



# Bridging the Gap in India's Glove Manufacturing Ecosystem: A Case Study on Nitrile Glove Production, Procurement Trends, and Policy Implications

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## ABSTRACT

This article examines India's nitrile glove manufacturing ecosystem and procurement trends to identify gaps in safety, policy and market structure. Using a 13-month procurement dataset from a hospital with five branches, the study reveals the continued dominance of latex gloves despite frequent complaints of skin rashes and allergies. The case study of Enliva India's leading nitrile glove manufacturer at Andhra Pradesh MedTech Zone (AMTZ) illustrates advances in sustainable production, adherence to international standards, and challenges posed by inverted customs duties and import competition. The findings emphasize the need for a policy shift toward nitrile gloves to ensure worker safety and strengthen domestic manufacturing. The paper recommends expanding hospital-level procurement analysis and implementing NPPA-led price capping to promote affordable, high-quality medical-grade gloves nationwide.

**Keywords:** Nitrile glove manufacturing, Medical glove procurement, India medical supply chain

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## INTRODUCTION

Gloves are one of the most essential components of personal protective equipment (PPE). It is used across a wide range of settings, including healthcare, laboratory work and manufacturing units, protecting users from biological agents, chemicals and other physical hazards. The 1990s saw the advent of Nitrile Gloves as a synthetic alternative to latex gloves, addressing a few major concerns revolving around traditional latex gloves, such as skin allergies and chemical resistance. With acrylonitrile and butadiene being its primary composition, it was able to offer excellent tensile strength, durability and resistance to a wide range of chemicals. Despite their advantages, the Indian Market still faces several gaps when it comes to quality, availability and awareness of Nitrile Gloves—issues which are examined in this paper. In addition to their medical applications, nitrile gloves have also become

a cornerstone in various industrial applications. Hence, it becomes all the more important to bridge the existing gap between demand and accessibility, particularly in emerging markets like India.

### Market Overview

The global Nitrile Gloves Market was valued at around USD 31.5 billion in 2024 and is anticipated to register a CAGR of over 8% to USD 67.8 billion between 2025 and 2034 [1]. This market expansion is driven by their high resistance to alkalis, acids, and chemical solvents as well as the rising adoption of personal protective equipment across industries, with healthcare, manufacturing and food handling being the most prominent ones. Additionally, the expanding chemical industry worldwide is contributing to this growth. Stricter health and safety regulations in pharmaceutical and medical

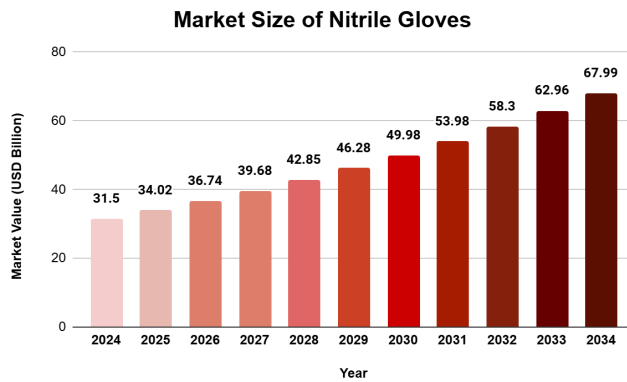


Figure 1: Market Size of Nitrile Gloves( KIHT Analysis)

handling in many countries are also supporting the industry's expansion.

Based on type, the powdered segment was worth over USD 7.17 billion in 2023 and is set to record an 8.4% growth rate through 2032. Cornstarch is added to powdered nitrile gloves to keep them from sticking together and to make it easier to wear them. These powdered gloves are highly preferred among medical professionals due to their effective, efficient, and easy application, which is expected to enhance product demand [2]. Based on grade, the industrial-grade gloves will exceed USD 11.9 billion by 2032. These gloves have become increasingly popular in manufacturing. They are known for their durability, comfort, flexibility, and resistance to harsh chemicals, making them versatile for various industrial uses. Moreover, growing concerns about employee safety are expected to further boost the sector's growth [2].

Based on texture, the micro-roughened segment was recorded to be over USD 16.7 billion in 2023. These gloves are popular in medical settings because their rough texture provides a better grip for holding medical tools during procedures. This has increased their use in healthcare institutions [2].

### International Standards for Manufacturing Gloves

In the manufacturing of gloves, particular adherence to international standards is crucial for ensuring product quality and safety. These standards help manufacturers minimize defects, enhance user protection, and comply with regulatory requirements. Some of the major standards for the production of nitrile gloves are:

#### ISO Standards

International Organization for Standardization. ISO regularly publishes standards, which are audited for compliance by sanctioning organizations called "Notified bodies". The relevant rubber medical glove standards are developed by the ISO Technical Committee TC 45, Sub Committee SC 4, for eg.

- **ISO 11193:2008** – Single-use medical examination gloves, Part 1: Specification for gloves made from rubber latex or rubber solution.
- **ISO 11193-2:2006** – Single-use medical examination gloves, Part 2: Specification for gloves made from poly(vinyl chloride).

- **ISO 10282:2002** – Single-use sterile rubber surgical gloves, Specification.
- **ISO 9001:2000** – Quality Management System of an organization.
- **ISO 13485:2003** – Quality management system for medical devices and related services.
- **ISO 21420:2020** – Protective gloves, General requirements and test methods

These standards cover specifications for compatibility, performance, and safety to ensure that the gloves are suitable for their intended use.

### EN Standards for Medical Nitrile Gloves

Within Europe, the EN 455 series serves as the basic standard for single-use medical gloves, including nitrile gloves. This series defines requirements related to freedom from holes, physical properties, and dimensions. Compliance with these standards ensures that nitrile gloves are safe for medical applications and protect against potential hazards [4].

### ASTM Standards for Nitrile Gloves

In addition to ISO and EN standards, the American Society for Testing and Materials (ASTM) provides several important standards for nitrile gloves. The ASTM D6319-10 standard, for example, specifically addresses the requirements for nitrile examination gloves used in medical applications. Additionally, ASTM D6978-05 (2019) is a standard practice for assessing the resistance of medical gloves to permeation by chemotherapy drugs, highlighting the need for specialized protective qualities in nitrile gloves used in specific medical settings [5].

### Regulatory Compliance and Standards in India: Strengthening Quality and Safety

The growing emphasis on health and safety in healthcare settings has significantly improved the consumer perspective on glove usage. Medical professionals in hospitals are increasingly prioritizing the protection of both patients and staff, driving demand for high-quality gloves. The procurement of surgical and examination gloves is now guided by stringent criteria to ensure their safety and efficacy, reflecting their critical role in infection control and occupational safety.

#### Bureau of Indian Standards (BIS) Initiatives

The Bureau of Indian Standards (BIS), through its Technical Committee for Medical Devices (MHD 12), has established a dedicated panel to address emerging challenges in glove manufacturing and usage. This panel is tasked with:

- Phasing out chlorinated gloves as per the Ministry of Environment, Forest and Climate Change (MoEFCC) Bio-Medical Waste (BMW) Rules.
- Restricting the use of powdered gloves, which pose risks of contamination and allergic reactions.

These efforts align with global trends toward safer, non-hazardous medical supplies.

#### CDSCO and Medical Device Rules (MDR) 2017

Under Chapter 2, Rule 7 of the Medical Device Rules (MDR) 2017, the Central Drugs Standard Control Organization

(CDSCO) mandates that medical devices conform to Indian Standards where available. For gloves, the IS 15354 standard governs quality, and over 50 BIS licenses are currently operational for surgical gloves. Recent enforcement actions have targeted:

- Substandard or reused chlorinated gloves entering the market.
- Unethical practices by importers and distributors.

Authorities have intensified inspections at ports of entry and conducted raids on entities violating regulations, ensuring compliance with safety norms.

### **IRGMA's Role in Advocacy and Quality Control**

The Indian Rubber Glove Manufacturers Association (IRGMA) has been instrumental in advocating for stricter quality controls. Their collaboration with the Department of Pharmaceuticals, Government of India, has led to the drafting of a Quality Control Order (QCO). This QCO aims to:

- Standardize glove production.
- Ensure only BIS-certified gloves reach the market.

IRGMA also monitors industry practices to identify and report violations, reinforcing India's commitment to becoming a global leader in safe medical device manufacturing.

### **Current Indian Manufacturers**

Several prominent manufacturers in India specialize in the production of nitrile gloves. Wadi Surgicals Pvt Ltd, Tegamen Safety Products Pvt Ltd, Koove Lot Pvt Ltd, India, claims to be the first company to manufacture nitrile examination gloves domestically and many players are coming to India. Navco Industries Private Limited Produces Latex Examination gloves. Notable player Wadi Surgical, specifically under the Enliva brand, which leads in technological adoption and production capabilities, operates India's fastest nitrile glove dipping line, significantly enhancing local production capacities.

### **International Manufacturers**

Apart from India, several key international players dominate the global nitrile gloves manufacturing industry. These companies are primarily based in Southeast Asia and other regions with strong manufacturing capabilities. Some of the major international players include Top Glove Corporation, Hartalega Holdings, Kossan Rubber Industries, and Supermax Corporation, all based in Malaysia, which dominates the global market. Ansell Limited from Australia and Medline Industries from the U.S. are also significant manufacturers with a strong global presence. Other notable companies include Semperit AG Holding from Austria, Sri Trang Agro-Industry from Thailand, and UG Healthcare Corporation from Singapore. These firms are leaders in producing and supplying nitrile gloves for medical and industrial use worldwide.

### **Andhra Pradesh Medtech Zone (AMTZ): The Medtech Capital of India**

Andhra Pradesh MedTech Zone (AMTZ), India's premier medical technology manufacturing hub, plays a crucial role in fostering innovation and excellence within the healthcare

sector. Enliva, a key manufacturing unit that produces nitrile gloves, benefits from AMTZ's state-of-the-art infrastructure and regulatory support, allowing it to lead in the production of high-quality nitrile gloves. The synergy between AMTZ's advanced ecosystem and Enliva's cutting-edge technology has enabled Enliva to scale up its production capabilities and meet both domestic and international demands for superior hand protection. With access to AMTZ's sterilization facilities and export support, Enliva continues to expand its market footprint, contributing significantly to India's healthcare manufacturing prowess.

### **Biomaterial Waste produced during the production of gloves**

The production of disposable gloves involves a variety of materials, each with their own set of properties, sustainability factors, and environmental considerations. This report provides a detailed examination of the different types of gloves, their biodegradability, and the biowaste generated during their manufacturing processes.

### **Nitrile Gloves**

Nitrile gloves are crafted from synthetic rubber known as nitrile butadiene rubber (NBR) and are widely utilized in industries such as healthcare, automotive, and scientific research. Renowned for their high durability, puncture resistance, and chemical protection, nitrile gloves are often the preferred choice for tasks requiring high levels of safety and protection.

#### *Degradability*

Standard nitrile gloves are non-biodegradable, taking between 100 to 200 years to decompose in landfill conditions, posing a considerable environmental challenge. However, advancements in technology have led to the development of biodegradable nitrile gloves that can decompose in a much shorter span, typically within 1 to 5 years, under appropriate conditions.

#### *Biowaste produced*

The manufacturing of nitrile gloves generates considerable biowaste, including:

#### *Wastewater*

Large quantities of water are used for mixing, compounding materials, cleaning, and cooling processes, resulting in substantial wastewater generation.

#### *Solid waste*

Defective gloves and production scraps contribute to solid waste, which is often incinerated or disposed of in landfills, adding to environmental concerns.

### **Latex Gloves**

Latex gloves are made from natural rubber latex sourced from rubber trees. They are highly flexible and comfortable, making them popular in various applications. However, latex gloves can cause allergic reactions in some individuals, limiting their use in certain environments.

**Degradability**

Latex gloves are inherently biodegradable due to their natural rubber content. However, additives used during manufacturing can slow down the degradation process, resulting in decomposition times that range from 5 years to over a century in landfill conditions.

**Biowaste produced**

The production of latex gloves generates:

**Wastewater**

This contains various chemicals and rubber particles, necessitating proper treatment before disposal.

**Solid waste**

Unusable latex and off-spec products result in waste that requires appropriate management to minimize environmental impact.

**Vinyl Gloves**

Vinyl gloves, made from polyvinyl chloride (PVC), are an affordable option for low-risk environments where minimal protection is needed. However, they are less durable and provide limited chemical resistance compared to nitrile and latex gloves.

**Degradability**

Vinyl gloves are non-biodegradable and can persist in the environment for hundreds of years. During degradation, they can release harmful chemicals such as dioxins and phthalates, which pose significant environmental hazards.

**Biowaste Produced**

The vinyl glove manufacturing process creates:

**Wastewater**

Contains hazardous chemicals that require careful treatment.

**Solid waste**

Includes defective gloves and scrap PVC, which must be managed to prevent environmental contamination.

**Procurement Analysis**

The COVID-19 pandemic exposed critical vulnerabilities in global medical supply chains, particularly for single-use disposable items. This case study, conducted by Kalam Institute of Health Technology on a 750-bedded hospital in Vijayawada, which has five branches, analyzes the procurement

data to quantify the market disruption for medical gloves and its impact on healthcare delivery costs.

**MATERIALS AND METHODS**

Procurement records from August 2019 to August 2020 were analysed for different segments of medical gloves. Comparative analysis of unit costs and maximum retail price was conducted across two distinct periods: pre-COVID (baseline) and during COVID (crisis period).

**RESULTS**

The procurement data for medical gloves over a 13-month period (August 2019 - August 2020) across 5 branches of a hospital group reveals interesting insights in terms of purchasing behaviour, material preference and usage trends within large healthcare institutions.

The total capacity of the hospital group can be calculated as 5 branches x 750 beds = 3750 beds.

The data reveal heavy reliance on examination gloves (Latex + Nitrile = 96% of the total volume), indicating their essential role in routine patient care and infection control protocols. This is a key observation as it highlights the continued predominance of latex gloves despite well-documented concerns related to latex-induced skin allergies and rashes among healthcare workers. This preference might be attributed to the fact that latex gloves are easily available in the market and procurement departments rely on existing vendor contracts and supply chains that primarily offer latex gloves. This pattern highlights the need for a gradual shift towards nitrile gloves, which are safer and better suited for long-term use, especially in clinical settings where prolonged glove use is common.

On an average 21 pairs of medical gloves are used per bed per day

The total additional cost of Rs. 22.45 lakhs represents a 168% overall cost increase for the same volume of gloves. This cost surge occurred over a 13-month period, creating severe budget pressure and operational challenges. In many instances, this additional cost represents resources diverted from other critical healthcare services. This cost will ultimately be transferred to the patients through higher treatment costs or absorbed through reduced operational margins.

**Enliva: India's Leading Nitrile Glove Manufacturing Facility at AMTZ, Adhering to International Standards**

In the ever-evolving landscape of health and safety, Enliva has emerged as a trailblazer in India's nitrile glove manufacturing industry. Established with a commitment to quality and innovation, Enliva's production facility stands as the fastest in India, setting a new benchmark in nitrile glove manufacturing. Their products, crafted with precision and adhering to the highest industry standards, have become synonymous with excellence, providing unmatched protection in sectors as diverse as healthcare, manufacturing, and food safety. Enliva's nitrile gloves stand out in the market for their durability, puncture resistance, and tactile sensitivity. Made

**Table 1:** Procurement volume by glove type

Glove type	Boxes procured	Percentage of total	Total pairs (in thousands)
Latex	395620	70.8%	19781
Nitrile	140800	25.2%	7040
Surgical	26070	4.7%	1304
Paper	7250	1.3%	362.5
Total	569740	100%	28,487



**Table 2:** Annual per-bed consumption

Glove type	Boxes procured	Total pairs	Annual pairs per bed	Monthly pairs per bed
Latex	395620	19781000	5275	440
Nitrile	140800	7040000	1877	156
Surgical	26070	1304000	348	29
Paper	7250	362.5000	97	8
Total	569740	28487000	7597	633

**Table 3:** Unit price comparison by glove type

Glove type	Pre-COVID unit price (INR)	During-COVID unit price (INR)	Price increase
Latex	1.70	5.98	252%
Nitrile	1.70	5.00	194%
Surgical	14.50-16.90	16.00-19.90	14-33%
Paper	0.75	3.76	401%

**Table 4:** Total procurement cost analysis

Glove type	Volume (Boxes)	Pre-COVID cost (INR)	During COVID-19 cost (INR)	Additional cost (INR)
Latex	3,95,620	6,72,554	23,65,808	16,93,254
Nitrile	1,40,800	2,39,360	7,04,000	4,64,640
Surgical	26,070	4,22,015	4,87,193	65,178
Paper	7,250	5,438	27,260	21,822
Total	5,69,740	13,39,367	35,84,261	22,44,894

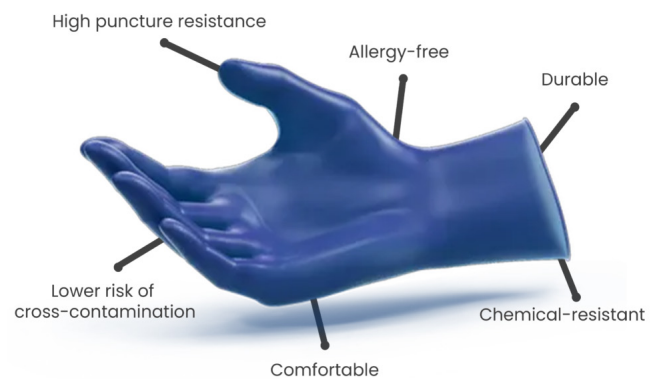
in India to the highest quality standards, these latex-free and powder-free gloves are suitable for a range of industries, from healthcare to food processing. The company's products are certified by ISO (International Organization for Standardization), CE (Conformité Européenne), ASTM (American Society for Testing and Materials), GMP (Good Manufacturing Practice), CDSCO (Central Drugs Standard Control Organization), and HACCP (Hazard Analysis and Critical Control Points), ensuring their reliability in any environment.

### Stringent Quality Control Measures

Quality control is one of Enliva's key pillars. To ensure the highest standards, they run trial batches of 10,000 gloves, selecting 80 samples for rigorous testing. These tests assess the gloves for physical properties like strength and elongation, as well as their visual appearance. Enliva's medical-grade gloves are chemotested, guaranteeing they meet all safety and regulatory standards. Their gloves also undergo GI sampling with an AQL (Acceptance Quality Limit) of 1.5 to ensure optimal barrier protection, while more critical aspects, such as contamination and mix products, are evaluated with a stringent AQL of 0.65.

### Product Range and Varieties

- Enliva Pro gloves offer enhanced durability and grip, making them ideal for industries requiring a higher level

**Figure 2:** Different qualities of Enliva Nitrile gloves resulting from stringent Quality control measures

of hand protection. These gloves exceed BIS standards and offer protection against chemicals, mechanical impacts, and contamination.

- QuickDraw gloves, designed for healthcare professionals, ensure swift and reliable protection with easy donning and maximum comfort, even during long shifts.
- Urban Shield gloves cater specifically to the food and beverage sector, offering superior resistance to oils, grease, and chemicals, while ensuring impeccable hygiene standards for food safety.

### Mission and Vision

Enliva's mission is clear; to dominate the nitrile glove market with revolutionary technology, exceptional quality, and an unwavering commitment to excellence. The company envisions becoming the industry leader by expanding its production capacity to achieve an ambitious target of producing 10 million nitrile gloves per day. This vision drives their innovation and continuous improvements in their manufacturing processes.

### Cutting-Edge Manufacturing Techniques

Operating around the clock in three shifts, Enliva's facility produces an impressive 1 million nitrile gloves every day. Their highly automated production line, which does not rely on a boiler system, is completely emission-free, aligning with their commitment to environmental sustainability.

At the heart of Enliva's success is their state-of-the-art manufacturing process, designed to ensure consistency, scalability, and the highest quality standards. The raw material used for their nitrile gloves is nitrile butadiene rubber, a synthetic material known for its superior durability, elasticity, and resistance to punctures.

Their production process begins with over 28,000 ceramic hand-shaped forms, which are thoroughly cleaned using acid and alkaline solutions to eliminate any remnants from previous batches. The ceramic forms are then dipped in a polymer solution at a level of 274 mm, allowed to dry, and subsequently immersed in a blue nitrile solution at 266 mm. This second dip creates the nitrile coating, which is then heated in an oven to accelerate chemical bonding, a process known as vulcanization. This crucial step provides the gloves with elasticity and strength, ensuring they are both durable and flexible.

After vulcanization, the gloves undergo a hot water leaching process to remove impurities, such as residues left from manufacturing. They are then automatically stripped from the ceramic forms by machines, ensuring efficiency and consistency. The entire manufacturing cycle, from start to finish, takes just 40 minutes to produce 28,000 gloves.

Once the gloves are produced, they are packaged into paper boxes and sent to the Sterila sterilization facility within the Andhra Pradesh Medtech Zone (AMTZ). Enliva has also introduced eco-friendly practices into their production, including water recycling in the leaching process and energy-efficient heating systems, reflecting their commitment to sustainability.

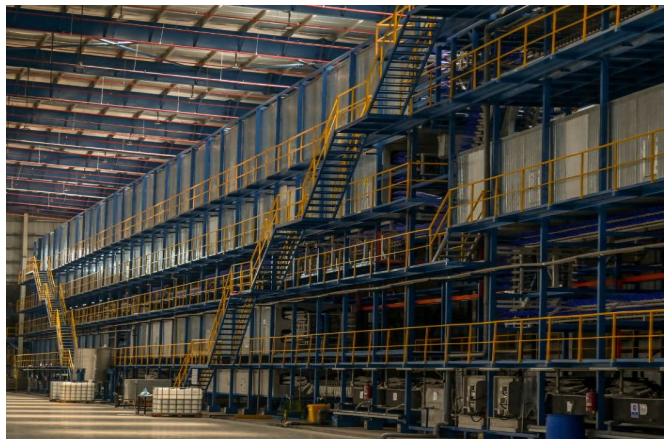
### Navigating Regulatory Barriers and Challenges

Like any industry leader, Enliva faces its share of challenges. Disruptions in the supply chain for raw materials sometimes force them to rely on Indian suppliers, whose products may not always meet the required standards. Inversion of customs duty also poses issues when it comes to producing the polymer used in the glove-making process, leading to imports from countries like Malaysia.

Further complicating matters is the Indian government's ban on the use of chlorine to treat medical gloves, citing



**Figure 3:** Glove Dipping and Vulcanization Process at Enliva Manufacturing Line



**Figure 4:** Enliva Nitrile gloves Manufacturing Line

health and safety concerns for workers. This ban, however, does not extend to the import of chlorine-treated gloves from countries such as Malaysia, Singapore, and South Korea. These gloves, produced in fully automated facilities with advanced vision-camera testing that delivers 80-85% accuracy, are then imported to India, manually sorted, and labeled as medical grade. This has created an uneven playing field for Indian manufacturers like Enliva, whose use of polymers in place of chlorine is often misunderstood by consumers. The faint white spots that sometimes appear on polymer-treated gloves are mistaken for defects, whereas chlorine-treated gloves do not exhibit such spots.

Additionally, the cost of raw materials and gas required for manufacturing has skyrocketed in recent years, straining profit margins. Enliva also contends with the challenge of high-slush water, which requires additional treatment before it can be used in the production process, consuming extra time and resources. Despite these challenges, Enliva has been able to maintain its competitive edge in the global market. With support from the leadership at AMTZ, the company recently began exporting nitrile gloves to several European countries, thanks to its CE certification. This marks a significant step in Enliva's goal of becoming a global leader in glove production. Domestically,



**Figure 4:** Research and development lab at Enliva

Apollo Hospitals is their biggest client, though Enliva also caters to specialized industries with custom glove orders.

### **Inverted Customs Duty: A major barrier in domestic production**

The inverted customs duty structure significantly impacts the domestic production of nitrile gloves in India, creating challenges for manufacturers like Enliva. Inverted customs duty refers to a situation where the import tariff on raw materials is higher than that on finished products. This scenario discourages domestic manufacturing because it makes importing finished goods more attractive than producing them locally. For instance, if manufacturers have to pay 70% duty on importing natural latex or the polymer, finished products attract a mere 0 to 10% duty. This leads to an influx of imports, driving domestic producers out of the market [9]. Enliva offers high-quality powder-free nitrile gloves, positioning itself as a reliable option for healthcare professionals. However, reduced import duties on similar finished products lead to an oversupply of imports, which harms local producers' market share and profitability.

Enliva's case is emblematic of the broader challenges faced by local manufacturers in India. Despite their focus on quality and compliance with stringent safety standards, the company struggles to maintain profitability in a market flooded with imported gloves, which are often available at lower prices due to the favorable duty structure for finished products. Higher production costs attributed to elevated tariffs on raw materials are making it increasingly difficult for Enliva to offer competitive pricing [9].

To rectify these challenges, a revision of the customs duty structure is essential. Lowering import duties on raw materials while increasing those on finished products could help create a more level playing field for domestic manufacturers. Encouraging local production of nitrile gloves not only supports manufacturers like Enliva but also aligns with the government's "Atma Nirbhar Bharat" initiative aimed at boosting self-reliance in various sectors, including healthcare. A collaborative approach between the government and industry stakeholders could pave the way for sustainable growth and improved market positioning for local manufacturers.

### **Fluctuating Costs and Market Dynamics**

The cost of manufacturing nitrile gloves has seen dramatic fluctuations. Currently, the cost of manufacturing is approximately \$13 USD for 1,000 gloves. Before the COVID-19 pandemic, these gloves sold for around \$22 to \$25 USD per 1,000 pieces. However, during the pandemic, demand surged, causing the market price to skyrocket to \$40 USD per 1,000 gloves, peaking at \$82 to \$85 USD at the height of the global health crisis. As demand has stabilized, the current market price hovers between \$16 and \$20 USD per 1,000 gloves.

### **Innovation in Product Development**

Enliva is continuously pushing the boundaries of innovation. Their R&D team is working on developing a new type of biodegradable glove infused with charcoal, which could be a breakthrough in the industry. These gloves would not only offer the same protection and durability as traditional nitrile gloves but also address environmental concerns by being more eco-friendly.

They also produce different grades of gloves, from medical to industrial use. In particular, their industrial-grade gloves offer superior grip and are designed to withstand harsh working conditions. Their special polymer-treated gloves, as opposed to chlorine-treated ones, are gaining popularity in the medical sector due to their safety features and better tactile sensitivity.

### **Prioritizing Worker Safety**

At Enliva, the safety of their workforce is a top priority. Every worker is thoroughly trained in the use of machinery before being inducted into the production line. Standard operating procedures (SOPs) are in place for each process, ensuring both safety and quality. Since not all workers come from a scientific or technological background, Enliva employs a system of audio-visual cues and color coding to make the processes easier to understand.

Automated alarms are installed throughout the facility to warn workers in case of emergencies, and the company's engineering team conducts regular planned maintenance to minimize the chances of machine breakdowns. Moreover, Enliva's leadership has introduced GAP systems to prevent accidents related to the ceramic hand chains used in the production process.

Rather than pushing for maximum output at the risk of endangering workers, Enliva has made it clear that safety comes first. This commitment to worker well-being is also reflected in their emphasis on training and maintaining a supportive work environment.

### **A Vision for Sustainability: A Way Forward**

Looking ahead, Enliva is committed to achieving zero-waste manufacturing by implementing a comprehensive roadmap to recycle both waste materials and wastewater generated during production. As a zero-emission manufacturing unit, Enliva stands out for its eco-friendly approach, eliminating the need for a boiler system in glove production. They are also working on developing a special kind of nitrile glove infused with



charcoal, designed to be biodegradable, further reinforcing their dedication to sustainability.

In the near future, Enliva plans to expand by adding more dipping lines, with a vision to produce up to 10 million nitrile gloves per day. With AMTZ working to enhance power supply consistency and establish a more effective drainage system, Enliva is set to significantly boost its production capacity in the coming years. These advancements will solidify Enliva's position as a leading force in the nitrile glove manufacturing industry. Enliva's combination of technological innovation, rigorous quality control, and a strong commitment to worker safety and environmental sustainability make it the brand of choice for reliable, eco-friendly hand protection in industries across the globe.

### **Future Scope of Work**

While this study provides valuable insights into the procurement and manufacturing dynamics of medical gloves in India, there remains significant scope for expanded analysis and policy intervention. Future research should aim to include a larger and more diverse hospital sample covering public, private, and trust-based institutions across multiple regions to develop a more representative understanding of glove consumption patterns, procurement costs, and material preferences.

From a policy perspective, further work should focus on evaluating the feasibility of implementing a price-capping mechanism for medical-grade gloves through the National Pharmaceutical Pricing Authority (NPPA). Such regulation would help stabilize market prices, ensure equitable access, and support the transition from latex to nitrile gloves without imposing financial strain on healthcare institutions.

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