



SWOT AND TOWS ANALYSIS OF THE COVID-19 VACCINE SUPPLY CHAIN: A CASE STUDY OF A TERTIARY CARE GOVERNMENT HOSPITAL IN NORTH INDIA

Hospital Administration

Dr. Mahwish Suhaib

MHA Student, Department of Hospital Administration, KGMU, Lucknow

Dr. Nitin Dutt Bhardwaj*

Professor (Jr Grade) & Head, Department of Hospital Administration, KGMU, Lucknow.
*Corresponding Author

Brig (Dr.) Pradeep Srivastava

Associate Professor, Department of Hospital Administration, KGMU, Lucknow

Dr. Anmol Jain

Senior Resident, Department of Hospital Administration, KGMU, Lucknow

Dr. Shifa Kausar

MHA Student, Department of Hospital Administration, KGMU, Lucknow

ABSTRACT

In order to vaccinate people, proper supply chain management is an essential requirement. This research paper delves into the COVID-19 vaccine supply chain model within a tertiary care government hospital in North India. Through an observational approach and checklist assessments, the study aims to conduct a comprehensive SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. Additionally, a TOWS (Threats, Opportunities, Weaknesses, Strengths) analysis will be carried out to formulate strategic recommendations for improving the vaccine supply chain effectiveness. The analysis provides valuable insights into the management, challenges, and potential enhancements of the vaccine distribution process.

KEYWORDS

Supply Chain, Vaccine, Cold Chain, SWOT, TOWS

1. INTRODUCTION

In the pursuit of global healthcare challenges, the COVID-19 emerged which was declared as pandemic in March, 2020 by World Health Organisation (WHO).^[1] The successful deployment of vaccines to combat this global crisis has underscored the vital role of supply chains and logistical systems in ensuring distribution of vaccines. India runs one of the largest Immunization programmes in the world, catering to the vaccination needs of more than 26 million newborns and 29 million pregnant women.^[2] This research delves into the intricacies of the COVID-19 vaccine supply chain in the context of a tertiary care government hospital in North India. The Government of India (GOI) constituted a National Expert Group on Vaccine Administration for COVID-19 (NEGVAC) which guided COVID-19 vaccine introduction in India in a phased manner on priority basis.^[3]

Employing the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis framework, alongside the complementary Threats, Opportunities, Weaknesses, Strengths (TOWS) matrix, this study aims to provide comprehensive insights on dynamics of vaccine distribution within a complex healthcare ecosystem.

The SWOT analysis methodology has gained prominence over the past decade as a valuable tool for strategic planning and analysis. It serves as a compass for organizations to navigate their internal strengths and weaknesses, while also addressing the opportunities and threats posed by the external environment.^[4] However, to make the most of SWOT, it must be extended to the TOWS matrix, which bridges the gap between internal and external factors. This framework enables organizations to leverage their strengths to capitalize on opportunities, mitigate weaknesses using available opportunities, and strategically address both weaknesses and threats. In essence, SWOT identifies the facts, while TOWS assists in constructing a coherent plan for progress.^[5,6]

With a population of 1.42 billion,^[7] India faces the monumental task of delivering vaccines to every corner of the nation. A resilient and efficient supply chain system and cold chain management becomes indispensable in such a context as once a vaccine loses its potency, it cannot regain it.^[8]

The observations from this research culminate in a comprehensive SWOT analysis of the vaccine supply chain, identifying key strengths, weaknesses, opportunities, and threats. Building upon the SWOT analysis, this study formulates strategic recommendations for the vaccine supply chain.

In conclusion, this research underscores the pivotal role of an efficient

vaccine supply chain in facilitating successful vaccination campaigns. The SWOT and TOWS analyses provide a comprehensive assessment of the current supply chain model, offering insights into areas for improvement, potential risks, and strategic opportunities. By capitalizing on strengths, addressing weaknesses, seizing opportunities, and mitigating threats, the vaccine supply chain can be optimized, ensuring equitable vaccine distribution across the population.

2. METHODOLOGY

The research was conducted at a tertiary care government hospital located in North India. The study employed an observational study design, focusing on the COVID-19 vaccine supply chain within the hospital. A pre-formed observational checklist given by Ministry of Health and Family Welfare^[9] was implemented to assess the preventive maintenance of Ice-Lined Refrigerators (ILRs) used for storing vaccines. The study exclusively included two COVID-19 vaccines, Covishield and Covaxin, while adhering to specific inclusion and exclusion criteria.

3. OBSERVATIONS

The study revealed that the Government of India was responsible for supplying vaccines to the State Vaccine Stores. The U.P. State Vaccine Store (SVS), played a pivotal role. Vaccines were distributed from SVS to 8 Divisional Vaccine Stores (DIVS), which further supplied vaccines to 75 districts across Uttar Pradesh. SVS either directly provided vaccines to the District Vaccine Store (DVS) or to DIVS which provided it to DVS. The distribution chain encompassed 20 cold chain points and ultimately reached the vaccine administration centres. Vaccine supply chain flowchart can be shown in fig 1.

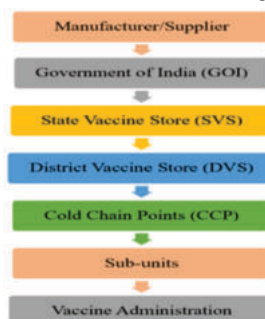


Figure 1: Vaccine Supply Chain

Notably, the study highlighted the absence of an indenting process for vaccine allocation. Cold Chain Points (CCPs) utilized historical data on dosage administered to estimate supply requirements. The hierarchical structure of personnel involved in vaccine distribution is illustrated in fig. 2.

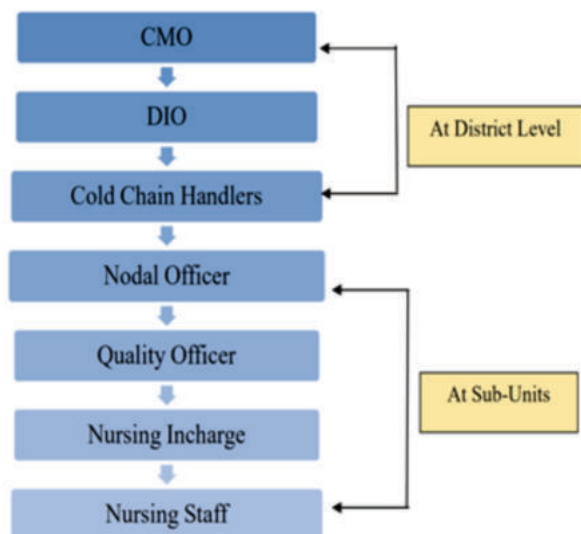


Figure 2: Hierarchy of Personnel involved in Vaccination

The involvement of personnel in allocating tokens to beneficiaries and managing queues was also observed. Computer operators were responsible for data entry into the Co-WIN portal.

To ensure appropriate use of equipment, a comprehensive checklist consisting of 32 parameters across three categories was implemented. This checklist was applied to both the District Vaccine Store (DVS) and the observed Cold Chain Point (CCP), resulting in 100% compliance. Cold chain followed during transportation is shown in fig. 3.

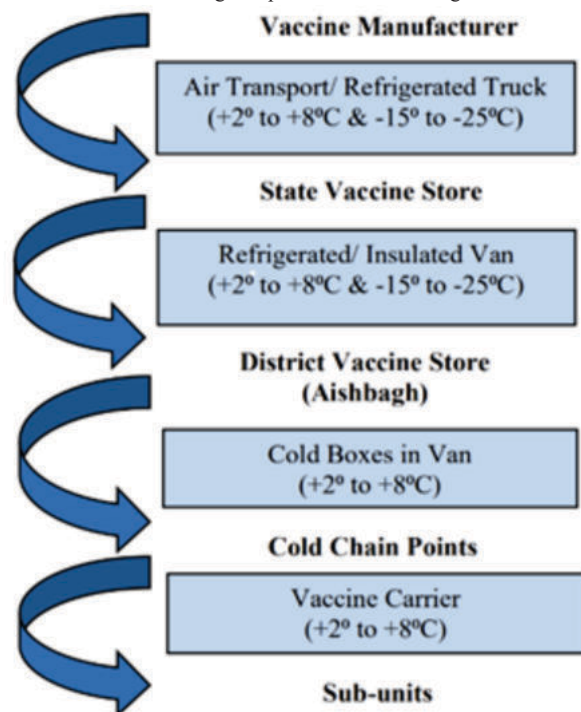


Figure 3: Cold Chain while Transportation

SWOT Analysis:

Strengths:

- Efficient hierarchical distribution process from central to local levels.
- Successful involvement of various personnel, ensuring smooth

queue management.

- Robust cold chain management with 100% compliance at key points.
- Effective utilization of the Co-WIN portal for data entry and tracking.

Weaknesses:

- Potential challenges in line listing and demand estimation for vaccine allocation, leading to supply imbalances.
- Vaccine vial monitor (VVM) was not present on vaccine vials.

Opportunities:

- Implementation of advanced data analytics for better dosage estimation and allocation.
- Private facility vaccines added as a support and to decrease load.

Threats:

- Vaccine related adverse reactions in non-government sector will also have impact to government supply.

SWOT Analysis of Vaccine Supply Chain

INTERNAL FACTORS	STRENGTHS	WEAKNESS
	• Efficient distribution process • Personnel involvement • Cold chain compliance • Co-WIN portal usage	• Allocation challenges • Absence of VVM
EXTERNAL FACTORS	OPPORTUNITY	THREAT
	• Data analytics implementation • Private facility collaboration	• Vaccine related adverse reactions

TOWS Analysis of Vaccine Supply Chain

		INTERNAL FACTORS	
		Strengths	Weakness
TOWS MATRIX	EXTERNAL FACTORS	• Efficient distribution process • Personnel involvement • Cold chain compliance • Co-WIN portal usage	• Allocation challenges • Absence of VVM
		Maxi-Maxi (S - O) • Efficient distribution process can be leveraged to capitalize on the opportunity of implementing data analytics for better logistics. • Personnel involvement can support collaboration with private facilities for vaccine distribution. • Cold chain compliance ensures the safe transport of vaccines, enhancing the potential for collaboration with private facilities.	Mini-Maxi (W - O) • Allocation challenges can be addressed through the implementation of data analytics, optimizing vaccine distribution. • Collaboration with private facilities can help compensate for the absence of vial monitors, ensuring vaccine safety.
		Maxi-Mini (S - T) • Efficient distribution can help mitigate the threat of vaccine-related adverse reactions by ensuring vaccines are delivered safely. • Personnel involvement can help manage adverse reactions through efficient response and communication.	Mini-Mini (W - T) • Allocation challenges and the absence of vial monitors may exacerbate the threat of vaccine-related adverse reactions.
		Threat • Vaccine related adverse reactions	

CONCLUSION:

The study underscores the significance of an efficient vaccine supply chain in facilitating successful vaccination campaigns. The SWOT and TOWS analyses provide a comprehensive assessment of the current supply chain model. The findings highlight areas of improvement, potential risks, and strategic opportunities. By capitalizing on

strengths, addressing weaknesses, seizing opportunities, and mitigating threats, the vaccine supply chain can be further optimized, ensuring equitable distribution of vaccines across the population.

Limitations of the Study:

- i. The study's focus on a single tertiary care government hospital limits its generalizability to broader contexts.
- ii. Observational data may be subject to bias and limitations in capturing the entire supply chain dynamics.
- iii. The study did not delve into external factors that could impact the vaccine supply chain, such as socio-economic variables or policy influences.

Financial support and sponsorship: Nil.

Ethical Considerations: The study was conducted after taking approval from institutional ethics committee.

Conflict of Interest: None

REFERENCES

1. WHO director-general's opening remarks at the media briefing on COVID-19 - 11 march 2020. World Health Organization.
2. Covid-19 vaccine faqs. Ministry of Health and Family Welfare (MoHFW).
3. Operational guidelines 1 - Ministry of Health and Family Welfare
4. Dyson RG. Strategic development and SWOT analysis at the University of Warwick. *European Journal of Operational Research*. 2004;152(3):631–40. doi:10.1016/s0377-2217(03)00062-6
5. Wehrich H. The TOWS matrix—a tool for situational analysis. *Long Range Planning*. 1982;15(2):54–66. doi:10.1016/0024-6301(82)90120-0
6. Ravanavar G. M., Charantimath P. M. Strategic formulation using TOWS matrix-a case study, *International Journal of Research and Development*, 2012 Vol. 1, No 1.
7. UN DESA Policy Brief No. 153: India overtakes China as the world's most populous country | Department of Economic and Social Affairs. United Nations;
8. What is a cold chain? UNICEF Supply Division.
9. NHM, Immunization Handbook for Medical Officers, MOHFW; (2017)