

Effect of COVID-19 on the Finances & Supply Chain in the Health Sector: A Case of Pakistan

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ABSTRACT

Aim of the Study: This study is an endeavour to explore the Covid-19's effect on the financing process of the supply chain in the health sector to provide a foundational understanding of the disruption faced by the pharmaceutical industry. This exploratory research investigated what and how Covid-19 inefficiency in the health sector and determined the factors that influenced the supply of medicines and other medical equipment in Pakistan and also affected the prices of medicines in the market.

Methodology: The primary and secondary data were utilised. In the case of primary data, the survey was conducted through a semi-structured questionnaire distributed among pharmacists, finance managers, supply chain managers and doctors. The sampling technique was nonprobability purposive sampling. In the case of secondary data, it was amalgamated from literary sources (Edmondson & McManus, 2007).

Findings: As per the respondents, the COVID-19 pandemic has affected personal life initially because some of their near and dear fell sick, got isolated, disrupted their daily routine life, and could not spend time with family and friends, keeping in mind the Corona restrictions. Everyone carried out their daily activities with the utmost sense of safety precautions required to stay safe. This interaction is by observing the required safety measures.

Conclusion: The practical implication of the study is that it delineates the factors and how they can be controlled so that the condition can be improved if the inhabitants had to face the situation again because coronavirus keeps coming back in the form of different variants and every country around the global needs to keep themselves prepared.

Keywords: COVID-19, Financing Process, Supply Chain Management, Health Sector, Pharmaceuticals, Medical Equipment.

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Background

The pandemic situation of Covid-19 caused a ripple effect that disrupted multiple sectors of the economy, where the system was not capable enough to handle the new situation. This was observed in the health sector's supply chain management financing process. The Chinese, being the Covid-19 epicentre and the global trading giant, were not prepared enough to cease their production capacity downfall, which eventually brought down the active pharmaceutical ingredients production. This eventually created a shortfall of raw materials used to manufacture pharmaceuticals. Moreover, the disaster within the disaster was that China, the significant producing API (Active Pharmaceutical Ingredients) by volume (Deqiang & Li, 2019), and India as a pharma product giant, failed to sustain the transportation outflow of active pharmaceutical ingredients. Notably, most of the APIs used in the USA are sourced from China, which created a direct and substantial adverse effect on the production of medicines (Rewari, Mangadan-Konath, & Sharma, 2020).

Vyas et al. (2020) described the situation in a manner that India was not able to handle the disruption caused by Covid-19 in the financing process of supply chain management in the health sector, despite being a significant player in finished pharma products, having trading ties with several countries and experience in medicines. Chatterjee (2020), in their research work published in *Lancet*, recorded the view of the experts that the "pharmaceutical supply chain exported out of China under significant pressure and workforce shortage due to more and more provincial governments adopting a mandatory 14-day quarantine policy for returning workers. Moreover, transportation and logistics apparatus is also getting clogged up due to various travel restrictions and difficult access to ports". Singh and Popli (2021) believe that the challenges caused by reliance on China for active Pharmaceutical Ingredients (API) have created opportunities as the pharma market of India is looking to develop its API capacity in future, as being a significant player in pharma products. This projects that the ideology of globalisation received a blow from Covid-19, and countries are now planning to divert from total reliance on sourcing from other countries (Liu, Lee, & Lee, 2020).

Shifting the argumentation from API to PPE (Personal Protective Equipment), which was essential for the front line health workers, its provision also became a challenge. Livingston, Desai, and Berkwits (2020) believe that sourcing the PPEs is a grave challenge that could further deepen the harm of Covid-19 and endanger the frontline. According to reports, meeting the increased demand for PPE would necessitate a considerable surge in PPE production, a task that could become time-consuming for healthcare systems that are presently dealing with a rapid influx of COVID-19 patients. Notably, Livingston et al. (2020) provided workable solutions such as import planning and reclaiming the pile of PPEs from the various market streams of institutions, NGOs and static resources. Furthermore, the reusability of the PPEs by replacing some parts and disinfecting others.

Moreover, having an exploration movement for repurposing the materials available at the health sector agents for making them usable PPE-like. Additionally, creating the local supply like stitched masks, using coffee filters and extending the supply of plastic things that can be used as PPEs like plastic bottles and plastic spectacles (all the countries immediately announced that they would be closing their borders for flight availability). Similarly, keeping to the essentials and unavoidable (materials, activities) in terms of patient, human resources, and standard operating procedures (Livingston et al., 2020).

In developing countries, such as Pakistan, some of the above projections by Livingston and companions were utilised, but after a while, the PPE and API availability became a significant concern initially for the market players. This triggered the massive buying initiation in the private market approximately one week before the lockdown. Interestingly, the buying drive was based on the sourcing of vitamin C and the second priority on the list was chronic medicine and other Covid-19 products. Buying these products by private entities escalated the rumours about Covid-19, and negative fear was raised instead of genuine concerns. In contrast, the public sector buying was initiated approximately three weeks after the private sector. This created a turbulent hype in the demand that the suppliers could not manage by any means and

sourcing the material with fair pricing backed by a resilient supply chain became a national problem (Kusumawati, Saragi, & Putriana, 2021). The closing of borders, the delay of shipments, and not knowing when the next supply would eventually trigger market players' control of the supply of essential material (Fonseca & Azevedo, 2020; Liu, Lee, & Lee, 2020).

So, regardless of the customers' pile of orders and willingness to buy, the established system of manufacturers was not able to meet the most desperate demands during the pandemic and endangered the lives of a huge chunk of the public in Pakistan. Many doctors, nurses, paramedical staff, and other frontline workers fell prey to this situation. Precious lives were lost due to supply chain failures and financing issues during the Covid-19 at various phases. Apart from API and PPEs, the Covid-19 testing kits became an issue that hindered monitoring of the spread and the various carriers (Sharma et al., 2020).

Introduction

In this age of post-industrialisation and globalisation, pandemics are becoming a primary concern in terms of public health around the globe. On March 11, 2020, the World Health Organization (WHO) classified Covid-19 as a severe acute respiratory disease due to its sudden outbreak in Wuhan. According to Sachs et al. (2022), the number of global deaths reported from the virus has exceeded 5.1 million. With increasing globalisation and migration, the likelihood of epidemics is elevating. The health sector is the focal point in this setting, and the pharma communities of the countries are part of the health system. The high prevalence of infectious diseases in a certain area makes it difficult to get affordable medicine. This lack of access is a significant problem, especially considering the importance of standard medicine in disease control. In times of epidemics, pharmaceutical companies are of utmost importance in providing quality healthcare, especially when the drug supply chain is disrupted due to various reasons. Traditional manufacturing and distribution roots, such as those in China, India, and Namibia, rely heavily on South Africa. Sharma et al. (2020) have noted this.

In addition, the stockpiling and non-distribution of pharmaceutical supplies to the supplying countries then leads to bottlenecks or disruptions in the pharmaceutical supply chain in the countries. Additionally, lockdowns early in the pandemic restricted domestic and cross-border movement, severely impacting the supply chain and transportation routes of medicines during this period. This disturbance in the supply chain systems for the health sector in the modern world has diverted the investor and national focus to exploring the reasoning and finding reliable solutions to the problems. Moreover, this disturbance in the supply chain may also increase the cost of the drugs. The more profound insight into the health-related supply chain failure reveals that the subsectors have been experiencing different impacts like ventilators, diagnostic test kits, APIs and PPEs (Fonseca & Azevedo, 2020; Livingston et al., 2020; Sharma et al., 2020). Therefore, entire supply chains in the healthcare sector should initiate a long-term structural change. From this perspective, the e-Health industry benefits from social distancing, while the government's hospital capacity building policy supports the home care and community healthcare industries.

On the other hand, hospitals are negatively affected while other services such as elective surgeries and clinical trials may have been delayed. Companies are under pressure to provide equipment for these courses and similar procedures. This means that the supply chain dynamics for an emergency, ongoing and pandemic demands are different, and a parallel strategy is a high call so that the supply chain can be mapped for each dimension of the health sector (Livingston et al., 2020).

For exemplification, toilet paper firms have increased standardised production while shifting the capacity from the product that consumers used at home and reduced the production of toilet paper used in commercial establishments. The firms also started producing less variety as it hindered lead and final destination delivery duration. The focus was on producing more essential products and addressing the essentials like mask shortage for most health workers. Likely, the personal protective shortage was one of the early flash points of the corona pandemic. It was observed that sourcing every kind of personal

protective equipment became hard to find when the developing countries braced the Covid-19. A similar situation was also noted in the developed world (Sharma et al., 2020).

Gap Analysis

Covid-19 impacted every sector, but the significant effects were on the health sector, as the global focus of supply chain operations for controlling the damage from the pandemic. Various studies have revealed the multi-layered and multi-dimensional effect of Covid-19 on the health sector's financing processes of supply chain ranging from human resources to material supply chain to related readiness mechanisms. Despite the plethora of studies, the developing world was not the focus of many studies and the comparative literary development related to exploring the Covid-19 effects on the medical or pharmaceutical sector in terms of supply mechanism. Notably, medical products are a vital part of the health sector. Therefore, the aim of this study is to examine the causes of the financing processes of the healthcare sector during the Covid-19 and the impact of the Covid-19 on the supply chain mechanism of the healthcare sector, and to inform the emergency preparedness management policies and strategies in this context.

Research Questions

- What are the primary reasons behind the financing processes of the health sector during Covid-19?
- What are the significant effects of Covid-19 on the supply chain in terms of the health sector?
- How to overcome the effects of COVID-19?

Research Objectives

- To identify the significant reasons behind the financing processes of the health sector during Covid-19.
- To identify the pivotal effects of Covid-19 on the supply chain in terms of the health sector.
- To know about the ways to overcome the effects of Covid-19.

Literature Review

A resilient financial system is mandatory to run every single department of the state in an efficient way (Fernández-Villaverde, Sanches, Schilling, & Uhlig, 2021). In this regard, during the pandemic, the health equipment supply chain mechanism is considered the backbone of the health sector. The health system is badly affected by Covid-19 as a lockdown was imposed, due to which production decreased. The selection of suppliers and the relationship between suppliers and buyer is a high call in the research communities, and the need for further studies is viewable. Researchers discuss the case of the developed world, like Sweden, facing supply chain challenges due to Covid-19, such as the shortage of essential medical equipment. Production-intensive industries faced a significant challenge as many workers were quarantined due to protocols for Covid-19. The three significant aspects of supply chain management – finance, production and delivery, all were seriously affected as these required a strong monetary backbone and human resources to deliver and control machines to carry out the production process (Jia, Blome, Sun, Yang, & Zhi, 2020). Finance is affected due to constraints in the budget (Federspiel, Borghi, & Martinez-Alvarez, 2022). Production is affected because required people cannot freely move to attend work due to safety measures (Sharma et al., 2020). Supply chain management is considered the basis of every kind of business, as it ensures that competitive advantage should be maintained. Additionally, the medical industry faces barriers to having an adequate supply chain due to limited education and insufficient management support (Livingston et al., 2020).

For developing countries like Namibia, exploratory studies have shown that the impact of Covid-19 has been profoundly negative on the pharmaceutical supply chain system. The reason behind this challenge

for the health sector was the sudden outburst of the virus, and small states with limited resources were not ready to deal with a problem that had emerged on such a big scale, thus effected the lives on individual and professional levels. The preparation of strategies and policies for the developing world was felt at the global level with the advent of similar instances (Jafri, Ahmed, & Siddiqui, 2020). As mentioned above, the demand for pharmaceutical equipment increased, and as more and more lives were at stake, there was a need for quick-fix strategies. This triggered researchers to conduct exploratory research to know the root cause and the shop-floor level. The studies would involve people who worked in the health sector to help make the strategies required for the supply chain system resilience of the health sector. These studies give the countries insight into how to deal with this natural disaster. Companies worldwide are struggling not only on the supply side of the supply chain but also to meet customers' demands because worldwide organisations face sharp fluctuations in supply and demand (Chowdhury et al., 2021; Liu, Lee, & Lee, 2020).

Research Design & Methodology

The researchers have conducted a modified form of research. The primary and secondary data were utilised. In the case of primary data, the survey was conducted through a semi-structured questionnaire distributed among pharmacists, finance managers, supply chain managers and doctors. The sampling technique was nonprobability purposive sampling. In the case of secondary data, it was amalgamated from literary sources (Edmondson & McManus, 2007).

The gathering of targeted data was a challenge as the researchers had to persuade the experts to provide their feedback per the semi-structured questionnaire items. The semi-structured meetings were arranged by the members associated with the finance, supply chain, and pharma as they explained how COVID-19 affected their lives and the lives of others due to the pharmaceutical sector. The data analysis was done to extract the learning points that could be converted into actionable recommendations and conclusive knowledge (Edmondson & McManus, 2007).

This study relied on a subjective method (qualitative methodology) to thoroughly elicit the candidates' thoughts. It is undeniable that neither some information nor an estimate on potential responses was previously given to the candidates. This study is based on a multi-case study approach that employs interviews (Eisenhardt, 1989; Eisenhardt & Graebner, 2007), where data obtained through semi-structured interviews are used to create a vicious cycle of exact certainty regarding the stockholders of the monetarist component. Numerous examples offer the opportunity to classify arrangements and fundamental undertones using beneficial subject and indicator checks. Table 1 contains the case study protocol (Haddock-Millar, Sanyal, & Müller-Camen, 2016).

Table 1: *Methodology for Case Studies*

Sr.	Methodology
1	Research qualifications, focus, and scope
2	The credentials of discrete prosperities provide “many examples”
3	Expanding the scope of the study questions
4	The qualifications of suitable study measures and qualitative data-gathering methods like focus groups and semi-structured interviews
5	The case studies' transparent and comparable part on the credentials of “acceptable” suppliers emphasises creative ecological and human resource management.
6	The time frame for data collection is August 2022 to December 2021.
7	Data analysis for state-level private subsidiaries
8	Development of extensive
9	Literature support
10	Concluding: The necessary research and data have been completed.
11	Dissemination: producing reports and other materials

A significant number of queries over the discussions stuck on the focus of this study – see regarding financing processes and supply chain issues of the health sector. This study successfully determined loopholes in the overall health sector during the pandemic.

The experts in finance, supply chain, and medicine in the health sector from Pakistan are the population for our study. To all-encompassing abstract material, semi-structured talks were conducted. In addition, nineteen interviews were systematised for this study: ten open-ended questions from the experts and fifteen direct face-to-face questions (Table 2); both yielded rational responses from our primary contenders.

Table 2. *Interview Respondents*

Job Role/ Category	Pakistan
Finance Experts from the Health Sector	5
Supply Chain Experts from the Health Sector	5
Doctors	5
Total Participants	15

The Job roles in Table 2 above prove that all our interviewees have a wide range of information concerning financial, supply chain, and health issues during Covid-19.

The existing literature on the developing world's health sector provided us with the basis for our queries. These are provided in Table 3.

Our interviews are in full swing with a comprehensive discussion on the individual's issues when buying medicines and other helpful equipment, the loopholes in the supply chain management of the health sector and controlling perspectives for health sector abnormalities. The interviews were then enthused towards the specific areas documented in the literature. Most of our direct one-on-one discussions lasted between forty and fifty minutes on average, with a maximum of sixty minutes for each participant.

Table 3: *Lists the Protocol and Interview Questions*

Lists the Protocol and Interview Questions
<i>The Interview Process</i>
Providing the correct information to the interrogator(s) and applicant(s), that is, informing them
Preparing our study strategy
Plan the study's grit, taking the goalposts into account.
In opposition to potential research worries, moral subjects, and reaching a consensus
Prepare for our interview/focus group in advance.
Areas that need more research and particular problems
<i>Effects of Covid-19</i>
1. How the COVID-19 pandemic has affected your personal life and time with family and friends, including how you usually carry out your daily activities?
2. With particular emphasis on the period of lockdowns, was there any difference between your sales volume before and during the lockdown?
3. How do you feel the pharmaceutical sector in Pakistan can handle a pandemic better in the future, with specific emphasis on the staff and supply chain?
<i>Experience with Individuals</i>
1. Can you explain how you interact with your patients/clients during this pandemic? Any positive or negative experience gained from this period?
2. Did your institution place any direct purchase order for a drug or PPE during the COVID-19 pandemic due to drug or PPE shortages?
<i>Pre and Post Covid-19 Sales</i>
1. Did you experience more product stock-outs after the COVID-19 pandemic started compared to the

previous period?

2. How were delivery lead times for your orders affected? What was the average lead time before the pandemic, and how did it change after the pandemic, etc.?
3. Is there a shortage of face masks, gloves and protective wear?

Market Abnormalities in the Health Sector

1. Can you estimate the difference in the acquisition cost of the Essential Medicines as shown in the WHO list of essential drugs pre-and post-COVID-19 pandemic?
2. Can you estimate the difference in the cost of PPE pre-and post-COVID-19?

Controlling Perspective for Market Abnormalities in the Health Sector

1. May you please tell us about individuals' few domineering inner intuitions when buying medicines and other related items?
2. Would you like to tell me what you usually do in these circumstances for the subject individual and situation?
3. If you observed any effects of your efforts, what are they?

About you

1. What type of information is vital for you in the direction of analysis/advice at the time of buying products for consumers?
 2. What can be the pivotal factor(s) to consider towards hedging for such situations in the future?
-

Results & Discussion

As per the respondents, the COVID-19 pandemic has affected personal life initially because some of their near and dear fell sick, got isolated, disrupted their daily routine life, and could not spend time with family and friends, keeping in mind the Corona restrictions. Everyone carried out their daily activities with the utmost sense of safety precautions required to stay safe. This interaction is by observing the required safety measures.

In addition, there was a difference in the sale volume, as it increased manifolds due to Covid-related expensive medicines. The first thing that was noticed through these questions was the effect of the hyper increase in prices of medicines and other stuff, which not only created an element of fear and rush in the common public but reflected the case of bad governance in terms of supply chain fragile situation regarding health sector. So, there were no shortages by ensuring the supply chain of medicines remained intact. Nonetheless, they experienced more stock-outs for products after the COVID-19 pandemic started compared to the period before. The average lead time was also disturbed due to the high demand for specific medicines, which was doubled in injectables. Therefore, the difference in acquisition costs for essential medicines, as reported in the WHO list of essential medicines before and after the COVID-19 pandemic, ended up being at least 20-25%, and the difference in PPE was 10-25%. However, due to the shortage of medicines or PPE, none of the institutions are placing direct orders for medicines or PPE during the COVID-19 pandemic. The main reason for the price increase was that, firstly, it was difficult to manufacture medicines during the pandemic because everything was closed then, and secondly, manufacturers had to supply these limited medicines to all their buyers. A similar case of supply disruption was reflected by Singh and Popli (2021), and detailed argumentation along with alternatives was projected by Livingston et al. (2020).

Another critical factor that has affected the supply chain is the demand for medicines. People panicked and tried to hoard the medicines and PPE, causing the shortage, and since the manufacturers could not manufacture the medicines at the same rate as they were before, it greatly impacted supply chain management. Moreover, a massive increase in the sales of medicines and PPEs was recorded that the local market players failed to satisfy. In terms of drugs, there was a significant increase in the sale of psychotic drugs and a slight decrease in the sales of GIT drugs. This projected that the supply chain failure caused direct health effects of psychiatry in nature (Sharma et al., 2020).

According to the collected data, it was observed that there was a shortage of face masks, hand sanitizers and surgical gloves. The developing countries do not hold this imported equipment in abundant inventory due to financial constraints, so when there was an increase in demand for these products, it became a shortage problem; hence local manufacturers started manufacturing their products (Fonseca & Azevedo, 2020). There were delays in shipment, which is quite apparent as the borders were closed, and importing stuff from other countries was not easy. The main symptom of the infection is shortness of oxygen in the human body, and a ventilator is a machine that mechanically pumps oxygen into the body for that purpose. Pakistan does not manufacture ventilators and has only a handful in hospitals. When Covid-19 started to hit hard in the country, there was a shortage of ventilators which left people gasping for air, and most of them lost their lives because of the said condition (Livingston et al., 2020). So, the effect of the health sector supply chain not only disturbed the socio-economic conditions but eventually resulted in the loss of lives.

On the other hand, a positive experience was gained from seeing everyone involved going all out to help the patients.

Conclusion

The learning points of this study are that Covid-19 entered the lives of the global population and destroyed almost all daily routines through the failure of supply chain systems and due to financial constraints in the developing world. The supply chain has faced multiple challenges and failures regarding engaging with the pandemic, but the most profound one is the health sector. The multi-layered and multi-dimensional challenges of the supply chain in the health sector are not limited to the availability of APIs, PPEs and related materials but supply chain of human resources, services, alternate mechanisms, innovative solutions and dealing with the market in terms of supply chain resilience and good governance, which could not only pave the way forward for exploring the failure reasoning but shifting to new-normal of health supply chain in the post-Covid-19 era.

Practical Implications of the study

This research can help people to understand how the health supply chain can better prepare for significant disruption, how can health sector supply chain explore viable solutions while bracing for the pandemic, and how to make a reserve for hedging such kind of pandemics in the future. Moreover, the need for governance and strategic planning by the government machinery to overcome sudden shocks in the environment. The thinking shifted to capacity building to produce essential drugs and medical stuff domestically. The government needs to manage the national stockpile at multiple locations across the country—furthermore, a foundational understanding of new avenues of supply chain management.

Recommendations

A few solutions to resolve these issues are

1. There should be pharmaceutical manufacturing companies or firms in the country for domestic capacity building and deterrence-based stockpiling for the projected threat.
2. As suggested by the people who have worked in the supply chain system and who filled out the questionnaire for us, the government need to control the mafia as it results in bad governance.
3. Initiation of innovation management in the health sector supply chain regarding human resources, alternate sources of equipment development like ventilators and gas masks, and parts of PPE to make them reusable.
4. The utilisation of non-human services, deployment of immune workers, revisiting the strategies and keeping to essentials and unavoidable (Livingston et al., 2020).

Future Research and Limitations

Future studies must concentrate on the health sector financial reserves, supply chain system resilience and agility for engaging with pandemic situations and large-scale supply chain disruption, and readiness factors. Moreover, the increased operational preparedness and effectiveness through supply chain simulations and operational strategies of suppliers on a massive scale needs to be identified. The micro tracking and managing the incidents of supply chain failure must be studied through AI and analytics. The limitations of this study are that it is one of the foundational studies in terms of understanding the Covid-19 effect on the health sector finances and supply chain, which restricts the researchers from dealing with the exploratory dimension of the problem concerned. Further studies based on a longitudinal, cross-sectional, time-lagged and mixed methodology based is needed. The comparative studies of developing countries and secondary-based international-level studies are a high call. The psychological effect on the common public through the disruption of the health supply chain and the need for innovation management in terms of PPEs and related materials is observable.

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Conflict of Interest

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