

Increasing Heart Attacks in Indian Youth - Post COVID Health Hazards and Mitigation Measures using Geospatial Technologies

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Abstract

"Indians are prone to high risk of heart attacks up to 30-40% due to genetic reasons", leading clinical reports says. In comparison with 1990's the risk of heart attacks in Indians are gone up in recent days, that too at a younger age than the other parts of the world because of the increase in stress, lack of sleep, smoking, alcohol consumption, dietary habits, increasing prevalence of obesity and sedentary lifestyles etc. According to news agency reports several cases of heart attacks were recorded in major city hospitals across India in the past six months, for example TV actor SiddhaanthVirSurryavanshi, Comedian Raju Srivastava, Kannada Superstar PuneethRajkumar and few young officers from armed forces were also died while working out in the gym. According to the experts in Cardiology, Covid or long Covid may cause persistent inflammation in heart vessels. This can rupture silent blockages and cause a heart attack and the risk increases when there are risk factors for heart disease like high BP, Diabetes, high cholesterol, smoking or obesity. The Indian Council of Medical Research (ICMR) has conducted a study on sudden rise in heart attacks and COVID Vaccines and the report is awaited. In the present paper an attempt has been made to bring awareness about the severity of the problem and also the use of geospatial applications in providing the solutions to mitigate the health hazards caused by the pandemic through maps/apps depicting the information pertaining to locations of medical facilities, shortest routes to reach these facilities, ambulance services, health and fitness centers and conveyance etc. At the same time every individual must spare some time for personal care not limited to good habits, nutritious diet, minimum tolerable physical exercises, yoga and pranayam besides periodic health check-up & appropriate medication.

Keywords: COVID-19, health hazards, SARSC2, geospatial technologies, inflammation, myocardial infarctions (MI), Pranayam.

Introduction

According to some leading clinical reports, Indians are prone to high risk of heart attacks up to 30-40% due to genetic reasons. In comparison with 1990's the risk of heart attacks in Indians are gone up in recent days, that too at a younger age than the other parts of the world because of the increase in stress, lack of sleep, smoking, alcohol consumption, dietary habits, increasing prevalence of obesity and sedentary lifestyles etc. It is evident in the social media about raising heart attacks not only in the elderly people but also in the young and apparently fit people, in the college compound, on the street, at the dance floor and in the gym. To the extent hashtag '#heart attacks' has been trending on Twitter now a days. According to news reports several cases of heart attacks were recorded in major city hospitals across India in the past six months, for example TV actor

SiddhaanthVirSurryavanshi, Comedian Raju Srivastava, Kannada Superstar Puneeth Rajkumar and few young officers from armed forces were also died while working out in the gym. According to the news agency reports in the month of August and November 2023 there were instances where the Pilots of Air India and Indigo were collapsed at the airport and one Spicejet pilot got heart attack and died while travelling from Delhi to Doha as a passenger. In all the above cases the age of the victims is below 50 years. In the month of Oct 2023 an Ex-MLA from Telangana State who died at the age of 52 due to heart attack triggered by hypertension. A 51 year old Ashish Kumar Garg, Marathan runner died due to heart attack in Delhi Half Marathan event. These deaths not limited to the celebrities but to my family too. I have lost my elder brother and my mother within two years of gap due to this deadly attack. According to the experts in Cardiology, Covid or long Covid may cause persistent inflammation in heart vessels. This can rupture silent blockages and cause a heart attack, especially after an unaccustomed exercises like heavy weight lifting or walking on a treadmill or running in a cold weather and the risk increases when there are risk factors for heart disease like high BP, Diabetes, high cholesterol, smoking or obesity. The Indian Council of Medical Research (ICMR) has conducted a study on sudden rise in heart attacks and COVID Vaccines and the report is awaited. "Currently there is insufficient evidence /data to prove whether the rise of myocardial infarctions(MI) and sudden deaths have been due to COVID-19 vaccines, but these cases of sudden deaths due to myocardial infarctions have increased post COVID"the Parliamentary Standing Committee on Health and Family Welfare said.

Coronavirus disease 2019(COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus2 (SARSC2). The first case of COVID-19 was reported in Wuhan, China and rapidly spread to the rest of the world [11]. Let us have a review of the COVID-19 statistics within the country as well as around the globe. The death toll due to the viral disease stands at 5,31,915 according to the health ministry's data updated at 8 am on 25July 2023. The tally of Covid cases in the country has gone up to 4,49,95,332 the data said. The national COVID-19 recovery rate was recorded at 98.81 per cent, according to the ministry's website. Globally, as of 8:20am CEST, 19 July 2023, there have been 76,82,37,788 confirmed cases of COVID-19, including 69,51,677 deaths, reported to WHO [16]. As of 22 July 2023, a total of 13,47,43,48,801 vaccine doses have been administered. The nationalCOVID-19 recovery rate was recorded at 98.81 per cent, according to the ministry's website. The number of people who have recuperated from the disease has gone up to 4,44,61,968, while the case fatality rate was recorded at 1.18 per cent. According to the ministry's website, 220.67 crore doses of anti-Covid vaccines have so far been administered in the country under a nationwide vaccination drive. Globally, as of 8:20am CEST, 19 July 2023, there have been 76,82,37,788 confirmed cases of COVID-19, including 69,51,677 deaths, reported to WHO. As of 22 July 2023, a total of 13,47,43,48,801 vaccine doses have been administered (Table-1).

Materials and Methods

COVID-19 outbreak was declared a pandemic on 11 March 2020[17]. Although SARSC2 primarily affects the respiratory tract, it frequently causes cardiac, gastrointestinal, hepatic, nephrological and central nervous system distress [5]. It mainly causes nonspecific symptoms like fever, cough and myalgia; however, in severe cases it can lead to respiratory failure, septic shock, multiorgan dysfunction, and even death [15]. Vaccination programs introduced

around the globe are aiming to reduce morbidity, mortality, and disease spread. With the available data as provided by the WHO, if we see the graph (Figure.1) of confirmed COVID cases versus population they are directly proportional. Researchers and Pharmaceutical companies had developed the COVID Vaccines in a record time of nine months which was need of the hour.

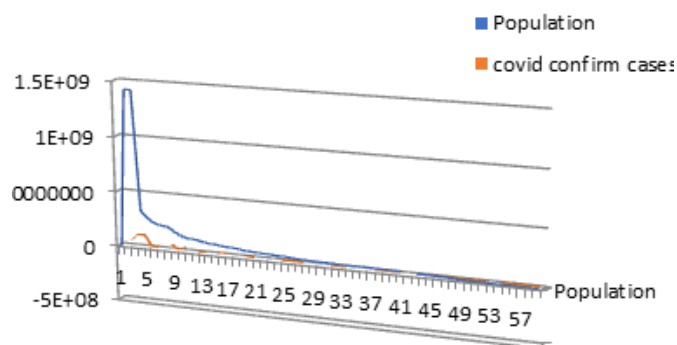


Fig. 1 Graph showing confirmed COVID cases versus population they are directly proportional.

Treatment for COVID-19 is in general supportive care and nutritional diet support besides respiratory care. However, due to lack of clinically approved interventions for COVID-19 treatment, attempts have been made for vaccine development to prevent the disease [5]. As a result, the safety and efficacy of several vaccines have been approved by the World Health Organization (WHO). Among these are AstraZeneca/ Oxford, Johnson & Johnson / Janssen, Moderna, Pfizer/ BioNteck, Sinopharm, Sinovac, and the Bharat Biotech BBV152 Covaxin Vaccine [10]. Vaccines for severe acute respiratory syndrome coronavirus(SARSC) 2 have several different mechanisms of action including; (1) RNA and DNA vaccines that are genetically engineered to produce a protein that warrants an immune response; (2) Vector vaccines that introduce a type of virus that can't produce disease but can effectively generate an immune response; (3) Vaccines that use genetically modified viruses to become weaker or inactivated in order not to cause virulence but retain their antigenicity; and (4) Harmless fragments of proteins or protein shells with similar antigenicity to the COVID-19 virus that are used in protein based vaccines to produce immunity[10].

Table 1 India and neighboring countries affected by COVID-19¹.

Country	Population	Confirmed cases	Deaths	% of deaths	Vaccination %
Global	8.1 billion	768,237,788	6,951,677	0.904886105	66.92
Bangladesh	172,954,319	2,043,730	29465	1.441726647	85.74
China	1,425,671,352	99,296,816	121536	0.122396674	87.3
India	1,428,627,663	44,994,955	531915	1.182165867	68.99
Indonesia	277,534,122	6,812,127	161879	2.376335614	63.94
Iran	89,172,767	7,612,728	146303	1.921820929	69.74
Iraq	45,504,560	2,465,545	25375	1.029184217	19.75
Pakistan	240,485,658	1,580,631	30656	1.939478601	63.59
Thailand	71,801,279	4,754,228	34410	0.723776815	77.62
Russia	144,444,359	22,971,107	399772	1.740325357	54.62
Singapore	5,637,000	2,519,716	1841	0.07306379	89.7

Source: WHO (covid19.who.int).

It is common to experience side effects following any vaccine, and no exemption to COVID-19 vaccine. Fatigue, headache, muscle pain, joint pain, chills, fever, generalized body

pain, and local reaction at the injection site are some of the side effects that have been reported after COVID-19 vaccination [1]. Several cardiovascular adverse effects have also been reported after COVID-19 vaccination including Myocarditis, pericarditis and thrombotic events. In addition to these, rare cardiovascular events such as hypertension, acute coronary syndrome, stress cardiomyopathy, arrhythmias, and cardiac arrest have also been reported. Although the relationship between these rare events and the vaccination is doubtful, the incidence of these rare side effects post vaccination in the absence of any other obvious cause in otherwise healthy individuals may suggest a causal relationship between the two [2]. According to Johansson et al [3] the relative risk of cardiovascular morbidity and mortality was 30% higher in those who suffered from myocardial infarction (MI) compared to the general population.

Data Analysis

In the present study the available data pertaining to delivery of vaccination in December 2020 to mid of the 2022 and research findings have been considered to establish facts about adverse effects by the COVID-19 vaccination. Available data in the public domain related to comorbidity and cardiopulmonary arrest cases after COVID vaccination in India has been considered for the present study. "Currently, there is insufficient evidence /data to prove whether the rise of myocardial infarctions (MI) and sudden deaths have been due to COVID-19 vaccines, but these cases of sudden deaths due to myocardial infarctions have increased post COVID" the parliamentary standing committee headed by Mr Bhubaneswar Kalita said. According to a new study, people suffering from flu could be at more than six times higher risk of heart attack a week after, than in the year before or after. The findings come to light as the number of flu cases in India has gradually increased over the past few weeks, as driven by the H3N2 virus [12].

Several cases of people dying due to heart attacks have been reported recently with many linking these deaths to Covid or the vaccination. Economic Times reported that the heart attack and brain stroke have been the two-main causes for hospitalisation and death among those who received Covid-19 vaccine. The researchers at the All India Institute of Medical Sciences in Delhi are carrying out a review of data generated from cases of death due to heart attack.

Based on the studies by the researchers, patients usually suffered from myocardial infarction (MI) after the first dose of the vaccine (69%), of these studies 53.3% of case reports reported MI within a few hours of vaccine administration and the rest within 10 days. Out of these patients, 44% of cases reported were of ST-segment elevation MI (STEMI) and 26% were non-ST-segment elevation MI (MSTEM). The mortality rate was 29%. The most studies reported were from the United States, the United Kingdom and India [14].

Globally, 65.8% of people have received at least one dose of a COVID-19 vaccine, and 11.79 billion doses have been ministered globally [6]. The doses of various vaccines administered through May 25, 2022 are as follows: Pfizer, 613 million; Moderna 147 million; AstraZeneca, 67 million; Janssen, 19 million; Sputnik V; 1.87 million; Sinopharm, 2.31 million; Sinovac, 3737; and Covaxin, 44, Pakistan has administered at least 248672457 doses of COVID-19 vaccines so far. Assuming that every person needs two doses, that is enough to have vaccinated about 57.4% of the country's population [7].

Results and Discussions

Myocardial infarction remains one of the rare complications of a COVID-19 vaccination [2]. The research studies reveals that 69% of MI occurrence found after the first dose, and 14% reported after the second. It is a known fact that a subsequent or a booster dose of a vaccine is given to increase the antibody titer especially for the patients with weakened immune response due to comorbidities [15]. A theory based on these findings is that since MI occurrence is higher after the first vaccine dose, immune response probably plays no role or only a minimal role in MI pathophysiology. If MI was due to overstimulation of the immune system, then the frequency of MI after the second dose would be higher. A study showed that COVID-19 vaccination produces an optimum immune response in chronic inflammatory disease patients on immunosuppressive therapy, and the risk of adverse consequences is not higher than in the normal population [4]. Kounis syndrome is one of the mechanisms identified for the occurrence of MI post COVID-19 vaccination as it has been observed in various patients who received a COVID-19 vaccination (Pfizer, AstraZeneca, and Sinovac vaccines) [10,9].

The BMJ (British Medical Journal) provides evidence on the risk of heart inflammation (myocarditis and pericarditis) after mRNA (messenger RNA) vaccination against the covid-19 virus. Researchers in Canada confirms that myocarditis is rare, but cases are highest among young males shortly after a second dose. Young male adults (50-139 cases per million in 12–17-year-olds and 28-147 cases per million in 18–29-year-olds). For girls and boys aged 5-11 years and females aged 18-29 years, rates of myocarditis after vaccination with Pfizer might be fewer than 20 cases per million. 2020 to 2023 witnessed large number of heart attack cases and the death meter is on. Known celebrities lost their lives due to cardiac arrest. I too lost my elder brother (age 50 years), my mother (age 72) and my aunt (age 69) with the deadly attack (Figure.2). Let us look into the key risk factors triggering these heart attacks in the post vaccination scenario.



Fig. 2 Few examples of known personalities including Author's family members who lost their life due to heart attack (Post Covid-19).

Key Risk Factors: According to the experts in Cardiology, Covid or long Covid may cause persistent inflammation in heart vessels. This can rupture silent blockages and cause a heart attack, especially after an unaccustomed exercises like heavy weight lifting or walking on a

treadmill or running in a cold weather and the risk increases when there are risk factors for heart disease like high BP, Diabetes, high cholesterol, Smoking or obesity. The Indian Council of Medical Research (ICMR) has conducted a study on sudden rise in heart attacks and COVID Vaccines and the report is awaited. The Parliamentary Standing Committee on Health and Family Welfare said “Currently there is insufficient evidence /data to prove whether the rise of myocardial infarctions and sudden deaths have been due to COVID-19 vaccines, but these cases of sudden deaths due to myocardial infarctions have increased post COVID”. Genetics plays a pivotal role. A family history of heart disease, particularly early onset heart attacks, signifies a strong genetic predisposition. Young adults with such family histories should undergo comprehensive screening for risk factors and specific familial heart diseases. Genetic components exert substantial influence, necessitating vigilance in those with immediate family heart-related issues.

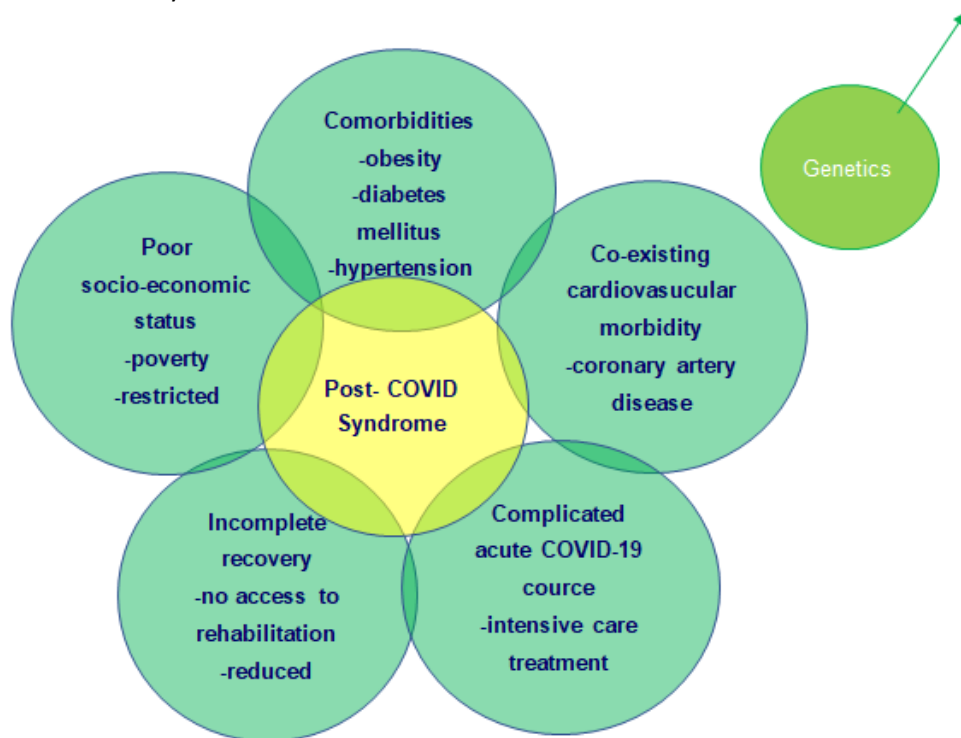


Fig. 3 Key risk factors triggering heart attacks.

Symptoms & First Aid: Men and women can have different symptoms. Men are more likely to break out in a cold sweat and to feel pain move down their left arm, feel pain, pressure, or discomfort in the chest, short of breath, sweat, faint, or feel sick. Women are more likely than men to have back or neck pain, heartburn, and shortness of breath. They tend to have stomach trouble, including feeling queasy and throwing up. They may also feel very tired, lightheaded, or dizzy. A couple of weeks before a heart attack, a woman might have flu-like symptoms and sleep problems. About 435,000 women have heart attacks in the U.S. yearly. Symptoms can be so mild they're dismissed as something minor [12].

First Aid at Home: When the patient found with the symptoms as mentioned above, first aid should be given immediately prior to arrival of ambulance and reaching nearest medical facility. Have the person sit down, rest and try to keep calm, ask if the person takes any chest pain medicine, such as nitro-glycerine (helps in widening blood vessels- 'vasodilator') for a

known heart condition and help them take it. Call for emergency medical help if the pain does not go away promptly with rest or within 3 minutes of taking nitroglycerin. Chew and swallow an aspirin while waiting for emergency help and begin CPR if the person is unconscious. Cardiopulmonary resuscitation (CPR) is an emergency procedure consisting of chest compressions often combined with artificial ventilation, or mouth to mouth in an effort to manually preserve intact brain function until further measures are taken to restore spontaneous blood circulation and breathing in a person who is in cardiac arrest. It is recommended for those who are unresponsive with no breathing or abnormal breathing (agonal respirations).

Preparedness and use of Geospatial Technologies: Whatever the damage happened to the mankind due to COVID can't be reverted back but we can mitigate the health hazards caused by the pandemic using the geospatial technologies which can give us solutions to reduce the risk by providing maps through apps depicting the information pertaining to locations of medical facilities, shortest routes to reach these facilities, ambulance services, health and fitness centres and conveyance etc. There are several mobile applications available today run by both Government as well as private agencies in PPP (public private partnership) formula. For example, Health Plix, using this app you can book an appointment of a specialised doctors and subsequent follow-ups for the treatment. Likewise, netmeds.com, MeDLiFe, Applolo24x7, Medi Buddy, PharmEasy etc. through which we can order our medicines get delivered to the doorsteps (Figure 4). mDiabetes program is a mobile-based initiative for prevention and care of diabetes by giving a missed call to 011-22901701. Currently more than 1 lakh users are registered for mDiabetes. Aarogyasetu has transformed into National Health App, bringing you a whole plethora of digital health services powered by Ayushman Bharat Digital Mission (ABDM). Using Aarogyasetu, you can now register for your Ayushman Bharat Health Account (i.e., Digital Health ID). Aarogyasetu helps you to schedule online doctor appointments powered by eSanjeevani OPD Application. You can schedule doctor appointments and consult with doctor from the comfort of your home. Aarogyasetu helps you to schedule/reschedule/cancel your appointments for covid-19 vaccination. Using Aarogyasetu you can download the vaccination certificate.

Medical emergencies may happen to anybody and any time. People generally get panic or freeze in such situations by seeing their loved one's suffering. So, finding an ambulance emergency number during a severe accident, a sudden stroke or heart attack, or even choking on the windpipe or other emergencies is very difficult. These kinds of situations may arise in our life at any time. So, we must be prepared with some knowledge about the emergency contacts for example ambulance number, medical emergency number to rush to the nearest hospital. It is not wise to rely on web search engines for such situations as you might get stuck due to low network coverage or other issues. Sometimes, every fraction of a second counts to stabilize the patient and transferring them in the nick of time to a health care centre might save their lives. Ambulances have proven to be life saviours in many such situations. So, it's important to know about medical emergency numbers and emergency services to get help in time. 108 is a toll-free ambulance emergency number in India. Every city or state has this number reserved for ambulance services only to make medical emergency care more accessible for everyone in India regardless of the income & location of the patient. It is currently operational in 23 states for *24x7 medical emergencies* with a team

of fully *trained professionals* on board. This team of technicians and medical staff is well-versed in Basic Life Support (BLS) and Advanced Life Support (ALS) equipment to introduce necessary Medical Aid while the patient is transported to the hospital. Emergency ambulance drivers are also trained to reach the nearest hospital in the shortest period. Two more emergency toll-free numbers are 102 and 104 for help of pregnant women and the mentally ill-health people respectively. Keeping the medical emergency numbers handy will be helpful.



Fig 4. Geospatial health/ medical assistance applications and emergency services which can aid in mitigating the risk.

Life style modifications and Preventive Measures:

Life Style Adjustments: We can lead a healthy life by adjusting slight modification to our life style like early to bed and early to rise, nutrient balanced diet intake and regular minimum tolerable physical exercises.

Prevention of Diabetes: Regular health check-up and continuous medication with follow up by a specialized doctor with proper diet and exercises can control diabetes.

Prevention of Hypertension: Sufficient sleep with less fat food and regular exercises and pranayam can help to control hypertension besides medication and regular follow- up by a specialized doctor.

Prevention of High Cholesterol: Avoid junk food, fats and include fibre rich food, leafy vegetables and fruits in your diet with regular exercises can help to prevent high cholesterol.

Regular Physical Activity/ Yoga: Practicing yoga and pranayam on regular basis is very useful in regulating hypertension and other respiratory problems including stress relief. These activities should be organized and mobilized as a community program through which we may raise awareness in community health (Figure. 5).

Keep away from Sedentary Living: In today's fast life style with the pizza culture, late night parties' odd duty hours, over stress and continuous sitting in front of computer/laptop or

continuous use of mobile phones besides environmental problems like air pollution, water pollution may push the people into the health disorders. To get away from these ones should have good living and dietary habits with regular tolerable physical exercises with routine health check-up may help in leading healthy life.

Vigilant for Potential Risk Factors/ Regular Checkup: Youngsters especially above the age of 25 years should prioritize regular heart health checkups encompassing blood pressure measurement for hypertension, cholesterol level screening to assess risk factors, blood screenings provide a holistic perspective on heart health, enabling early intervention and risk reduction. Establishing a baseline and continuous monitoring are crucial for youngsters to prevent potential future heart-related problems, sugar tests to detect diabetes, BMI (Body Mass Index) measurement for obesity evaluation, ECG for irregular heart rhythms, a review of family history for genetic risks, and a lifestyle assessment to gauge overall heart health. These comprehensive issues. At the same time every individual must spare some time for personal care not limited to good habits, nutritious diet, minimum tolerable physical exercises, yoga and pranayam besides periodic health check-up & appropriate medication.



Fig. 5 Public awareness and health consciousness through community initiatives.

Conclusions

According to experts Covid infection increases the blood clotting tendency which raises the risk of all diseases arising owing to development of blood clots like heart attack, cerebral stroke, deep vein thrombosis or peripheral arterial thrombosis [8]. Weakening of heart muscle owing to inflammation of heart which is known as myocarditis which may lead to efatures of heart failure. Increased tendencies to abnormal heart rhythms termed arrhythmias. This could be abnormal reductionof heart beat or abnormal type of fast heart beats. This could be a new irregularity or exacerbation of pre preexisting abnormality. The association of heart disease, especially myocarditis with COVID vaccine is still being evaluated. According to experts opinion, there has been some evidence of this association especially in young people after the second dose of vaccine but that risk is overall small as compared to the potential benefits of vaccination. The studies reveal that the heart stroke is no more considered as disease of elderely. We have been witnessing many youngsters landing in heart stroke in their early age. This trend has increasingly been seen in the COVID-

19 pandemic. However the detailed study results based on the case studies is awaited from the ICMR.

Even after the COVID-19 vaccination drive we are not safe, still the SARS-CoV-2 cases are coming up. The news agency reports says that still people in China are suffering with respiratory diseases in a large number especially in children. According to WHO reports as of 24 Sep 2023, over 770 million confirmed cases and over 6 million deaths have been reported globally. Globally, the number of new cases decreased by 55% during the 28 days period of 28 August to 24 September 2023 as compared with the previous 28-day period, with over 685,000 new cases reported [16]. That means still the COVID-19 is not fully eradicated.

At a press conference on 13 November 2023, Chinese authorities from the National Health Commission reported an increase in incidence of respiratory diseases in China. Chinese authorities attributed this increase to the lifting of COVID-19 restrictions and the circulation of known pathogens such as influenza, *Mycoplasma pneumoniae* (a common bacterial infection which typically affects younger children), respiratory syncytial virus (RSV), and SARS-CoV-2 (the virus that causes COVID-19). On 22 November, WHO requested additional epidemiologic and clinical information, as well as laboratory results from these reported clusters among children, through the International Health Regulations mechanism. WHO has recommended that people should follow measures to reduce the risk of respiratory illness, which include recommended vaccination; keeping distance from people who are ill; staying home when ill; getting tested and medical care as needed; wearing masks as appropriate; ensuring good ventilation; and regular hand-washing. Hence be aware, be hygienic, be vigilant and keep good health.

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