

Educating Frugal Innovation as a Necessity for Affordable Health Care in India: A Study During Covid-19

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Abstract:

Making healthcare affordable to all segments of society, particularly the bottom of the pyramid (BoP) who live below the poverty line, must be a key priority in today's world of disruption. When organisations around the world are struggling to fulfil the demands of a growing population, the concern is how medical aid can be offered to a country like India, which has the world's second-largest population. In India, a major section of the population lives below poverty and cannot afford medical care simply because it is out of their budget. In comparison to other developing countries, government spending in the medical sector is low, which creates hurdles in meeting the medical needs of people. Long-term solutions that are affordable at all levels of the Indian economy are required to address this issue. This research paper is a descriptive study that focuses on frugal innovation as a solution to the healthcare problem and develops conclusions based on the findings.

Keywords: *Bottom of the Pyramid (BoP), Economical, Frugal Innovation, Healthcare, Covid 19*

Introduction:

The world is battling with a lot of health issues, and India's absence of a basic healthcare system is one indication of the obvious battle that the country's people are facing. The daily increase in population, which worsens the demand-supply equilibrium, is a major concern for this problem. It also carries with it additional difficulties such as unequal wealth distribution and living standards, a lack of work prospects, and a resulting disparity in individual purchasing power. As a result of many diseases and life's uncertainties, the demand for medical facilities and healthcare is growing.

According to the World Health Organization, India's domestic general government health expenditure (GGHE-D) was only 0.96 percent of GDP in 2018, the lowest among comparable countries such as Brazil (3.36 percent), South Africa (4.46 percent), and China (3.02 percent). Pakistan spends 1.14 percent of its GDP on healthcare, while Bangladesh spends 0.4 percent, both of which are more than India's GDP and growth. Since March 2020, the situation in Covid has deteriorated, with government spending increasing to 1.5 percent of GDP in 2019-20 and 1.8 percent of GDP in 2020-2021,

respectively. Since March 2020, a disease known as Covid 19 has affected the entire world. On the supply side, pricey treatments and health screenings, as well as exorbitantly priced pharmaceuticals, are out of reach for India's economically disadvantaged residents who live at or below the Bottom of the Pyramid. The population of India's population living at the Bottom of the Pyramid (BoP) ranges from 335 million to 1.05 billion people. According to Government of India officials, the poverty level is at the bottom of the scale, with 30 percent of the population taking wages less than INR 32 per day in urban areas and INR 26 per day in rural areas. The great bulk of India's people and markets are found at the bottom of the financial pyramid. According to a 2005 McKinsey report, 1.05 billion Indians (or 5 out of every 6 persons) were poor, earning less than INR 2,00,000 per year or 16,667 per month. According to a report on India's living conditions and unmet needs, many families are struggling to fulfil their basic needs daily, with very little disposable income and savings (**Roy et al., 2017**).

Bottom of the Pyramid Concept (BoP):

"In a Radio Address from Albany, New York: "The 'Forgotten Man' Speech- Franklin D Roosevelt" bitterly mentioned that those at the bottom of the economic pyramid had a lot of potential, and the only thing required to leverage it, is faith in them, this concept received a lot of attention. In general, an economic pyramid can be used to show how wealth is distributed and revenue is generated around the world. The wealthy and high-income folks are at the top of the pyramid. Nonetheless, nearly four billion people live on less than \$2 per day in the BOP (**Harvey, Fruehauf, and Prahalad 2005**). The Indian notion of the Bottom of the Pyramid, as stated by Prahalad in his book "The Fortune at the Bottom of the Pyramid," cannot be statically defined, according to the results of various research investigations. According to the National Sample Survey Office (NSSO), an urban Indian household's income is around twice that of a rural Indian home. To more accurately reflect the urban-rural divide, BoP can be defined as less than INR 300,000 for urban households and less than INR 1,60,000 for rural households, based on the assumption that urban households account for 30.5 percent of the population and earn 91 percent more than rural households.

Frugality:

In 380 B.C., Greek Philosopher Plato stated that Necessity is the mother of Innovation, which means then adversity brings creativity to the mindset and results in an innovative solution. Economic development is a market-driven solution to a widespread problem that has evolved from the crucibles of ease, starkness, resourcefulness, adaptation, and suffering to generate an "economically viable product." (**London 2013, Lehner et al., 2018; Arshad et al., 2018**).

In 1816, Laennec dealt with a tough situation involving a young overweight woman who wanted her heart examined. He used a choir of paper folded into a chamber to auscultate the heart because her stoutness prevented palpation and percussion. Hence, direct auscultation with the ear to the chest was "delivered unacceptably by the patient's age and sex," which led to the development of the first stethoscope after further refinements (**Rogin, 2006**). This is an excellent example of "frugal advancement," which was created to describe the use of local knowledge to defeat a test. Frugal Innovation is a broad phrase that refers to several acts that provide effective solutions to common problems with the least number of resources available. Such innovations develop in low-asset environments since established solutions are either prohibitively expensive or unavailable (**Tran and Ravaud, 2016**). Frugal Innovation, a cutting-edge concept in economic growth, was proposed by Schumacher in 1973, who advocated for employing frugal innovation as a complete formative strategy to address emerging-market financial inconsistency (**Schumacher EF, 1973**). "Any smart simpleton may build things larger, more mind-boggling, and crueller,". He asserts in his book "Small Is Beautiful." That the real challenge is making things simple and easy to understand at affordable prices. Reverse Engineering can be adopted to bring complexity to simplicity, as to travel in the opposite direction, you'll need a dash of virtuosity and a lot of mental perseverance (**Schumacher EF, 1973**). Prahalad saw a huge economic opportunity in catering to the unmet needs and desires of four billion people living on less than two dollars per day, or the "bottom portion," as he referred to them. He presented revolutionary innovations and plans of action to provide simple solutions to people at the BoP's significant basic challenges (**Prahalad 2012**).

The process of developing and processing a product component to extract only the most basic component is referred to as "frugal innovation" (**Birtchnell et al., 2013**). A frugal product or method is less expensive because it lacks sophisticated or pricey features. When it comes to feeding India's two-thirds population, mass production and economies of scale is the most cost-effective option. When select outdated components are replaced with contemporary components, then rather than redesigning the complete product, the cost of a newly re-engineered product is reduced. Most of the time, existing resources and technologies are used to generate these streamlined commodities, and the price-per-unit remains low because it is aimed at the BoP market. To encourage frugal innovation, simple, practical, and cost-efficient strategies are used. (**Tran and Ravaud, 2016**). To summarise, low-cost items lack the sophistication of their higher-priced counterparts. As a result, it only accomplishes its goal while still providing essential functions. Frugal innovation is a product development strategy that targets markets with limited financial, material, or institutional resources. It is built on quality, versatility, simplicity, and cost-effectiveness. Overcoming the constraints of complex and highly-priced products which are unaffordable, can be met through low-cost inventions that turn into opportunities (**Bound, Kirsten & Thornton, 2012**). In countries with favourable socioeconomic and geographic advantages, such as India and China, frugal innovation is very popular.

Frugal Innovation has been referred to as "reverse development," "creative development," "grassroots development," "synergist development," "Gandhian development", and "Jugaad" in Hindi (**McPhee et al., 2018**). In their book "Jugaad Innovation," **Radjou et al. (2012)** establish the six criteria for effective improvements: "find a good scenario in a challenging circumstance, achieve more with less, think and act deftly, keep it simple, incorporate the edge, and follow your heart." They go on to say that "as a whole, these six Jugaad attributes assist inspire strength, frugality, flexibility, effortlessness, inclusivity, compassion, and vitality." Radjou and his associates (**Radjou et al., 2012**) mentioned that, if a development achieves the following criteria: a significant cost reduction, a focus on core functionalities, and higher execution standards, it will be labelled cost-effective or frugal (**Weyrauch, 2016**). Small progress can be sustained, according to studies (**Levänen et al., 2018, Hossain et al., 2016, Winterhalter, 2017**), and it extends from undeveloped to developed countries. These can be found in nearly every business and many aspects of daily life. The medical care industry is one of the biggest stakeholders which has a lot of untapped potential which can be explored by adopting frugal ways for the betterment of society.

As the new word "Indovation" aptly signifies, India is today's epicentre of economic advancement. (**Lehner et al., 2018**). In the BoP approach to medical care delivery, India is at the forefront because the major population who lives below the poverty line lacks effective and affordable medical care. BMVSS (Bhagwan Mahaveer Viklang Sahayata Samiti), better known as Jaipur Foot, and Aravind Eye Care System, are the world's largest organisation for impaired people, are two of the most well-researched and successful instances of providing adequate therapeutic care (**Arshad et al., 2018**). One of the few truly outstanding Indian medical breakthroughs is the Jaipur foot. Both organisations produce an adequate profit to fund their aggressive expansion and extension by using viable and appropriate upgrades to give high-volume and exceptional clinical attention to the majority. India is second only to the United States in terms of the number of cost-effective medical service item advances, and it leads as the supported first-dispatch market, this makes India a potential hub for frugal innovators.

India and Various Waves of Covid 19:

Because the entire world has been fighting covid since March 2020, when WHO declared covid_19 a pandemic with over 1180 cases and 4291 deaths in 114 countries (WHO). India, the world's second-most populous country, has been hard hit in terms of medical aid availability, it was not worse than a massacre when Covid was spreading through respiratory droplets and contact, and the number of infected cases was rising sharply. The situation in India is more serious due to the incontrovertible reality of a big population, weak medical infrastructure, and a complex socio-economic system, where self-isolation, social distancing, and quality treatment are the major controlling elements to mitigate the impact of HIV/AIDS (**Kaliya-Perumal et al., 2020, Bhuyan**). India's sensitive ecosystem, which

is afflicted by smog, fine dust, and water pollution, has been impacted by the rise of cities and the subsequent need for more resources. Sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and particulate matter (PM) are all toxic gases that contribute to pollution in the environment (**Sarkar and Chouhan, 2020, Huang and Brown, 2021, Bherwani et al., 2021**). Air pollution is a major concern in several Indian cities, including Mumbai, Kolkata, and Pune (**Conibear et al., 2018**). High rates of respiratory disease, stroke, heart disease, diabetes, and lung cancer, all of which had a percentage of cases caused by severe air pollution, caused one out of every eight (about 12.5%) deaths in the country in 2017 (**Gurjar et al., 2016**). On the advice of the International Health Regulations (IHR) Emergency Committee, the Director-General of WHO declared the novel coronavirus (2019-nCoV) outbreak a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. (**Black et al., 2020**) In its initial surge in 2020, COVID-19 infected about 20 million people around the world, with 90 nations in the community transmission stage (**Bherwani et al., 2021**).

A new wave of the COVID-19 virus has again started destroying India slowly from February 2021 and has put India's economy in jeopardy (**Sarkar and Chouhan, 2021**). It was the time when the second wave of COVID-19 wreaked havoc on India's health system and economy, the country was just beginning to recover from the first (**Ranjan, 2020, Ghosh et al., 2020**). The number of daily confirmed cases in India began to grow in February 2021 (**Sengupta et al., 2021**). Around the middle of April 2021, there was a tremendous spike, with thousands of daily deaths reported around the country (**Khanna, 2020**). The second wave of COVID-19 in India was influenced by the difficult interaction of mutant virus strains, the inability to follow COVID-19 best practices, delays in immunisation efforts, and public scepticism of the COVID vaccine (**Kar et al., 2021**). On April 26, 2021, India had the greatest daily number of new SARS Cov 2 infections ever recorded in the world, with 360 960 infections, bringing India's pandemic total to 16 million cases and over 2,000 deaths, second only to the United States (**Thiagarajan, 2021**). India reported approximately 26.4 million confirmed COVID-19 cases and around 274000 deaths as of May 18th (Balsari et al., 2021). India has enforced the world's worst national lockdown in response to the COVID-19 epidemic, which will run until March 25, 2020. (**Lancet, 2021**).

During the second wave, however, the country's condition became extremely hazardous. On March 1, 2021, the WHO confirmed 15,510 new cases in India, with 414188 verified cases on May 7 marking the high (**Saha and Chouhan, 2021**). The number of new cases in India has risen dramatically since April. On April 17th, 2021, the country reached its peak, with confirmed cases accounting for 10.6% of the overall population. The WHO reported 16,411 confirmed cases on May 11, 2021, and 178 deaths per million. (**Status of Cvids in the Different States, 2021**). In the states of North-East India, the disease is spreading more quickly. The outbreak was focused on India's largest cities, particularly Delhi, Mumbai, and Bengaluru, from the start of the second wave (**Lancet, 2021**). The coronavirus has infected 7.57 percent of the country's population as of January 4, 2021 (**Adviser et al., 2021**). On May 11th, though, the figure had grown to 16.67 percent (**Thakur et al., 2021**). The most critical task at this time is to organise and make basic life-saving treatment facilities, as well as oxygen and immunizations, and to be made available at the grassroots level (**Ioannidis, 2021**). According to WHO and Media Releases, the second wave of COVID-19 is caused by "severe acute respiratory syndrome (SARS-CoV-2)," which has created devastation in India because of the country's enormous population, where most of the people live in poverty and are exposed daily to earn a living, otherwise, they may starve to death if not for Covid19. Self-isolation, social distancing, and quality treatment are the key controlling factors to neutralise the impact of the disease (**Kaliya-Perumal et al., 2020, Bhuyan, 2021**) as per guidelines issued by the Government of India.

In addition, massive political rallies and demonstrations accompanied legislative assembly elections in Assam, West Bengal, Tamil Nadu, and Kerala, completely destabilising the situation. Even though India is the world's most democratic country, state elections in Assam, Puducherry, Kerala, Tamil Nadu, and West Bengal may be postponed till circumstances return to normal (**Samarasekera, 2021**). To keep the economy viable, many states chose a night curfew rather than a full lockdown this time. In the first week of April 2021, the world's largest vaccination push began in India, with 6.06 percent of the total population receiving the first and second doses, according to statistics. 13.3 percent of the

population has been vaccinated as of May 11th (**Covid-19: Status across States, 2021**). When compared to the population, India's immunisation rate was not encouraging. The mutant's developing nature had gotten worse, as had the country's general demand for oxygen was not met on time (**Timilsina et al., 2020**).

A sharp increase in the number of serious cases daily resulted in a shortage of medical instruments, oxygen, hospital beds, and life-saving drugs, prompting an unintentional response by the central government, which issued orders to build the desperately needed medical facilities to alleviate the shortage (**Gupta et al., 2021**). The government, on the other hand, made significant efforts to halt the second wave of rising incidents, but the story of India's suffering was ultimately presented through an economic catastrophe. Covid active cases have reduced somewhat from 40,832 on August 1' 2021 to 37,719 on August 11' 2021 (**TOI, August 13' 2021**).

According to the government, we can win the battle against Covid if we keep a consistent focus on the five-point method (TTTVA) of **Test, Track, Treat, Vaccination, and Adherence** to Covid proper behaviour (**MHA, Nov 30 2021**). According to ET, the covid caseload on October 18th, 2021 was around 7500, with a veiled warning of a third wave to begin with the New Year. The availability of medical facilities is still a problem for many people. Medical treatment is scarce at the grassroots level, which has become a problem to be solved on an immediate basis, Many NGOs and Social Work organisations stepped in to bridge the gap. But high population pressure, and not following the covid appropriate behaviour had worsened the situation. It is owing to a lack of focused research aimed at the poorest strata of society, who are frequently denied access to numerous services simply because they are not affordable.

India's Healthcare situation during Covid 19:

The Indian government released AarogyaSetu, a COVID-19 tracking application that uses GPS and Bluetooth to alert people when they are in danger of being exposed to COVID-19. Through their foundations, new companies such as KlinikApp and Practo are providing COVID-19 examinations at home and online meetings with doctors. Because there aren't enough ventilators for basic consideration, startups like Nocca Robotics (incubated at IIT Kanpur), Aerobiosys Innovations (founded at IIT Hyderabad), and AgVa Healthcare are developing low-cost, easy-to-use, and handy ventilators that can be transported even to rural India. Before these ventilators could be shipped, clinical administrative approval would be required. New firms are also assisting the government's public data battle against Covid by establishing innovation stages to disseminate government alerts. Using a platform established by QKopy, the Kerala state government put out an application named GoK-Kerala Direct. It delivers COVID-19 updates and travel data via phone notifications and SMS to more established telephones for roughly half of India's population who do not have cell phones. These messages are delivered in both English and the native tongue, Malayalam.

Statement of the Problem:

Government spending must be boosted from the current 1.8 percent of GDP (2020-21) to at least thrice to meet the unmet medical requirements of the Indian population living below the poverty line. Furthermore, long-term medical facilities that can respond to pandemic events, such as Covid, at any time are urgently needed, particularly for the weakest segments of society.

Research Questions:

RQ1: What is the challenge that India has faced in Health-Care Sector during Covid 19?

RQ2: What is the solution to overcome the challenging situation that India faced during the Covid outbreak?

Objectives of the Study:

O1: To identify the challenges that India faced in the Health-Care sector during Covid_19

O2: To find out the solutions to overcome the challenges posed during the Covid outbreak

Methodology:

The secondary data has been explored to identify the challenges India had faced during the Covid outbreak since March 2020, especially in the Health-Care sector for people living at the Bottom of the Pyramid (BoP). The researcher tried to identify possible solutions that can be taken to handle this kind of pandemic that might occur in future.

Findings and Discussion:

India is currently dealing with a slew of serious healthcare issues. To begin with, treatment is tough to come by, especially for India's Bottom of Pyramid (BoP) population which lives majorly in rural areas, which accounts for more than 70% of the country's total population. Doctors, nurses, and hospital beds are in short supply in India's healthcare system. The doctor-to-population ratio WHO recommends is 1:1,000 (**Dagar and Dadhich, 2015**), which is six times lower in rural areas than in urban areas (**Ramdorai and Herstatt, 2015**). Furthermore, around 60% of all hospitals are located and 80% of all doctors are available in metropolitan or semi-urban areas (**Dagar and Dadhich, 2015**), which signifies the lack of healthcare management. Furthermore, healthcare affordability in India is a constant societal concern that must be addressed with deliberate efforts. To deal with such uncertain scenarios in the future, India must consider establishing long-term solutions. Even though many countries have suffered major consequences as a result of the Covid 19 outbreak, because India is the world's second most populated country, its position is a little different. There is a portion of society that is unable to obtain the necessary medical services due to prohibitive costs. Hence, there is an urgent need to provide solutions with a "Frugal Mentality" that are economical, simple, and easy to use. To do this, India must concentrate on this three-pronged plan with the assistance of relevant stakeholders.

To begin, the educational system, particularly the medical curriculum, must be reframed to fit current medical needs; courses such as medical scientist training programmes must be taught by people who have completed an MBBS, an MBBA with a PhD in a specific subject of interest, or a 5-year MBBA (Hons.) Traditional medical education and biomedical education can be blended to create innovative solutions to problems. A dedicated MBBS with a year of Research and Development can bring breakthroughs to this profession, and medical innovators may create miracles we haven't contemplated yet (**Ozair and Singh, 2021**).

Second, building an atmosphere that promotes creativity, innovation, and cost-effective living, with a focus on ensuring that individuals living below the poverty line (BPL) or at the bottom of the pyramid (BoP) have access to medical care. To succeed and provide an example for future generations, to believe in their ideas and themselves to make a positive influence in society, disruptive ideas must be welcomed, nurtured, and incubated. Entrepreneurship, in conjunction with the "Jugaad" strategy commonly referred to as Frugal Innovation (**Radjou et al., 2012**), must thrive at medical institutes and universities to forward the objective of helping society via their unique creations.

Third, a collaborative and inclusive strategy should be pursued, with all stakeholders who are capable of and have a similar vision for serving society stepping out and joining hands to tackle such uncertainties as Covid 19. Medical Volunteers Programs, Free Medical Check-up Camps Run by Non-Governmental Organizations and Private Organizations, Health and Hygiene Awareness Campaigns, Blood Donation Camps, and other similar efforts are examples. Several studies have discovered that immunity plays a vital role in preventing covid attacks as well as battling covid to prioritise health and boost the natural immune system to combat different mutants of Covid 19 (**Chemaitelly et al., 2021**). The government needs to incentivize and motivate people and businesses who work with the goal of 'Giving back to Society,' who create a 'bridge' in the form of a product like the 'Practo App,' which makes doctors available virtually in 60 seconds, and who fill the gap with a 'Jugaad Mind-set.' If we have more of these "Jugaad Innovators and Inventions" lined up to give it their all, the very least we can do is encourage and motivate them, so that they can work with their full enthusiasm for the betterment of the medical-care system in India.

Also, to address this issue, three basic concepts of frugal innovation—the brilliant art of achieving more with less—can be used to rapidly develop and implement an efficient crisis response with little resources **Radjou et al. (2012)**

Interact and iterate is the first frugal principle: This theory is underpinned by the idea that "perfection is the enemy of good." It encourages innovators to empathise with end-users—customers or patients—and provide a "good enough" solution that fits their immediate needs, before iterating and improving the solution over time based on actual user data.

Making use of all available resources is the second frugal principle: Companies tend to either reinvent the wheel, which takes time and money or replace it with a creative and affordable alternative. A cost-effective way to create more value faster and better is to wisely reuse, repurpose, or recombine existing resources, by adopting the 'Out of the Box', design thinking approach.

Collaborating with "consumers" to produce value is the third frugal principle: Thanks to the Internet, social media, wearable technologies, and self-monitoring health apps, which passive patients are increasingly becoming highly involved called "prosumers" who proactively control their health. Consumers make up 15-20% of every industry, including healthcare. These health prosumers are as well-informed as doctors, self-motivated, have a lot of social media influence, are willing to offer advice and support to other patients, give their personal data for the study, and push for better health outcomes. Care providers may foresee future patient requests and market trends by involving these prosumers as innovation partners and respond more rapidly and effectively by co-developing major solutions for the benefit of all, who need them.

Conclusion:

India is a land of talented individuals who think with a focus on different needs and requirements, which we can call the "Need-based approach," also known as the "Jugaad or Frugal based approach,". Looking at the pandemic's Covid 19 roller-coaster ride that has been happening since March 2020, 'Frugality Imbued with Catastrophic Inventions' is all that can safeguard the Indian populace from such unanticipated medical disasters. MNCs and other potential start-ups should pay attention to the 'Bottom-Up' strategy, reverse-engineered products and services to make them less complex, sustainable, and easy to operate, lowering prices and making them more affordable to individuals living at the bottom of the economic pyramid. Frugality is a mental process that can easily be introduced into today's educational system, with a special focus on medical schools and colleges to build simple and economical medical facilities. Given that India is the world's second most populated country, with inhabitants of diverse income classes and a big population living at the Bottom of the Pyramid, the need to motivate, mentor, and respect frugal-approach-based solutions to confront medical facility difficulties is a need of hour. This means 'Affordable Health Care for All,' and it's quite likely that by working together with frugal innovators, educators and the support of policymakers, we will be able to defeat the covid epidemic and be better equipped to handle similar issues in the future.

If India continues to develop cost-effective healthcare advances, it will be able to combat any pandemic that may strike the country in the future, affecting all sectors of the population, even those at the bottom of the pyramid (BoP). India must maintain and improve its entrepreneurial mindset with Jugaad based approach to be prepared for any circumstance that might disturb the country's ecosystem.

Implications of the Study:

This research could be useful in incorporating frugal innovation and engineering into school and medical college courses to assist students to grasp the notion from the bottom-up approach. Furthermore, it may be useful to the government in formulating policies to promote a thrifty mindset, which would not only solve this unsolved problem but also provide economical solutions and job possibilities for our country's creative brains. If frugality is wholeheartedly accepted by all sections of the economy, India's youth will be inspired and hopeful to create long-term solutions for society, this will constructively give their talent and expertise a boost to make this planet a more vibrant, inclusive, and healthy place to live.

Future Avenues:

This study could be expanded and investigated further by looking into the various ways that frugality can be used to solve some of society's most pressing issues. Although our economy is developing in all sectors, the most important sector that ensures the health and well-being of all citizens, the "healthcare sector," is becoming commercialised, making it expensive to a large portion of our population. More studies may be done to develop creative ways for healthcare services to be brought down according to various pocket sizes, with people living at the bottom of the pyramid in mind (BoP).

Limitations of the Study:

The study comprises only the secondary data, since the outbreak of Covid 19 in India. The findings mentioned may be biased due to the personal perception of the researcher.

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