Research Article

HEALTH SECTOR RESILIENCE AND DISASTER MANAGEMENT WITH RESPECT TO COVID-19

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ABSTRACT

In the moment of preparation of this paper, the world is still globally in grip of the Corona (COVID-19) crisis, and the need to understand the broader overall framework of the crisis increases. As in similar cases in the past, also with this one, the main interest is on the "first response". Fully appreciating the efforts of those risking their lives facing pandemics, this paper tries to identify the main elements of the larger, possibly global, framework, supported by international standards, needed to deal with new (emerging) risks resulting from threats like Corona and assess the resilience of systems affected. The paper proposes that future solutions should include a number of new elements, related to both risk and resilience. That should include broadening the scope of attention, currently focused onto preparation and response phases, to the phases of "understanding risks", including emerging risks, and transformation and adaptation. The paper suggests to use resilience indicators in this process. The proposed approach has been applied in different cases involving critical infrastructures (energy supply, water supply, transportation, etc., exposed to various threats). The detailed, indicator-based, resilience analysis included mapping resilience, resilience stress-testing, visualization, etc., showing, already before the COVID-19, the resilience (stress-testing) limits of the infrastructures. The paper links these results with the options available in the area of policies, standards, guidelines and tools (such as the Risk Radar), with focus on interdependencies and global standards, linking emerging risks and resilience.

INTRODUCTION

The outbreak of novel coronavirus disease (COVID-19) puts a spotlight on the resilience of health systems and countries' emergency preparedness and response. The rapid expansion of COVID-19 emphasizes the urgent need for a strong health workforce as an integral part of every resilient health system. Now the question arises is what we understand by the term health sector resiliency? As when we think of health sectors, we mainly think of the hospitals. But our health sectors includes all the nurses, staff members, hospitals, informal care givers, our government and community centers etc. So all these work together to make and build a strong health infrastructure. But in any disaster or calamity the more pressure is created on the hospitals and people get affected physically, socially and mentally. So for these difficult times, our health sectors has to be prepared with enough funds and facilities to face the resiliency. There were many challenges faced in these pandemic times by people and the government like- lack of beds, supply chain deficiencies (like PPE kits, tests kits, reagents and other consumables), lack of qualified labor force, lack of patient management protocols and procedures w.r.t COVID-19, more pressure on the people with

low economic status, more mental problems, social distancing etc. But due to enough funds and resources we are able to been through this in a much better way. The concept of resiliency does not mean to get out of the situation but also how will the health sector and the people be able to cope up after the disaster. What will the impact on the life and health of people weather its physical, mental or social health?

Background

The outbreak of COVID-19 was firstly reported in December 2019 in Wuhan City, Hubei Province, People's Republic of China, and the infected patients were diagnosed with symptoms of intense respiratory disorder, headache, fatigue, throat pain, mild fever and others. As per reports, this have been found to be as an irresistible sickness out-break in China since 1949. However, at worldwide level, the strategy to control the spread of infection through this virus need to be availed as soon as possible. Most specifically, three queries should be answered, including (i) how to take the crisis reaction activities viably in various nations; (ii) how to activate assets rapidly with vital ways; and (iii) how to support individual's professional from different sectors effectively. Proficiently, control of the irresistible sources, hindering the spread courses, and ensuring the susceptive population care

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few crucial steps and could play significant role in the prevention as well as monitoring of the infection spread.

Initial approaches against pandemic crisis

In managing the outbreak, countries like China has firstly attained the method of fitting intercessions into neighborhood arrangements, from rapidly finding the tainted individuals, followed by close associates and putting them in the isolation conditions, to promote essential cleanliness measures to general society. By adjusting reaction strategies to the neighborhood setting, it might abstain from barring the city when it isn't required, and furthermore keep from a significant flare-up without making any move. These strategies were later followed by other nations.

Empowering individuals proactively to fight against COVID-19

It is critical to protect the people, specifically the working class and daily wages workers, from the contamination and in these circumstances all occupants in the potential hazard territories were urged to remain at home. Initially, the laborers and volunteers showed with the symptoms were proactively taken for diagnosis and screening for the presence of infection in the body. These diagnostic approaches helped in actualizing the number of positive cases and also for arranging appropriate measures by administrations, for example, driving patients to the portable medical clinics. The epidemiologists working in communities for regulating sickness and prevention of infection gave the factual outcomes regarding the propagation of epidemiological information effectively

Effect of Covid-19 outbreak

COVID-19 has effected everyday life of humans and has hindered the worldwide economy. This pandemic also impacted a social life of people all over the world. This infection has spread all over the globe, almost in 213 countries, and has showed severe implications over countries economic and health systems. Many countries locked their facilities, amenities, educational institutions, industrial sectors, daily usage marketplaces and others, to prevent the spread of this infections. The different trades and business sectors have been severely influenced by this infection. Apart from these some significant impacts and concerns over the healthcare services, economy and social life has been discussed.

Human services (healthcare) impacts

- Difficulties in the identification, isolation and treatment of suspected or infected patients.
- Overburden of the medical and clinical personals.
- Patients suffering or diagnosed with other diseases are effected due to ignorance.
- Overloaded cases decreased the medication facilities in medical shops.
- High assurance is needed.

Monetary (economy) impacts

- The accumulation of basic products has been slowed and reduced.
- Disruption in the flexible range of stuffs.
- Loss in the national and global trade.
- Meager income in the global market.

Social impacts

- Service areas do not found any options to manage their apt support.
- Withdrawal or deferment in international or national sport sectors.
- The tourism sectors have been severely affected.
- Prohibition over various festive occasions.
- Unnecessary apprehensions amongst the public masses.
- Distancing from family, friends and relatives.
- Shut down of the cafeterias, restaurants, shops, recreations centers, gyms etc.

Global threat

COVID-19 pandemic has become a global threat and has developed a fear amongst the mankind, however the people have taken lots of cautious steps to get rid of this dreadful infection. Moreover, negative feelings and thinking amongst the people could result in severe transmission of the infection, and the dismay could cause unwanted hazards in the society. These outcomes of public fear for COVID-19 spread has produced alterations amongst the social life of people all over the world. A passionate reaction to a hazardous circumstance can impact thinking in two stages. Moreover, the feeling quality of a person (for instance, constructive versus adverse) depends upon the type of information and thoughts shared by the individuals around. Thus, increase in hostile feelings amongst the people increases and this might generate negativity in thoughts and so could enhance the threat feelings of COVID-19, and this is very essential to control and make people feel less panic.

Disaster and panic

There is a typical confidence in mainstream society that, when in risk, individuals fear, particularly when they are in groups. So, they act aimlessly and unreasonably out of self-protection, possibly imperiling the endurance of all. Such thought has been utilized to disclose reactions to the present COVID-19 flare-up, mostly according to the idea of 'alarm purchasing. Unquestionably, a few people do act childishly and a few, particularly the individuals who are helpless, may encounter more misery. The participation, active representation and astounding humanity of people have been noticed by the people during the crises, tragedy and other numerous disastrous cases. For example, the guiding principles and unity among people in general have increased because of Covid-19. In fact, in fires and other common hazards, individuals are less inclined to bite the dust from over-response than from under-response.

Social practices

Mostly the behaviour of individuals get effected by the practice of their thinking about what other people think or do, they follow the same. A number of literature has been reported regarding several thought practices related to moral values and ethics. In spite of the fact that people are obstructed by values, their recognitions are usually inaccurate. For instance, individuals can underestimate wellbeing advancing practices (for instance, washing of hands and misjudge ill-fated activities. Altering practices by rectifying such misunderstandings could be accomplished by open messages fortifying positive moral values. Giving exact data about the activities of the people and their behavior probably could be

more useful rather than mentioning false activities. Informal population or communities could increase the spread of practices which are hurtful well as useful during the plague infections, and these effects might spread from an individual to a group and further to the entire community. Moreover, the main suspected persons or infected patients might be prominent in increasing the awareness against the pandemic prevention since they are the productive sources of intrusions such as washing of hands, isolation and others.

Paranoid ideas

Paranoid fears rose along after the main updates on COVID-19 and proceeded to persist. Few considered the origination of SARS-CoV-2 infection, for instance, as it was a form of bio-weapon developed by the Chinese to take up arms against the developed countries like United States and other. Apart from this, other focused on anticipations for its treatment approaches and prospects, for example, traditional clinical treatment ought not to be reliable and that the individuals or patients should make use of elective solutions for prevent the infection or its consequences. It isn't amazing that paranoid fears have thrived right now. Examination recommends that individuals want to clarify huge occasions with relatively enormous causes and are bound to have faith in fear inspired notions about occasions with genuine concerns and in the midst of predicament. This is likely on the grounds that individuals are progressively attracted to paranoid ideas when significant mental needs are frustrated. In this way, fear inspired notions may acquire footing as COVID-19 spreads and more individuals disengage themselves.

False news and falsehood

Fake news and misrepresentation, mostly via web-based networking media, about the COVID-19 pandemic has severely impacted its post-pandemic situation all over the globe and has caused various lethal consequences. Developing examination is utilizing sociology to comprehend and fetch the spread of deceiving news. To mitigate this circumstances, delineation of such news and keeping people aware of it, could be one of the significant method to get rid of it. Also, co-prejudice, uncovering refusal, and rectifications that give causal clarifications, all will in general increase the viability of countering misinformation. Additionally, various government agencies have combined performed numerous strategies regarding the significant alterations essential for the augmentation of people's faith towards accurate news and to identify the misleading information.

COVID-19 outbreak: effects on society, global environment and prevention

The connection between human wellbeing and ailment is neither another idea, nor another subject. The origination of COVID-19 from China followed by its global outbreak has led for significant medical problems. The most common mode of transmission is from person to the person due to close contacts. To overcome the infective symptoms, sanitizers or vaporizers are usually used that could infiltrate the human body (respiratory framework). The presenting highlights of COVID-19 malady in grown-ups are articulated. It involves extraordinary implication to explain the relationship amongst the COVID-19 and the infected persons. COVID-19 pandemic is a respiratory tract associated disease that mostly harms the cells/tissues of lungs, but might also affect other respiratory organs or tissues. Moreover, the virus propagation is very common in serum or plasma in respiratory tract infections, thus the SARS-CoV-2 transmission probably may occur by blood transfusions.

COVID-19 and global economy

The loss of lives because of any pandemic leads to unmistakable damages to the general public. The COVID-19 pandemic has extremely impacted the global economy. It is very important to restrict the further spread of the infection in the society and for this a most of the nations have opted a strict decision of nation lockdown. These circumstances have severely affected the business transportations of different countries and has led for economy crisis. Traders who were completely dependent over the transportation systems, have been effected the most doe to this pandemic. Also, due to significant increase in number of infective cases, the daily worker count has decreased leading to a major impact of industrial sectors. Economy of various nations are presently facing the issue of increased joblessness due to lack of productivity and more consumption for the cure and renewal of the COVID-19 fatalities and their relatives. Lockdown or shut-down have reasonably influenced the GDP of each nation in the substantial economic aspects. Recently, the GDP of few Asian, European and South-American nations have declined very certainly and this could significantly lead to devastating consequences in the upcoming days. The economic and social life of people of these countries has been affected severely by the post-pandemic situations. The government and other regulating agencies of these nations should have to take some severe actions, either independently or with mutual consents and discussions.

AIM AND OBJECTIVE

The main aim and objectives of this research are-
To know that: -

1. Our health sectors are resilient enough to manage any disaster.
2. The factors which make our health sector more vulnerable.
3. Which changes need to be done to make our health sector stronger.
4. What problems and challenges were faced by people during covid-19.

RESEARCH METHODOLOGY

This systematic review is reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines for reporting of systematic reviews.

Ethical approval

Ethical approval was not required as the study was a systematic review of peer-reviewed journal articles and studies published in books.

Inclusion and exclusion criteria

The systematic review was limited to:

1. Scholarly peer-reviewed journal articles and studies published in books, written in English.
2. Studies published in journals and books that described RHC, and/or methods used to study RHC

and/or factors to develop and enhance RHC in any health care setting.

Studies were excluded if

1. They were about resilience in non-health disciplines.
2. They were about individual or community resilience.
3. They were about resilience in disaster.

Search strategy and study selection: Electronic searches of PubMed, Scopus, and Cochrane databases were conducted using the search terms. Other search methods such as hand searching, serendipity/browsing, checking with experts, and searching the specialist website resilienthealthcare.net were also used to identify further relevant peer-reviewed studies and studies published in books. The search covered a time period from September 14, 2020 to November 14, 2020. Disagreements were resolved by discussion to achieve consensus.

Data extraction

I independently extracted the following information: aim of study, study design and methodology, study setting, sample size, descriptions of RHC, methods used to study RHC and factors that develop RHC where available.

Quality assessment

Quality assessment was done by using a sample survey on a population. The sample size taken was 101. Questionnaire was prepared in Google form. And method of sending the questionnaire was through social media. A consent was taken prior to study from the population. The whole data was analysed using Statistical Package for Social Science (SPSS) software.

LITERATURE SURVEY

India's response to the COVID-19 pandemic

India's response to the COVID-19 pandemic is one of the most stringent in the world, based on data from 73 countries. At the very first level the Indian government was quick to activate its health management system and issue necessary travel advisories. Screening of all travellers coming into India from affected countries was initiated as early as Jan 2020. Even when a person reported no symptoms, govt machinery was activated to track and check their progress for next two weeks by at-home visit and phone calls. Though initial directives for quarantine were not taken seriously by some, as the days progressed the government became more and more vigilant and followed up with strict actions. In the meanwhile, India embarked to ensure that most of its stranded citizens, especially workers and students stuck abroad in various countries, were flown back. India suspended all travel, domestic as well as international, by 20 March. On 24 March, India announced a total lockdown for three weeks. Well-coordinated action plans include careful airport checking, active health laboratories and the quick establishment of quarantine facilities across the country. The strategy of the government has been to stick to the 'prevention is better than cure' model.

Let's have no doubt about it, this will come to an end. We will have a vaccine and new, approved treatments based on millions of patients' data. We will have new public health protocols too for how to prevent another calamity of this scale. These are for sure.

However, what's also for sure is that the life that we get back to will be significantly different from the one we had before the outbreak. From healthcare workers suffering from PTSD through new habits to a need for a shift in the point-of-care, we analyze how life will change after COVID-19, and also how life can and should change post-COVID-19 in a medical point of view.

What will surely change?

We've seen it all during this global public health crisis; overwhelmed hospitals forcing patients to sleep on the floor; mounting fear of being in proximity to others; but also the importance of a robust healthcare system. As a consequence of our collective and individual experiences throughout the pandemic, things will change in the healthcare landscape. Below we discuss three of the most significant changes we'll experience.

An unprecedented toll on healthcare workers- During this global tragedy, it's not only the economy or the population that are being affected but also the healthcare professionals on the frontlines. The latter are enduring extreme work conditions and sacrifices in order to help the infected. Despite a shortage of personal protective equipment (PPE), they show up to work using DIY-solutions like ski goggles and bin bags with a high risk of being infected. Many are working overtime and witness patient after patient succumb to the disease. The anxiety of knowing you might be at risk when you're doing your job can be very challenging for health care workers," says Terri Rebmann, a nurse researcher and director of the Institute for Biosecurity at Saint Louis University. "It's physically and mentally draining."

More than burnouts, we will see frontliners with symptoms of post-traumatic stress disorder (PTSD).

Diminishing trust in the globalized world

In the pre-pandemic globalized world, we enjoyed a certain level of trust we mostly took for granted. We could travel almost without limitations, meet people without restrictions and order products worldwide. This will simply change after billions of people had to stay indoors for weeks. We will not be able to travel that freely or enjoy the supply chains of the world so easily. We will think twice before going somewhere or to meet someone. The pandemic is already exacerbating signs of social anxiety and agoraphobia. Regaining trust takes time and these trends will take place for months after lockdowns are lifted.

Focus on the healthcare system

It's tragic how the pandemic highlighted the shortcomings of healthcare systems worldwide. The overburdened hospitals need an upgrade on every level from their infrastructures to their processes. These will be needed to ensure a safe environment for the personnel and patients, as well to better cope with any emergency situations.

What can change?

While we'll unfortunately witness the toll on our healthcare workers and face reduced trust, other changes could take place depending on countries, duration of lockdowns and even personal experiences. Here are three changes we could see emerge as a result:

Get your new travel document: the immunity passport

Such a passport will function in a similar way to how passports and visas work. If you are certified to be immune to the virus, you will get a pass to resume your daily routine, and if not, you will have to stay indoors.

Surveillance as an ongoing public health measure

No one wants to be surveilled, but what if it's for greater good? That's what certain governments had to resort to in order to facilitate contact tracing. Countries from Germany through Israel to Singapore are using phone tracking data to locate and alert those who might be infected. South Korea went the extra mile by using CCTV footage and bank transactions in addition to phone use in its tracing process.

Brand-new habits*:* Awareness for personal and public hygiene measures saw a surge thanks to the contagion. Health authorities are advocating for regular hand washing with soap for at least 20 seconds. Social distancing measures are in place. People are getting used to wearing facemasks for grocery shopping.

RESULTS

This part summaries the calculations and observations made on the basis of response given by the sample population which was analysed using SPSS (statistical programe for social science

Fig 1 Age in years and percentage of females in sample

		Frequency	Percent	Valid Percent
Valid	15-24 YEARS	35	34.7	34.7
	24-35 YEARS	60	59.4	59.4
	35-50 YEARS	6	5.9	5.9
	Total	101	100.0	100.0

There were total about 60% people who were in between the age group of 24-35 years out of which 66% were female.

Fig 2 occupation of population

Businessman	6	5.9%
Housewife	4	4.0%
Student	54	53.5%
Employee	30	29.7%
Others	7	6.9%

Out of total sample around 53% were students from various backgrounds.

Fig 3 state of the population

Bihar	1	1.0%
Chandigarh	7	6.9%
Delhi	5	5.0%
Haryana	8	7.9%
Himachal pra	5	5.0%
Karnataka	3	3.0%
Maharastra	1	1.0%
Punjab	64	63.4%
Rajasthan	1	1.0%
Uttar prades	1	1.0%
Uttrakhand	1	1.0%
West bengal	3	3.0%

Around 39% of people think that about 64% of people were mainly from the state of PUNJAB.

Fig 4 how much does climatic and environmental changes leads to any disaster

	N	%
20%-40%	6	5.9%
40%-55%	21	20.8%
55%-70%	39	38.6%
70% AND ABOVE	35	34.7%

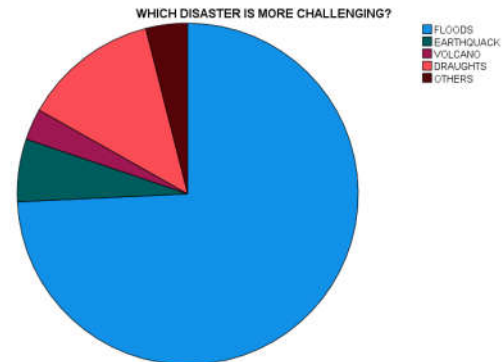55%-70% of climate and environmental leads to any disaster.

Fig 5 which is the most challenging disaster

About 75% people think that floods are the most challenging health disaster.

Fig 6 which disease is most likely to prevalent after any disaster?

	Frequency	Percent	Cumulative Percent
Vector borne disease	20	19.8	79.2
Respiratory diseases	15	14.9	94.1
Sexually transmitted disease	3	3.0	97.0
Others	3	3.0	100.0

About 60% people think that water borne diseases are more likely to be prevalent after any disaster

Fig 7 do you have sufficient knowledge to manage your health in any kind of disaster?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	37	36.6	36.6	36.6
	NO	20	19.8	19.8	56.4
	MAY BE	44	43.6	43.6	100.0

Most of the people are not sure that either they have sufficient knowledge to manage their health in any kind of disaster

Fig 8 which health sector is the strongest in our country

Leadership And Governance	41	40.6%
Finance	9	8.9%
Medical Care	7	6.9%
Information Sector	23	22.8%
Service Delievery	8	7.9%
Health Care Workers	13	12.9%

About 40% people believe that leadership and governance has most of the power and although it is one of the weakest section in our India.

Fig 9 which department is weakest in our country

	N	%
Health infrastructure	34	33.7%
Trained health workers	21	20.8%
Transportation facilities	5	5.0%
Water and sanitation supply	11	10.9%
Hospital infrastructure	24	23.8%
Medicines	6	5.9%

Due to lack of good governance, we have weak health infrastructure.

Fig 10 - 5 key points which make our health system vulnerable- these were the following main highlights

	Frequency	Percent	Valid Percent	Cumulative Percent
Illeteracy	21	20.8	20.8	20.8
Lack of doctors/health workers	4	4.0	4.0	24.8
Poverty	5	5.0	5.0	29.7
Valid Lack of health facilities	28	27.7	27.7	57.4
Lack of funds	20	19.8	19.8	77.2
Others	23	22.8	22.8	100.0
Total	101	100.0	100.0	

Due to Illiteracy there is lack of educated ministers which leads to making of poor health policies and their implementation is hard.
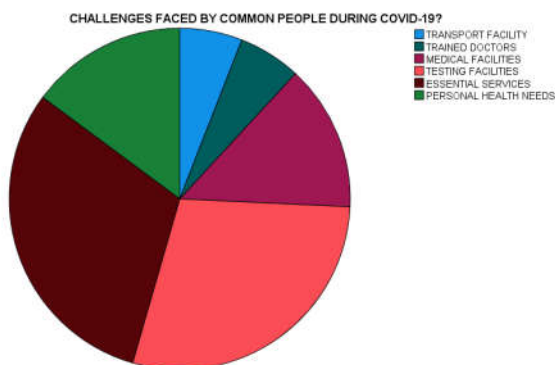

Fig 11 common challenges faced during covid-19

When asked most of the people faced problem in getting the basic essential facilities and testing facilities during this period of covid-19.

Fig 12 Sector which was more affected in covid-19

	N	%
Urban sector	21	20.8%
Rural sector	16	15.8%
Both are equally affected	63	62.4%
None	1	1.0%

Around 63% of people think that both urban and rural sector were equally impacted during covid-19

Fig 13 Will people be able to connect more socially and emotionally during this pandemic

	N	%
YES	35	34.7%
NO	31	30.7%
MAY BE	32	31.7%
OTHERS	2	2.0%

About 35% of people think that they were able to connect more socially and emotionally

Fig 14 Do you think India has improved in digitalization during this pandemic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	54	53.5	54.0	54.0
	NO	18	17.8	18.0	72.0
	MAY BE	27	26.7	27.0	99.0
	OTHERS	1	1.0	1.0	100.0

About 53% people agreed that due to covid-19 India has improved in digitalization. People are more engaged in online classes, new machines and e- sources have been provided.

Fig 15 Does belief in Ayurveda medicine will increased after covid-19

	N	%
Strongly disagree	2	2.0%
Disagree	6	5.9%
Neutral	42	41.6%
Agree	34	33.7%
Strongly agree	17	16.8%

As many Ayurveda medicines and home remedies were discovered during covid-19 but still most people does not agree that it will be beneficial in future.
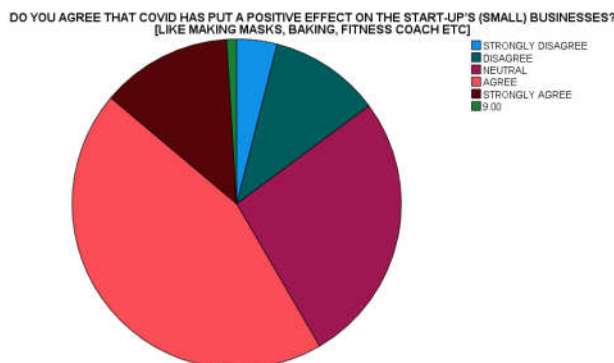

Fig 16 COVID has put positive effect on start-up businesses

About 45% of people agreed that in this pandemic, there was a rise in start-up business and more people tend to work from home.

A survey of 250 start-ups has revealed that the COVID-19 pandemic has had an unprecedented impact on the business, with 70 per cent saying that their business has been impacted, and some of them shutting operation. The survey on the "Impact of COVID-19 on Indian Start-ups" conducted by Ficci jointly with the Indian Angel Network depicts that only 22 per cent of the start-ups have cash reserves to meet fixed cost expenses of their companies over the next 3-6 months

Fig 17 Rate our health sector preparedness on scale of 10

	N	%
0-4	32	31.7%
5-7	60	59.4%
8-10	7	6.9%

When people were asked to rate our health sector preparedness during covid-19, 60% people rate 5-7 out of 10.

Fig 18 Main challenges people faced during covid-19

	N	%
Work and travel facilities	18	17.8%
Increase screen timings	1	1.0%
More mental stress	18	17.8%
More stagnant lifestyle	6	5.9%
Unemployment	9	8.9%
Feeling of home bound	8	7.9%
No problem	7	6.9%
Lack of basic health facilities	16	15.8%
Fear of being covid test positive	5	5.0%
Others	13	12.9%

The 3 main challenges mostly people faced were-

1. Work and travel facilities.
2. More mental stress and anxiety issues.
3. Lack of basic health facilities.

There were some other challenges like- loss of study, not able to visit or take regular health treatments.
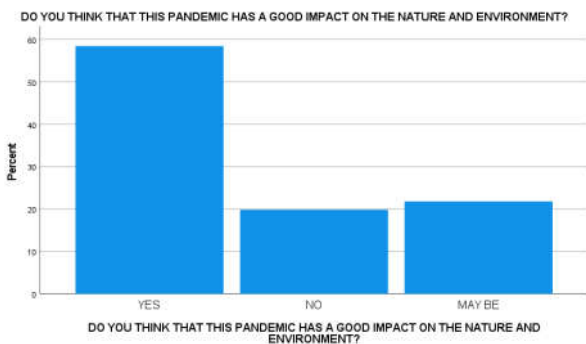
Fig 19 Does this pandemic has good impact on our environment

About 59% of people believe that due to covid-19, there is a good impact on nature. Air quality has improved and nature is healing.
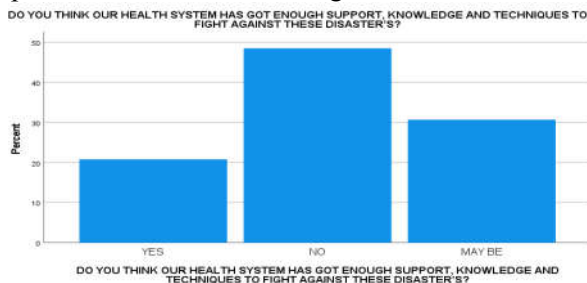

Fig 20 – Does our health system has enough support, knowledge and techniques to fight against any disaster

About half of population does not agree that India has good health infrastructure and we do not have enough support and techniques to fight against these disasters.
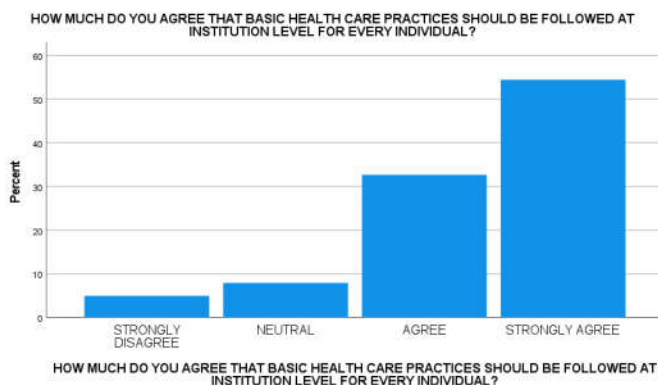

Fig 21 Do you agree that healthcare practices must be taught at institution level

About 55% people strongly believe that basic health care practices must be followed at the institution level only. So that more awareness must be created among people and our quality of life must be improved.

Initiatives Need To Be Taken: Based on the analysis of the included studies, seven key factors were used at different levels (individual, team, and organisation) to develop RHC: (18)

Teamwork was considered a factor in developing and sustaining resilience in the health care sector. Aspects of teamwork included:

- *Effective and frequent team meetings* involving active listening, decision-making.
- *Effective communication*, characterised by respect, building trust between professionals,
- *Effective leadership*, keeping the organisation focused on key objectives while also remaining open to feedback from clinical staff to create a shared vision, and revise decisions if required.
- *Effective involvement of clinicians* as top-down leaders to look for positive work practices.
- *Effective team working structure* between doctors, nurses and patient flow-coordinator.

In-situ practical experience was a core factor in building resilience by providing a deep knowledge of how the system works and how the organisation adapts to and copes with expected and unexpected situations.

Exposure to diverse views and perspectives on the patient's situation provided the fundamental advantage of understanding the patient's situation thoroughly while decreasing the likelihood of cognitive bias and maintaining the previous level of performance.

Trade-offs: Being mindful and acting proactively to shift from one mode to another in the presence of disturbances is one of the key reported factors in developing RHC.

The value of using protocols and checklists: They are valuable ways of defining potential variabilities and situations that are well known in the clinical practice and described in the literature of speciality.

System design: One empirical study developed and tested a framework in a health care environment by adopting insights from resilience engineering to create conditions that supported resilient performance.

Workarounds: These facilitated practice to continue by enabling staff to cope with challenges and maintain effective delivery of patient care. One study considered that intended workarounds were necessary activities to mitigate risk and enhance safety.

2-30 June 2020, New Delhi: COVID-19 has impacted nations across the world, disrupting lives, economies and societies. With a vision to enable knowledge sharing and information to spur innovative thinking around issues surrounding COVID-19 pandemic management- infection prevention and control measures, addressing outbreak in densely populated areas, waste management, innovative technologies, WASH, Gender based violence and psychosocial support etc., the National Institute of Disaster Management (NIDM), Ministry of Home

Affairs, Government of India and WHO Country Office for India convened a series of webinars dedicated to COVID-19 and disaster management.

Some of the important key messages from the webinar were:

- There is a need for strengthening collaboration, command, control, and communication systems for efficient, prompt, and graded response and recovery.
- Technology cannot replace or make up for other public policy measures, but it does have an increasingly critical role to play in emergency responses. Covid-19 presents an excellent opportunity to reflect on the legal plausibility, ethical soundness, and effectiveness to use emerging technologies to inform evidence-based public health interventions.
- There is a need for prioritizing the COVID-19 prevention and control in informal settlements, to assess the community risk perception, and thought process to enable community-based public health emergency preparedness and risk informed policy making in future.
- WASH is vital to COVID-19 response and recovery. Best practices for safely managing health-care waste should be followed, including assigning responsibility and adequate human and material resources for safe management and disposal of wastes.
- Multi-hazard preparedness with a focus on health needs to be integrated across sectors. Risk assessments and risk preparedness should emerge as a culture for next generations to enable better management of disasters and public health emergencies.
- Documentation of best practices, creating knowledge platform for lessons-learning will promote an inclusive, participatory and well-informed preparedness strategy.

Future Work

Resilient communities and health sectors

At the ground level are communities and community-based organizations that focus on health, welfare, and resilience. This includes faith-based organizations, other nonprofit civic entities, community clinics that focus on the health of vulnerable populations. Each of these, whether they realize it or not, play a role in the resilience of the health sector in a disaster. Through a new federal initiative to build a Culture of Resilience, all of these community-based organizations should be encouraged and incentivized to (1) enhance their own resilience to disasters, (2) support and encourage their community's resilience efforts, and (3) engage with local HCCs around preparedness and resilience.

Broad, effective healthcare coalitions

Most HCCs now include acute care hospitals, public health departments, EMS, and emergency management agencies. All other healthcare facilities and providers should be encouraged and incentivized to participate as well. HCCs and their constituent members (eg, hospitals and public health agencies) are the natural conduit through which community entities can connect to traditional preparedness efforts. HCCs are the bridge between the community resilience efforts and disaster resource hospitals.

Specialized disaster resource hospitals

Large academic medical centers with comprehensive services are the referral hubs for most highly specialized medical care—in particular, for services that might be relevant for disasters. They have the capabilities needed for providing care to the most complicated disaster-related injuries and illnesses, including all kinds of surgery as well as expertise in radiation injuries and infectious diseases. By setting rigorous standards, providing direct funding, and requiring accountability, a network of geographically distributed disaster centers of excellence (Disaster Resource Hospitals) could be created. They would be closely connected to local disaster resources, such as Medical Reserve Corps and National Disaster Medical System units. Through telemedicine and other evolving technologies, they could be a source of real-time, remote, clinical expertise. In addition, they could provide education and training to their local partners and coordinate exercises. As part of their innovation research they could promote a Culture of Resilience by exploring ways for the formal healthcare system to interact more closely with civil society and community-based organizations around disasters.

CONCLUSION

The resilience of health systems is an essential feature of disaster risk management. Even if Intensive Care Unit beds, PPE or stocks of ethanol go unused for long periods, it is essential to have them, as many countries have learned to their cost.

Resilient health systems require long-term investment in key elements such as an adequate number of trained health workers; robust health information systems, including surveillance; and appropriate infrastructure including supply chain, stocks and labs.

Global investment in research and development for medical products, vaccines and diagnostics is also critical.

Resilient health systems should integrate robust community responses that are essential to effectively fight pandemics and disasters. Community engagement has been a key pillar of containing the spread of COVID-19 through physical distancing, hand-washing and self-isolation when necessary.

The great loss of life and the global economic crisis triggered by COVID-19 will exacerbate the impact of other man-made and natural hazards.

Many elements need to be put in place in order to build both the resilience of health systems and to integrate disaster risk reduction into health policies and strategies. This will be especially important in the all-out effort to either avoid or to cope with any resurgence of COVID-19.

In a world where much of the global population still cannot obtain essential health services and many millions are pushed into poverty because they must cover health expenses from their own pockets, public health management and disaster risk management are intimately linked.

This larger vision of tackling disaster risk cannot become reality without the leadership, expertise and guidance of the WHO.

Our health sector is not resilient enough to fight against many disasters. The main reasons for this are-

- Illiteracy.
- Poor health infrastructure.
- Poor health policies and its management.
- Low GDP invested in health. [India has around 1.4% GDP invested on health. But it has been found that minimum 5% should be invested]

The factors which make are health sector more vulnerable is same as mentioned above, which does not make our health sector resilient. Both the sectors (urban and rural) were equally affected at the time of covid-19.There were challenges faced by common people, which were- lack of getting essentials, work and travel problems, people feel home-bound and they were facing many anxiety and mental issues as they not able to connect physically and mentally. It has been seen that due there is a positive impact on nature and environment. Even there is support and rise in small business like masks, baking, fitness programmer, etc

References

1. Hollnagel E, Braithwaite J, Wears RL. Resilient health care. Surrey, England: Ashgate; 2013 http://scholar.google.com/scholar_lookup?&title=Resilient%20health%20care&publication_year=2013&author=Hollnagel%2CE&author=Braithwaite%2CJ&author=Wears%2CRL

2. Ellis L, Churruca K, Clay-Williams R, Pomare C, Austin E, Long J, et al. Patterns of resilience: a scoping review and bibliometric analysis of resilient health care. Saf Sci. 2019 https://doi.org/10.1016%2Fj.ssci.2019.04.044

3. Berg S, Akerjordet K, Ekstedt M, Aase K. Methodological strategies in resilient health care studies: an integrative review. Saf Sci. 2018;110:300–12. https://doi.org/10.1016%2Fj.ssci.2018.08.025

4. Barzelay U, *et al* (2018) SmartResilience D3.5: interactive visualization as support to indicator-based decision making. EU project SmartResilience, Project Nr. 700621 (2016–2019), IBM Research, Haifa, Israel.

5. Brem S, Hohl M (2015) The National Risk Analysis of Disasters and Emergencies in Switzerland. Federal Office for Civil Protection, Bern, Switzerland https://www.babs.admin.ch/en/aufgabenbabs/gefaehrdrisiken/natgefaehrdanalyse.html

6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7271643/table/Tab1/?report=objectonly

7. https://www.youtube.com/c/NIDMINDIA/videos

8. Schulman PR. General attributes of safe organisations. Qual Saf Health Care. 2004;13(2):ii39–44. https://doi.org/10.1136/qshc.2003.009613

9. Fairbanks R, Wears R, Woods D, Hollnagel E, Plsek P, Cook R. Resilience and resilience engineering in health care. Jt Comm J Qual Patient Saf. 2014;40(8):376–83. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=25208443

10. Deutsch E, Fairbanks T, Patterson M. Simulation as a tool to study systems and enhance resilience. In: Hollnagel E, Braithwaite J, Wears R, editors. Delivering resilient health care. Abingdon, Oxon: Routledge; 2019 http://scholar.google.com/scholar_lookup?&title=Delivering%20resilient%20health%20care&publication_year=2019&author=Deutsch%2CE&author=Fairbanks%2CT&author=Patterson%2CM

11. McCray J, Palmer A, Chmiel N. Building resilience in health and social care teams. Pers Rev. 2016;45(6): 1132–55 https://doi.org/10.1108%2FPR-04-2014-0095

12. US Department of Health and Human Services. Hospital Preparedness Program (HPP) website. Reviewed January 16, 2018. https://www.phe.gov/Preparedness/planning/hpp/Pages/ default.aspx. Accessed January 17, 2018.

13. Organization WH Novel Coronavirus (2019-nCoV) - situation report 1. World Health Organization, 2020. https://scholar.google.com/scholar_lookup?title=Novel+Coronavirus+(2019-nCoV)+-+situation+report+1&publication_year=2020&

14. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? Lancet 2020;395:1225–8.10.1016/S0140-6736(20)30627-9 https://www.ncbi.nlm.nih.gov/pubmed/32178769

15. Bouadma L, Lescure F-X, Lucet J-C, et al.. Severe SARS-CoV-2 infections: practical considerations and management strategy for intensivists. Intensive Care Med 2020;46:579–82.10.1007/s00134-020-05967-x https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7079839/

16. Manyena SB. The concept of resilience revisited. Disasters 2006;30:434–50. 10.1111/j.0361-3666.2006.00331.x https://scholar.google.com/scholar_lookup?journal=Disasters&title=The+concept+of+resilience+revisited&author=SB+Manyena&volume=30&publication_year=2006&pages=434-50&doi=10.1111/j.0361-3666.2006.00331.x&

17. Streb M, Häller P, Michael T. PTSD in paramedics: resilience and sense of coherence. Behav Cogn Psychother 2014; 42:452–63. 10.1017/S1352465813000337 https://www.ncbi.nlm.nih.gov/pubmed/23714206

18. Organization WH Novel Coronavirus (2019-nCoV) - situation report 34. World Health Organization, 2020 https://scholar.google.com/scholar_lookup?title=Novel+Coronavirus+(2019-nCoV)+-+situation+report+34&publication_year=2020&

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