Preventive Health and Hygiene Practices in World's Most Productive Locomotive Factory Workers During Covid-19 Pandemic

Utsav Chaware[1], Nisha Sheoran[2], Anindita Das[3], TashiOngmu Bhutia[4], Atisha Mandal[5]

[1]Ph.D. Scholar, Department of Health Sciences, Lakshmibai National Institute of Physical Education, Gwalior, India

[2]MPEd, Department of Sports Biomechanics, Lakshmibai National Institute of Physical Education, Gwalior, India

[3]Associate Professor, Department of Health Sciences, Lakshmibai National Institute of Physical Education, Gwalior, India

[4]Ph.D. scholar, Indira Gandhi Institute of Physical Education & Sports Sciences, Delhi, India

[5]MPEd, Department of Health Sciences, Lakshmibai National Institute of Physical Education, Gwalior, India

DOI: 10.47750/pnr.2022.13.S01.61

Abstract

After the successful combat with the first covid wave in the country, Mutation created havoc in India. This was addressed to poor social habits and irresponsible covid behavior in the community and lack of awareness. Many studies during and after the pandemic assessed the preventive health and hygiene practices of Health Care and front-line workers and reported substandard and suboptimal practices regarding various subsections, but only a few studies investigated the practices of the community, and no study addressed the preventive practices of factory workers and labors. This study assessed the health and hygiene practices of Chittaranjan Locomotive Workers, India, the world's most productive locomotives. A pre-validated questionnaire consisting of 21 items incorporating various subsections including hand hygiene, social distancing, mask, gadgets/fomites, and lifestyle was used for the study. The findings of the study unfold some suboptimal practices regarding hand hygiene, social distancing while working, repeatedly touching, and inappropriate disposal of masks, which could lead to widespread infections, and families of workers were found to be at greater risk. However, in most of the areas workers were aware and cautious but constant vigilance and heightened self-awareness can result in better prevention from infections. The study will contributeto policy framing and program building in times of health emergencies and also will strengthen the health practices of workers who are most vulnerable to infections.

Keywords: health, hygiene, preventive practices, locomotive, workers, covid-19, pandemic, Chittaranjan locomotives.

INTRODUCTION

According to the joint statement of the International Labour Organization (ILO) and World Health Organization (WHO) (2020), the covid-19, also SARS-Cov-2, pandemic has pulled the world towards deglobalization and put an unprecedented challenge to public health, and growth. After the first covid-19 wave in India has caused severe havoc, the government implemented a complete lockdown of 54 days, which impeded the infection rate and effectively curtailed the infectionto the community, only the frontline workers, including Healthcare workers (HCWs), medical professionals, police officers, and other staff working in the primary circle were prone to infection(Kar et al., 2021).Numerous studies all around the world conducted during and post covid assessed the health and hygiene practices of HCWs hygiene practices at workplaces and in person, A comprehensive cross-sectional study on occupational and personal health and hygienic practices of HCWs in India concluded a suboptimal acquiescence to preventive practices amongst the HCWs, the study also identified some obstacles, such as more than 58% HCWs use personal gadgets during duties which could be fomites and may cause infections(Agarwal, Ranjan, Saraswat, et al., 2021). Many articles published around the globe during the pandemic evaluated the health and hygiene practices of medical professionals and HCWs, and many others assessed the health practices of frontline workers (Asaad et al., 2020; Modi et al., 2020; Singh Gambhir et al., 2020). Limited studies assessed the knowledge, attitude, and behavior of other non-frontline workers and communities since the country was under strict lockdown, only necessities were permitted to function, and minimal need was felt to evaluate the health practices of non-frontline workers (Altaher et al., 2021; Kaushik et al., 2021; Kiaghadi et al., 2020).

The outbreak caused by a mutated version of covid-19 left everyone vulnerable to infection unlike 1st wave, and no lockdown

was implemented to avoid disruption in the country's economy(Chandra, 2021). According to a study by Max Health care, India, mutation of SARs-COV-2, also the 2nd wave magnified the life loss to around 40%more than in 1st wave(Jha, 2021), This could be attributed to poor health and hygiene practices in communities, irresponsible approach towards infection and unseemly awareness(Jain et al., 2021). A study published in The Lancet Respiratory Medicine Journal accounted for the 2nd covid outbreak to 'poor execution of coherent containment' and overcrowded regions(Asrani et al., 2021)however, the study dealt with more implications of the 2nd covid wave and not on health and hygiene assessment. Kaushik et al., (2021) via an extensive survey of 21406 participants report a poor knowledge base and awareness among the varied age group in the community. It concludes the need to extend the knowledge and hygiene practice in the community.

Nonetheless, there are numerous surveys with different applications, but none, by themselves, can provide a comprehensive description of the health and hygiene practices of factory/industry workers who were more susceptible to infection during the 2nd wave. Since the impact of covid-19 further burdened the occupational health of factory and industry workers as they were more prone to infection. As suggested, a study assessed covid-19 risk, vulnerability, and prevalence in the community and reported, that covid-19 infection could be fatal to workforces in compromised environmental conditions such as air pollutants, and carbon emissions, also in extreme temperature and humidity(Conticini et al., 2020; Hossain, 2020; Kiaghadi et al., 2020). There is a dearth of studies dwelling on the assessment and suboptimal health and hygienic practices of the factory and industry workers, particularly in India.

Since Chittaranjan Locomotives, Kolkata is India's largest and recognized as the world's most productive locomotives(Onofrei, 2020), this study aimed to examine the health and hygiene practices of the Chittaranjan locomotive workers (CLWs)and their awareness of covid-19. Conferring to the GOI, the Ministry of Railway's report, 35 employees from CLW were reported covid positive during the first wave including1 death. Nonetheless, above all curbs and lockdown covid cases were reported(Ministry of Railways, 2020), The then Railway minister Piyush Goyal in a press conference revealed, that an estimated 1952 railway employees succumbed to death due to covid-19(Business Standard, 2021; The Hindu, 2021). Subsequently working on a social ground, the chances of spread are more and 2nd covid outbreak was strongly correlated with environmental factors which may turn lethal to the community. This objectified a dire need to assess the health and hygiene practices of Chittaranjan locomotive workers.

Material and methods

Region

Chittaranjan Locomotive works is located near Kolkata, the capital city of West Bengal, and lists among the most populous cities in India.

Study design

The qualitative, cross-sectional survey regarding health & hygiene practices and knowledge of the same during the 2nd wave of the covid-19 pandemic was conducted from 9th May 2021 to 2nd June 2021, during the 2nd covid wave in India.

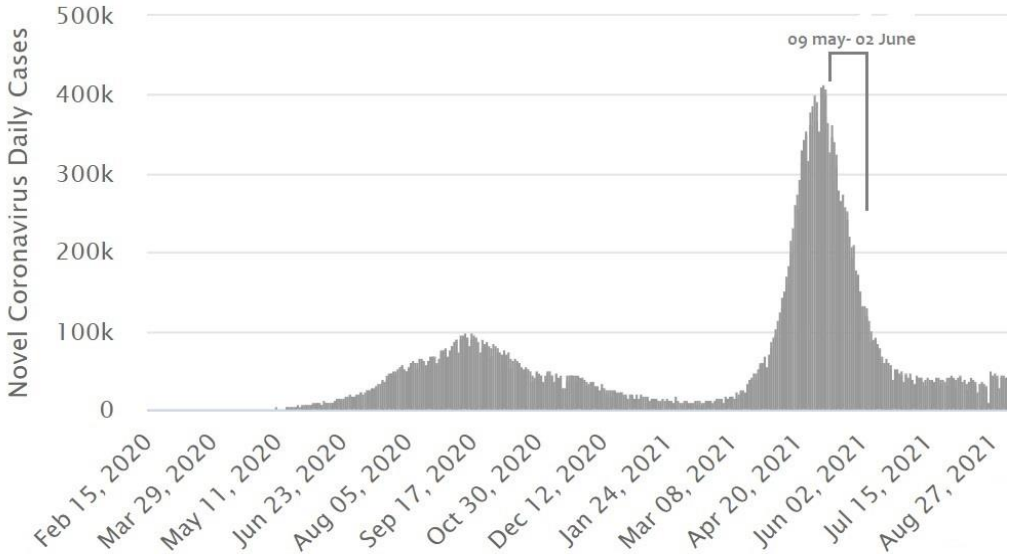

Figure 1 source- Worldometer.info/India Daily new covid cases in the country

Following the Covid-19 safety protocols and guidelines, with the help and permission of senior officials and administration. An online/offline survey was conducted, and the questionnaire was distributed in electronic forms using google forms as well as in physical form to the workers. All the employees were either from the main unit or the ancillary unit of CLW.

Participants

A total of 938 employees who used to be on-field support in the social circle for the most duration of time and are most vulnerable to infection were given the questionnaire via several modes (physical, digital, and google forms links), out of which 898 responded to the questionnaires. The response rate to the survey was approximately 95%, this could be credited to the officials who briefed the significance of the study and the momentous of their responses. After an initial screening of the retorts received, 46 responses were eliminated from the study due to incomplete and unclear responses. 852 Group- C and D employees which included casual laborers (348), multi-tasking staff (181), and groundsmen (323), responded to the questionnaires. All the employees were between the age range of 20- 49 years.

Purposive sampling for Group classification was done, and later randomization was employed. All groundsmen and employees on-field were given the questionnaire regarding preventive health & hygiene practices during the 2nd wave of the covid-19 pandemic and were asked to fill it out without any senior official monitoring the responses to avoid the chance of any behavioral alteration of the workers. All the participants were briefed about the purpose and significance of the study and informed consent was taken.

Survey tool

A pre-validated questionnaire developed to assess the preventive health and hygiene practices of HCWs in India was used to assess the practices of CLW workers (Agarwal, Ranjan, Saikaustubh, et al., 2021). The questionnaire consisted of two sections, Section -A contains 29 items answered on 5 points Likert scale to evaluate preventive practices during covid-19, and Section-B consisted of 27 semi-structured items to examine the reason for sub-optimal practices. For the survey to evaluate the preventive practices of CLW workers, only Section-A of the questionnaire was considered. The Content validity of section-A was remarkable (Content validity Ratio (CVR) = ¼ 0.87, Content Validity Index (S-CVI/Av) = ¼ 0.978). The internal consistency (Cronbach's alpha coefficient) was enumerated to be 0.85.

Out of 29 items from the pre-validated questionnaire- Hand hygiene (5), social distancing (7), Mask & PPE (10), Gadget and fomites (3), Lifestyle (2), 6itemsfrom Mask & PPE subsection, and 2 items from exposure subsection were eliminated as they were practices oriented predominantly to HCWs and were redundant to the present study. After the elimination of those items, 21 questions were finalized for the survey.

The questionnaire consisted of two sections, first part (Section-A) assessed basic information such as name, age, category (labor, MTS, groundsmen), work unit (main/ancillary), and education qualification. The second section (Section-B) consisted of 21 items to assess the preventive health and hygiene practices of CLW workers.

Statistics

Responses were collected in excel sheets and were analyzed using the same. Descriptive statistics and percentile method was used for the analysis.

Result and Analysis

Table 1 displays demographic data of 852, responses from group C and D CLW workers with a mean age of 35years, out of which 21% were Multitasking staff with a mean age of 31 years, 38% were groundsmen with a mean age of 36 years and 41% were casual laborers aging the average age of 39 years.

Section A

Demographic characteristics of the employees

Table 1 Demographic characteristics of the employees

Classification	No. of worker (percentage)	Mean Age	qualification
MTS (multi-tasking staff)	181 (21%)	31 years	4% post-graduate 47% graduate 38% senior sec. 11% higher sec.

Groundsmen	323 (~38%)	36 years	48% Senior sec. 22% higher sec. 30% not mentioned
Labor	348 (~41%)	39 years	Senior sec. 39% Higher sec. 14% Not mentioned 47%

Section B:

Prevention practices against COVID-19 infections among Locomotive workers

Table 2-Responses (%) of employees to Hand hygiene items of the questionnaire

S No.	Item	Always (more than 90% times)	Mostly (approx.75% times)	Commonly (approx. 50% times)	Occasionally (approx. 25% times)	Rarely (less than 10% times)
Hand hygiene						
Q1	I shake hands while meeting colleagues.	-	~2% (17)	10% (85)	21% (179)	67% (571)
Q2	I sanitize my hands after contact with any common place or surroundings.	~39% (333)	55% (468)	6% (51)	-	-
Q3	I ensure that I wash/sanitize my hands for at least 20 s.	51% (434)	34% (290)	11% (94)	4% (34)	
Q4	I properly follow the steps of washing/sanitizing hands.	58% (494)	41% (351)	>1% (7)	-	-
Q5	I touch my eyes, nose or mouth without washing/sanitizing my hands.		>1% (6)	20% (162)	23% (179)	56% (435)

Hand hygiene

Table 3 shows the number of responses and percentage of responses to the preventive health and hygiene practices by CLW workers. In the hand hygiene section of the survey, 571 (67%) workers ‘rarely’ shake hands while meeting colleagues, but 85 (10%) employees were likely to shake hands ‘commonly’ but not all the time, likewise approximately 333 (39%) and 468 (55%) of the workers were cognizant to hand sanitization responded ‘always’ and ‘most of the times’ respectively, after contact with any common place. For employees who wash their hands for at least 20sec, the majority were on the edge with 434 employees responding ‘always’ comprising 51%, the rest 290 (34%) workers reported ‘not always’ but ‘mostly’ abide to wash their hands for a set duration.

Nearly 500 (58%) employees making the majority of the share believe they always follow the proper steps of washing hands and sanitizing. Nevertheless, 41% (351) reported proper hand wash practices responding ‘mostly’ but ‘not always’. When asked whether they touch their eyes, nose, or mouth without washing or sanitizing 435 (51%) and 179 (21%) responded ‘rarely’ and ‘sometimes’ respectively. Also, a noticeable percentage (20%) of employees were recorded to practice touching their nose and mouth commonly (almost 50% of the time during work).

Table 3-Responses (%) of employees to Social Distancing items of the questionnaire

S No.	Item	Always (more than 90% times)	Mostly (approx.75% times)	Commonly (approx. 50% times)	Occasionally (approx. 25% times)	Rarely (less than10% times)

Social Distancing						
Q6	I maintain at least 1 m distance with family members	38% (321)	33% (281)	26% (221)	3% (25)	>1% (2)
Q7	I maintain at least 1 m distance with co-workers at the workplace.	71% (605)	17% (145)	11% (94)	>1% (8)	
Q8	I maintain at least 1 m distance while eating food with my colleagues.	68% (580)	22% (187)	8% (68)	2% (17)	-
Q9	I maintain at least a 1-m while talking to my colleagues in the duty rooms/while working	53% (453)	33% (282)	12% (103)	>1% (6)	>1% (7)
Q10	I maintain at least 1 m distance from others in public spaces (e.g., shopping, social gatherings, etc).	71% (605)	21% (179)	8% (68)	-	-
Q11	I have attended social gatherings (Like meeting friends, going to religious places, visiting theatres etc) in the past two Months	-	-	6% (51)	15% (128)	79% (673)
Q12	I avoid going out of the house unnecessarily	86% (733)	11% (94)	3% (25)	-	-

Social distancing

When asked about distancing family members (at least 1m) the responses were nearly proportionate as 321(38%) marked ‘always’, 281(33%) choose ‘mostly’ and 221 (26%) opted for ‘commonly’ which implies employees didn't maintain a safe distance with family members. Contrastingly, 71% (605) of the employees always maintained at least 1m distance from co-workers at the workplace, 68% (580) while eating food with colleagues, and 58% (453) while talking to fellow workers during duty. The awareness to maintain social distancing was prevalent in employees with 71% (605) out of 852 always maintaining a 1m distance from others in public places. Only a few people 68 (8%) were less aware comparatively,

Table 4-Responses (%) of employees to Mask related items of the questionnaire

S No.	Item	Always (more than 90% times)	Mostly (approx.75% times)	Commonly (approx. 50% times)	Occasionally (approx. 25% times)	Rarely (less than 10% times)
Mask						
Q13	I wear mask inside work premises	88% (751)	11% (94)	>1% (7)	-	-
Q14	I cover both my nose and mouth with a mask while wearing it.	85% (724)	9% (77)	6% (51)	-	-
Q15	I touch the outer surface of the mask while wearing it.	-	2% (17)	10% (85)	10% (85)	78% (665)
Q16	I keep my mask properly in a separate bag/dustbin after using it.	70% (596)	24% (205)	4% (34)	2% (17)	-

Masks

The results of masks were expected to be lower than the actual outcomes. 88% (751) of workers preferred to wear masks almost all the time inside work premises, furthermore, almost all of them 85% (724) wear it aptly covering both mouse and nose. Not the majority but 170 workers which is approximately 20% accepted the practice of touching the outer surface of masks while wearing them. Nonetheless, the workers put on the masks properly but disposing of the mask was found to be jeopardized, only 70% (596) of workers used dustbins or separate bags to dispose of their masks rest were either unaware or 'sometimes' disposed of masks suitably.

Table 5-Responses (%) of employees to Gadgets and Fomites related items of the questionnaire

S No.	Item	Always (more than 90% times)	Mostly (approx.75% times)	Commonly (approx. 50% times)	Occasionally (approx. 25% times)	Rarely (less than 10% times)
Gadgets/Fomites						
Q17	I use my personal items like mobile phones, etc during duty.	>1% (5)	-	9% (77)	29% (248)	61% (521)
Q18	I sanitize my personal items like mobile phones, pens, etc with sanitizer after my duty.	48% (409)	35% (298)	7% (60)	6% (51)	4% (34)
Q19	I take precautions while buying things to avoid contamination with COVID-19.	80% (681)	17% (145)	3% (26)	-	-

Gadgets/Fomities

248 (29%) workers responded 'occasional' use of personal items like mobile phones, pens, etc. while 77 (9%) of them accepted the use of gadgets and phones 'commonly' during work. Sanitization habits of personal gear were found to be imperiled as only 409 (48%) always sanitize their mobile phones and other personal items, 298(35%) opted 'mostly', but there was a section of workers who retorted 'rare' (4%) or just 'occasional' (6%) sanitization of their items. However, 681 (80%) workers take precautions while buying things to avoid exposure.

Table 6-Responses (%) of employees to Mask related items of the questionnaire

S No.	Item	Always (more than 90% times)	Mostly (approx.75% times)	Commonly (approx. 50% times)	Occasionally (approx. 25% times)	Rarely (less than 10% times)
Lifestyle						
Q20	I take adequate sleep (6–8 h) daily.	87% (742)	12% (103)	>1% (6)	-	-
Q21	I stay updated regarding coronavirus disease by watching the news or reading guidelines.	79% (673)	10% (85)	6% (51)	3% (26)	2% (17)

Lifestyle

87% (742) of the workers when asked about their sleeping habits responded positively, as they always had 6-8 hrs of sound sleep. Regarding the news and virus-related updates, 79% (673) of workers followed the news and there were few in the category around 10% (94) of workers who either sometimes or rarely took updates on covid-19.

Discussion

The spread of covid-19 infection in the first wave was attenuated majority by strict lockdown and seizing human movement, truncating the spread and fatalities in India, but the later wave of mutation was nothing less than a catastrophe for India. The spread of infection is subsided at present, but WHO warns of future mutation(Callaway, 2021), which could be even more fatal. Studies claim substandard community health practices lack of awareness and a resilience attitude were also the reasons behind the loss(Asrani et al., 2021; Chandra, 2021). This study tried to assess the preventive health practices of locomotive workers who work amidst challenging environments, making them most susceptible to infections. Hand hygiene practices for most of the employees were satisfactory, but there still exist some suboptimal practices of shaking hands with colleagues at the workplace, which is the most common way of infection transmission. Nevertheless, the hand sanitization and handwash practices were adaptive and workers were aware of it, but some were skeptical of the time duration (20secs.) they wash hands, and lack of attentiveness as it takes time specifically in case of the covid-19 virus to wash(UNICEF, 2021).

Some workers reported touching of nose and mouth during work, This could be associated with the habit of touching the face leading to elevated chances of infection and illnesses, timely reminders and active consciousness can dissuade this practice.

Family members were deemed to be the most vulnerable to infection from employees but the responses reveal inadequate distance from family members. However, all the workers agreed to maintain a safe distance from co-workers at the workplace while working and eating, but while on duty rooms and while the team works this distance tends to be reduced where social distancing was not always followed and sometimes compromised, this could lead to widespread infection as social distancing was one of the imperative measures to avoid infections, Kaushik et al., (2021) pointed out the concern regarding compliance to the risk and preventive practices in public. However, the awareness of workers in public spaces and avoiding social gatherings could be attributed to the creative and extensive measures taken by the government to generate awareness.

Putting masks on working premises and wearing them properly was followed by almost 90% of the workers all the time, which is the most operative way to prevent the spread(Leung et al., 2020), But, the practice of touching the outer surface of the mask could be fatal in terms of carrying the infection. But subconsciously workers sometimes during their work or while putting off the mark touched it. This may take time but they need to practice the habit of not touching the mask as it may carry a hefty viral load (WHO, 2020). Also, proper disposal of masks was a concern, as many workers either were unaware or didn't dispose of masks properly.

The findings of the study by Agarwal, Ranjan, Saraswat, et al., (2021) correspond to the present study, HCWs followed adequate precautionary measures to avoid infections but reported suboptimal practices in carrying personal items like mobile phones and gadgets. These could be the potential carriers of infections that remain in primary contact with the people throughout the time in and outside work premises. Lifestyle habits including sleep were adequate for almost all the workers, and they also agreed to stay updated on covid-related news.

Conclusion

The study reports substantial awareness among CLW workers in certain areas, at the same time lower scores in certain critical areas to curtail the covid-19 spread. This study gives an insight into preventive practices followed by Group C & D workers with lower education levels, where practices could be developed using repetitive instructions and monitoring by government and officials, as done during the covid-19 pandemic, whereas there exist some important practices proper hand washing, carrying and disposing of masks which need technical guidance. At times when the infection is widespread personal items could be potential carriers of infection which need special care and attention.

Further, studies could be conducted to compare the health and hygiene practices between group A and C&D workers as there exist awareness and educational differences, also, other than CLW there are a lot of laborers and workers who live in compromised environments their health and hygiene status need to be assessed to create health awareness and apprehension.

Conflict of interest

The authors do not have any existing conflict of Interest

Fundings Acknowledgments

The author(s) received no financial support for the research, authorship, and/or publication of this article.

REFERENCES

1. Agarwal, A., Ranjan, P., Saikaustubh, Y., Rohilla, P., Kumari, A., Prasad, I., Baitha, U., & Dwivedi, S. N. (2021). Development and validation of a questionnaire for assessing preventive practices and barriers among health care workers in COVID-19 pandemic. Indian Journal of Medical Microbiology, 39(2), 200–211. https://doi.org/10.1016/J.IJMMB.2021.03.006
2. Agarwal, A., Ranjan, P., Saraswat, A., Kasi, K., Bharadiya, V., Vikram, N., Singh, A., Upadhyay, A. D., Baitha, U., Klanidhi, K. B., &Chakrawarty, A. (2021). Are health care workers following preventive practices in the COVID-19 pandemic properly? - A cross-sectional survey from India. Diabetes and Metabolic Syndrome: Clinical Research and Reviews, 15(1), 69–75. https://doi.org/10.1016/J.DSX.2020.12.016
3. Alsahafi, A. J., & Cheng, A. C. (2016). Knowledge, attitudes and behaviours of healthcare workers in the kingdom of Saudi Arabia to MERS coronavirus and other emerging infectious diseases. International Journal of Environmental Research and Public Health, 13(12). https://doi.org/10.3390/IJERPH13121214
4. Altaher, A. M., Elottol, A. E. Y., Jebril, M. A., &Aliwaini, S. H. (2021). Assessment of awareness and hygiene practices regarding COVID-19 among adults in Gaza, Palestine. New Microbes and New Infections, 41, 100876. https://doi.org/10.1016/J.NMNI.2021.100876
5. Asaad, A., El-Sokkary, R., Alzamanan, M., & El-Shafei, M. (2020). Knowledge and attitudes towards middle east respiratory sydrome-coronavirus (MERS-CoV) among health care workers in South-Western Saudi Arabia. Eastern Mediterranean Health Journal, 26(4), 435–442. https://doi.org/10.26719/EMHJ.19.079
6. Asrani, P., Eapen, M. S., Hassan, M. I., &Sohal, S. S. (2021). Implications of the second wave of COVID-19 in India. The Lancet Respiratory Medicine, 9(9), e93–e94. https://doi.org/10.1016/S2213-2600(21)00312-X
7. Business Standard. (2021, May). Covid effect: 1,952 employees dead, 1,000 infected daily, says Railways | Business Standard News. https://www.business-standard.com/article/indian-railways/covid-effect-1-952-employees-dead-1-000-infected-daily-says-railways-121051000958_1.html
8. Callaway, E. (2021). Beyond Omicron: what's next for COVID's viral evolution. Nature, 600(7888), 204–207. https://doi.org/10.1038/D41586-021-03619-8
9. Chandra, S. (2021). Why India's Second COVID Surge Is So Much Worse Than the First - Scientific American. Scientific American. https://www.scientificamerican.com/article/why-indias-second-covid-surge-is-so-much-worse-than-the-first/
10. Conticini, E., Frediani, B., & Caro, D. (2020). Can atmospheric pollution be considered a co-factor in extremely high level of SARS-CoV-2 lethality in Northern Italy? Environmental Pollution, 261, 114465. https://doi.org/10.1016/J.ENVPOL.2020.114465
11. Hossain, M. A. (2020). Is the spread of COVID-19 across countries influenced by environmental, economic and social factors? MedRxiv, 2020.04.08.20058164. https://doi.org/10.1101/2020.04.08.20058164
12. Impact of COVID-19 on people's livelihoods, their health and our food systems. (n.d.). Retrieved June 3, 2022, from https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people's-livelihoods-their-health-and-our-food-systems
13. Jain, V. K., Iyengar, K. P., & Vaishya, R. (2021). Differences between First wave and Second wave of COVID-19 in India. In Diabetes and Metabolic Syndrome: Clinical Research and Reviews (Vol. 15, Issue 3, pp. 1047–1048). Elsevier. https://doi.org/10.1016/j.dsx.2021.05.009
14. Jha, N. D. (2021, June). Loss of lives was 40% higher in 2nd wave, those below 45 years worst hit | Delhi News - Times of India. https://timesofindia.indiatimes.com/city/delhi/loss-of-lives-was-40-higher-in-2nd-wave-those-below-45-yrs-worst-hit/articleshow/83935243.cms
15. Kar, S. K., Ransing, R., Arafat, S. M. Y., & Menon, V. (2021). Second wave of COVID-19 pandemic in India: Barriers to effective governmental response. EClinicalMedicine, 36, 100915. https://doi.org/10.1016/J.ECLINM.2021.100915/ATTACHMENT/34C4896E-3295-46B1-ACDE-CD18F0C8C9DC/MMC1.DOCX
16. Kaushik, M., Agarwal, D., & Gupta, A. K. (2021). Cross-sectional study on the role of public awareness in preventing the spread of COVID-19 outbreak in India. Postgraduate Medical Journal, 97(1154), 777–781. https://doi.org/10.1136/POSTGRADMEDJ-2020-138349
17. Kiaghadi, A., Rifai, H. S., &Liaw, W. (2020). Assessing COVID-19 risk, vulnerability and infection prevalence in communities. PLOS ONE, 15(10), e0241166. https://doi.org/10.1371/JOURNAL.PONE.0241166
18. Leung, N. H. L., Chu, D. K. W., Shiu, E. Y. C., Chan, K. H., McDevitt, J. J., Hau, B. J. P., Yen, H. L., Li, Y., Ip, D. K. M., Peiris, J. S. M., Seto, W. H., Leung, G. M., Milton, D. K., & Cowling, B. J. (2020). Respiratory virus shedding in exhaled breath and efficacy of face masks. Nature Medicine 2020 26:5, 26(5), 676–680. https://doi.org/10.1038/s41591-020-0843-2

19. Ministry of Railways, G. (2020). GOVERNMENT OF INDIA MINISTRY OF RAILWAYS RAJYA SABHA UNSTARRED QUESTION NO.783 ANSWERED ON.
20. Modi, P. D., Nair, G., Uppe, A., Modi, J., Tuppekar, B., Gharpure, A. S., &Langade, D. (2020). COVID-19 Awareness Among Healthcare Students and Professionals in Mumbai Metropolitan Region: A Questionnaire-Based Survey. Cureus, 12(4). https://doi.org/10.7759/CUREUS.7514
21. Onofrei, R. (2020, January). Largest producer of locomotives: world record set by The Chittaranjan Locomotive Works. World Record Academy. https://www.worldrecordacademy.org/transport/largest-producer-of-locomotives-world-record-set-by-the-chittaranjan-locomotive-works-219459
22. Singh Gambhir, R., Singh Dhaliwal, J., Aggarwal, A., Anand, S., Anand, V., & Kaur Bhangu, A. (2020). Covid-19: a survey on knowledge, awareness and hygiene practices among dental health professionals in an Indian scenario. RocznikiPaństwowegoZakładuHigieny, 71(2), 223–229. https://doi.org/10.32394/RPZH.2020.0115
23. The Hindu. (2021, May). 1,952 employees have died due to COVID-19: Railways - The Hindu. The Hindu. https://www.thehindu.com/news/national/1952-employees-have-died-due-to-covid-19-railways/article34530294.ece
24. UNICEF. (n.d.). Everything you need to know about washing your hands to protect against coronavirus (COVID-19) | UNICEF. 2021. Retrieved June 29, 2022, from https://www.unicef.org/coronavirus/everything-you-need-know-about-washing-your-hands-protect-against-coronavirus-covid-19
25. WHO, I. G. (2020). Mask use in the context of COVID-19. https://www.ashrae.org/technical-resources/resources
26. Sen, Sushanta, et al. "A DATA VISUALIZATION ON THE BAD EFFECTS OF CHILD'S SOCIAL MEDIA AND VIDEO GAME ATTRACTION DUE TO COVID-19 PANDEMIC." International Journal of Computer Science and Engineering (IJCSE) ISSN (P): 2278–9960; ISSN (E): 2278–9979 Vol. 11, Issue 1, Jan–Jun 2022; 61–68
27. Nguyen, Dongthi Thao, and Thu Chung Kieuthi. "New trends in technology application in education and capacities of universities lecturers during the Covid-19 pandemic." International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) 10 (2020): 1709-1714.
28. Singh, Neha, et al. "Awareness Towards Covid-19 Pandemic among Farm Women and its Technological Strategies." International Journal of Agricultural Science and Research (IJASR) 10 (2020): 151-158.