RESEARCH ARTICLE

INCREASING THE AVAILABILITY AND AFFORDABILITY OF TELEMEDICINE FACILITY IN THE TIMES OF PANDEMIC - CHALLENGES AND PERSPECTIVES

Dr. Anupma Srivastava[1] and Shriya Bhatia[2]

1. Associate Professor & Head, P.G. Department of Economics, Isabella Thoburn College, Lucknow.
2. Student of B.A.3rd Year, Isabella Thoburn College, Lucknow.

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Manuscript Info	Abstract
………………………. *Manuscript History* Received: 15 April 2022 Final Accepted: 17 May 2022 Published: June 2022	………………………………………………………………… For more than 30 years, clinicians, physicians, healthcare officials and others have been investigating the use of advanced telecommunication and other technologies to make changes or improvements in the health care systems. The collective efforts of the team lie in the development and the use of telemedicine further penetrating it in the villages as well. Telemedicine is the electronic information and communication technologies to provide and support the health care systems when the distance acts as a barrier between the patients and the healthcare officials. It is a socially accepted, feasible and cost-saving technology that can further act as the cheapest way to bridge the urban-rural divide in access to health care in India. Moreover, it can help attract and retain the health professionals in the rural areas by providing proper training and collaboration with the other healthcare officials. The study explains the ways for increasing the availability, affordability, and accessibility of the telemedicine facility in the times of the COVID-19 pandemic not only among urban population but among the rural population as well.

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Introduction: -

"With physical distancing, telemedicine is the answer to getting care to the people who need it, while keeping people home and out of the hospital and preventing people from getting sick"

- **Christian Milaster, Ingenium Digital Health**

As per World Health Organization (WHO), "The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities".

Telemedicine is the use of electronic information to communicate technologies to provide and support healthcare when distance separates the participants.[1] "**Tele**" is a Greek word meaning "distance "and "**mederi**" is a Latin word meaning "to heal". Time magazine called telemedicine "healing by wire". Although initially considered "futuristic"

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[1]Brown N. A brief history of telemedicine. *Telemedicine Information Exchange.* 1995 ;105 :833–5.

Corresponding Author:- Dr. Anupma Srivastava
Address:- Associate Professor & Head, P.G. Department of Economics, Isabella Thoburn College, Lucknow.

and "experimental," telemedicine is today a reality and has come to stay. Telemedicine has a variety of applications in patient care, education, research, administration, and public health.[2]
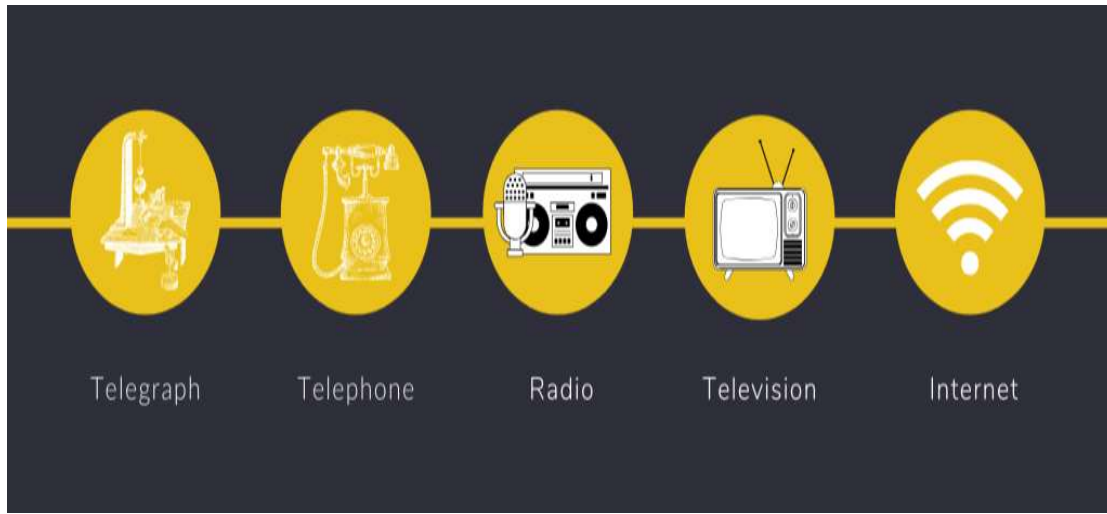
Telemedicine is increasingly becoming important post the COVID-19 pandemic but the exact date of the origin of telemedicine is quite unknown. Technological advances in telecommunications in the twentieth century continued to evolve the landscape of telemedicine. Casualty lists and medical supplies orders were communicated via telegraph during the civil war and there are reports of telephone wires being used for medical communication as early as 1906. Radio communication opened new avenues for telemedicine after World War II and was followed by the development of television several decades later. The first predecessor to the modern virtual appointment (now over Skype, Zoom, or other major teleconferencing software) occurred in 1964 via interactive video linking the Nebraska Psychiatric Institute to the Norfolk State Hospital.[3]Although the interest in the telemedicine facility has increased considerably over the past four to five years but it has been in use in some form or the other for over thirty years. The National Aeronautics and Space Administration (NASA) played an important part in the early development of telemedicine.[4]

The activities related to telemedicine was started in 1999 in India though the government recognized the potential of telemedicine in the year 2000. The Indian Space Research Organization deployed the first nation-wide SATCOM-based telemedicine network in 2001.

'Changing The Operations and Healthcare Delivery Model of Hospitals and Healthcare Professionals.'
It is a statement which depicts that there is an insufficient supply of the amenities in the healthcare sector which causes its unavailability to its patients and if these things are available then too these needs to be in such a way to be affordable for all the strata of the people. So there needs to be a change and to reskill the existing operations and the existing healthcare models and its delivery to their customers. There needs to be a rapid rethinking about the existing professionals of the healthcare system so that they can easily adopt the changes and work accordingly in their respective spheres.

Not only there needs to be a rethinking in the overall healthcare model and its operations but the change should be such so that the people can adopt to it accordingly and to increase the facilities thereby increasing the supply to the changes in the demand of the facility.

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[2]Ganapathy K. *Neurosurgeon, Apollo Hospitals, Chennai, Telemedicine in India-the Apollo experience, Neurosurgery on the Web.* 2001.
[3]Telemedicine : History, applications, and impact on librarianship, K.M. Zundel ; Bull Med Libr Assoc, 84(1) (1996), pp. 71-79
[4]Bashshur R. *Superintendent of Documents.* Washington DC : US Government Printing Office ; 1980. Technology serves the people : The story of a cooperative telemedicine project by NASA, the Indian Health Service, and the Papago people.

Moreover, the COVID-19 that is, the Coronavirus situation has left crores of people of all age groups and strata locked in their homes and under doubt of where they should go to the hospitals and other healthcare centers for their check-ups or to get themselves consulted by a doctor due to any reason because of the fear of getting infected by the virus. In that case, telemedicine can really prove to be beneficial for the people as they can in this way get free consultations or consulted by well qualified doctors at affordable rates. In this way, through the usage of such online platforms they can order their medicines as per their requirements at nominal or discounted prices.

Furthermore, people switching over to online technology may result in the increase in the effectiveness and affordability. These platforms are easy in operation so they can be operated easily from anywhere and by anyone. This can not only help them to be more technology savvy but also make the people more digital friendly and will also help the country in developing and improving its internet services and become more digitalized.

Review Of Related Literature:-

Healthcare has become one of India's largest sectors both in terms of revenue and employment. Healthcare comprises of hospitals, medical equipment, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment. Indian healthcare delivery system is categorized into two major components- public and private. The Government. public healthcare system comprises limited secondary and tertiary care institutions in key cities and focuses on providing basic healthcare facilities in the form of primary healthcare centers (PHCs) in rural areas. The private sector provides majority of secondary, tertiary, and quaternary care institutions with a major concentration in metros, tier 1, and tier 2 cities.

India's competitive advantage lies in its large pool of well-trained medical professionals. India is also cost competitive compared to its peers in Asia and Western countries. The cost of surgery in India is about one-tenth of that in the US or Western Europe. India's healthcare systems are ranked 145th among 195 countries assessed in the terms of quality and accessibility of healthcare. India also has fewer hospital beds and nurses than either China or the US. When it comes to availability of hospital beds, India has just five beds for 10,000 Indians. The Human Development Report 2020 showed that out of 167 countries, India would rank 155th on bed availability. The number of beds per 10,000 is used as an indicator of health infrastructure in general and the poor bed availability points to India's failure to expand its health infrastructure in keeping with the growth in population.[5]

INDIA HAS 8.6 DOCS PER 10,000

Countries/ categories	Hospital beds per 10,000	Doctors per 10,000	Countries/ categories	Hospital beds per 10,000	Doctors per 10,000
Very high*	52	31.2	Myanmar	10	6.8
High*	31	17	Bangladesh	8	5.8
Medium*	7	7.9	Pakistan	6	9.8
Low*	5	1.9	Afghanistan	4	2.8
China	43	19.8	Nepal	3	7.5
Sri Lanka	42	10	India	5	8.6
Bhutan	17	4.2			*Development

India's per capita healthcare spending (as a proportion of GDP) and specifically public spending is among the lowest per capita in the world. This clearly portrays that certain changes are necessary to be made in the operations as well as the healthcare delivery models. Since the global pandemic named covid-19 has affected many crucial areas hospitals and other health sector being its epicenter. India as well having a huge population of 1.4 billion (as of June

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[5] https://timesofindia.indiatimes.com/india/5-hospital-beds/10k-population-india-ranks-155th-in-167/articleshow/79769527.cms ; Rema Nagarajan ;Updated : December 17,2020

12,2022), based on Worldometer elaboration of the latest United Nations data,[6]its health sector is unable to cope up with the pandemic challenge. If we increase the uses of telemedicine services in the city of Lucknow and especially make the rural population aware of its uses and importance, then we will be able to extract the maximum use of the service also in this way they need not go to the hospitals of pharmacy for the general stuff.

The COVID-19 pandemic has affected several sectors in many countries including India and has similarly posed threat to the health sector of the country. The pandemic situation has brought crores of people caught up in their homes due to the lockdown and due to the fear of getting infected by the dangerous virus, unable to move out of their houses even for their basic requirements or necessities and especially for simple check-ups and normal treatments people have lost faith in going to the hospitals, diagnostic centers or even to pharmacies for that matter.

For the above-mentioned case there needs to be a solution or an alternative where people can consult the doctors anytime and anywhere. The people can as well book for their daily check-ups and even buys medicines.

To overcome these problems, Telemedicine facility can be a solution.

Now, the problem is - How the telemedicine facility will be made available to every possible citizen of the city of Lucknow? How do we increase the affordability of the telemedicine service to all the people of Lucknow? Lastly, how to increase the efficiency and the effectiveness of the telemedicine facility?

The main rationale for the development of Telemedicine facility has been the urge to provide or supply the healthcare services to those people whose healthcare accessibility is restricted in some way or the other or to those that have difficulty in availing the normal healthcare services due to any reason. It is also necessary to reduce the doctor-patient ratio which in Lucknow is currently at 1:18,000, that is, there is 1 doctor for every 18,000 patients in the city of Lucknow. Whereas the World Health Organization (WHO) recommends the doctor-patient ratio to be at 1:1,000.

Scope Of theStudy: -
Rural Population in India was reported at 65.07% in 2020, according to the World Bank where the health care services are minimal, and telemedicine can close the gap by overcoming distance barriers through collective efforts of the public and the private healthcare institutions.

The scope of the study will be the city of Lucknow, the capital city of Uttar Pradesh. This survey is going to present how the telemedicine services are working and how it has become more successful and important during the coronavirus pandemic situation.

Objectives Of theStudy: -
1. To make more people aware of the use of telemedicine services further increasing its use.
2. To make people aware of its importance in fighting Covid-19 by maintaining social distancing and the other precautions in mind thus further increasing the demand of telemedicine facility in the country.
3. To provide remote or rural patients with access to specialists and the best clinical support for their treatment.
4. To increase patient engagement and arouse satisfaction among the people for telemedicine services even in the remote corners of the country.
5. To improve the patient convenience by using telemedicine services so that the non-covid patients need not go to the hospitals for general stuffs.
6. To reduce overcrowding of people in the hospitals for their daily check-ups to prevent them for getting infected from coronavirus and plus getting them connected with the best doctors available.
7. To provide 24/7 access to specialists to the people during this pandemic so that they can quickly and easily get consulted from the doctors for their problems.

Methodology:-
This study is based on quantitative as well as qualitative research methodology.

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[6]https://www.worldometers.info/world-population/india-population/#:~:text=India%202020%20population%20is%20estimated,of%20the%20total%20world%20population.

1. In qualitative research, the data collection is conducted on field but looking at the current situations of COVID-19 pandemic, the collection of data is not possible on fields therefore, a questionnaire using google forms was prepared and sent to several people online through various social media platforms.
2. Data analysis was generated after the collection of 100 respondents from the city of Lucknow itself.
3. Pilot Testing of Questionnaire was conducted on 10 respondents to check the questionnaire and make the necessary changes in it.
4. For the data analysis and interpretation, cluster sampling method was used after which using Pivot table the data analysis was carried on.
5. Secondary Data Collection methods were also used in this research study like newspaper articles, various websites, surveys related to telemedicine facility, various important government websites, previous studies made on telemedicine facility and its uses in India as well as in many other countries.
6. Some studies from various online news platforms such as Economic Times, India Today, Medical News Today and such more to explore more about the topic were included.
7. The census of 2011 was also studied by which we got to know about the total population of the city of Lucknow.

Hypothesis Of theStudy: -
India has a shortage of around estimated 600K doctors and 2Mn nurses, as per reports in 2020. India only has 1 government doctor for every 1,139 people,1:1139, whereas the World Health Organization (WHO) recommends a ratio of about 1: 1000.The shortage of doctors is limiting face to face consultations among patients.

India also has a shortage of hospital beds, which makes hospitalization tricky, and there needs to be better facilities and infrastructure for cases where patients can be attended to via teleconsultation.

About 5% to 10% of the population will require some sort of healthcare services at a given time. It seems to be deficit in the delivery services of the health care services, lack of infrastructure for telemedicine because of which this telemedicine facility is not properly used by the doctors as well as patients.

The present research aims to test the following: -
•**To find out whether the private Indian healthcare providers are a key link to solving India's burgeoning healthcare burden and that if the telemedicine company should give discounts and other offers then it may prove to be beneficial to the people.**
•**To increase the availability of the telemedicine facility to the whole population and to especially attract the rural population to make use of this facility.**
•**To increase the awareness of the telemedicine facility in the backward areas by way of door-to-door communication of the healthcare officials with the people.**

Data Collection, Analysis andResults:-
The target sample size of my research is 100 and the people included are from various income groups, occupations, gender, and age groups, from households to self-employed to employed by an organization, and the people are from 15 years of age to more than 60 years of age.

In this research study, quantitative analysis has been used. The study can also be said to be based on primary data collection where the data is collected by a researcher from the first-hand sources with the help of methods like surveys, interviews, or experiments. The data collected after receiving the responses of the questionnaires from the people was then converted to excel sheet for the data interpretation which was done using Pivot Table through which various conclusions mentioned ahead were drawn.

The following study shows us the collected data and its analysis which can clearly show various aspects related to telemedicine facility and of the responses collected-:

In how much distance is there a hospital in your area?

OPTIONS	NO. OF RESPONDANTS
1. Within a kilometer	29
2. Within 2-3 kilometers	54

3. Within 3-5 kilometers	**13**
4. More than 5 kilometers	**4**

According to the data analysis as shown above, we can clearly see that the location of the hospitals is not an issue because most of the people have hospitals or other health care centers located near their houses say about 96% of the people have within 5 kilometers and only 4% people have hospitals located more than 5 kilometers.

Do you have access to proper network connectivity?

OPTIONS	NO. OF RESPONDANTS
1. Yes	**89**
2. Sometimes	**10**
3. No	**1**

Furthermore, network connectivity is also not an issue for the people because a huge majority of the people, that is,99% of the total number of people have access to proper net connections so they can make use of the telemedicine and other online platforms and avail its benefits. On the contrary, only 1% of the people have net connectivity issues in their areas.

Do you use telemedicine services?

OPTIONS	NO. OF RESPONDANTS
1. Always	**3**
2. Sometimes	**29**
3. Rarely	**24**
4. Never	**44**

Moreover, it has been seen from the above given table that about 44% of the people have never made use of the telemedicine facility whereas, about 56% of the people have made use of this facility either they use it always or sometimes or some of them also make use of this facility rarely when there is an emergency or due to any other reason.

If you do not avail the telemedicine facility, then why?

OPTIONS	NO. OF RESPONDANTS
1. I do not use this facility because I do not have proper knowledge of it.	28
2. I do not use this facility because I find buying medicines from the market more convenient.	41
3. I do not use this facility because of network connectivity issues in my area.	2
4. I use telemedicine facility.	29

Then in the 4[th]table, people had to give their reasons on as to why they do not use this facility in which it was seen that most of the percentage of people do not avail this facility because they find buying medicines from outside from the markets more convenient and yet some others do not have proper knowledge of such online platforms.

What difference does it make when you buy medicines online?

OPTIONS	NO. OF RESPONDANTS
1. Never bought medicines online.	47
2. Prices are more than what you get in the market outside.	10
3. The prices and the quality of the products remain the same, offline as well as online.	34
4. The quality of the product differs from what you buy outside from the market.	9

In the 5[th]table we can see that again the views of the people were asked as to what difference does it make to buy medicines online rather than buying them offline by going to pharmacy or visiting the hospitals. In this 34% of the

people are under the impression that the price and the quality of the products have no difference but still they are not interested in ordering medicines online or seek online consultations.

Why do you think that telemedicine facility is important or is required?

OPTIONS	NO. OF RESPONDANTS
1. The medicines available here are more reasonable than those bought from retail stores.	**12**
2. I am still not interested in buying medicines online.	**27**
3. Doctors are available anytime and anywhere as they are just a call away.	**21**
4. Both the above-mentioned options, 1 as well as 2.	**40**

Lastly, in the 6th table we can see again that an opinion based question was asked in which the people had to give their opinions about why do they think that the use of the telemedicine facility is important or is required in which a majority of the people, that is,40% of the people are under two views that the medicines bought from online stores are more reasonable than those bought from the retail markets outside but they are still not interested in buying medicines through online stores.

Conclusion And Policy Recommendations: -

As I mentioned earlier in my hypothesis that there is a shortage of around 600K doctors and 2Mn nurses as of the 2020 reports. India has only 1 government doctor for every 1,139 patients and if we further penetrate and see in the city of Lucknow then there is 1 doctor for every 18,000 patients which is definitely a very poor number as far as the recommendations of the WHO which is at 1:1,000. So, the shortage of doctors is limiting the face-to-face consultations among the doctors and patients.

In this case the government can try to train the more people in the medical and health care field so that the people can visit such well-trained people in case of any disease or disorder instead of visiting the hospitals and other health care centers during this pandemic.

Moreover, as I had mentioned earlier that about 5% to 10% of the people would require some sort of health care services at a given time.

Therefore, in this situation as well the government can further develop more infrastructure and other online technologies and medical platforms and put them into effective use so that some percentage or proportion of people can avail the facilities as and when they need. This way the needy patients can be attended to via teleconsultations.

'Virtual visits' can be an effective way to decide who needs to be tested for Covid-19. Virtual Consults could reduce unnecessary visits.

There has been certain schemes and monitoring systems that have also been implemented by the government -:
1. The government has initiated the **DigiGaon Initiative** in 700 villages which aims at the provision of telemedicine, education and skills using digital technology. **Akodara in Gujarat** is the first DigiGaon of India.
2. The government has also initiated ANM online (ANMOL), a tablet-based application for integrated RCH Register which allows ANMs to enter and update data for beneficiaries.
3. **Telemedicine Mobile Van** was as well deployed at Ujjain Kumbh Mela from the 22nd April, 2016 to the 21st May, 2016 from SGPGI, Lucknow. The telemedicine van equipped with Medical Equipment was used for health awareness, screening of Non-Communicable Diseases of the devotees through telemedicine by using VSAT connectivity provided by the Department of Space (DOS).
4. Other schemes proposed by the government for the telemedicine facility to operate effectively and efficiently are -:
a. National Rural AYUSH Telemedicine Network
b. Village Resource Centre (VRC)
c. AROGYASREE

Taking into consideration all the above aspects and from the conclusions drawn, some suggestions for the telemedicine facility to operate properly and more efficiently in the areas of the city of Lucknow where I have conducted my study are mentioned below-:

1. The health officials should understand their patients' profiles and create an understanding relationship with them so that the patients are ready to share their personal as well as health information with them and shall be made sure of the fact that their information are safe.
2. The telemedicine company should further give discounts and other offers like one-on-one free services or such that may not only benefit the people but will also attract more people especially during the COVID-19 situation where they can readily be benefitted while being at homes.
3. There should also be door-to-door communication of health officials with the people to make them aware of this facility and the benefits that they would get by availing it and further to make them aware of its structure of working.
4. Also post the lockdown, many governments, hospitals, e-pharmacies and even corporate can adopt to telemedicine in their employee wellness strategies.

The following precautions should be taken while implementing the telemedicine services to its users -:

1. While delivery of medicines the patients or customers should check the bill and the medicines and take into consideration the expired or incorrect delivery of medicines. If such a thing happens, the person should contact the delivery person or the telemedicine company then and there.
2. The telemedicine company should disclose all the possible risks to the patients prior to their enrolments.
3. The patients should make sure that they use those telemedicine companies which are recognized by the government or by some well-known private company and which are trustworthy.
4. The telemedicine companies, on the other hand, should make sure that all the data security and encrypted protocols are up to date.

'Telemedicine seems to be the cheapest way to bridge the urban-rural divide in access to health care in India. India being a Hub of Information Technology (IT), there is a very good scope for further growth of telemedicine with support of greater technology, standardization, and regulations.'

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