 Perceptions of the end of pandemic

Fig. 3.8 is a histogram showing the number of respondents who believe the situation would return to pre-pandemic times at a certain time. The dotted line represents the average time of all respondents.

Section 4: Economic Impact

Paragraph 1 Introduction: economic impact of the pandemic

The economic impacts of any pandemic are profound, and COVID-19 has been no exception. By inducing an unprecedented and rapid collapse of business, industrial production and employment, the COVID-19 pandemic has caused the global economy to plunge and posed formidable challenges to policymakers and the general population. As a case in point, the gross national product of the United States experienced its steepest quarterly drop ever: a decrease of 9.1% [1] in the second quarter of 2020. The pandemic wiped out approximately 20.5 million nonfarm jobs in April 2020 and has led to record high unemployment claims.

The economic impact of COVID-19 in India extends beyond what can probably be inferred from national statistics. Not only have major industries - aviation, tourism, retail prices - bore the brunt of the economic collapse, but people have also suffered financially at the individual level.

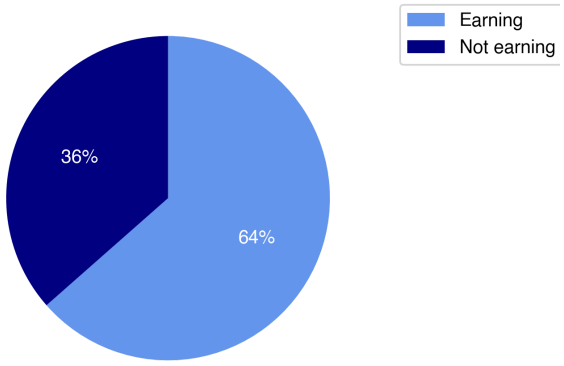


Figure 4.1 Employment: current status

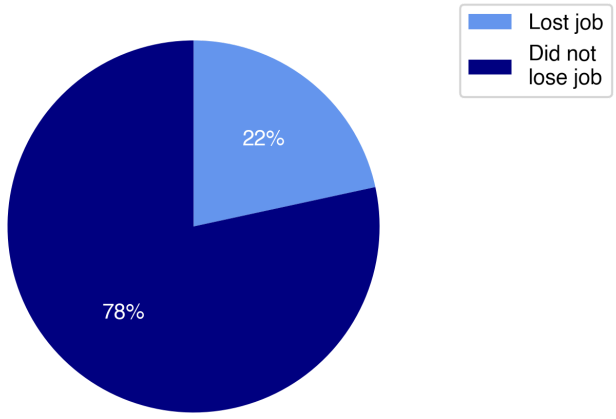


Figure 4.2 Unemployment during the pandemic

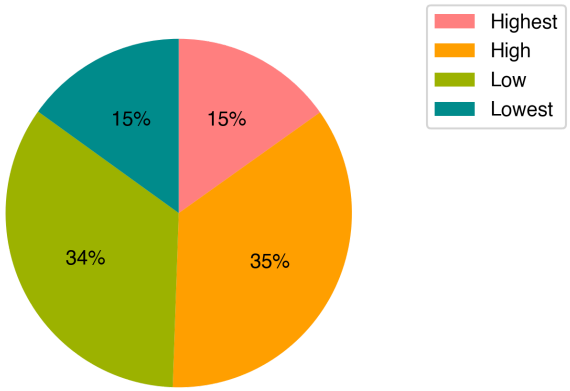


Figure 4.3 Income change during the pandemic

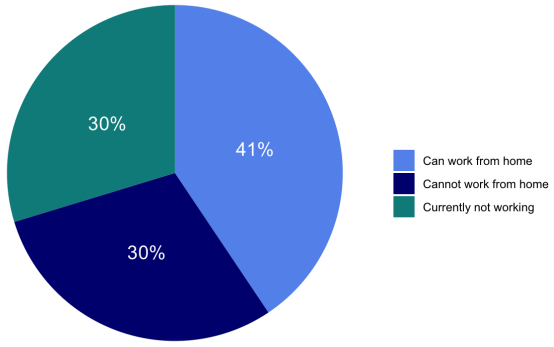


Figure 4.4 Work-from-home status

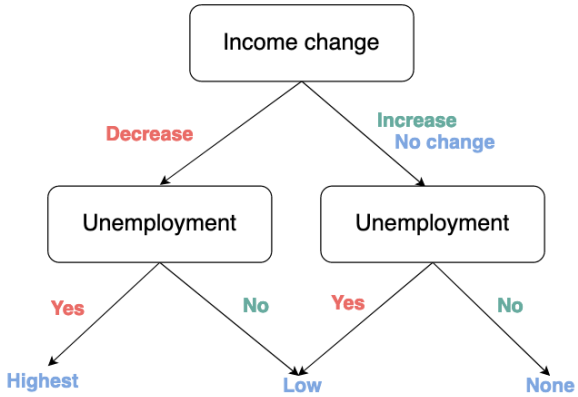


Figure 4.5 Economic impact: a metric

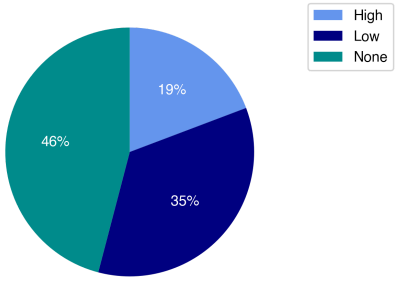


Figure 4.6 Economic impact

Description of the state of the economy

Almost everyone has experienced the economic impact of the pandemic in some or the other way. Recovering from an economic impact definitely takes time. However, India's economy is seeing a relatively quick recovery and is predicted to follow the 'V-shaped' recovery trajectory. [5,6] The people too seem to be prettyFig. (x) is a histogram showing the proportion of respondents who believe the economy will return to normal at a certain time. The dotted line represents the average time of all respondents. optimistic about the economic normal, more than 80% think that economic normal will be achieved in 2022.

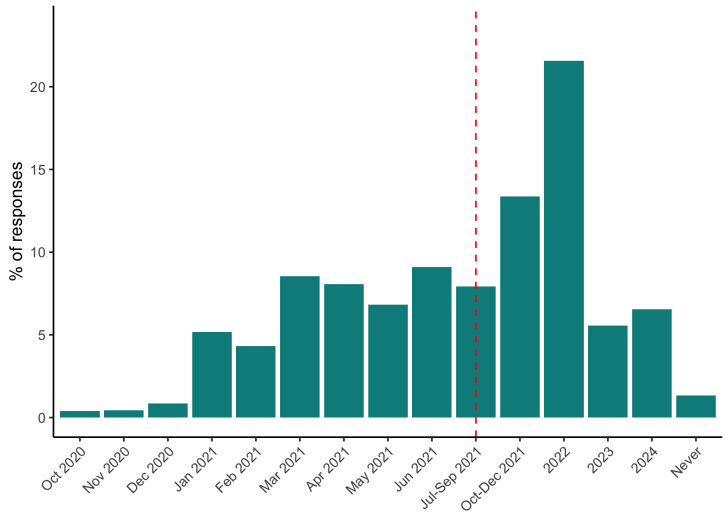


Figure 4.7 Perceptions of economic normalcy

Fig. 4.7 is a histogram showing the proportion of respondents who believe the economy will return to normal at a certain time. The dotted line represents the average time of all respondents.

Section 5: Fighting the pandemic

Introduction

In one of the most widespread and devastating viral outbreaks in recent history, personal and public health measures have risen to the forefront of public discourse. Public health science, behavioural interventions, and associated digital tools have proven to be valuable assets alongside established medical infrastructure for fighting the COVID-19 pandemic. While measures such as lockdowns, compulsory mask-wearing, and even contact tracing apps such as Aarogya Setu in India have been touted as harsh, or even intrusive, they have provided some measure of defense against an unchecked spread of the disease.

As seen from the previous outbreaks of similarly transmissible pathogens, the knowledge and attitudes of the people, and the resulting behavioural changes in the public, are key to preventing further complications in arresting the spread of disease (Johnson & Hariharan, 2017; Lau et al., 2003; Mishra et al., 2016). With this survey, we have attempted to understand the 'Puneri' perspective of practices and compliance regarding private as well as public health interventions associated with the COVID-19 pandemic.

Private Interventions

Handwashing

Handwashing with water and soap has been considered as one of the most impactful general public health measures worldwide, even before the current COVID-19 pandemic. For India, the estimated net returns from national behaviour handwashing programs would amount up to ₹40,589 Crores, accounting for disability adjusted life years (Townsend et al., 2017). With ample early evidence of COVID-19 transmission occurring through direct and indirect transmission, washing of hands with soap and water is considered to be one of the most simple and cost-effective methods of preventing COVID-19 transmission. Despite its simplicity, promoting hand-washing through simple and effective communication (and subsequent evaluation) in order to bring about massive behavioural change through the populace is, and has been, an ongoing effort through multiple channels ("Opinion," 2020). In our survey, we tried to capture our people's attitude towards hand washing during the survey period by

measuring not only the self-reported frequency of handwashing, but also the perceived importance of handwashing as a mitigation measure against the transmission of COVID-19. Reported frequency of handwashing and its perceived importance are modulated through various factors such as age, frequency of visiting crowded spaces, access to information, and so on.

As seen in Fig. 5.1, variability exists as to the self-reported counts of handwashing throughout the day. However, there is a clear clustering of responses around the 4-10 times a day. When the respondents were asked for an ideal count for washing hands each day, the responses with higher counts were observed in higher frequency as observed in Fig. 5.2. This portrays a less than optimal behavioural adjustment as self-reported by the survey respondents.

In addition to the self-reported frequency of handwashing, we also asked our respondents to rate the importance of handwashing as a measure against fighting COVID-19 transmission. As seen in Fig. 5.1 and 5.3, more than 85% of the respondents rated handwashing as a ‘Very Important’ measure against fighting COVID-19 transmission, with around 10-12% of the overall population citing the measure as ‘Somewhat Important’. Only a slightly higher percentage of medical workers rated the overall importance of handwashing ‘Very Important’ as compared to the rest of the populace, showing considerable parity of attitudes regarding handwashing between medical workers and non-medical workers. This can be attributed to effective communication of said strategy from the media, government workers, the internet, and so on.

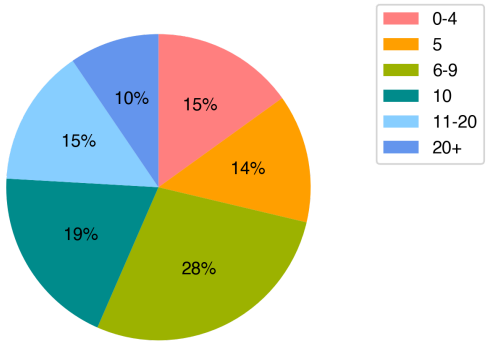


Figure 5.1 Self-reported hand washing frequency

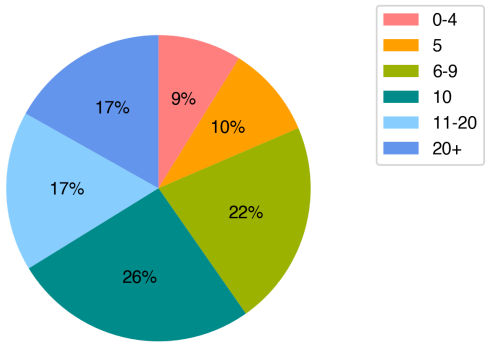


Figure 5.2 Optimal hand washing frequency

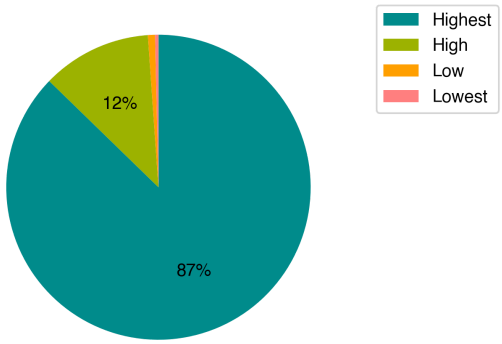


Figure 5.3 Perceived importance of hand washing

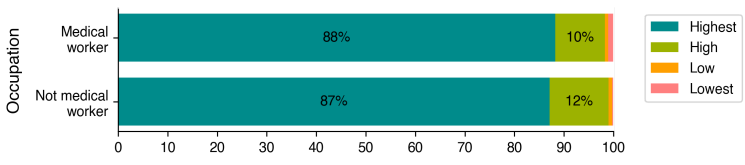


Figure 5.4 Perceived importance of hand washing by medical background

Mask Wearing:

From the initial stages of the pandemic in India, politicians, and health workers have spoken about the importance of wearing masks in public, including a tweet by Prime Minister Narendra Modi. Mask wearing was touted as a 'Social Vaccine' for instances where individuals had to step out for essential needs (Bellman, 2020). Landmark studies have demonstrated the importance of mask-wearing in combating respiratory infections, in multiple cohorts across various countries, in previous pandemics such as the SARS-CoV pandemic in 2003 (Sim et al., 2014). Research has shown a significant drop in transmission rates of COVID-19 associated with mandatory mask-wearing measures, solidifying its status as an important public health intervention for fighting the COVID-19 pandemic (Mitze et al., 2020). In our survey, we attempted to understand the importance of mask-wearing from the perspective of our respondents.

As seen in Fig. 5.5, 94% of our respondents understood mask-wearing to be an important exercise in fighting COVID-19 transmission. The high percentage of 'Very Important' responses (>90%) remains constant when categorizing the data according to age, gender, medical vs non-medical workers, education, and socio-economic status. This suggests a high level of penetration of information regarding mask-wearing amongst our respondents.

In addition to self reported importance of mask wearing, we also posed a question as to the percentage of people correctly wearing masks in public that the respondents encountered. According to the data, as seen in Fig. 5.6, we see a negatively skewed distribution, implying that a higher proportion of the responses denoted a high value of mask compliance among observed subjects. However, the mean of this distribution of responses lies at 67.3%, which indicates a demand for even higher mask compliance and associated activities.

When asked regarding the potential end of mask wearing as a required measure while venturing out, the corresponding responses display a large peak at 2022, with the mean of the responses lying in the last quarter of 2021.

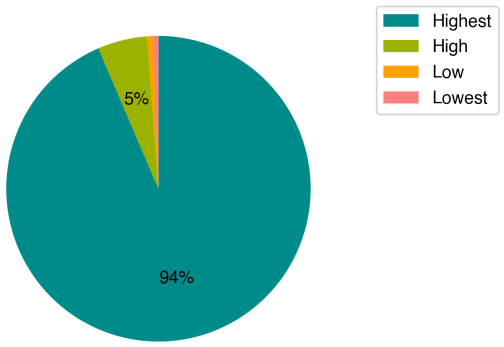


Figure 5.5 Perceived importance of mask usage

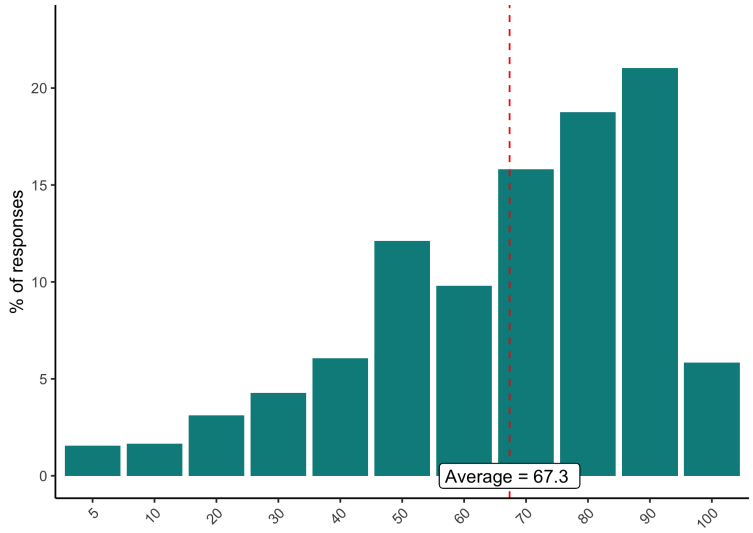


Figure 5.6 Perceptions of public mask usage

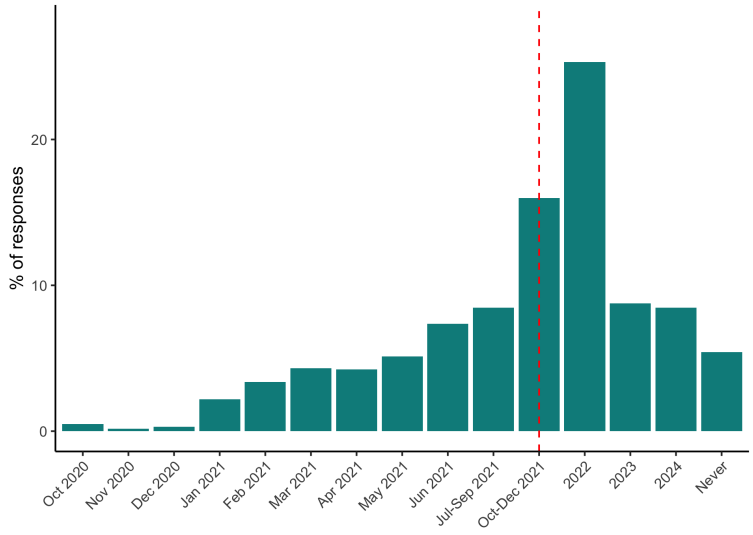


Figure 5.7 Perceptions of the end of mask usage

Social distancing

Social distancing is a public intervention intended to decrease the contact (and therefore increase the distance) between people, regardless of their infection status, in order to lower the chances of airborne as well as physical transmission of the COVID-19 pathogen. Although not cited as a fool-proof measure, it has been shown to considerably decrease the spread of the disease in a given populace in certain configurations, subsequently also decreasing the morbidity and mortality associated with COVID-19 (*Coronavirus Disease (COVID-19)*, 2020).

In our survey, we tried to understand the importance of social distancing from the perspective of our respondents, and how these impacts differ according to modalities such as age, occupation, change in income, and so on.

As seen in Fig. 5.8, 85% of the respondents perceived ‘Social Distancing’ to be a ‘Very Important’ measure. Similar numbers are seen in Fig. 5.8, where there were no significant differences in the perception of the social distancing measures, regardless of the economic impact of the pandemic on the respondents. The survey included questions regarding the number of people the respondents would see within a week, and the number of people they knew well. There is a very apparent trend of the number of people seen within a week shrinking away from the number of people known well by

the respondents. This denotes the precautions taken by the respondents with respect to socialising, and therefore self isolating against COVID-19.

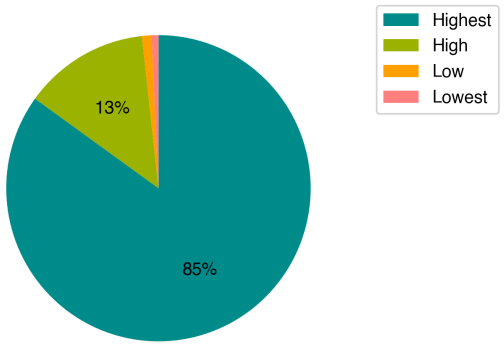


Figure 5.8 Perceived importance of social distancing

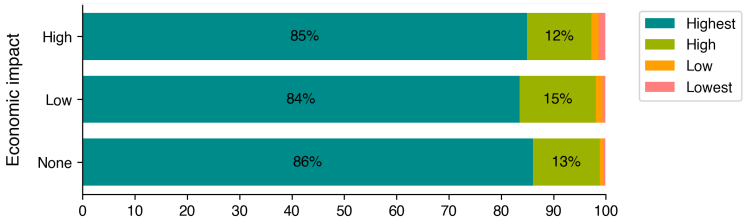


Fig. 5.9 Perceived importance of social distancing by economic impact.

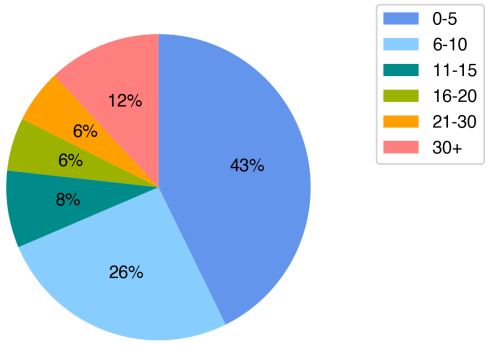


Figure 5.10 Number of people met

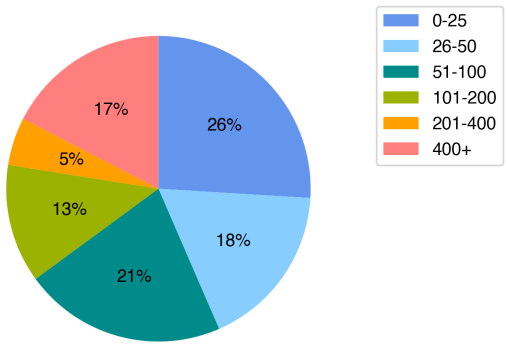


Figure 5.11 Number of people known well

Lockdown

Apart from physical distancing between individuals or groups of individuals, social distancing also encompasses measures such as closing down educational institutions, exam centers, workplaces, restaurants, places of worship, weddings, and any other 'non-essential' places where people may come into close contact. Considered to be one of the most disruptive measures introduced in order to fight the spread of the COVID-19 pandemic, such 'lockdowns' have greatly reduced the speed and spread of COVID-19 transmission. The first case of a COVID-19 patient in Maharashtra was observed in Pune as of 9 March 2020. Subsequently, more people were traced across the state who were found positive for COVID-19 . On the 18th of March, the Federation of Trade Association of Pune announced the closing of all shops, barring those for essential goods (Kasbe, 2020). Chief Minister of Maharashtra Uddhav Thackeray announced the closure of all workplaces in Pune (among other cities), barring those for essential services and public transport, with an advisory against stepping out of homes for anything other than necessary purposes. This was followed by a nation-wide lockdown, which was subsequently 'unlocked' in stages of freedom from 30 June onwards (Singh, 2020).

In our survey, we tried to understand the importance of and lockdowns from the perspective of our respondents, and how these perceptions change according to modalities such as age, occupation, change in income, and so on.

Fig. 5.11 displays the cumulative importance of the lockdown measure as rated by the respondents. An interesting trend is seen in Fig. 5.12, which depicts the responses of the people with regards to the importance of the lockdown measure. When seen through the metric of socioeconomic status, we see that a larger percentage of the yellow ration card holders rating the lockdown measures as ‘Very Important’, with the subsequent Ration card holders responding to the choice in a decreasing trend. A bulk of the responses are clustered around ‘Somewhat Important’, with a substantial number of responses also found for ‘Not Much’ and ‘Not at all’. This is a surprising trend since the lower levels of the socio-economic classes were the most affected by the lockdown measures, given the poor access to resources, as well as lower opportunities for remote working (India Today Web Desk, 2021).

This trend can be tentatively attributed to the following reasoning: Firstly, as per the data we were able to collect, a relatively higher fear of the coronavirus pandemic was reported by respondents from the lower socioeconomic classes Fig. 5.13. Respondents belonging to these categories reported corresponding lower education levels, a higher density of people in each living unit, and a higher propensity towards venturing out in crowded places, as compared to people from higher socioeconomic classes. All of these factors paint a picture of a justifiably higher fear of the pandemic in the lower socioeconomic classes, since all aforementioned factors contribute towards a higher chance of exposure to COVID-19. This could, to a certain extent, explain the observed relation between the perceived importance of lockdown and socioeconomic class.

Again, we also investigated the difference between times the respondents left house in a week, vs. number of times the respondents visited crowded areas. Since the survey took place in mid-November 2020 to the end of December 2020, a lot of the lockdown restrictions in Pune had been lifted. Both graphs 5.13 and 5.14 explain a lot regarding the resumption of mobility among the general populace.

Fig. 5.16 Shows the projection from the respondents regarding the end of the lockdown measures against COVID-19, with a peak of responses noting 2022, and the mean lying in the last quarter of 2021. This prediction, from today’s standards, has proven to be pessimistic in its outlook. Nonetheless.

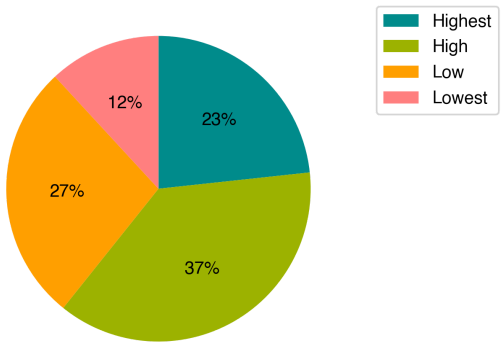


Figure 5.12 Perceived importance of lockdown

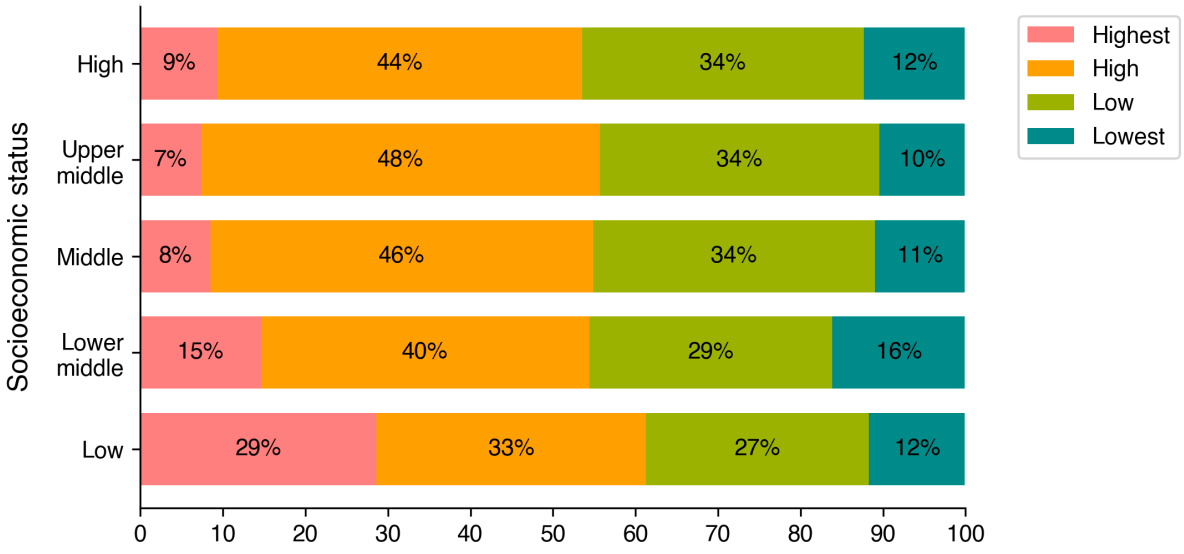


Figure 5.13 Perceived importance of lockdown by socioeconomic status.

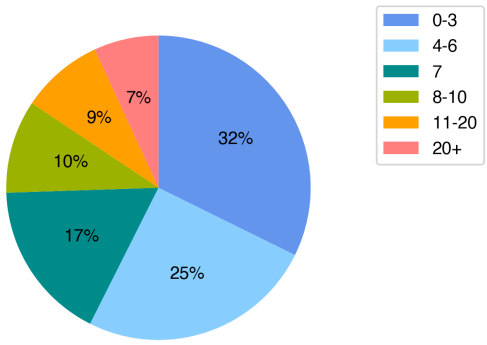


Figure 5.14 Times left home

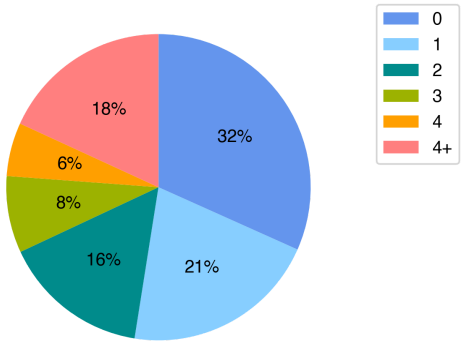


Figure 5.15 Visits to crowded area

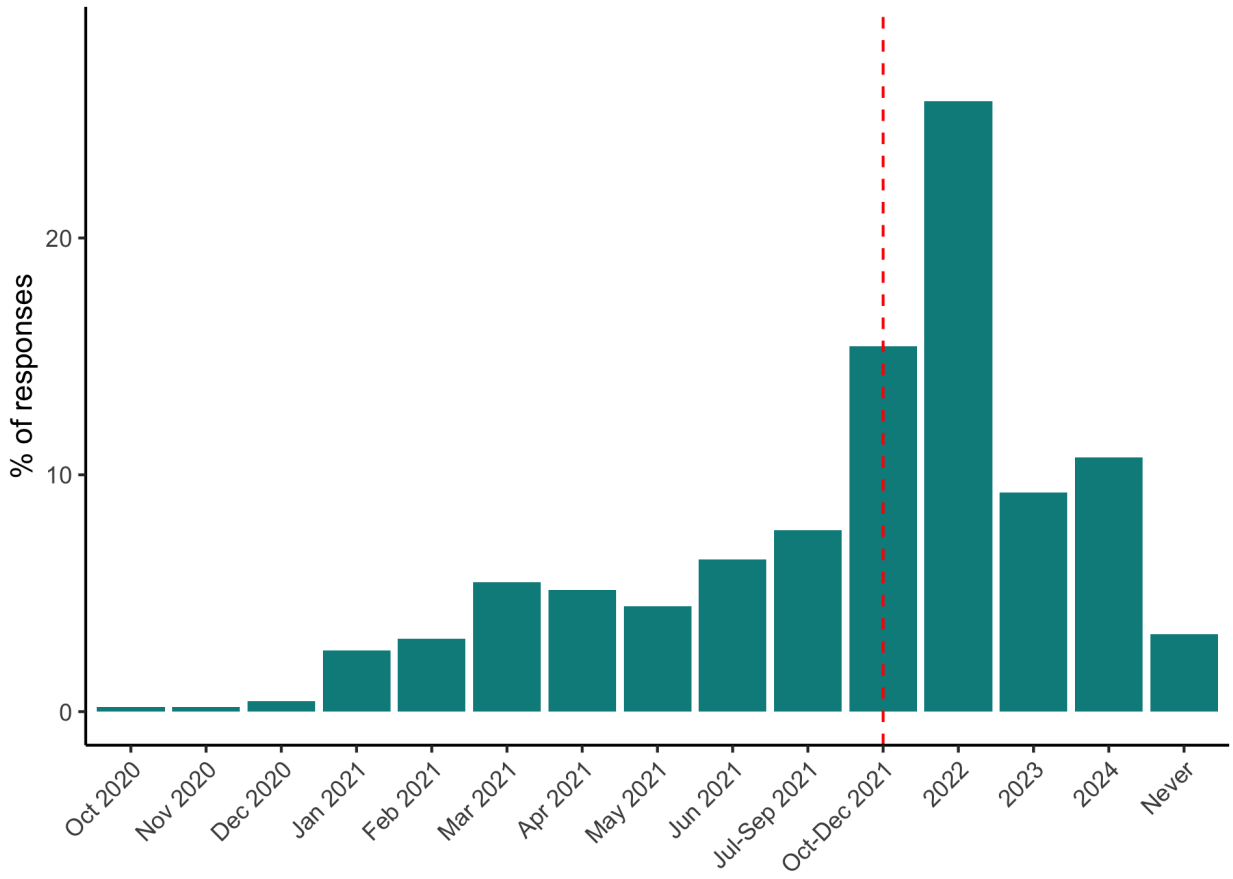


Figure 5.16 Perceptions of the end of lockdown

Aarogya Setu

Aarogya Setu is an indigenous 'Contact Tracing, Mapping, and Self Assessment' digital service, primarily disseminated as a mobile app, developed under the Ministry of Electronics and Information Technology. The service offers a multifaceted array of utilities including advisories for best practices, important resources for COVID-19, and user tracking for gauging exposure to COVID-19 infected individuals. The app was not considered mandatory. However, Aarogya Setu was utilized as a requirement in certain private establishments and civic containment zones as a method of tracing close quarter movements of people in areas of high-risk.

As seen in Fig. 11, our findings show that although a large proportion of our respondents did report Aarogya Setu as an important mitigation measure against COVID-19, the absolute importance attributed to the service was less than other measures such as hand washing, mask wearing, and social distancing. This could be attributed to privacy concerns regarding the app, as reported by various sources (Dubey, 2020). The relative low importance attributed to Aarogya Setu could also be attributed to the ease of access to hands-on information relating to COVID-19, which could be sourced voluntarily, and the decreased necessity for a resource intensive tool for the same purpose.

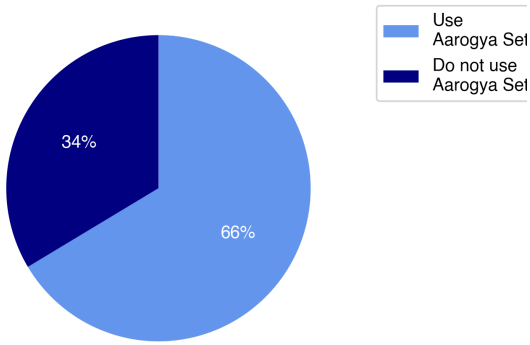


Figure 5.17 Aarogya Setu usage

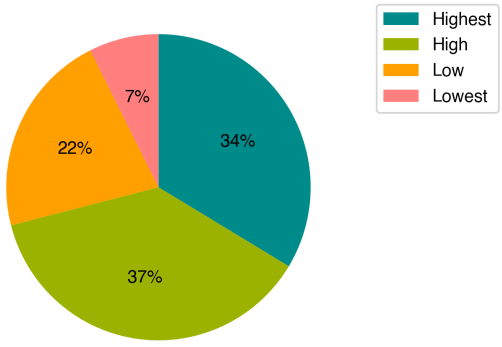


Figure 5.18 Perceived importance of Aarogya Setu

Testing

In a worldwide address, World Health Organisation head Tedros Adhanom Ghebreyesus urged for the nations to ramp up testing of individuals for the SARS-CoV-2 pathogen to provide a mainstay for isolation and contact tracing of exposed individuals. Testing in India was initially reserved for travellers and for individuals with explicit COVID-19 symptoms. However, with the easing of international shipping and the availability of COVID-19 test kits, various local governments, and associated entities began testing the general populace for the SARS-CoV-2 antigen (current infection) and antibodies (past infection/potential immunity. In the month of June 2020, Pune Municipal Corporation undertook the first mass testing initiative for detecting the COVID-19 antigen for around 1 Lakh citizens residing in the containment zones of the city. This was made possible due to the availability of rapid antigen testing kits developed by the SD Biosensor company, which was approved by the Indian Council for Medical Research (ICMR) (Thevar, 2020). Said test kit worked around multiple hurdles of PCR-based testing by employing a fast-acting reagent kit that could be used in non-laboratory settings and could be deployed by volunteers on a door-to-door basis. This reduced the need for citizens to step out of their homes, which was additionally valuable for immunocompromised patients, pregnant women, and other sensitive individuals. This bolstered and therefore reduced the strain on the steadily rising capacity of government and private testing centers dedicated to COVID-19 diagnostics.

In our survey, we attempted to understand people's perception of the importance of testing for the COVID-19 pathogen as a tool for fighting the pandemic situation.

As seen in Fig. 5.17, we see a similar trend as in Fig. 8, although less pronounced, where respondents with lower socioeconomic status attributed higher importance to testing than higher groups. This can be attributed to higher incidences of COVID-19 patients in Informal Urban Settlements. This has been particularly noted in Pune in areas such as Bhavani Peth. By mid-May, the Informal Urban Settlements of Pune held about 90 percent of the total COVID-19 patients. The Pune Serosurvey undertaken between 20th July - 5th of August in 2020 demonstrated that the seropositivity rate was decidedly higher when associated with hutments or informal dwellings, floor space of fewer than 150 sq. ft., and the use of common toilets (Ghose, 2020). Testing is, therefore, an important tool for not only identifying areas with higher rates of infection

and for the deployment of resources during a pandemic situation, but it is also valuable as a post hoc tool for policymakers to identify the areas of the city which can benefit from special fortifying measures in order to ensure their resiliency against future emergency situations.

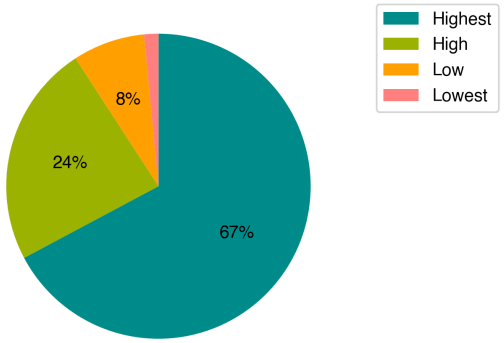


Figure 5.19 Perceived importance of testing

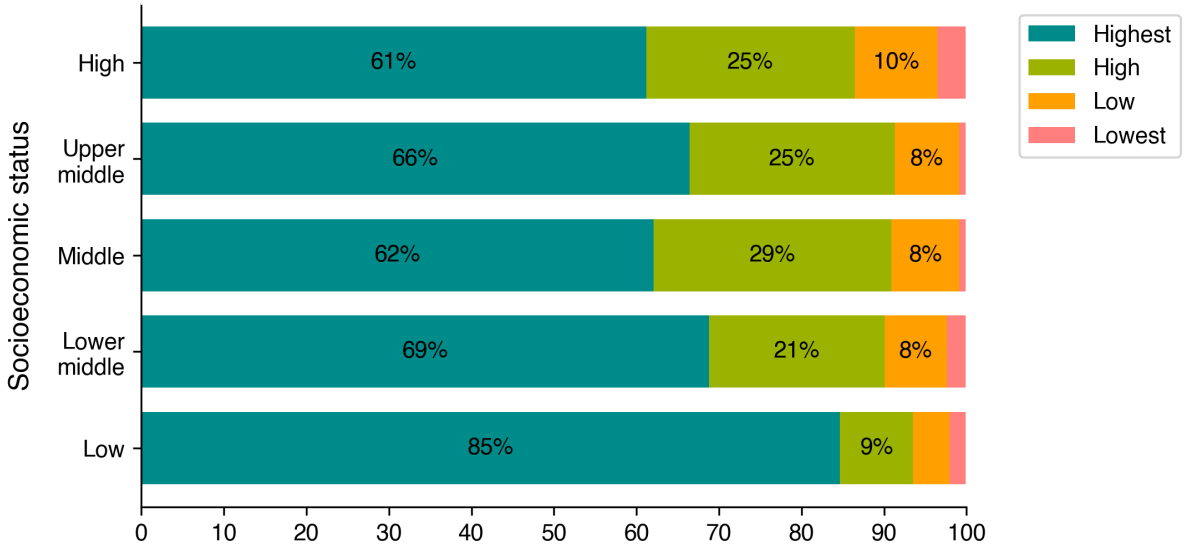


Figure 5.20 Perceived importance of testing by socioeconomic status

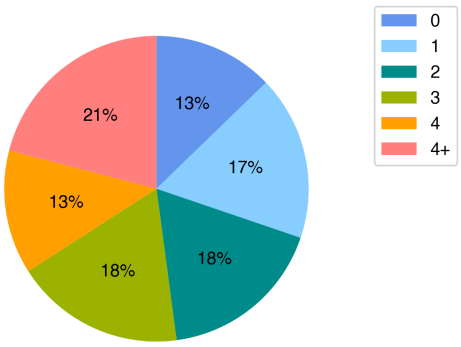


Figure 5.21 Time elapsed before testing: development of symptoms

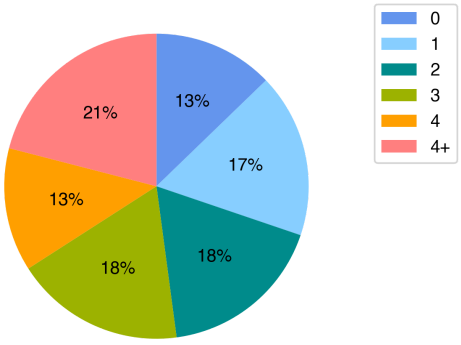


Figure 5.22 Time elapsed before testing: contact with COVID-19 patient

Vaccination

As seen in Fig. 5.20, a large proportion of the overall respondents (78%) do consider the vaccine as an important measure in fighting the pandemic. However, the net proportion of responders rating the vaccine as 'Very Important' is decidedly lower than the corresponding proportion for personal measures such as handwashing and mask-wearing.

As seen in Fig. 5.24, people's response to the time point at which a COVID-19 vaccine will be available averages around the May 2021 mark, which has turned out to be an

overestimation given the beginning of a vaccination drive in March 2021 itself. According to our findings, people estimate that the need for wearing masks in public will far outlast the successful vaccination of the people of Pune. This perception can be attributed to Vaccine Hesitancy in a section of the respondents (Dror et al., 2020), and the sustained adoption of habits such as mask-wearing long after the pandemic, as seen post the 2003 SARS pandemic in East Asia, where the mask-wearing habit was sustained long enough to facilitate mask-wearing compliance during the COVID-19 pandemic (Wong, 2020). People also estimated that the population of the city of Pune will be vaccinated by July-September 2021, as seen in the distribution in Fig. 5.26.

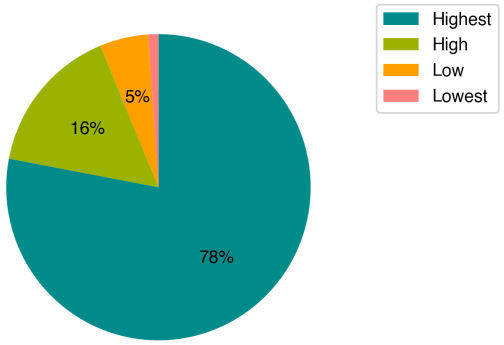


Figure 5.23 Perceived importance of vaccination

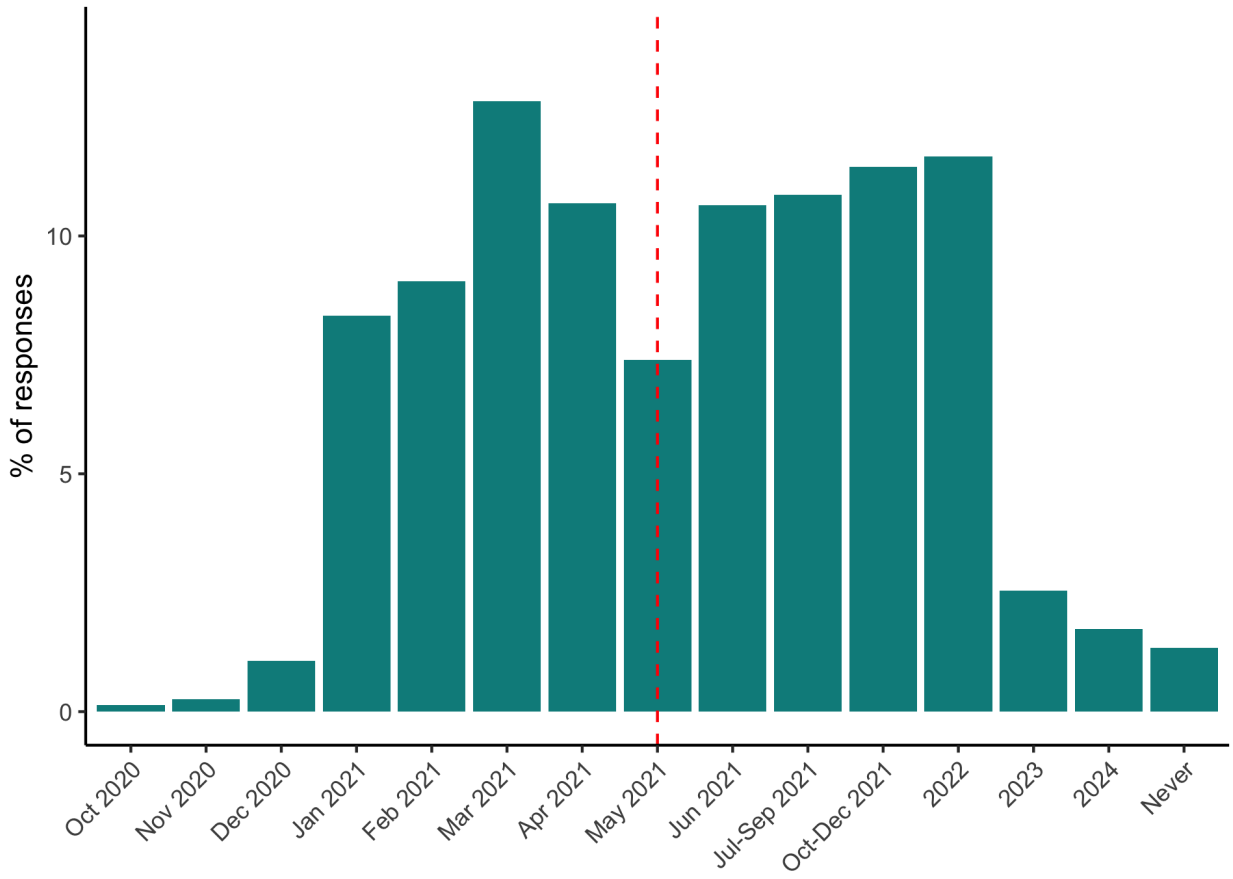


Figure 5.24 Perceptions of vaccine availability

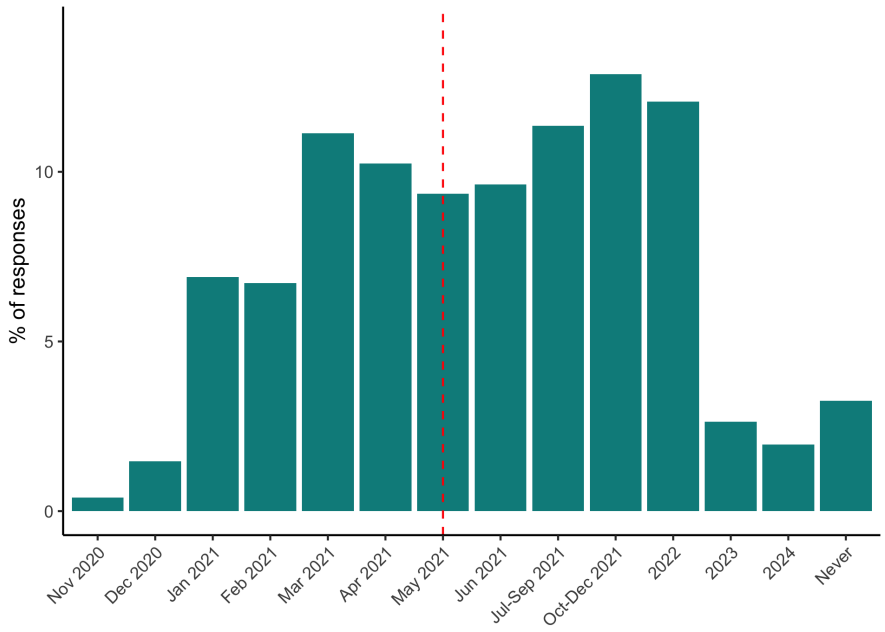


Figure 5.25 Perceptions of self-vaccination

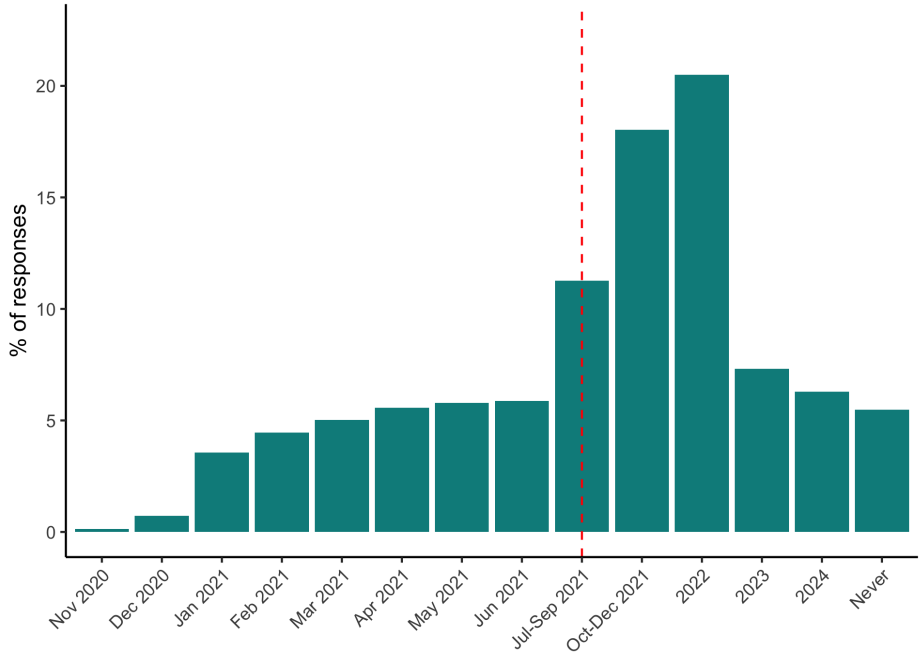


Figure 5.26 Perceptions of mass-vaccination

Conclusion: Our findings show that people's trust and therefore compliance towards fighting the pandemic, and towards the tools for fighting the pandemic, are greatly influenced by factors such as intrusiveness of the measures, ease of compliance, fear towards the pandemic, socioeconomic factors, and so on.

The key theme seen in these findings is that our survey population showed a tendency to be agreeable towards measures that are personal, low cost, behaviourally adoptable, and non-intrusive. This is clearly seen with the high agreeability towards measures such as hand washing, mask wearing, and social distancing. For complex measures such as large scale lockdowns, testing, vaccination, and app based contact tracing, a decreased positive response can be seen. This can be attributed to various concerns arising from lack of straightforward information, innate hesitancy, effects on normal habits and routines, and a myriad of complex factors.

It is undeniable that measures such as lockdowns, large scale testing, and vaccination drives have had large scale benefits in terms of lives saved, lowered stress on medical infrastructure, and many other aspects. However, there still remains much to be done in terms of efficient, coherent, and ground level dissemination of information regarding such measures. With the beginning of COVID-19 vaccinations beginning in early 2021, vaccine hesitancy among the populace could result in a significant proportion of the population electing to forego the procedure. In the long term, such unaddressed sections of population could not only undergo personal trials with COVID-19, they could also offer a buffer for the pathogen to remain in circulation. This poses a considerable risk for sections of the population such as those too young to be vaccinated, or immunocompromised people. This has been observed in cases where pockets of unvaccinated individuals can face outbreaks due to low levels of immunization in the population (Olive et al., 2018). In an evolving pandemic such as COVID-19, with evidence of mutations across the world, it is a very real possibility that unvaccinated individuals can sustain the pathogen in the population long enough to produce a strain that may overpower the immune status of vaccinated individuals. The social and economic costs of such phenomena are substantial regardless of speculative events, and policymakers can focus on well founded machineries of information dissemination that provide reliable, transparent, and easy to access caches of information relating to important policies and measures, backed by detailed and open source data.

Section 6: Fighting the infodemic

Introduction: fighting the infodemic

The growing digitalization of the world has enhanced the availability of news, making it possible to access a plethora of sources all from a mere smartphone or a device connected to the internet. This ease of access and abundance of resources, both formal and informal, has contributed to the growing spread of unreliable information within countless communities, which can, and do, have real world consequences. This, without significant vetting, can prove to be counterproductive, especially during a global crisis such as the one brought on by the COVID-19 pandemic.

In addition to the more visible elements of the COVID-19 pandemic, a secondary, manmade, and 'pandemic' is of concern: the 'infodemic'. The infodemic is described as a product of mass information coupled with regulated and unregulated production and consumption of news (WHO, 2020b). The infodemic amplifies the danger of COVID-19 by targeting accurate, vetted information that is imperative in shaping public response to a pandemic. With an overabundance of both official and unofficial news, not only are effective countermeasures to the virus slowed down, but even reversed, with examples ranging from cherry picked data diminishing the importance of masks, to anti-vaccine propaganda, to claims of hot lemon tea providing immunity against the COVID-19 virus (Polygraph, 2021)!

The infodemic is a complex entity, shaped by motivated disinformation, uninformed misinformation, lapses in fact checking, blind information sharing, and lack of access to the proper news sources. For example, differing socioeconomic levels, lead to different levels of access to news where hypothetically, residents in a lower socioeconomic level would have a lower active awareness for the filtration of fake news, while also having potentially fewer sources of information. Additionally, entities such as online 'filter bubbles' can also be a significant player in the infodemic, where our online 'echo chambers' could potentially lead to the circulation of misinformation without any external validation, or without any reference to news that fails to make it through the 'filter' (Spohr, 2017).

Even though the infodemic is a worldwide phenomenon, it is exacerbated in India by the staggering 1.366 billion residents in the country, 400 million of which are internet users (The World Bank, 2021). This survey aimed at understanding the public's position on the perceived production of news, and the trust associated with the respective

course. The data collected were mapped against several distinct demographics, such as age, gender, and socioeconomic status, in an attempt to extract the perceptions of communities as a function of their distinct demographics, and to accurately track the mechanisms and path of the infodemic.

In this section of the survey, we asked our survey respondents about their trust levels in various traditional and non-traditional sources of information about coronavirus. A fundamental assumption of any Knowledge, Attitudes, and Practices survey is that knowledge drives attitudes which in turn drive practices. Indeed, a quintessential KAP survey question often assumes a lack of knowledge and tries to gauge it. However, this assumption hardly holds true in today's information age. In this age of the infodemic, we are constantly bombarded with information from all around, and it hard to tell apart the fake from the real. In such a scenario, the trust one has in different information sources proves crucial in how they perceive such information.

In Fig. 6.1 we can see that the information consumed from the government is the most trustworthy as reported by the majority of people. Generational gaps produce slightly predictable patterns in terms of perceived percentage of news received from various sources. Adults in the 65+ range seem to have higher trust in government sources of information. Fig. 6.2 shows that according to the survey respondents, others i.e. other people excluding themselves almost consume and trust the equal amount of information from the government.

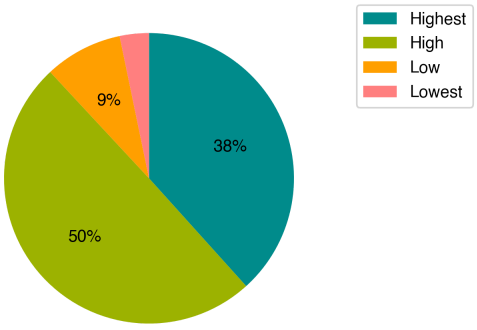


Figure 6.1 Perceived trust in government

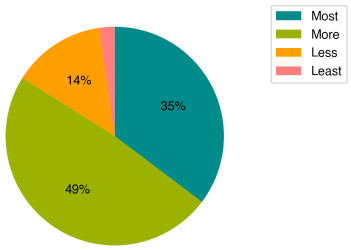


Figure 6.2 Perceptions of public exposure to information from the government

The analysis of the survey data states that, followed by the government sources, NGOs are the most trustworthy sources of information. Survey respondents from lower socio-economic groups tend to have more interaction with the NGOs and thus tend to have higher levels of trust in them. There are numerous NGOs working tirelessly for the betterment of the society. From the survey, we can say that the work is paying off. However, while there is a high perceived trust in NGOs (87%), our survey respodents perceive less public exposure to information from NGOs (78%). This may be reflective of the proportion of survey respondents from higher socioeconomic groups that tend not to come in contact with NGOs on a daily basis. Alternatively, it presents an opportunity for NGOs to ramp up their outreach so as to cater to Punekars who trust them.

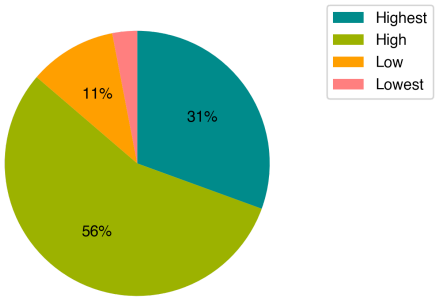


Figure 6.3 Perceived trust in NGOs

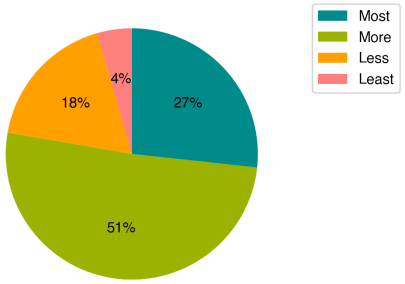


Figure 6.4 Perceptions of public exposure to information from NGOs

Radios are a traditional source of information, common across India and socioeconomic groups. Our survey respondents report high trust (76%) in information coming from radio broadcasts (Fig. 6.5). This may be reflective of the way radio does not exploit the attention economy. Radio bulletins in India are typically short and to the point - often with little room for extraneous information. This trust is reflected in the amount of information our survey respondents perceive the general public is receiving from radio broadcasts (Fig. 6.6).

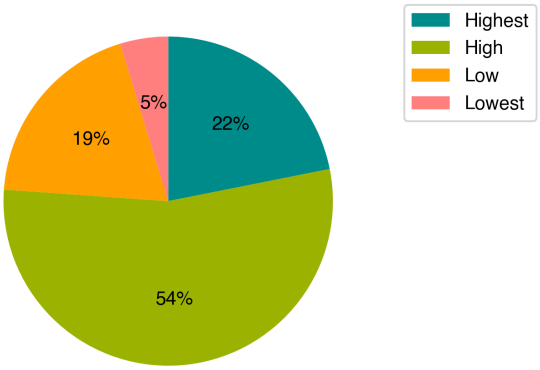


Figure 6.5 Perceived trust in radio

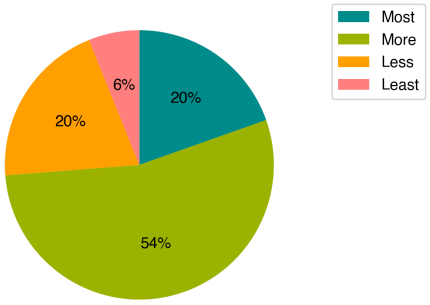


Figure 6.6 Perceptions of public exposure to information from radio

Newspapers and print media represent another important source of information about coronavirus.

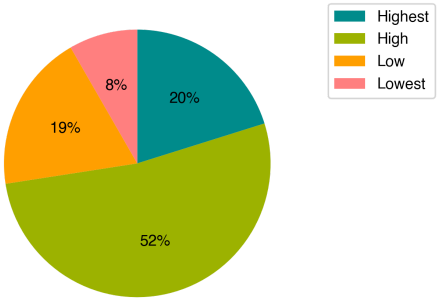


Figure 6.7 Perceived trust in newspapers

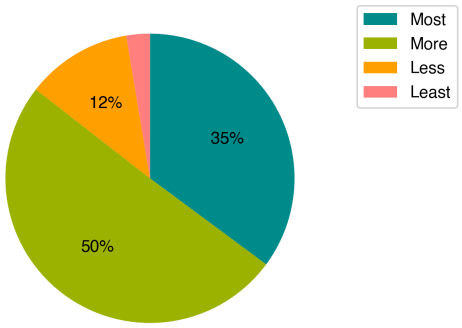


Figure 6.8 Perceptions of public exposure to information from newspapers

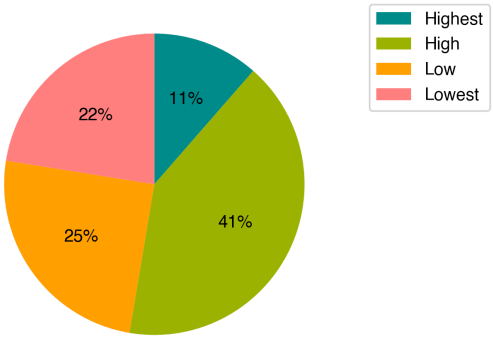


Figure 6.8 Perceptions of public exposure to information from newspapers

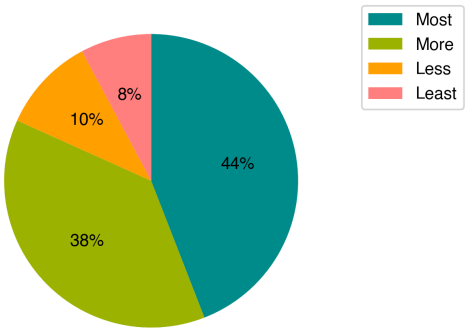


Figure 6.9 Perceived trust in TV

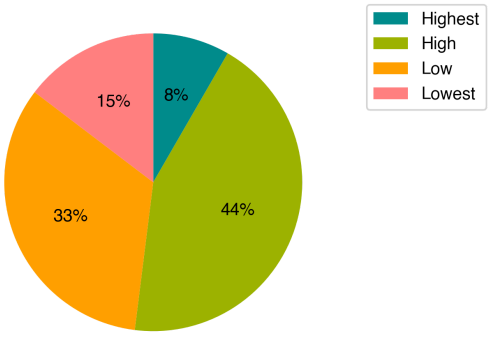


Figure 6.10 Perceptions of public exposure to information from TV

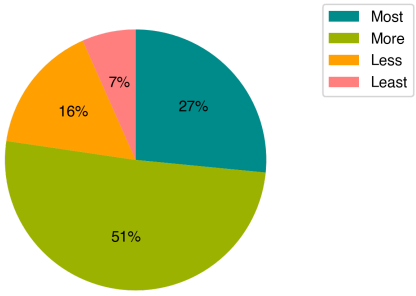


Figure 6.11 Perceived trust in social network

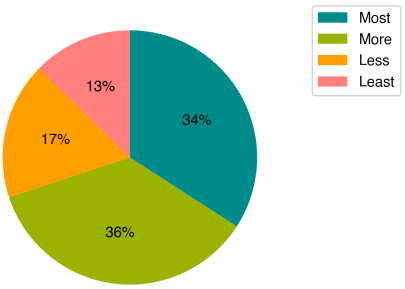


Figure 6.12 Perceptions of public exposure to information from social network

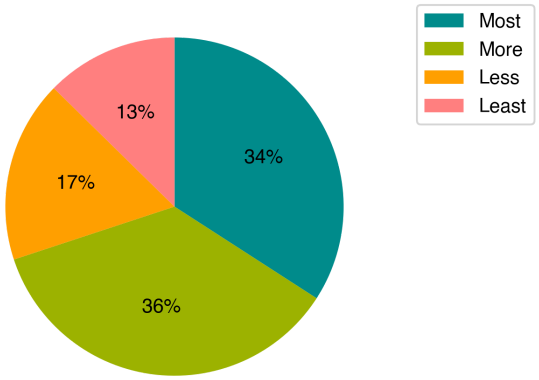


Figure 6.13 Perceived trust in social media

From the survey analysis, we could infer that the respondents tend to have very low levels of trust in social media; irrespective of the age, gender, socioeconomic group they belong to. It seems that social media is a mode of entertainment and communication, but Punekars tend to be skeptical about the accuracy of flood of information.

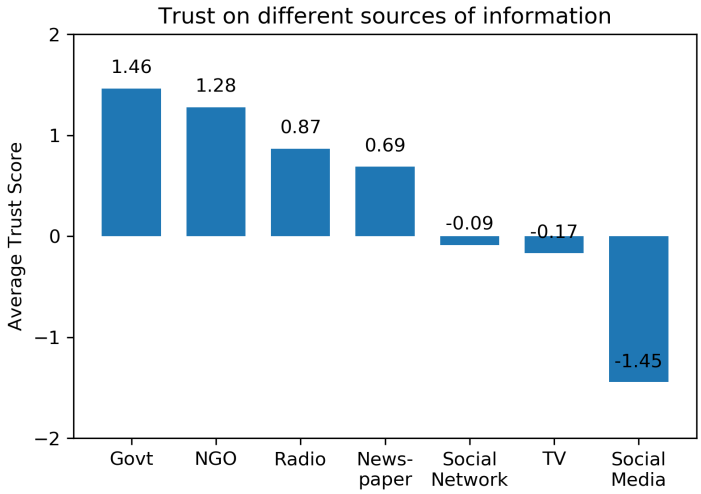


Figure 6.14 Perceptions of public exposure to information from social media

From the figures we can see that all economic levels were greatly skeptical of news received from social media, followed by social networks, and TV. This is primarily given the abundance of information available to the public, both from public and private entities, many times proving to be contradictory.

Section 7: Perceptions of the pandemic

Introduction

The impact of the COVID-19 pandemic has hit all Punekars at varying intensities. The pandemic has not only affected Punekars medically and economically, but it also has a profound psychological impact. In order to understand the psychological impact of the pandemic and its behavioral implications on Punekars, it is essential to understand how they perceive the situation. In situations of crisis such as the pandemic, perception of risks is crucial in determining the motivation of taking protective actions and the overall health behaviors in the pandemic (Ferrer et al., 2018).

Perception is affected by many factors such as the past experiences of a person, environment in which a person lives, education, socioeconomic background, etc. This section will discuss questions like , 'When did people fear the pandemic the most?', 'How serious do people think the current situation is?', 'Do people think the situation is improving or getting worse?', And how do these perceptions vary with age, gender, socio economic groups, being a medical worker or not, income etc.

Fear

Fear is a human emotion generated by the perception of danger. Fear is an evolutionary defense mechanism that plays a key role in survival of humans as it is responsible for generating behavioral responses to prevent threats. However, in case of uncertain and continuous threats like the COVID-19 pandemic, fear can become a chronic response. Prolonged fear might have undesirable effects on an individual's psychological as well as physical well-being (Mertens et al., 2020). In humans, the 'fear of the unknown' is a fundamental fear arising due to unpredictability and uncertainties of the situation (Carleton, 2016).

As we can see in Fig. 7.1, 12% of the respondents reported 'Very High' level of fear against the pandemic, whereas 44% of the respondents reported a 'High' level of fear. Fig. 7.2 adds a temporal dimension to this, showing that people were most afraid of the pandemic during March- May 2020, after which there was a gradual decline till November 2020.

The initial sudden rise in fear could be due to the sudden outbreak of COVID-19 in the world as well as in India. The WHO declared the COVID-19 outbreak as a global Pandemic on 11th March 2020 and the first case of COVID-19 in Pune was recorded on 9th March 2020. So, the initial fear of a threat to the entire world can be seen.
There could be a possible association with the nationwide lockdown which coincides with the peak of fear levels. The subsequent decrease in fear levels is seen following the unlock 1.0. The first lockdown was implemented from 25th March – 14th April 2020 and phase two was declared in continuation, form 15th April – 3rd May 2020. The majority of people report to be most afraid of the virus during this time period. The following first phase of unlock – 'unlock 1.0 ' was implemented from 1st June 2020, a corresponding sudden decrease in the fear levels can be observed in the figure.

Mitigation measures taken by the government of Maharashtra in March such as shutting down of public places and government offices in mid-March (India Today Web Desk, 2020; India TV News Desk, 2020), the state wide curfew, sealing state boundaries by March end (E.T. Online, 2020) and making wearing masks mandatory from the 1st week of April (Nirala, 2020) might have caused people to realize the seriousness of the situation and possible its threats, thus creating fear of the virus.

Eventually, with the settling of noise, spread of quality information, and even fatigue, people also could speculate a point in time where a 'Psychological Normalcy' could be regained. It represents a time by which most of the population can resume their activities with a mindset more or less consistent to that of before the pandemic. Fig. 7.3 shows the estimates of our respondents as to when such a normalcy could be attained. The data shows a sharp clustering of responses towards the last quarter of 2021, and the highest proportion of respondents estimate 2022 to be the year when psychological normalcy could be regained.

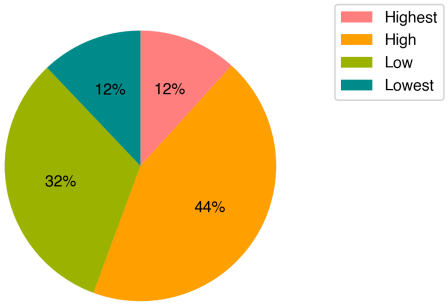


Figure 7.1 Perceptions of fear: static

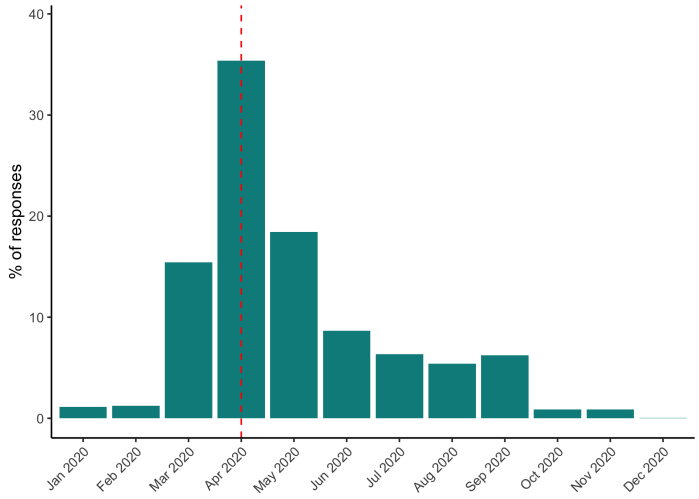


Figure 7.2 Perceptions of fear: dynamic

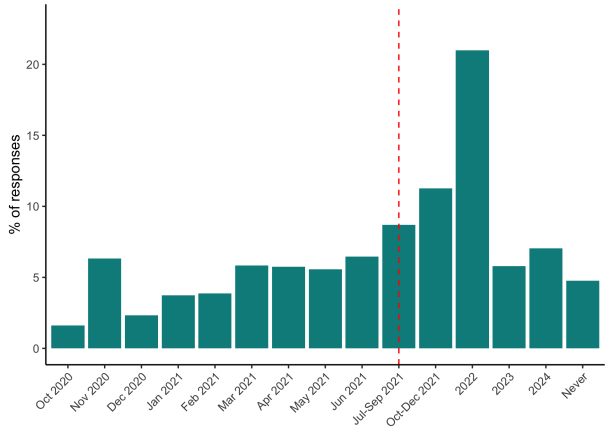


Figure 7.3 Perceptions of return to psychological normalcy

The degree of seriousness perceived by an individual reflects the severity of the psychological impact of the pandemic on the individual. Although such a perception may produce stress upon the individual or even a community as a whole, the same perception may actually help the said entities maintain a state of vigilance. These concerns, to a certain extent, are channeled into actions that work towards self preservation, and the protection of our loved ones and communities.

Fig. 7.4 demonstrates the seriousness of the overall situation as experienced by our respondents. 98% of the respondents do think the situation to be serious, which reflects the profound psychological impact the COVID-19 pandemic has created.
Likewise, Fig. 7.5 portrays the estimates of our respondents as to when the overall situation will return to pre-pandemic times, representing a recovery on all fronts. Variability is seen in the estimates of such a time point. However, mirroring the responses to 'Psychological Normalcy', the highest proportion of responses point towards 2022 as the year when such an overall recovery could be reached.

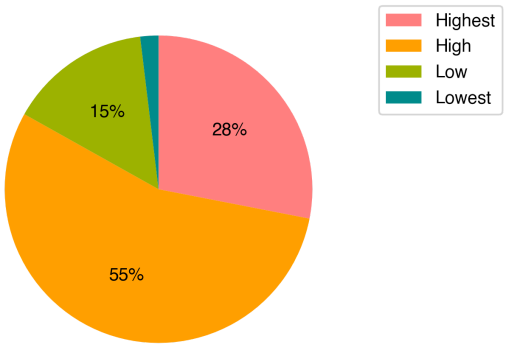


Figure 7.4 Seriousness of the overall situation

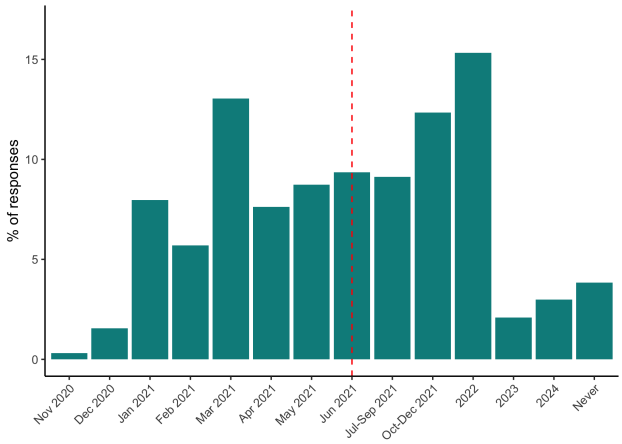


Figure 7.5 Perceptions of return to pre-pandemic times

There was a peak of daily new cases reported in September 2020. In September daily new COVID cases in Pune were around 2000, these reduced to roughly 300 per day by mid November, when the survey was conducted. The deaths per day also reduced significantly by mid November(~5) as compared to the peak in September(~40). Along with reduction in daily cases and deaths, the 'unlock' might have helped in boosting people's optimism. For example, the opening of restaurants, malls, shops, tourist places etc.

Fig. 7.6 shows how respondents felt the situation of the pandemic was evolving during the survey period between November to December of 2020. 81% of the people displayed optimism about the evolving situation, and 19% perceived the situation to be worsening.

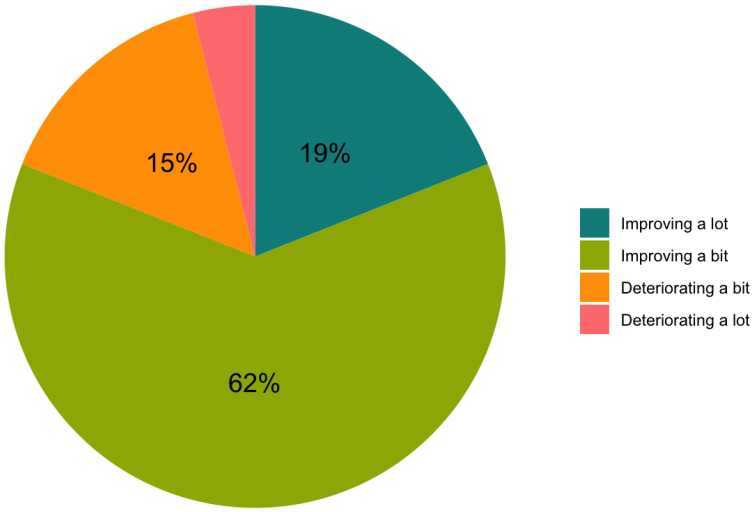


Figure 7.6 Evolution of the situation

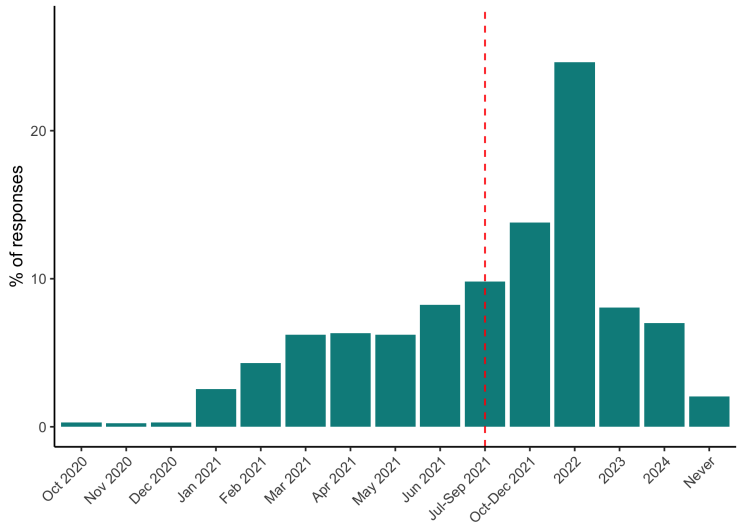


Figure 7.7 Perceptions of the situation returning to normalcy

Awareness and Vigilance

Shared situational awareness has especially been an important factor against the coordinated defense against the spread of COVID-19. Through the alignment of multiple systems, including the shared consciousness among lay-people, a constantly evolving and adapting mental model of the pandemic has dictated individual and group level responses. Such awareness of the situation, molded by personal experience, news, policy implementation, and the open exchange of information has resulted in certain mental models amongst the populace that provide a base of knowledge that can be understood and leveraged to further the fight against the pandemic. The importance of such awareness has been explored in previous studies from the perspective of emergency management mitigation and response (Harrald & Jefferson, 2007)**.**

Fig. 7.8 displays the 'self-awareness' of the survey respondents i.e. the level of awareness they possess regarding the ongoing pandemic as captured during our survey period. 90% of the survey respondents reported 'High' or even better awareness of the situation. However, when asked about the awareness of others regarding the same, the responses change considerably as seen in Fig. 7.9, where 29% of the responses attribute others possessing low awareness about the pandemic situation. A tenable explanation to this disparity can be linked to illusory superiority and the Dunning Kruger effect. It is essential to take cognizance of these human biases from the perspective of policy making and information dissemination, as they could negatively impact the mitigation efforts during emergency situations.

Figure 7.8 Perceptions of self-awareness

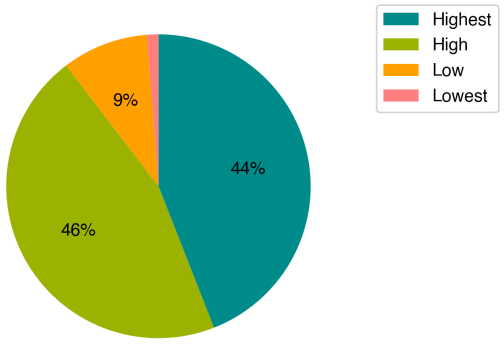


Figure 7.9 Perceptions of public awareness

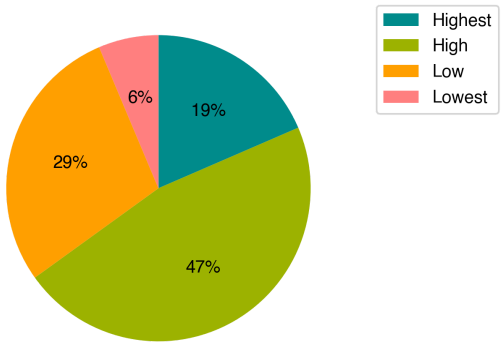


Figure 7.10 shows people's perceptions of 'self-vigilance' in following practices to fight the pandemic. 98% of the respondents perceive themselves to be highly vigilant. Figure 7.11 however, tells a little bit of a different story, when people were asked about their perception about other's vigilance towards following practices. 25% of respondents perceive others' vigilance to be 'low' or worse than that. The reasoning behind this mirrors that for self-awareness vs public awareness.

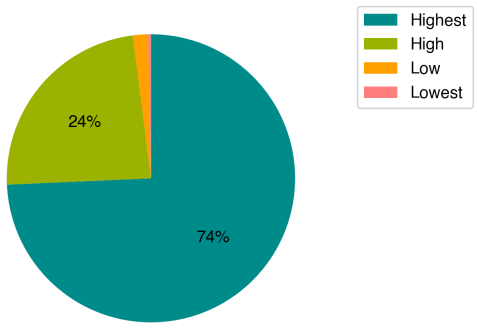


Figure 7.10 Perceptions of self-vigilance

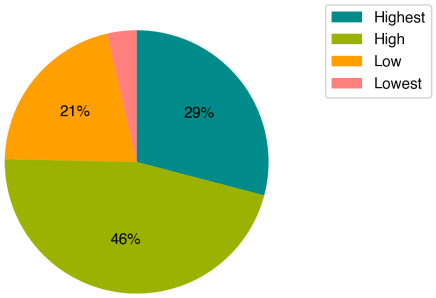


Figure 7.11 Perceptions of public vigilance

Perceptions of disease spread

Attitudinal factors such as awareness of self and others in terms of infection risk and disease spread have been shown to be important factors for individuals for engaging in protective behaviours (Bish & Michie, 2010). With that in mind, we aimed to understand the perceptions of self infection and population level infection i.e. “How likely is it for me/the population around me to have been previously infected with COVID-19?”. Concerned perception could not only provide us a template of group level estimates to corroborate against actual serological data, but it also provides a framework to understand the psychology behind risk assessment and consequent protective behaviour engagement in individuals and communities. A study from Caltech has previously described growing awareness of risk tied to a corresponding increase in protective behaviour, and the relative underestimation of risk for self as compared to risk for others (Wise et al., 2020). Investigation in the same vein for Pune is crucial to understand the importance of risk perception and therefore further interventions to overcome this bias.

Figure 7.12 demonstrates how likely (in percentage) people think that they have been previously infected by COVID-19. Almost 40% of the people think that the possibility is less than 5%. However, Almost 20 % of the people think the possibility of them having been previously infected to be 50 %.The median (indicated by the red line in the figure) is around 20%.

The figure 7.13 shows people's perceptions about how likely (in percentage) people think that the population around them has been previously infected by COVID-19. The curve is more normally distributed than the previous one, centered around 50%.

Figure 7.14 demonstrates people's response to the question, when do you think the second wave of the pandemic will hit the pune city. Almost 60% of the respondents thought that the second wave will hit in December 2020 or January 2021. The percentage of respondents thinking that second wave will never hit the pune city is also considerable, summing up to almost 20%

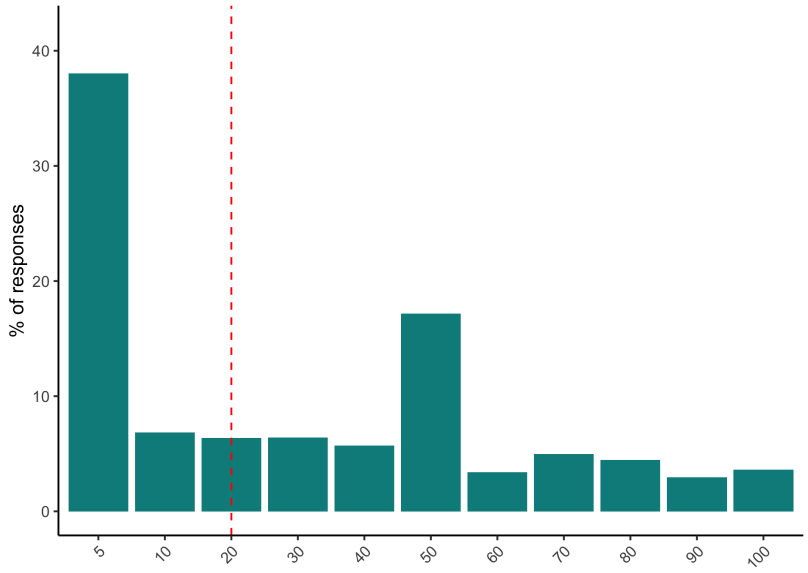


Figure 7.12 Perceptions of self-infection

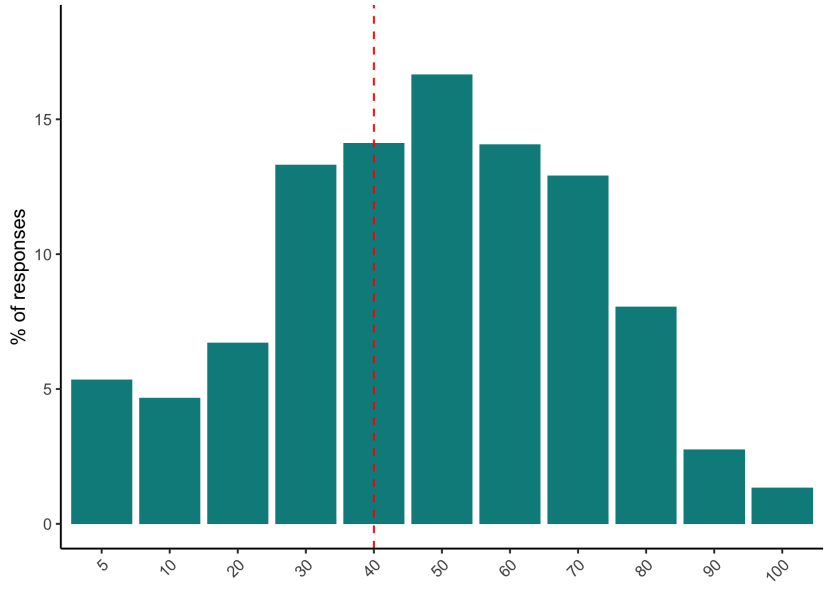


Figure 7.13 Perceptions of public infection: all data

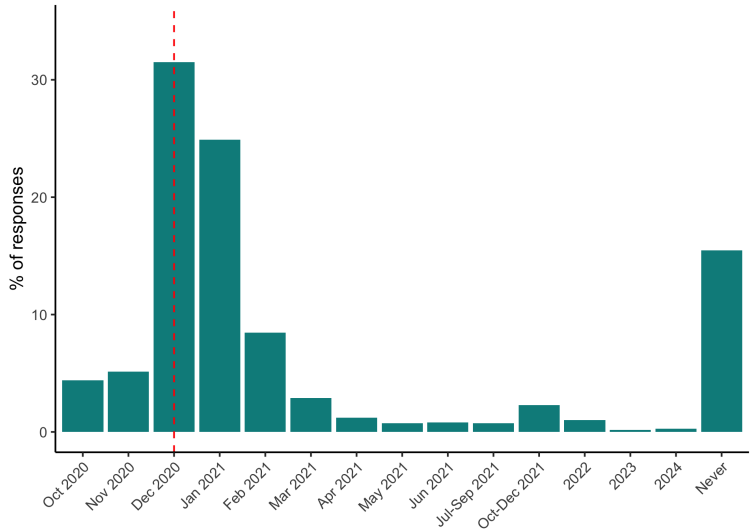


Figure 7.14 Perceptions of the second wave

Conclusion

Perceptions of fear, normalcy etc. are important indicators of the psychology of people during a situation of crisis. Various factors like gender, being a medical worker or not, education etc. are seen to affect the perceptions of the pandemic. As perceived fear is an important factor that determines behaviour of people, the fear levels of people of various backgrounds, indicate the varying degrees at which the pandemic has affected them psychologically. Higher fear levels were seen among people from lower education and economic backgrounds. The fear levels were also higher in women, compared to men and higher in non-medical workers, compared to medical workers.

The peak of fear levels was seen in April 2020 and the fear levels dropped significantly by June 2020.

The perceived seriousness of the situation is high, 83% people think the situation to be moderately, or very serious. At the same time, people are pretty optimistic, 81% people are positive about the situation improving. Most of the respondents predict that the situation will get back to normal in 2022. A large fraction of people, irrespective of their education or economic backgroundal predict that the psychological normal too will be achieved around the same time.

As fear is a key factor in determining behavior, addressing the fear and anxiety of people is important. As described in the infodemics section, the data from this survey shows that the government is the most trusted source of information.Thus, delivery of information and supportive messages by the government to people can play an important role in tackling the fear levels of people. As the fear of the virus is seen to be higher in people of lower educational and economic backgrounds, creating awareness and emphasizing more on educating people scientifically about the virus/disease and providing proper information about the positive developments happening in order to conquer the pandemic, such as vaccination programs and improvement in treatments, or information regarding reduction in death rates could help to reduce fear levels.

Bibliography

Bellman, E. (2020, December 30). Covid-19 Was Consuming India, Until Nearly Everyone Started Wearing Masks. *Wall Street Journal*. https://www.wsj.com/articles/covid-19-was-consuming-india-until-nearly-everyone-started-wearing-masks-11609329603

Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology*, *15*(4), 797–824. https://doi.org/10.1348/135910710X485826

Carleton, R. N. (2016). Fear of the unknown: One fear to rule them all? *Journal of Anxiety Disorders*, *41*, 5–21. https://doi.org/10.1016/j.janxdis.2016.03.011

Coronavirus disease (COVID-19): Herd immunity, lockdowns and COVID-19. (2020, December 31). https://www.who.int/news-room/q-a-detail/herd-immunity-lockdowns-and-covid-19

Dror, A. A., Eisenbach, N., Taiber, S., Morozov, N. G., Mizrachi, M., Zigron, A., Srouji, S., & Sela, E. (2020). Vaccine hesitancy: The next challenge in the fight against COVID-19. *European Journal of Epidemiology*, *35*(8), 775–779. https://doi.org/10.1007/s10654-020-00671-y

Dubey, R. (2020, December 5). *Privacy in a Pandemic: Is the Aarogya Setu App legal?* Bar and Bench - Indian Legal News. https://www.barandbench.com/columns/privacy-in-a-pandemic-is-the-aarogya-setu-app-legal

E.T. Online. (2020, March 24). Uddhav Thackeray imposes curfew in entire Maharashtra—The Economic Times. *The Economic Times*. https://economictimes.indiatimes.com/news/politics-and-nation/uddhav-thackeray-imposes-curfew-in-entire-maharashtra/articleshow/74775886.cms?from=mdr

Ferrer, R. A., Klein, W. M. P., Avishai, A., Jones, K., Villegas, M., & Sheeran, P. (2018). When does risk perception predict protection motivation for health threats? A person-by-situation analysis. *PLOS ONE*, *13*(3), e0191994. https://doi.org/10.1371/journal.pone.0191994

Ghose, A. (2020). Pune Serosurvey. *Technical Report*, 4.

Harrald, J., & Jefferson, T. (2007). Shared Situational Awareness in Emergency Management Mitigation and Response. *2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07)*, 23–23. https://doi.org/10.1109/HICSS.2007.481

India Today Web Desk. (2020, March 15). *Coronavirus: Cases in Maharashtra surge,*

states shut down public places | Developments—India News. https://www.indiatoday.in/india/story/coronavirus-cases-in-maharashtra-surge-states-shut-down-public-places-developments-1655635-2020-03-15

India Today Web Desk. (2021, January 25). Explained: How Covid-19 has made life difficult for India's poor. *India Today*. https://www.indiatoday.in/business/story/explained-how-covid-19-has-made-life-difficult-for-the-poor-indians-1762531-2021-01-25

India TV News Desk. (2020, March 17). *Coronavirus Outbreak: Maharashtra to shut government offices for next 7 days | India News – India TV*. https://www.indiatvnews.com/news/india/coronavirus-uddhav-thackeray-maharashtra-government-offices-shut-7-days-598998

Johnson, E. J., & Hariharan, S. (2017). Public health awareness: Knowledge, attitude and behaviour of the general public on health risks during the H1N1 influenza pandemic. *Journal of Public Health*, *25*(3), 333–337. https://doi.org/10.1007/s10389-017-0790-7

Kasbe, N. (2020, March 18). Coronavirus impact: Markets in Maharashtra in shutdown mode. *The Financial Express*. https://www.financialexpress.com/market/coronavirus-impact-markets-in-maharashtra-in-shutdownmode/1901557/

Kim, E. J., Marrast, L., & Conigliaro, J. (2020). COVID-19: Magnifying the Effect of Health Disparities. *Journal of General Internal Medicine*, *35*(8), 2441–2442. https://doi.org/10.1007/s11606-020-05881-4

Kumar, A., & Nayar, K. R. (2020). COVID 19 and its mental health consequences. *Journal of Mental Health*, *0*(0), 1–2. https://doi.org/10.1080/09638237.2020.1757052

Lau, J., Yang, X., Tsui, H., & Kim, J. (2003). Monitoring community responses to the SARS epidemic in Hong Kong: From day 10 to day 62. *Journal of Epidemiology and Community Health*, *57*(11), 864–870. https://doi.org/10.1136/jech.57.11.864

Mertens, G., Gerritsen, L., Duijndam, S., Salemink, E., & Engelhard, I. M. (2020). Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *Journal of Anxiety Disorders*, *74*, 102258. https://doi.org/10.1016/j.janxdis.2020.102258

Mishra, P., Bhadauria, U. S., Dasar, P. L., N, S., Kumar, S., Lalani, A., Sarkar, P., Chauhan, A., Godha, S., & Vyas, S. (2016). Knowledge,attitude and anxiety towards pandemic flu a potential bio weapon among health professionals in Indore City. *Przeglad Epidemiologiczny*, *70*(1), 41–45, 125–127.

Mitze, T., Kosfeld, R., Rode, J., & Wälde, K. (2020). Face masks considerably reduce

COVID-19 cases in Germany. *Proceedings of the National Academy of Sciences*, *117*(51), 32293–32301. https://doi.org/10.1073/pnas.2015954117

MoHFW | Home. (2021). https://www.mohfw.gov.in/

Nirala, S. (2020, September 4). Wearing masks compulsory in Mumbai, Pune, Nashik, Nagpur—India News. *India Today*. https://www.indiatoday.in/india/story/wearing-masks-compulsory-in-mumbai-pune-nashik-nagpur-1665161-2020-04-09

Olive, J. K., Hotez, P. J., Damania, A., & Nolan, M. S. (2018). The state of the antivaccine movement in the United States: A focused examination of nonmedical exemptions in states and counties. *PLOS Medicine*, *15*(6), e1002578. https://doi.org/10.1371/journal.pmed.1002578

Opinion: Sustained Handwashing Behaviour In India - A Necessity During COVID Pandemic | Blogs. (2020, October 14). *NDTV-Dettol Banega Swasth Swachh India*. https://swachhindia.ndtv.com/opinion-sustained-handwashing-behaviour-in-india-a-necessity-during-covid-19-pandemic-51765/

Polygraph. (2021, February 23). *The Infodemic: Lemon Tea Doesn't Prevent or Cure COVID-19 | Voice of America - English*. https://www.voanews.com/covid-19-pandemic/infodemic/infodemic-lemon-tea-doesnt-prevent-or-cure-covid-19

Sim, S. W., Moey, K. S. P., & Tan, N. C. (2014). The use of facemasks to prevent respiratory infection: A literature review in the context of the Health Belief Model. *Singapore Medical Journal*, *55*(3), 160–167. https://doi.org/10.11622/smedj.2014037

Singh, S. G. (2020, July 2). Covid-19: Here's a timeline of events since lockdown was imposed in India. *Business Standard India*. https://www.business-standard.com/article/current-affairs/here-s-a-timeline-of-events-since-lockdown-was-imposed-in-india-120070201413_1.html

Spohr, D. (2017, August 23). *Fake news and ideological polarization: Filter bubbles and selective exposure on social media—Dominic Spohr, 2017*. https://journals.sagepub.com/doi/full/10.1177/0266382117722446

Sweeney, M. (2015, September). *Stop Skipping Class: Why socioeconomic status (SES) matters*. Https://Www.Apa.Org. https://www.apa.org/pi/ses/resources/indicator/2015/09/socioeconomic-status

The World Bank. (2021). *Population, total | Data*. https://data.worldbank.org/indicator/SP.POP.TOTL

Thevar, S. (2020, July 1). Rapid antigen testing begins in Pune after 1 lakh kits made

available. *Hindustan Times*. https://www.hindustantimes.com/pune-news/rapid-antigen-testing-begins-in-pune-after-1-lakh-kits-made-available/story-d0doNxjokQq3Sz69WfkctJ.html

Townsend, J., Greenland, K., & Curtis, V. (2017). Costs of diarrhoea and acute respiratory infection attributable to not handwashing: The cases of India and China. *Tropical Medicine & International Health*, *22*(1), 74–81. https://doi.org/10.1111/tmi.12808

WHO. (2020a). *Mental health and psychosocial considerations during the COVID-19 outbreak*. https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf

WHO. (2020b, September 23). *Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation*. https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation

Wise, T., Zbozinek, T. D., Michelini, G., Hagan, C. C., & Mobbs, D. (2020). Changes in risk perception and self-reported protective behaviour during the first week of the COVID-19 pandemic in the United States. *Royal Society Open Science*, *7*(9), 200742. https://doi.org/10.1098/rsos.200742

Wong, T. (2020, May 12). Coronavirus: Why some countries wear face masks and others don't. *BBC News*. https://www.bbc.com/news/world-52015486