

**Research & Writing**  
**Supply Chain Management**

**PPE Kit Supply Chain Challenges during (COVID 19)  
pandemic in the United Kingdom**

Research Proposal  
By



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Dissertation  
Help Services

# PPE Kit Supply Chain Challenges during (COVID 19) pandemic in the United Kingdom

24<sup>th</sup> July 2021

## OVERVIEW

This document provides us with an insight of how the supply chain of PPE kits is affected by the COVID and how it is managed out. This includes the financing done by government, NHS trusts responsibilities, army support and other organizations support and help. PPE has become an essential part since the pandemic as it has helped in protecting the lives of many front line health workers as it minimizes the risk of interacting with the deadly virus. Since the pandemic, the supply chain has been affected all across the world. Here we will be discussing about the steps government have taken to ensure a steady supply chain across UK.

## GOALS

1. Understanding the supply chain across UK
2. Learning about the way the production, packing and supply of PPE kits
3. Getting to know the organizations involved in the supply chain of PPE
4. Produce National Level PPE kits that fulfills the required standard by UK health department
5. Understanding the international chain supply of PPE kit products

## SPECIFICATIONS

This document provides clear guidance on the supply chain management done in UK. The production of PPE kits by contracting new manufacturers in UK for a national supply and also contacting with international suppliers to maintain a steady flow of PPE kits to all the health and social care centers. The role of NHS is also discussed how NHS trusts have made the supply of all the public and health departments across the UK an achievement. National Supply Disruption Response (NSDR) role in the production, packing and distribution of PPE kits is discussed and how it was able to provide their services during the pandemic.

## CHALLENGES

Although the government have made every possible arrangement for the production, distribution and supply of PPE kits. A billion PPE items are not enough as PPE items are mostly for single use only. This was a big factor for the shortage of PPE supply. The government tried to make national level PPE kits to ensure a stockpile in the country in case of another pandemic but not all the PPE products made up to the standard of health care department.

## MILESTONES

### From April to May, the government

- An approximate of 22 million items were delivered to health care departments
- 8 million aprons, 4 million masks and 20 million pairs of gloves was distributed to social care departments
- For the fast delivery online website was made to ease the questioning of requirements
- National Supply Disruption Response was set up to take up orders from the requestors and provide them with the stock in case of an urgent need
- The government released a budget of £1.6 billion to cover up the expenses in making and distributing the PPE items to all the local authorities
- Existing SCCL-supplied suppliers delivered 738 million items of PPE while new suppliers delivered 235M items within two months



## ABSTRACT

The world has completely changed since the Coronavirus, also known as COVID-19, start to spread and soon became a global threat. The COVID-19 is a highly infectious virus that have caused millions of deaths around the globe in a short period of 1 year. The COVID-19 affects the person internally and attacks its respiratory system to cause breathing problems alongside vomiting, nausea, fluctuating heart rate, loss of smell and taste and many other effects. Approximately, around 5.7M people have died in United Kingdom due to this deadly virus. Recently, the scientists have discovered vaccines to control its spread and this have resulted in a great decrement in its spread rate. Its rate can also be decreased by taking precautions like wearing masks, using sanitizers and interacting with less people. Especially, the lives of our doctors, nurses and those who are playing the main frontline role are in danger. However, with such a rate in the COVID-19 cases, there is an international issue regarding the shortage in the supply chain of personal and protection kits, also known as PPE kits.

PPE kits are specially designed for reducing the rate of coronavirus spread. It was specially designed for front line health workers who are risking their lives and treating the COVID-19 patients. These PPE kits are sensitive to heat and cannot be reprocessed. Although the disinfection techniques in hospitals and emergency wards are very efficient but these PPE kits still cannot successfully reprocess because of the nature of these kit materials. So, we have to prepare ourselves for maintaining a supply chain of PPE kits and take steps to overcome the shortage.

The solution may vary in different ways. Starting from having a powerful disinfectant may help in the reprocessing of PPE and make it to be used again and modified production of PPE kits to overcome the shortage. The reprocessing of PPE should be done in such a way that it would reconsider the fabric and should be easy to sanitize.

# CHAPTER 1

## INTRODUCTION

COVID-19 has a great impact on the global demand and supply of PPE kits. PPE has become an essential part since the pandemic as it has helped in protecting the lives of many front line health workers as it minimizes the risk of interacting with the deadly virus.

### 1.1 COVID-19 and its symptoms

Coronavirus is a life threatening virus which has been spread across the globe in a very short period and have taken the lives of millions of people. According to the WHO report, coronavirus is a large group of virus that affects the human body in such a way that it causes illnesses such as flu and low to severe respiratory system failures. (government, 2020)

Coronavirus are made up of a wrapped single stranded RNA genome. Their genome sizes extend between 26 and 32 kilobases in length (Rothan & Byraredy, 2020). It first case was identified in Wuhan, China. And soon due to its fast spreading characteristics it was declared a global disaster taking the lives of millions of people. Many people who are infected with the coronavirus suffer from slight flu and respiratory issues but the aged or the one with medical issues like diabetic, cancer and heart patients require more care and can more easily get infected by corona virus.

This virus usually spreads when another person comes in contact with the infected. It can be due to the droplets coming out from the infected person while sneezing or coughing or yawning. There can be multiple reasons hence the precautions are necessary and the people should use the PPE kits or equipment in order to protect themselves from COVID.

The most efficient way to protect ourselves from the virus is to use the PPE equipment as it stops the virus from interacting with our skin or clothes. Due to the shortage of PPE kits around the globe the most efficient way is to interact with the least minimum amount of people and to use face masks and sanitizers whenever leaving our houses.



## **1.2 COVID-19 and its present situation in today's world**

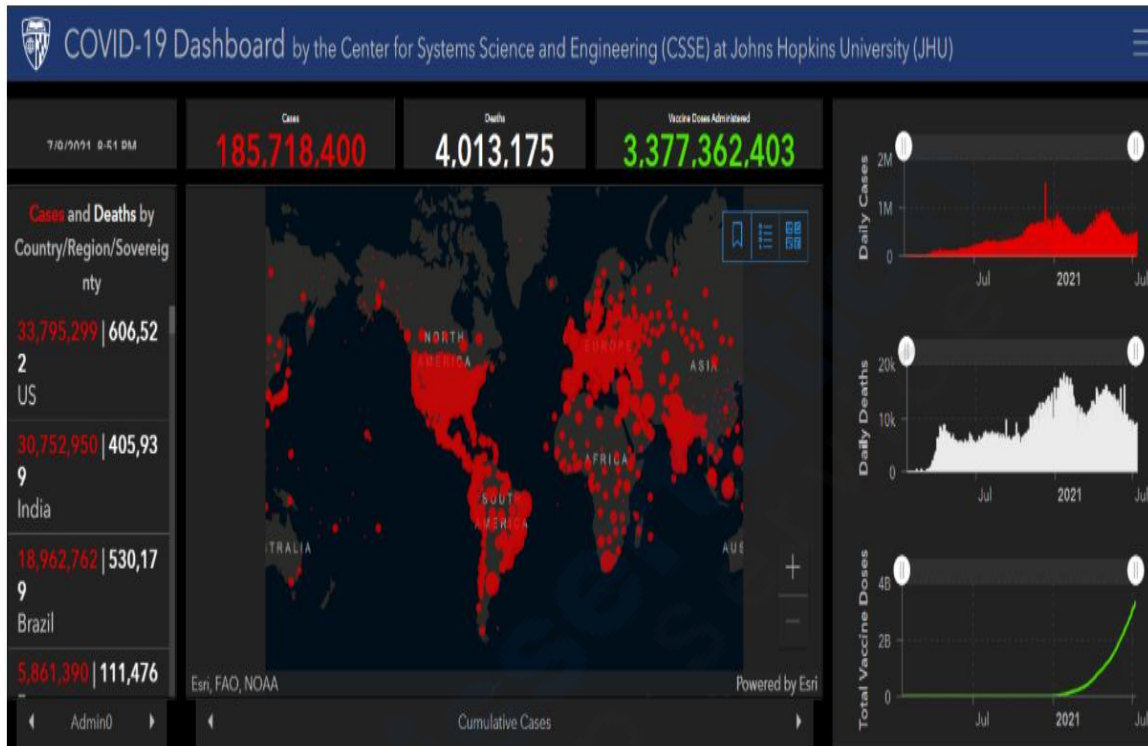
Recently, we have noticed a similar trend in the coronavirus cases as it was when it first started. India have again risen in the top 3 of the list as the most affected country alongside with the US and Brazil. Although, the companies have started to keep their workers at home and managing online work, the economy has faced a downfall globally.

The conditions have improved but not so good as it could have been. One reason can be that the focus has been taken off the original virus. It has, however, left behind many new variant viruses. The most dangerous variant is known as Delta variant and is spreading rapidly across Asia currently. (Alderman, 6 february, 2020)

The introduction of vaccines has helped a lot in controlling the spread of coronavirus. But due to the increase demand of vaccines around the globe, the supply has not been accomplished. It may seem like many people will not be



able to have access to the vaccines till the 2022. This pandemic has shown us the weakness in the management of our supply chain and this has mainly effected the third world countries.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 CORONAVIRUS AND PPE SUPPLY CHAIN (GUIDANCE)

During the pandemic, the government and the public departments have to face a lot of difficulty in providing the people with the necessary equipment to protect themselves from this virus. Especially, the protection equipment kit which include the masks, gloves, glasses, uniform and all the things required. These equipments are essential for those frontline health workers who are risking their lives to protect those who are infected. The pandemic has created a great imbalance in the supply and demand of these kits. At the start of march 2020, there was a sudden rise in the demand of PPE and eventually the supply decreased. This resulted in the increase of price rate and the settled high society people were ready to buy large amount of these kits just to protect themselves and those which were actually in need of those were left empty handed.

By the end of july 2020, the government of United Kingdom had given away goods of over 8000 contracts to the people affected by the pandemic, which valued about £18 billion. An approximate of 7000 from these were PPE kits which valued over £12 billion. This value was used to stock up the PPE kits for a period of 4 to 5-month time and to fulfill the demand even in case of an emergency. The government had made schemes to identify new manufactures who can make PPE kits and also maintain a steady supply chain. (hennebry, 2020)

##### 2.1.1 NHS role in the supply of PPE

The National Health Service (NHS) is a fully funded government organization in United Kingdom which offer medical and health services to its people without taking full fee for its service. With the global pandemic the demand for PPE was increased. In this time, the NHS trust foundation came forward and brought forward a lot of PPE from their supply chain.

COVID-19 had a great effect on the demand and supply of PPE in the year 2020. The PPE kit was not so much in demand before the pandemic as it was just used in operation theater or in hospitals and clinics. But since the pandemic, there was a sudden rise globally in the demand of PPE. This even lead to high rates and even these kits were sold at a black market rate. One reason was also that the export on PPE was banned by many countries including China which was the biggest manufacturer of PPE. This lead to high prices in the PPE even by new manufacturer companies which lead to changes in the standard quality of these kits.

### **2.1.2 Government scheme for Supply chain**

COVID-19 has a great impact on the global demand and supply of PPE kits. PPE has become an essential part since the pandemic as it has helped in protecting the lives of many front line health workers as it minimizes the risk of interacting with the deadly virus. The safety of all the health care or social care workers is the first priority of the government. The emergency department was made to ensure that all the PPE items were given to the organizations where they were needed and in the amount of quantity that is required.

### **2.1.3 PPE and health care departments guidance by United Kingdom government**

The government have made some criteria to supply the PPE kits to all those who are actually in need of them to maintain a stable flow of supply and demand. The government and the administrations are fully committed to supply the PPE to the frontline health workers who are in a critical need of these kits to work in a safer environment.

The doctors or nurses are most vulnerable as they in close contact with the infected people or those with symptoms. They are in direct contact with the patients and they are responsible for taking care of the patients and fulfilling their requirements. They do this at the risk of their lives. So, the government have taken specific measures to provide them with these kits and securing their lives.

Clear instructions are given out to those people who use PPE. The instructions contain the directions as how to use the PPE kits and when to use these PPE. The guidance was given out and the guidance were updated from time to time as per the research on COVID-19. The guidance provided was to ensure that the people know the correct way to use these items and they are being used in the right way.



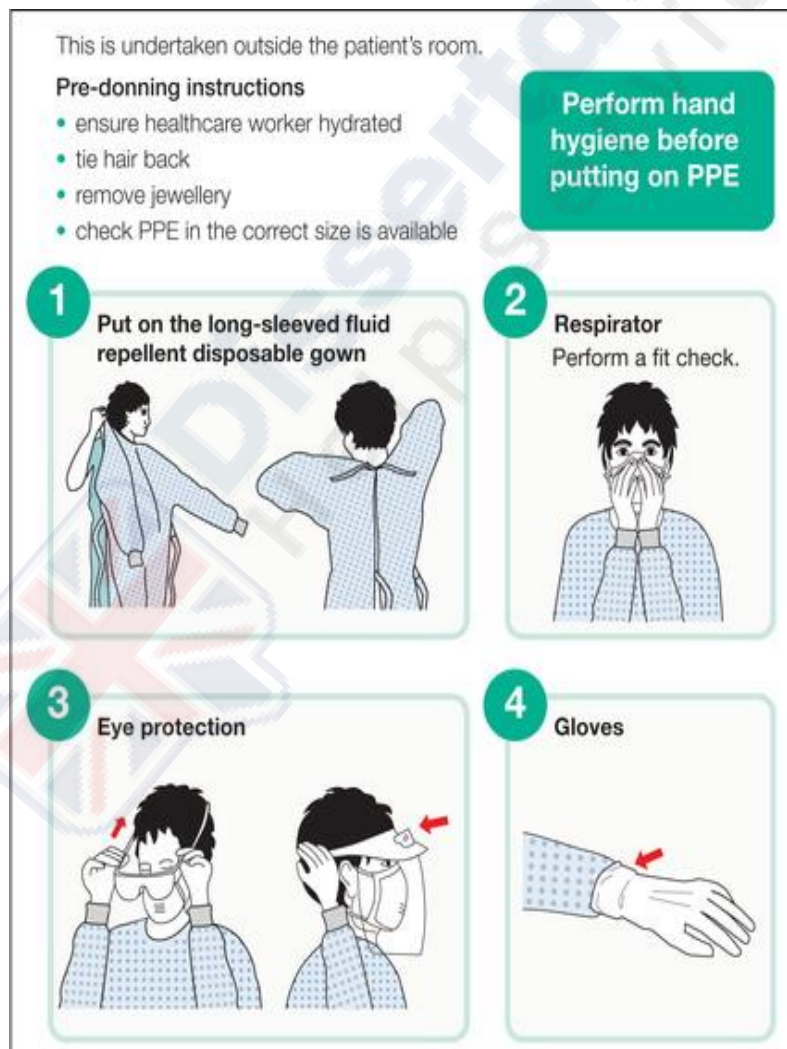
In this pandemic, the social care sector department have played an important role in taking care of the COVID patients and also those which have recovered or recovering and have to be transferred to other wards. Thus, the safety of these workers have to be considered and these workers have to be provided with PPE kits.

The government of United Kingdom have announced clear instructions on providing all the health workers with PPE kits. This was approved by all the four public health bodies in the United Kingdom and hence instructions were given out to NHS to implement these orders.

The guidance regarding the guidance of PPE supply in United Kingdom have been discussed. The NHS have been equally active and with the

increasing rate of coronavirus cases in United Kingdom, the supply of these PPE kits have to be ensured. The United Kingdom PPE guidance planning have ensured that the health workers in hospitals, clinics or social health care workers will be the provided with the maximum amount of facilities as possible.

As per the government, they are working very closely with the health care workers to ensure their security and avoiding the risks of getting infected as much as possible. The government aims to save these workers from any sort of interaction with COVID and do this at the rate of minimizing the waste and using the resources in the right way to avoid wastage. The government also aims at providing training to these workers regarding these kits.





The social care workers are also playing an important role to the people who can be affected by this virus. Their own lives are at risk and for this the government of United Kingdom have stepped in and are providing proper guidance to these people and ensuring that they know what to use and for how long. For any person who is encountered with several patients in the same household, they have to take care of wearing masks, gloves, protection glasses and plastic apron to protect from catching the virus. If the worker has to take care of a single person who is to be surely suffering from COVID in such a case the worker has to fulfill the safety requirements by wearing additional PPE kits. For those taking care of special COVID patients units like those mentally ill, prisoners, with learning disabilities or such units, wearing protection gloves, glasses and plastic apron alongside with face mask is compulsory.

Wearing a PPE is as difficult as taking it off. The workers wearing it have to be very careful to avoid any sort of contact with the contaminated PPE and also proper disposal technique has to be followed. All these training will be provided by the government of United Kingdom.



### **2.1.4 PPE and non- health care departments guidance by United Kingdom government**

COVID-19 has made a lot of change in the way we live our lives. It has made us more careful of our surrounding. The people outside the health care departments are also concerned about their safety and are curious about the use of PPE kits. In this regard, the government have given out instructions regarding the use of the necessary PPE. The government have given out instructions to ensure that the people who are actually in real risk are given the PPE.

The government believe that the people outside health care departments are in a less need of complete PPE kits than those frontline health officers. This decision also varies as per the involvement of the non-health workers in providing their services to the people and the health department. The people like those who are responsible for management of the deceased and prisoners and those whose are available at the first call are must to have PPE and the government have given guidance to all these people and have managed to provide them with PPE.



Although PPE kits are beneficial but it has proven in less control on the widespread of the virus. The main key to reduce the widespread of these virus is to practice social distancing and use sanitizers again and again to kill off the germs and to wear masks. These are the key points to control the widespread of coronavirus.

## What shall I do to prevent catching and spreading the virus?



Wash hands frequently with soap and water or use hand sanitiser gel



Catch coughs and sneezes with disposable tissues



Throw away used tissues (then wash Your hands)



If you don't have a tissue use your sleeve



Avoid touching your eyes, nose and mouth with unwashed hands



Avoid close contact with people who are unwell



The WHO have taken consideration and have noticed that the use of face masks is a positive step in securing ourselves. But the use of face masks may trigger alarm as people have started to neglect other factors and this is the direct result of the widespread of COVID-19. The government have asked people to follow other practices as well rather than only relying on the use of facemasks to overcome this deadly virus. (R, 2020)

COVID-19 had a great effect on the demand and supply of PPE in the year 2020. The PPE kit was not so much in demand before the pandemic as it was just used in operation theater or in hospitals and clinics. But since the pandemic, there was a sudden rise globally in the demand of PPE.

The employers should ensure that the employees are the secure and they are protected from the COVID. The managers and owners should ensure the safety of their employees by managing the work in such a way that the employees are in least amount of contact with each other and they are practicing social distancing by working from their homes. If this is not possible, the schedule of the employees should be done in such a way that minimum employees are present in the office at a time by making schedules. The staff members should be instructed to carry out proper practices and should avoid social practices as much as possible. If an employee is seen with symptoms like coughing and sneezing, the employee should be instructed to stay at home. Even those employees who have infected members in their houses should be told to stay at their homes. This step could improve the conditions in offices and employees will be able to remain safe as well. The employees should be given short breaks to allow them to wash their hands at regular intervals.

## 2.2 CORONAVIRUS AND PPE SUPPLY CHAIN (DELIVERY)

The United Kingdom government have been well prepared with a reserved large stock of PPE and necessary medicines which was reserved for an emergency outbreak of influenza or such diseases. The government had stocked up such a large amount of medicines and PPE in case of a deadly virus breakout and if approximately 50% of the population gets affected. The government of United Kingdom have collected about 50,000 bundles of

medicines and other soft goods including PPE that can be helpful in responding to an emergency breakout in the future.

### **2.2.1 PPE Items delivered**

The government of United Kingdom have established great schemes to provide PPE to the frontline workers and these stocks have been supplied to those workers. The government have supplied approximately 748 million PPE kits to the frontline workers. These kits include approximately 132 million masks, 1.2 million gowns, 470 million pairs of gloves and 145million aprons.

The government have made some criteria to supply the PPE kits to all those who are actually in need of them to maintain a stable flow of supply and demand. The government and the administrations are fully committed to supply the PPE to the frontline health workers who are in a critical need of these kits to work in a safer environment.

This virus usually spreads when another person comes in contact with the infected. It can be due to the droplets coming out from the infected person while sneezing or coughing or yawning. There can be multiple reasons hence the precautions are necessary and the people should use the PPE kits or equipment in order to protect themselves from COVID.

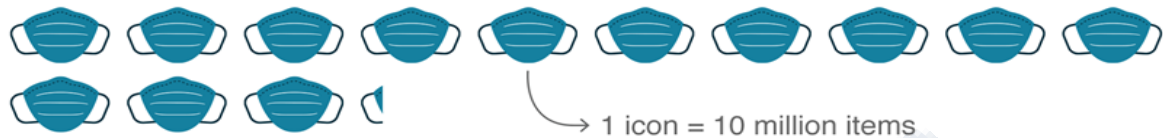
The most efficient way to protect ourselves from the virus is to use the PPE equipment as it stops the virus from interacting with our skin or clothes. Due to the shortage of PPE kits around the globe the most efficient way is to interact with the least minimum amount of people and to use face masks and sanitizers whenever leaving our houses.

## Government PPE supply

February 25th to April 18th

Masks

132 million



Aprons

145 million



Gowns

1.2 million



Gloves

470 million



**Total**

**748 million items**

On a 53 day period

14 millions items per day

As we can see that approximately half of the demand is of gloves and the rest items are in lower demand as compared to that. Even though no national figures have been issued but different organizations are working separately to

have an approximate idea of the daily used items and this somehow gives us an idea of the left items and their shortage.

Due to COVID, the demand in these supplies have increased spontaneously and the system was designed to supply about 226 NHS trust is now reduced. The shortage supplies of these kits have to be upgraded and the production rate have to be increased to fulfill the demand of 58,000 healthcare centers.

The government of United Kingdom have taken quick action to help in the supply chain of these kits by bringing in the help of armed forces. These armed forces have helped in easing the supply chain of NHS and delivering these equipments to the people in need in the fastest time possible.

COVID-19 had a great effect on the demand and supply of PPE in the year 2020. The PPE kit was not so much in demand before the pandemic as it was just used in operation theater or in hospitals and clinics. But since the pandemic, there was a sudden rise globally in the demand of PPE.

Although the supply has not been possible to fulfill the demand requirement completely but with the help of the armed forces the supply chain have improved a lot and PPE kits are delivered as quickly as possible where they are needed.



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## CHAPTER 3

### RESEARCH DESIGN

#### 3.1 PPE DISTRIBUTION ACROSS UNITED KINGDOM

The government of United Kingdom have announced clear instructions on providing all the health workers with PPE kits. This was approved by all the four public health bodies in the United Kingdom and hence instructions were given out to NHS to implement these orders.

The guidance regarding the guidance of PPE supply in United Kingdom have been discussed. The NHS have been equally active and with the increasing rate of coronavirus cases in United Kingdom, the supply of these PPE kits have to be ensured. The United Kingdom PPE guidance planning have ensured that the health workers in hospitals, clinics or social health care workers will be the provided with the maximum amount of facilities as possible.

##### 3.1.1 Supplying NHS with PPE kits

NHS services are working tirelessly with the armed forces regularly to fulfill the supply demand all over United Kingdom. The hospitals, clinics and all the health care services are made aware of the supplies to be delivered so that they are fully prepared to use them and they can take most of their services. The government have started a service which will supply the PPE to all the locations according to the number of COVID patients available there. The government wishes to use a systemic system once this situation stabilizes.





### 3.1.2 Supplying PPE kits to health care professionals

The government of United Kingdom have taken special steps to provide PPE to these health officers. These kits were delivered all over Europe to surgical centers, pharmacies, dentists and emergency wards. The government have also released the remaining PPE to wholesalers so that they can be sold to these providers. A total of approximately 22 million items have made available to these health officers in this way.



### 3.1.3 Supplying PPE kits to social care professionals

The government have paid special attention to those who are working as social workers and they are provided with PPE. This sector has a sudden rise in the demand of PPE as they are most exposed to COVID patients and socially active in society.

The government have recently delivered about 7 million PPE items to these workers. An approximate of 300 masks were given to every social worker. A few months later 8 million aprons, 4 million masks and 20 million pairs of gloves was distributed to these workers.



The United Kingdom government understands that these workers are working differently as compared to frontline health officers but, that they still require these PPE kits to protect themselves. So, to solve this matter the government gave away 23 million items of PPE to whole sale suppliers so that they can be sold to these workers and their services won't be affected. The government have contacted with Careshop, Blueleaf, Delivernet, Countrywide Healthcare, Nexon Group, Wightman and Parrish and Gompels to supply these items to these workers so that they can be protected again this virus.



The government have also worked tirelessly with DHSC, NHSE&I, NHS Supply Chain, Clipper logistics and the Armed Forces to set up a scheme known as Parallel Supply Chain (PSC) to support the supply chain system. The PSC is established to ensure the supply of the PPE items and this will help to maintain an undisturbed supply chain of the country.



#### **3.1.4 The National Supply Disruption Response (NSDR)**

The government have started a new scheme named National supply disruption scheme to be prepared to react to an urgent PPE demand. The NSDR has three main parts to fulfill the demand in case of an emergency PPE requirement. The functions are described below.

1. These organizations are available 24/7 to fulfill the demand of those in need of an emergency stock of PPE kits. The call operators gave the information about the requestors. The details may include the reason of demanding PPE kits, whether there are any COVID patients treated in those centers and whether the requestor demand is legit and not just to stock up a set of PPE. These details are then entered in the system and these are then forwarded to the management department.

2. The management community then takes on this list of requestors. The management staff has become large since the last evaluation and more than 100 people are in this department. The management team is then responsible for overlooking the demands and assembling the required PPE. the management is also responsible for checking all the latest deliveries to the organization, the confirmation of the amount of PPE items required and when they can be available to have the items delivered.
3. Finally, in the last part the courier team is contacted to pack, receive and deliver the package to the organization. The NSDR will make sure to deliver those items which are urgently required. Once the process is completed and the order is delivered the case is closed.

The NSDR is a great achievement to fulfill any urgent demand. Over 90% calls done to the NSDR was answered within a minute.



### **3.1.5 Supplying PPE kits to Local Resilience Forums**

These organizations are a group of different local servicing organizations that work together to fulfill the demand of the PPE kits in all the local departments and clinics. These organizations are responsible for providing PPE to those centers where the workers are most vulnerable to COVID patients. The stock given to these organizations are limited so they determine the number of people in that area that are most vulnerable to the virus and distribute that amount of PPE kits to the staff.

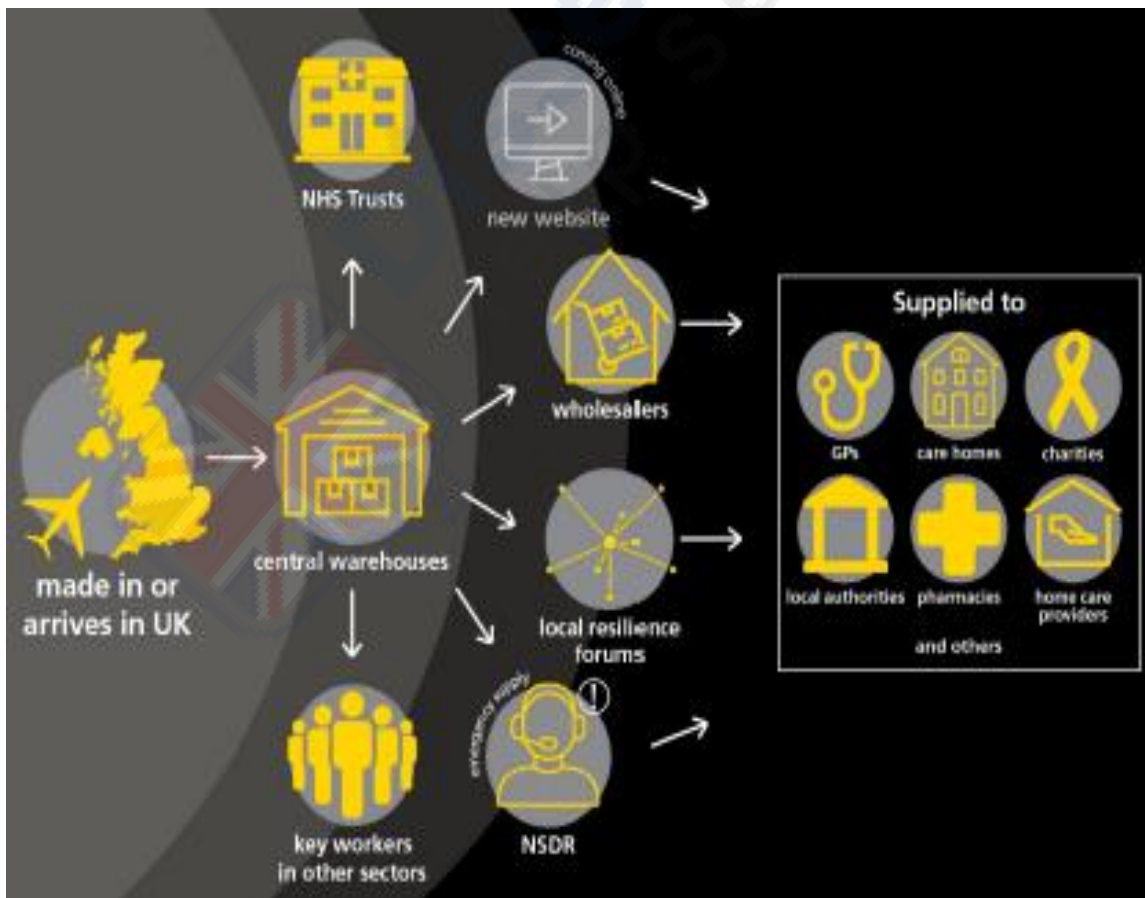
### **3.1.6 Ordering PPE through websites**

The pandemic has strengthened our supply qualities and have improved our ability to keep a check the PPE needs in the United Kingdom. To ease the long process of obtaining knowledge over phone calls and fulfilling the long list of requirements, the government have made online website which will ease the process of verification and both parties can be easily satisfied. The requestors will fill the form online, the orders will be managed via the public health organization of United Kingdom, this will then be processed by the NHS trust and will be picked up and delivered to the doorstep of the requestors by the royal mail. This is a very positive step in the supply management of PPE kits as it will not only fulfill the requirements of local health workers but will also be helpful in providing PPE items to frontline workers.



### 3.1.7 PPE through a UNITED KINGDOM-wide approach

The COVID-19 is a challenge for everyone across the globe. The government of United Kingdom have tried their best to work side by side with the devolved nations to overcome the issue. Each of the devolved nations (Northern Ireland, Wales, United Kingdom and Scotland) have worked together to ensure the supplies are meeting the demand in all the four nations. All the devolved nations are working closely to fulfill the demand of PPE all across the United Kingdom. However, the devolved nations are trying to fulfill the demands of their own PPE needs by themselves. COVID-19 had a great effect on the demand and supply of PPE in the year 2020. The PPE kit was not so much in demand before the pandemic as it was just used in operation theater or in hospitals and clinics. But since the pandemic, there was a sudden rise globally in the demand of PPE. The government of United Kingdom has worked hard and have tried to fulfill the need of overseas countries and have provided them with a good stock. (WHO, 3-3-2020)





### **3.1.8 PPE supply to remaining sectors**

The United Kingdom government have focused on all the sectors in health and care department. It has clearly ensured that the frontline workers are supplied with the PPE items and those with small health care centers are also provided with protection equipment. Now, those remaining workers or home members or of the devolved nations which require PPE items are also taken under notice. For this, the government of United Kingdom have set up a cross government PPE board which focuses on the demand of these organizations and so that the supply is given away as soon as possible to those in need. (WHO, 24 march, 2020)

### **3.1.9 PPE supply funding**

The government of United Kingdom have made proper arrangements for the supply of PPE across the country. All the sourcing and payment have been done through the department of health and social care. This department is responsible to keep a check-in of all the PPE supplies entering and leaving the country. The funding is managed by the health department to make sure that the PPE supply isn't stopping and it is delivered to those in need in proper time.

The government had released a budget of £1.6 billion to cover up the expenses in making and distributing the PPE items to all the local authorities. This budget focuses on providing the PPE especially to adult people who are more vulnerable to virus. This funding is managed to provide essential services to the frontline health workers as well. The health department is working continuously with the authorities to keep an eye on the budget and the cost of PPE kits.

## **3.2 PPE SUPPLY DURING COVID-19**

COVID-19 has made a lot of change in the way we live our lives. It has made us more careful of our surrounding. The people outside the health care departments are also concerned about their safety and are curious about the use of PPE kits. In this regard, the government have given out instructions regarding the use of the necessary PPE. The government have given out instructions to ensure that the people who are actually in real risk are given the PPE.

The most efficient way to protect ourselves from the virus is to use the PPE equipment as it stops the virus from interacting with our skin or clothes. Due to the shortage of PPE kits around the globe the most efficient way is to interact with the least minimum amount of people and to use face masks and sanitizers whenever leaving our houses.

### **3.2.1 Provision of PPE during the COVID-19 epidemic**

Coronavirus had a dramatic impact on a global call for demand and supply of PPE by 2020. To protect people from epidemics, there was a great need for PPE protection equipment. Demand for necessary equipment for pandemic began in England in March. NHS, social care and health care workers desperately need PPE to protect themselves from patients, colleagues, and other people with covid-19. Steps were needed to prepare for the epidemic.



### **3.2.2 Departments improved to save budget**

SCCL (Supply Chain Coordination Limited) was developed in 2018 to manage procurement processes and financial priorities. Many health care providers have purchased PPE from providers or NHS providers just before the epidemic. Local trusts have spent about 146M pounds on PPE in 2019. It includes 61M Pounds from NHS supply system. To achieve better financial savings and improve the NHS budget, the department has set specific procurement targets for the NHS, which have been exceeded from 2019 to 2020. Therefore, the development of a performance model could not cope with this epidemic.

The 2018 restructuring model was responsible for the management and procurement which included the purchase and distribution of PPE to contractors. At the time of the flu epidemic, PHE (Public Health England) managed and owned storage of 400 million PPE items. PHE has entered into a contract with SCCL for stock management. SCCL has a small contract with a private contractor to handle storage and distribution. However, the main department itself handled a large amount of stock to be used if it was not properly organized following the EU 'exit from the agreement. The main purpose of maintaining the Influenza Preparedness Program (PIPP) was to focus on the flu epidemic. Therefore, this stock was not enough for the coronavirus epidemic. The stock is limited to two weeks or more of the required PPE to be used for the NHS and social health care system.



### **3.2.3 Government stockpile of PPE**

During the PPE shortage, the government has decided to use PIPP stock to meet demand. Public Health England had full responsibility for PIPP stock, but as they have entered into an agreement with SCCL for asset management and procurement. They faced problems with the distribution of PPE due to a lack of information about the need for PPE for each trust and had no physical access to stock. The Department of Defense undertook a state of emergency assessment in March. After that, they decided that the operation of the NHS Supply chain, operations, and infrastructure could not meet the needs of the epidemic.

### **3.2.4 Parallel supply chain**

Following the final decision, the department made a series of resources accompanied by a team consists of approximately 450 staff by the end of March to deal with the worsening situation on a daily basis. The aim was to obtain and distribute PPE from trustees and health care providers. They received personal protective equipment from SCCL outgoing suppliers, new suppliers, and new United Kingdom manufacturers to handle the situation.

In between March and April, the department made an estimate about the total amount of PPE over the next three months. These estimates depict that a huge volume of PPE was required compared to what they had in the PIPP stock. At the end of May, the department ordered approximately 14.6B items of PPE worth 7Billion Pounds. These PPE materials came from those suppliers already in the SCCL framework. As the department imposed an order on suppliers, suppliers generally have to wait for their manufacturers to produce PPE. After the production of PPE, the goods were then moved to the United Kingdom. Items are inspected using receipts prior to issue for distribution to local trusts and organizations. This PPE ordering process takes time.

### **3.2.5 Challenged faced in fulfilling demand**

In April and May, existing SCCL-supplied suppliers delivered 738 million items of PPE while new suppliers delivered 235M items within two months. During these months the level between shares remains low. In this case, local trusts and organizations had only one route assigned to central distribution. They buy PPE directly through them and from other organizations with high levels of stock. After that, by the end of May, the situation had improved and they were getting better results. In the parallel supply report, they stated that they had left with only one day's stock for the first time in all various kinds of PPE. Time spent between placing orders and availability to be used was a major reason why supply chain chains did not meet the needs of trustees and local organizations.

There has been a shortage of information about your stock in both SCCL and any other national organization. The Parallel supply chain distributed the same amount of PPE material among all trusts and local organizations. This distribution was based on the PPE estimates required for use and the number of patients.



### **3.2.6 Failure of supply chain management**

The PPE market has shown a strange environment during the epidemic, increasing the risk of buying PPE in this market. The power supply chain usually tests the equipment according to the required government specifications of PPE. In the event of failure of this test, the equipment may be sent to the division and may not be allowed to exclude local organizations. However, there were some cases where the corresponding supply chain purchased a piece of equipment that could not hit the standard specifications of PPE. They ordered 75 Million respiratory masks with a total worth of 214M Pounds. The department reported that about 195 million items were inappropriate.

### **3.2.7 High prices and large stocks**

The amount spent by the Department from February to July 2020 was approximately 12.5B pounds on 32B PPE items. PPE prices are starting to rise compared to 2019. These rising PPE prices are due to the rise in global demand and export restrictions in many countries. COVID-19 had a great effect on the demand and supply of PPE in the year 2020. The PPE kit was not so much in demand before the pandemic as it was just used in operation theater or in hospitals and clinics. But since the pandemic, there was a sudden rise globally in the demand of PPE. The epidemic was getting worse. Over time, there was a significant increase of 166% in demand for respiratory masks and 1310% rise in body bags demand. The department had paid very high prices for PPE because at that time it was the first and most important work to be done and the department was in a position to pay. They paid a high price to buy PPE between February and July 2020.

### **3.2.8 Clash between NHS and Government over PPE management**

Following a discussion on financial matters, the following is the experience of senior staff and health care workers. They rely on official guidance in preventing and controlling infection to understand PPE, what PPE requires, when and how to make a significant use of PPE. In England, Department, PHE, and NHS development provide this guide jointly. Social workers and health representatives were concerned about the significant direction and measures for the protection of health workers. The British Medical Association (BMA) was very concerned about the leadership and training of health care workers at the time so as not to promote gloves and eye protection.

### **3.2.9 Shortage of PPE in adult social care departments**

The NHS Providers' Association has shared their views that they always have access to PPE whenever they need it. But this was not the real problem. When senior health workers and social workers report that they do not have access to PPE in emergencies. Their response showed that they were not adequately protected during the high wave of the coronavirus epidemic. Most adult care providers from private or voluntary organizations can obtain PPE from major retailers or forums for resilience. The adult social care providers received approximately 331 Million items of PPE from the central government during the period of March and July. The sector is also facing financial pressure due to high prices of PPE and other means of protection. The social service provider said they received very little government funding. Although the government has provided funding to other local authorities to assist them to deal with covid-19.

### **3.2.10 COVID cases among social care members**

It is very important for all employees in the health and care sector to receive PPE and specific training to manage this condition and reduce their risk of receiving COVID-19. Many cases have been reported to employees. The cases of health and safety managers show tangible evidence that they are infected as a result of exposure to work. Therefore, preventive measures are very important for everyone.

### **3.2.11 PPE items supplied**

Epidemic preparations are also underway to prepare for future challenges. The same provision and purchase of the NHS purchased approximately 32 billion PPE items in February and July. At the same time, they also delivered items to key employees. Subsequently, the department reported that they had delayed the delivery of PPE for four months in November 2020. The newly developed strategy for obtaining a solid supply of PPE could be challenging. The department has published new strategies to increase resilience through massive stock, the United Kingdom's largest Manufacturer base, a better distribution network system and understanding of user needs. There are challenges to beat, which also include how to fund the United Kingdom PPE production base.



Employees working in parallel, procurement workers, social workers play an important role. The Department deserves to receive good credit as they have made a concerted effort to regulate and build momentum through the international procurement system and distribution network. We can say that the government initially thought of setting things up and was well placed to deal with the disease. But stockpiles or general procurement arrangements for PPE can affect things. As a result, the government structure collapsed in March 2020. When the government saw the ongoing situation, it created a similar supply chain for the purchase and distribution of protective equipment. Obtaining PPE supplies from new suppliers is time consuming and risky. At first, the leaders felt unsupported. The government has budgeted 15 billion pounds to buy PPE from the people of England between 2020-21. They have paid hundreds of millions of pounds to purchase PPE that will not be able to use for the original purpose.

It is important that you identify, read and act promptly at the risks of ongoing outbreaks. The government recently reported on PPE contracts and recommendations to improve purchases. The new PPE strategies identify some of the subjects that follow directly. The department has had to take some unplanned steps to receive PPE in emergencies. The comprehensive study will be for all key stakeholders, including local governments, labor



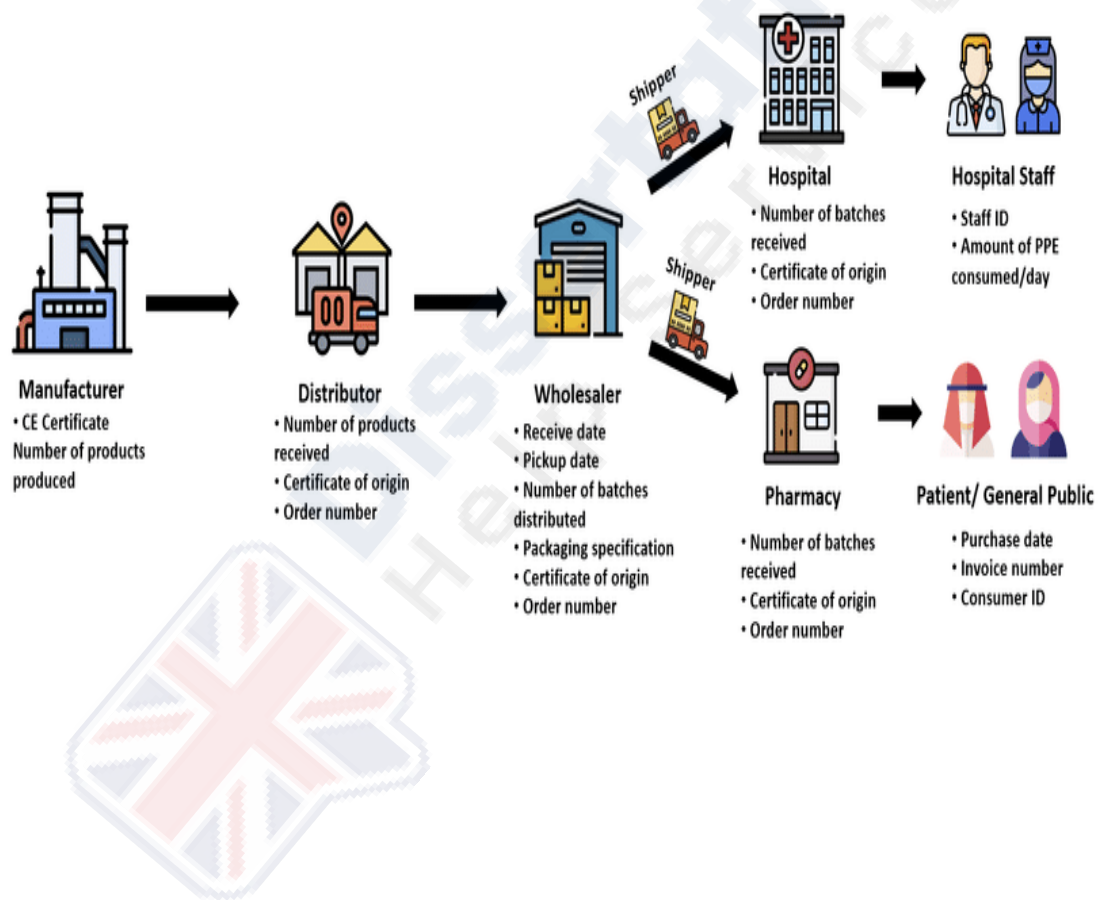
representatives, and future emergency planning planners. Planning strategies should include considering any problem with PPE that could cause infection or death of COVID-19, determining the shortage of vital equipment like PPE, and recording of events during the situation of emergency response.

Business activities are required to maintain a proper balance in between the operational efficiency and financial efficiency against long-term consolidation and strength. These include cost considerations, necessary incentives, the development and maintenance of various production bases, and the increasing diversity of international assets. Emergency systems should be able to provide an adequate supply of high quality PPE with reliable specifications. The new plan should include the distribution of protective equipment to local people, community care, health care providers, and all parts of the health system. Organizations should actively evaluate and monitor all their activities and programs. (PAHO, 2020)



A quick response that works in an emergency should be effective governance, accountability, and responsibilities. As part of the emergency plan, these arrangements should be up-to-date. At the national level of emergency response management, details of the two approaches and better communication are key. This includes details about PPE stocks and demands. Failure of these two essential services will result in a loss of trust, a failure to take recommended measures, and a significant amount of money. This will have a profound effect on the economic and health system in general.

Health and social care have been almost separate programs for years, although efforts to integrate two programs have been ongoing for years. COVID-19 has created a major crisis in the country and as a result of this crisis, the social services sector has been hit hard by a severe shortage of PPE. Government must understand the fact that why national governing bodies provide more assistance to hospitals for handling emergencies and disasters than the public care sectors which also provide more services to deal with emergencies. There is also a great need to address this issue, and how they can prevent this from happening again in the future. It should plan the necessary precautions and actions before the emergency.





## CHAPTER 4

### ANALYSIS OF THE DATA

#### 4.1 PPE STRATEGY

A capable supply chain is capable of overcoming any difficult situation whether it is to overcome a global pandemic. So, it is necessary to maintain a supply chain that will be effective to meet the demand of the people. If the system is strong, it will help to meet the demand of the people.

United Kingdom manufactures of PPE play an important role in the supply of PPE kits. The new manufactured companies have made a significant achievement to overcome the demand of PPE kits. About 70% of the United Kingdom demand was covered up by these manufacturers till December. It is a great step as it will ensure employment to those who have been affected by the pandemic. This is also help in improving the economy as it will make United Kingdom a new center of inventive products.

A survey was conducted by the department of health and social care to check the demand of PPE and the amount of these items required. The government of United Kingdom want to ensure that the products are stocked up and so that in case of a long pandemic an extra supply of all the items of at least 4-5 months is available in the United Kingdom.

Although our main focus is the COVID-19 pandemic but the government of United Kingdom wants to be prepared for any other pandemic as well. The people working along the government to ensure the distribution and tracking down of the PPE during this pandemic have started to gain their focus back at their usual works. So, the United Kingdom government have developed a forceful plan that will maintain the tracking down of these kits and their distribution a constant. The government have ensured to prepare a backup in case of any pandemic.

The setup of a PPE supply chain has proven a really efficient step for the United Kingdom government to create a path for stabilizing the economy by opening the job opportunities to the people. This will help in improving the economy and will provide the people with skills and ambition. The

department of health and social care have acknowledged the need of PPE and supplying these to the people.

	Before COVID	Emergency reaction to COVID	Alleviate and build elasticity in the supply chain September 2020 - March 2021
Amount of supply	<ul style="list-style-type: none"> <li>Supply chain by NHS</li> <li>Supply to Wholesale dealers</li> <li>A huge stickup pile of PPE kits and soft goods for protection against influenza</li> </ul>	<ul style="list-style-type: none"> <li>A model to fulfill the demand was made</li> <li>200 International suppliers are contacted to import the PPE health standardized kits</li> <li>The amount of calls received by National Supply Disruption Response was about 600 calls a day</li> </ul>	<ul style="list-style-type: none"> <li>A model to fulfill the demand was improved</li> <li>The amount of calls received by National Supply Disruption Response was about 50 calls a day</li> <li>A huge stock pile that can last about 6 months</li> <li>Contract assistance on ordering a new PPE stockpile</li> </ul>
Delivery	<ul style="list-style-type: none"> <li>A total of 226 NHS trusts were responsible for the distribution of PPE</li> </ul>	<ul style="list-style-type: none"> <li>More than 58,000 organizations were delivered with PPE kits</li> <li>Local Resilience Forums</li> <li>Prepare a large stock of PPE at all the public and private organizations</li> </ul>	<ul style="list-style-type: none"> <li>An online PPE website was set up</li> <li>A blue-print for fast organization was set up to be prepared for other pandemic</li> </ul>
United Kingdom manufacturers	<ul style="list-style-type: none"> <li>In United Kingdom, the PPE manufacturers were less than 1%</li> </ul>	<ul style="list-style-type: none"> <li>Signing contracts with manufacturers that are in United Kingdom</li> <li>Not reusable PPE by default</li> </ul>	<ul style="list-style-type: none"> <li>To sustain a high level of United Kingdom PPE items in the future manufacture requirements were reviewed</li> <li>Reusable PPE items as much as possible</li> <li>About 70% of the demand is to be covered up by the United Kingdom based supply</li> </ul>
User requirements		<ul style="list-style-type: none"> <li>Difficulties with PPE fit described and suitability in working environment</li> </ul>	<ul style="list-style-type: none"> <li>PPE items demand to be improvised</li> <li>United Kingdom manufacturing are made to communicate directly with requestors</li> <li>Shift towards more inventive and maintainable PPE</li> </ul>

## 4.2 SCOPE OF PPE

The winters are always crucial and difficult for the management of supply chain. This puts a pressure on the on the NHS trust and social care workers in placing the PPE kits orders at the correct time. The government have started preparations for it and is fully prepared for the 4<sup>th</sup> wave of COVID. The government of United Kingdom have ensured that enough stock of medicines and soft goods along with the PPE have been stocked up.

The strategy will cover all the medical care PPE products and supply of these items. The strategy will cover all the items in the PPE kits. The list of these kits are as follows:

1. Protection glasses
2. Face masks including the IIR, FFP2 and 3
3. Gloves
4. Gowns
5. Hygiene products

The government have appointed the responsibility of the supply of PPE to the department of health and social care to fulfill the needs of all the frontline health workers and all the clinics and private organizations as well. Up till the march 2021, the government have given away full PPE kits to almost all the organizations across the Europe.

Many people across the United Kingdom have been covering the face with normal masks or cloth masks which aren't the proper standards. So, the government is trying to raise awareness among the people through these departments and supplying them with face masks and other PPE items so that the people can be protected from the virus and standard health items will be used by people.

All this is a success because of the together working of all the four nations. The government of United Kingdom is working closely with Wales, Scotland and Northern Ireland to closely comprehend the requirement of PPE kits and pile up a proper stock.

## CHAPTER 5

### INTERPRETATING THE RESEARCH MATERIAL

#### (PRODUCT CATEGORY APPROACH)

Through a comprehensive category analysis, we ensure resistance to future demand increases. A robust supply chain system can resist, adapt and adapt to Restoration from disruption to continue meeting supply requirements and, Production can expand to satisfy growing demand in the case of a pandemic. The nature of the market for each is very different. EPP medical-grade category and to provide the best possible resilience supply chains of DHSC, a comprehensive approach category by category required. An alternative method to ensuring higher resilience for every PPE category and will involve combining stocks, strengthening ties with important suppliers, expanding domestically and globally the variety of the supply and perhaps contacting with dealers with additional production capacity for use in crisis situations.

DHSC PPE leaders performed a comprehensive review of DHSC's category supply alternatives, primarily aimed to resilient security and an extra four months' storage. The considerations will include an evaluation of confidentiality levels in DHSC, which will result in timeliness, good quality, timeliness of access and vulnerability of supply alternatives to the risk of raw material shortage necessary to be manufactured. These variables will be included in future tenders for PPE goods. The category of leads has recommended the best balance of British production and shopping from the outside, recognizing that the increasing United Kingdom manufacturing is a significant element of a more robust supply chain, but includes different period and deal levels to be set up depending on the EPI grouping.

**Raw materials:** The leading categories provide a deeper grasp of the Supply Chain and the fundamental requirements essential to facilitate the manufacturing of six types of PPE-grade medical items necessary to guard contrary to COVID-19 transmission via the PPE category method. It not only identifying and assessing the supplier location, but then also examining the hazards of raw materials for internal use and manufacturing in United Kingdom. The government have been able to detect and manage raw material

risk by attempting to expand its supply chain, explore new market entry possibilities and reduce dependency on certain of reusable raw materials.

The leading category explored future demands to ensure resilience in commodities with global and United Kingdom firms. Furthermore, there has been increasing availability of raw material sources with a global increase in demand. Any raw material need will be part of the subsequent phase of the EPI tendering, and we have examined bulk raw material acquisitions in the United Kingdom. We now have a supply mix in each product category that ensures continuous supply in the future months and builds a stock of four months. This involves knowing how the mix will change with an increasing demand.

## **5.1 Enhanced contacts with international suppliers**

### **5.1.1 Focusing on long-lasting partnerships with a broad spectrum of foreign dealers we are increasing our capacity further.**

Concerning China's importance as a key source of world supply, COVID-19 has emphasized the need of understanding the United Kingdom's connection with global supply networks. Therefore, the United Kingdom government is continuing to diversify its supply via trade with other markets. A collaborative cross-government effort has vetted and permitted working with international manufacturers, and we have established a market chain participation approach to allow providers to better fulfil DHSC's requirements within the scope of public procurement regulations. We will utilize the information gathered from this pre-market exercise to impact bid criteria in order to create a diverse and long-lasting framework that will ensure long-term supply security. By negotiating contracts with original equipment manufacturers (OEMs) and purchasing on the spot market, we were able to guarantee medium-term capacity in each category.

### **5.1.2 Reinforcement of connections with foreign markets**

COVID-19, the Global Partnership Initiative, headed by the Foreign, Commonwealth, and Development Office, was established in aim to improve the resilience of the United Kingdom's personal protective equipment (PPE) via international cooperation and mutual aid (FCDO). They look at areas where international collaboration and reuse with other countries may be



beneficial. Arrangements on the joint collaboration meetings of EPP in the event of an advance crisis, trade collaboration, sharing info to improve enthusiasm for new increases in demand, partnership on the cleaning and re-use of EPP demand reduction technologies, and free-trade open markets and the elimination of export restrictions are some of the potential areas of collaboration.

### **5.1.3 Enhanced networks of distribution Ensure that the PPE is in good quality and in good time.**

During the emergency reaction, resources from the National Health Service, the military, corporations, and volunteers were mobilized quickly to establish a logistics and delivery team. EPI was concerned with getting the information to the end user as fast and reliably as possible. With the stabilizing system in place, DHSC can now move on to a more sophisticated model, drawing on our experience with some of the emergency partnerships and processes that we have successfully served in the past, among other things.

A variety of logistical options are available for the delivery of safe solutions to various consumers: smaller quantities are now purchased via the PPE portal using a 'pull' technique, while larger quantities (pallets) are supplied using a push mechanism. Few customers choose a solution that is tailored to their specific requirements, which we establish with each party in terms of quantity, storage capability, and rate of purchases. As part of a quality assurance process, the warehouse verifies that the goods delivered to customers meet the expected standards of quality and safety. This entails sampling and submitting samples to regulatory bodies for approval, which is accomplished via paperwork and photographs.

The PPE Portal is available to all adult healthcare centers, home care providers, social healthcare sites for children, GPs, community pharmacists, dentists, and optometrists in England. By boosting PEP supply, the PPE Portal hopes to meet all these NHS contractors' need for COVID-19 for business as normal. The PPE Portal now offers tabling, hand gloves, IIR masks, cleanliness of the hands, and visors. Providers that meet the PPE criteria will be allowed to order respirator masks and apparel by October 1. Weekly order limits increase based on COVID-19 PPE model demand and supplier size.

The United Kingdom government have provided each Local Resilience Forum with a PPE inventory in another situation of a local COVID-19 spike or a temporary breakdown of the other EPI distribution methods. Each LRF

has access to FFP3 masks for up to a week and other PPE for up to a month to meet local demand. We are developing unique EPP distribution procedures for LRFs and local authorities that wish to continue to distribute PPE to services that cannot be supplied via the PPE portal. Those areas without LRFs are looking for alternative distribution routes.

Over the course of the crisis, several government entities purchased personal protection equipment. DHSC helped some sectors, such as jail healthcare, by providing PPE. PPE was acquired in accordance with public procurement and state aid rules throughout the disaster. There is a high level of trust in the quantities accessible at DHSC. DHSC will now give the majority of PPE to the public sector until COVID-19 is no longer a threat.

## **5. 2 Stockpile**

The winters are always crucial and difficult for the management of supply chain. This puts a pressure on the on the NHS trust and social care workers in placing the PPE kits orders at the correct time. The government have started preparations for it and is fully prepared for the 4th wave of COVID. The government of United Kingdom have ensured that enough stock of medicines and soft goods along with the PPE have been stocked up.

We have guaranteed that our stockpile is prepared for winter and any subsequent COVID-19 wave by learning from experience. Additionally, we are evaluating the stockpile needs for other kinds of pandemic threats and requesting fresh expert opinion to support our decision. DHSC is developing a strategic stockpile to guarantee the United Kingdom can react quickly to potential demand spikes. This equates to four months supply of every product classification and were placed and stored in our warehouses by November 2020. In certain product categories, such as aprons, where we have expanded production capabilities in the United Kingdom, we had recently negotiated with United Kingdom dealers to maintain some developing capacity that can be activated quickly to fulfil increasing demand. The stockpile will serve as a buffer between a spike in demand and the ramping up of United Kingdom capacity for certain goods. PHE revoked its Acute Shortages Guidance on 9 September 2020 considering this increased availability.

Our network of storage facilities spans the nation, with over 25 sites. All inventory is viewable via a single system that groups comparable items and makes them readily accessible in the case of a demand spike. Within 48 hours

of an order being made, stock may be delivered to consumers. To strengthen future preparation, we wish to explore stockpile needs for various kinds of pandemic threats in addition to the COVID-19 stockpile. As a result, we have initiated a study and commissioned fresh counsel from specialists such as NERVTAG and other scientific advisers to offer experimental input and management in determining the form, content, and amount of a future pandemic stockpile.

### **5.3 A 'blueprint' for quick mobilization has been developed.**

**We are sure that we have a solid strategy in place to respond quickly if the need arises.**

In response to the epidemic, there have been outstanding donations from both public and private sectors and they have stepped up and collaborated successfully. As the individuals who assisted us in managing the purchase and distribution of personal protective equipment (PPE) throughout the late winter and early spring transition back to their regular jobs, we have made certain that we are well-prepared to react to any future demand. A comprehensive strategy has been created to quickly restore procurement and distribution systems in order to offer a fast reaction with the greatest amount of efficacy possible in a crisis. This strategy includes a clear understanding of the arrangements that should be used to determine when any emergency supply should be activated, recognizing the amount of people and kinds of skills that will be required in advance, and putting in place a system that will provide a single source of data as well as complete visibility into the supply and distribution process. (Davies, 2020)

When another pandemic strikes, the model that was created to react to this one may serve as a model for establishing a highly successful supply organization for health and social care centers in future epidemic situations. This reaction's knowledge of these tools and resources are being documented also and preserved in order to make them accessible for any future large-scale response. An action strategy for how they will be supplied in a future reaction will be created to guarantee that these kits are available for deployment when the situation calls for them.

**5.4 The expansion of industrial capacity in the United Kingdom has been a major accomplishment. This strengthens our supply position while also providing possibilities for innovation.**

Except for one product category, all United Kingdom production is currently in place. In December, it is expected that supply from the United Kingdom will satisfy about 70% of projected demand across all categories of personal protective equipment, except gloves. This is a tremendous leap forward in time. Because of the COVID issue, four manufacturers namely Elite, Polestar, PFF, and Lincoln have converted their facilities from manufacturing plastic bags to producing plastic aprons in order to react to the situation. For example, before the COVID there was little to no production of aprons in the United Kingdom. This "can-do" mentality typifies the reaction of United Kingdom business to this crisis, as well as its support for front-line workers in the country.

The government received more than 24,000 offers of assistance from more than 15,000 vendors to help with the crisis and supply personal protective equipment to frontline workers. Many businesses and individuals have collaborated with local hospitals and social care facilities to offer extra personal protective equipment. Companies who could provide big quantities quickly were given top priority in the central government's procurement process. Except for gloves, we have secured contracts with manufacturers in the United Kingdom across all PPE categories. With a robust domestic supply base, we can change our capacity to react to future crises and increase our resilience in the event of a second wave of terrorism.

It also has broader implications, such as the possibility for job creation and the potential for the United Kingdom to become a center for creative goods that satisfy consumer requirements. Throughout this transformation of the United Kingdom's PPE manufacturing competency, the government has ensured that the specific COVID-19 response management guidance provided by the European Commission to the entire European Union has been followed, in order to ensure that contractors were treated fairly and evidently, and that any subsequent contracts agreed were officially accommodating with the law.

### **5.5 Honeywell masks are available**

Beecham Corporation has been contracted to manufacture at a facility in Mother well, Scotland, and will have the capacity to create more than 65 million FFP2 and FFP3 respirator masks each year for the next two decades. Face masks like this shield user from up to 99 percent of external particles, such as dust, viruses, and mould. They may be purchased online. Workforce

members have used their knowledge and technical abilities to repurpose product lines for these kinds of masks to be produced.

For the first time, a product was created on the premises. The manufacturing has begun and will continue through the end of 2021, resulting in the creation of about 450 jobs.

Survitec robes are a kind of protective clothing. Survitec was chosen by the Department of Health and Social Care in the United Kingdom to manufacture sterilized surgical isolation gowns in order to provide the NHS with much-needed personal protective equipment.

In order to better serve the aerospace and defense industries in the United Kingdom, Survitec's Birkenhead facility has been prolonged to include a committed area for the production of sterilized surgical quarantine gowns. Survitec's Birkenhead facility has been expanded to include a dedicated area for the production of sterilised surgical isolation gowns.

In order to assist this important task, the business has recruited approximately 100 extra employees from the surrounding region. Survitec already manufactures safety-related products for highly regulated environments, such as the aerospace industry, and has collaborated with the government to expedite the governing and attaining processes, allowing it to begin production as soon as the specialized raw materials are received. To increase the availability of raw materials and to scale up production of gowns for the health and social care sectors, the government have taken steps.

## **5.6 Aprons from the PFF Packaging Group**

The Health and Social Care Department has selected PFF, a freely owned and business United Kingdom manufacturing company, to manufacture disposable aprons for the purpose of providing the NHS with essential personal protective equipment.

During the COVID-19 crisis, PFF continued to operate, giving support to the United Kingdom's food retail sector via the manufacture and distribution of food packaging, as well as the establishment of new capabilities and capacity to manufacture aprons for the food service industry. In one of the company's facilities, which is located in Washington in the Northeast of England, the



shop floor has been reorganized, and a dedicated area for the manufacture of aprons has been formed around the clock.

Over £1 million has been invested in the creation and manufacturing of this new product line of aprons by the business in question. Aprons in a roll format have been produced using specialized equipment that has been purchased and put into operation in order to meet the demand for the product throughout the 1-day manufacture and packaging procedure. More than 100 workers have been employed for the duration of the contract in order to accomplish this serious project on schedule and within budget constraints. We are delighted to be able to help the National Health Service while also creating job prospects in the Northeast of the United Kingdom.

We are now evaluating future needs and determining the most effective approach to reproduce a dependable supply that will incentivize and maintain the current high level of PPE manufacturing in the United Kingdom. When it comes to tendering, we will consider how our principles and criteria for selecting bidders will require adaptation to deliver our overall approach to resilience. We will make certain that the experience and learning gained from crisis procurement processes is applied in the future, including, for example, short lead times for delivery.

Building resilience in the personal protective equipment supply chain is inextricably linked to the government's broader initiatives to assist economic recovery via the New Deal. This means that we can achieve our goals for United Kingdom industry while also raising the overall standard of jobs and skills throughout the country. We can do this in a way that is both environmentally friendly and ethically responsible, supporting our goal of eradicating modern slavery while also assisting us in achieving our net-zero goals. Determining how our tendering rules and criteria may guarantee high environmental standards as well as ethical labor practices is another something we are examining right now.

In March 2020, the government released the world's first Government Modern Slavery Statement, which outlines our approach to combating modern slavery in government supply chains and how we plan to do it. Contractual provisions will be added in the future when it is appropriate and reasonable to do so in order to avoid instances of modern slavery from occurring. More specific contractual clauses may, for example, allow for more extensive audits, supplier rehabilitation, and/or compliance with international labor standards,

to name a few possibilities. If any problems are discovered, we will work in collaboration with our suppliers to make real changes to working conditions. If recorded abuses have not been properly addressed, we will take corrective action. We will also examine if our regulatory approach to personal protective equipment and testing needs to be revised in order to facilitate the entry of new producers and innovators into the market, particularly when this is in line with broader government objectives.

### **5.7 Examine and expand the possibilities for reuse and innovation in medical-grade personal protective equipment.**

We are eager to expand on and explore possibilities for innovation, especially in the industrial sector in the United Kingdom, while also ensuring that employees have the confidence, they need that reuse is safe and effective.

Because of global supply constraints and the possibility of future periods of volatility in the personal protective equipment (PPE) market across the globe, several nations have implemented alternative 29 and reuse plans to deal with short-term stock shortages. DHSC and the NHS are eager to explore comparable reuse and innovation methods in order to enhance resilience to future scarcities and VfM, but also because we remain dedicated to a greener health-care system in the long term. As part of the NHS Long Term Plan, we have committed to evaluating and decreasing the NHS's environmental impact, and we want to ensure that our use of personal protective equipment (PPE) is consistent with this larger objective.

Earlier this year, we began working across government and with regulators such as the Medicines and Healthcare Products Regulatory Authority (MHRA), the Health and Safety Executive (HSE), and the Office for Product Safety and Standards to quickly identify and assess potential reuse opportunities across the United Kingdom. We expect to complete this work by the end of the year.

### **5.8 Repurposing single-use personal protective equipment (PPE) in an emergency**

We established this procedure to ensure that, in the event of an emergency, we have alternatives for safe and quick decontamination of single-use personal protective equipment (PPE). Our current study is on FFP3 respirators. When compared to prior cost levels, this is the hardest item to

obtain worldwide. To provide resilience and emergency supply of respirators in this difficult scenario, countries are looking into disinfecting single-use FFP3s. We are presently testing a range of masks with Moist Heat Treatment. Moist Heat Treatment (MHT) is the process of decontaminating single-use FFP3s for reuse using steam sterilisers on predefined time/temperature cycles. Experiments have indicated that some brands and kinds of FFP3s are suitable for MHT decontamination, and more research is underway.

Hydrogen Peroxide Vapor (HPV) is created from hydrogen generators and is now utilised in acute care settings to disinfect wards, rooms, and equipment. The testing will follow HSE and PHE requirements and begin in September 2020 with two United Kingdom suppliers. However, we want to ensure that it is safe and effective in the United Kingdom, as well as in line with existing rules, which only allow its use in times of supply shortages. The first findings are expected in the autumn.

We will work with the Royal Colleges and Unions to establish what guarantees and information employees will need to feel comfortable and secure reusing PPE. For example, we want to assess new types of PPE that are built for reuse from the outset, such as those made in the United Kingdom.

Reusable gowns are being tested by NHS England and Improvement (NHSE/I), with 20 providers already participating and another 60 on the waiting list. While increasing the share of reusable gowns in the system, they are reducing waste created by single-purpose gowns. On average, a reusable gown saves up to 75 single use gowns each year.

A brief assessment of the challenges and potential barriers to improved innovation and sustainability in PPE was conducted. As part of our research, we conducted interviews with more than 40 stakeholders to better understand potential national policies for high-impact personal protective equipment development. Participants included national teams, AHSNs, the Health and Safety Executive (HSE), providers, and innovators.

The study identified a variety of barriers to the development and broad implementation of PPE technology. Improving demand signals and engagement between innovators and frontline employees, navigating the regulatory process for new entrants and finance and procurement frameworks that promote single-use PPE with low purchase prices but possibly higher overall lifespan costs.

A framework and buying environment that encourages more innovative and ecologically friendly personal protective equipment is therefore a top priority. Working with partner organizations to promote research, regulation, procurement, and deployment of new goods, we are also promoting dialogue with all stakeholders along the innovation route. This will include discussions with industry and government officials.

## **5.9 Enhancing the user's experience**

Our overarching goal continues to be to provide personal protective equipment (PPE) that protects against the transmission of COVID-19. DHSC has gained a better grasp of the user experience throughout the course of the epidemic, and our understanding of the demand is developing.

PPE must be appropriate for the task at hand. As a result of our experience acquired during the COVID-19 emergency response and taking into consideration user input on the kind and quality of personal protective equipment, we evaluated if any changes to technical requirements were necessary. Products that are fit for purpose provide the best value to the end user and the system by providing the appropriate level of security, usability, and VfM (value for money).

PPE must be suitable for all users. We now have a better understanding of how personal protective equipment (PPE) is utilized on the front lines, as well as the kind of problems that may emerge. In addition to medical need, we must take into account the particular requirements of the user. Women and people of color, among other groups, have expressed frustration with the practicality of certain personal protective equipment. To better understand user requirements, and in response to anecdotal input, NHSE/I has started a project headed by the Deputy Chief Nursing Officer to collect the solid evidence and data we need to identify and address issues as soon as they arise. The FFP3 fit-testing study gathered data from 5,557 individuals from 47 different NHS Trusts with a variety of different backgrounds for the purpose of analysis. Based on this information, the NHSE/I project will collaborate with manufacturers to develop FFP3 respirator masks that will provide better mask fit.

Departments have been asked to provide information on the following topics as part of the DHSC's efforts to collate PPE requirement data from across government and how potential inequalities have been considered; the

demographics of both their workforce and the public with whom their staff interacts, which has proven important in the use of PPE; and mismatches or difficulties detected between any of the PPE. This will guarantee that the demand model accurately represents the various combinations and sizes of equipment needed to satisfy the diverse requirements of users in a variety of situations.

We must also consider the comfort of the user and any damage that may result from the use of personal protective equipment, especially for those who will be wearing the equipment for an extended length of time. The NHSE/I is working in partnership with Southampton University, which is conducting research into the relationship between personal protective equipment (PPE) use and skin destruction, counting the serious thresholds for PPE use, the incidence of breaks required to release the skin, and the exact areas of the face pretentious by different FFP3 mask proposals.

Gloves are only one of the numerous precautions that health and public care workers may take to keep themselves and their patients safe. The usage of non-antiseptic gloves, however, is linked with deprived hand hygiene, cross-contamination and spread of healthcare-associated diseases, as well as interact dermatitis, as shown by a growing body of evidence<sup>1</sup>. In order to address this, the Great Ormond Street Hospital initiated an effort in 2018 that sought to enhance hand sanitation practices and the proper usage of gloves in the hospital environment. Contact dermatitis referrals to occupational health decreased by 33% during the 2018-19 school year, while the usage of plastic gloves decreased by 33% over the same period of time. The government is investigating if a gloves awareness initiative, which aims to promote hand cleanliness, would result in better influence health for government employees. There are additional patient requirements to reflect, as well as the effect of personal protective equipment on their connections and experiences. For example, those that need employees to wear different safety gear in instruction to lip read may fall into this category.

### **5.10 Clear face masks may be used to overcome communication obstacles**

The Health and Social Care Department is presently testing transparent face masks through the NHS and public services. A fresh agreement by the US-based firm Clear Mask has resulted in a narrow supply of 250,000 masks being complete accessible across the United Kingdom. Certain supplies have already been made to hospitals and health-care organizations across the



country. Social care workers now have access to the masks as a result of a new pilot system with LRFs that is being tested. This applies across the United Kingdom, and the government in association with the devolved governments to determine how the masks will be distributed.

Masks are transparent and feature an anti-fog fence to guarantee that the face and lips are always noticeable, allowing physicians, nurses and caregivers to interact more effectively with their patients and improve patient outcomes. The Department of Health and Social Care (DHSC) is collecting input from the NHS and public care providers based on their experiences. Our suppliers will remain to collaborate closely with us on upcoming purchases founded on input received from the health and social care sector.

With an estimated 12 million individuals suffering from hearing loss in the United Kingdom, the masks will be very useful for those who will be required to lip-read in order to communicate throughout the current response to the COVID-19 epidemic and yonder. The masks will also be beneficial to individuals who depend on facial expressions to communicate effectively. Those with knowledge impairments, autism or dementia, for example, otherwise those who speak a foreign language and their interpreters, are all eligible.

Several incapacity charities have met the introduction of clear masks for use in war-zone health and public care facilities, noting the welfares they will bring to disabled people who rely on lip-reading and facial expression to connect, and for whom personal protective equipment (PPE) is a barrier to their ability to communicate effectively.

In the next months and years, Focus to winter pressures and the possibility of second wave of COVID-19, the Department of Safety and Health will evaluate the PPE program in accordance with the standards stated in the case below. To successfully wide-ranging the stabilization stage and transition to the long-term upcoming operating model, the resource and distribution of personal protective equipment (PPE) will requisite to have been completed in accordance with the metrics related with each of these criteria.

Throughout the emergency response, the most important concern was ensuring a continuous flow of supplies. Prices were variable as a result of worldwide demand, and as a result, became a secondary consideration. When compared to pre-COVID expenses, the average price of personal protective equipment (PPE) has risen considerably, with certain categories seeing prices

double or triple their previous levels. As soon as the situation has stabilized, we will concentrate our efforts on attaining VfM and increasing efficiency. The Department of Health and Human Services (DHSC) hopes to begin migrating to an upcoming model that is both robust (capable to react to whichever demand spikes caused by COVID-19 or another pandemic danger) and proportional as early as next year. Among the most important issues for the model past March 2021 are the following: • to what range and for how time-consuming must a distinct PPE source chain be maintained?

- How can we build on and make the most of the COVID-19 experience acquired via this program?
- What are the next steps?
- When it comes to inventory management, how can we guarantee that various sections of the United Kingdom's health and public care method are not in competition with one another for supplies?
- How can we ensure the long-term viability of our manufacturing base in the United Kingdom?
- How can long-term resilience be created in order to scale up and down supply in order to meet any future threats?

This year, we will see a sea shift in the way personal protective equipment (PPE) is procured and distributed throughout the nation. The supply network is now more robust, and it will be able to meet demand throughout the winter. We have gained a great compact from this knowledge and are in a good location to face the challenges of the upcoming.

## CHAPTER 6

### CONCLUSION

#### FUTURE SUPPLY

The government of United Kingdom have been successfully prepared a stock of PPE kits and all the necessary equipments but it is important that this stock remains constant. To ensure this, the government have to keep a check in balance of these items. The government have started efforts to set up new production plants that will fulfill the supply and demand ratio on a national level.

#### 6.1 Buying more PPE

The government have set up a new unit to ensure the quality and the quantity of the PPE kits in the system. The unit is specially designed to make sure that the demands of the frontline workers or other clinical health workers is fulfilled. The unit is designed to ensure that the supply chain in the country is maintained and the prices of these items are set up in an average price rather than go high above the sky.

The NHS trust have been working with the cross government team to ensure that the manufacturers and suppliers around the globe are providing us with a steady inflow of these PPE items. This achievement is likely to fulfill the shortage of PPE in the country and also will be a successful step in establishing a national supply system in the country.

The Foreign and Commonwealth Office (FCO) teams of United Kingdom residing around the globe have made it very easy to find international suppliers and deliver these items at a national rate. This has helped us in securing incoming arrangements in a short period of time. The department of trade is working tirelessly to ensure that all the arrangements required for incoming of these PPE items is done quickly and safely.



The FCO teams are also keeping a close eye at the quality the PPE produced. The quality of these products are checked whether they meet the clinical safety standards or not. The products are then sent to United Kingdom.

The companies in United Kingdom are concerned about the competition that might have occurred in market due to the international import of these PPE. The government have ensured that these supplies are necessary to maintain a steady amount of stock in the United Kingdom for any further long lasting pandemic scene. After the formation of national plants of PPE, the main focus of supply will be done from these industries rather than importing it from overseas.





## **6.2 PPE and businesses offers**

The businesses in United Kingdom are also offering stocks of their PPE kits and donating them to the NHS trust and public health bodies to overcome the shortage of PPE kits. Few businesses like Apple and Airbus donated an approximate of 215,000 and 700 thousand masks to the NHS trust respectively, Kingfisher donated an approximate of 24 hundred thousand protective glasses.

COVID-19 had a great effect on the demand and supply of PPE in the year 2020. The PPE kit was not so much in demand before the pandemic as it was just used in operation theater or in hospitals and clinics. But since the pandemic, there was a sudden rise globally in the demand of PPE. Although the offers are very beneficial in creating a steady PPE supply to the people. The process is time taking as the quality of these PPE items are to be checked and those have to reach the public health sector demand.

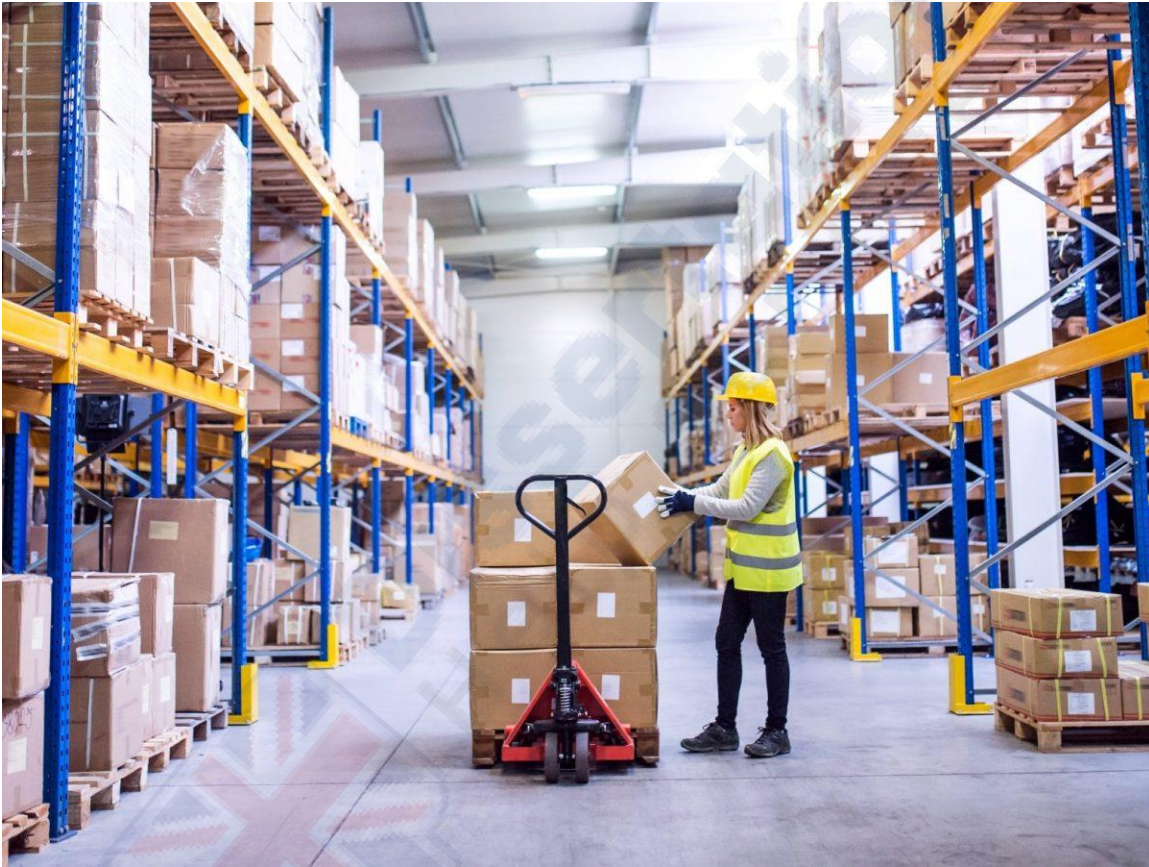


## **6.3 PPE and National manufactures**

With the increasing demand of PPE kits, the government is now turning to local industries and encouraging them to make local PPE kits. Initially, there were very few local manufactures of these items. So, the government of United Kingdom have established new industries and given chance to new manufactures to supply them with local PPE kits that would meet the safety criteria as well.



Industries like Royal Mint, Burberry and McLaren are appointed to provide them with protective gowns. Other industries like Diageo and Unilever are given the responsibility of producing hygiene products like sanitizers, hand wash, soaps etc. The government have contracted many new manufactures as well to provide them with other safety products that will help them to maintain a steady supply system in the economy as well as produce a proper stock of these PPE to be prepared in case of a long lasting pandemic.



The importance of our strategy lies on the level of demand for PPE by DHSC in terms of quantity, combination, type and sizes. During COVID-19 a PPE demand model was designed based on the assumptions made by PHE's guidance followed by tests with clinical staff. A number of senior managers and clinicians provided input and model outputs were checked by chief health officers.

After its establishment we carry on getting more information for the purpose of different improvements in our model.

The development of model over the course of COVID-19 has led us to feed the experiences of different care sectors and factors into our model. As a

result, different adaptations like determination of COVID -19 versus non COVID -19 demand, improvement of assumptions on social care, use of medical-grade PPE and balance of PPE, take into consideration the seasonal flu in winter and requirement of a vaccination program by POE were made in model.



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COVID-19 has a great impact on the global demand and supply of PPE kits. PPE has become an essential part since the pandemic as it has helped in protecting the lives of many front line health workers as it minimizes the risk of interacting with the deadly virus. The safety of all the health care or social care workers is the first priority of the government. The emergency department was made to ensure that all the PPE items were given to the organizations where they were needed and in the amount of quantity that is required.

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