

Development of Web Based Online Medicine Delivery System for COVID-19 Pandemic

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Abstract

Average Bangladeshis spend a significant amount of income on medicine. A reliable and fast online medicine delivery system is not ubiquitous. Most people buy medicine from the local Pharmacies. They need to go to medicine stores to buy the specific medicine prescribed by the specialized doctors. Sometimes all prescribed medicines are not available in local Pharmacies therefore people need to go to other areas to buy the medicines. It is very time consuming and people need to spend money as well for this. In our country, traffic jams are a very big problem. People waste longer time on the road due to traffic jams. Here most of the pharmacies are closed at night time but sometimes in an emergency situation medicine is very essential. In this case an online web based e-commerce medicine delivery system is needed very much. In addition, currently the whole world is suffering due to COVID-19 pandemic. Coronavirus is very contagious which we all know. In this pandemic time it is not risk free to go out to buy medicine from the pharmacies. Due to COVID-19, medicine scarcity is also an important issue. In this situation, an online medicine delivery system can play an important role. By considering the above mentioned facts, a reliable and fast online solution is proposed. This paper presents the development of a web based online medicine delivery system. A reliable, fast, safe and user-friendly online based e-commerce web application has been developed in this paper. Medicine delivery system has also been included with this proposed system. This platform is a dynamic web application built in Hypertext Preprocessor (PHP) based Laravel framework with a powerful back end. It is hosted on a dedicated Virtual Private Server (VPS). This system is lightning fast and optimized very well for searching engines. With the help of the developed platform, drugs will be available at one's doorstep very fast, safely and reliably. In this system, users can choose a medicine section of their choices and go through all the items that the system provides. Users can then select the desired drug items, add

them to cart and then proceed to payment. It has payment integration of Cash on Delivery (COD) systems. After developing the system it has been tested and it works fine. It is a one-stop solution where people can find various medicines including COVID-19 related medicines and other items in this online platform. Besides medicine, here you can also find other health care products like food supplements, birth control products, hair care products, skincare products, beauty products, etc. People can order their required medicines or other medical related available items from online and the delivery support will provide the products door to door for the users. Using this system now users can get their needed medicine without leaving home. They can save money and they do not need to go out in this pandemic situation to buy medicine. In this crucial situation, the online medicine delivery system is very helpful and it will act as a blessing for the people.

Keywords

Medicine, Delivery, Online, Laravel Framework, PHP, MySQL, CSS, AJAX, Android, Web Application, Virtual Private Server, COVID-19, Pandemic, E-Commerce

1. Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 is a novel coronavirus that outbreaked in China in 2019 and causes COVID-19 disease. Coronaviruses are zoonotic viruses that circulate amongst animals and spill over to humans from time to time and have been causing illnesses ranging from mild symptoms to severe illness; see [Figure 1](#) and [Figure 2](#) [1]. On 7 January 2020, Chinese authorities confirmed the outbreak of COVID-19 and on 30 January 2020, the Director General of the World Health Organization (WHO) declared the COVID-19 outbreak a Public Health Emergency of International Concern. On 1st February 2020, 312 Bangladesh citizens were brought back from China's Wuhan city and quarantined for 14 days. Eight of them were immediately isolated and three more were subsequently isolated upon showing symptoms. Their samples were tested on the 2nd February 2020 in the laboratory of the Institute of Epidemiology, Disease Control and Research (IEDCR) and found negative for COVID-19. On 8 March 2020, Bangladesh confirmed its first COVID-19 case. On 11 March, the World Health Organization (WHO) declared COVID-19 a pandemic [2] [3]. Coronavirus has currently spread over 213 countries globally and in Bangladesh, the first case was identified on 8th March 2020. The reported number of cases in Bangladesh had increased to 425,353 with 6127 deaths as of 11th November 2020 [4]. Coronavirus is very contagious and it spreads very quickly [1]. The maintenance of physical distancing regulations based on the latest expert and industry guidance are very important. During the month of April 2020, the Government of Bangladesh imposed quarantine over the whole nation with a notion to

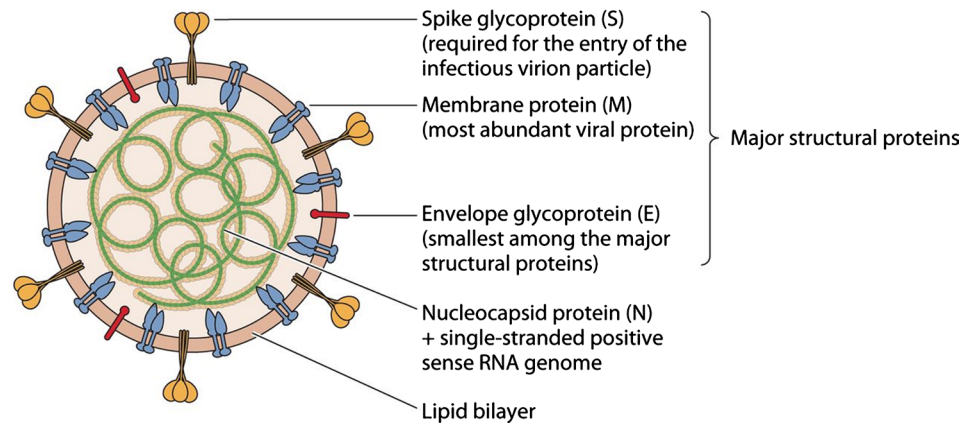


Figure 1. SARS-CoV-2-virus structure [1].

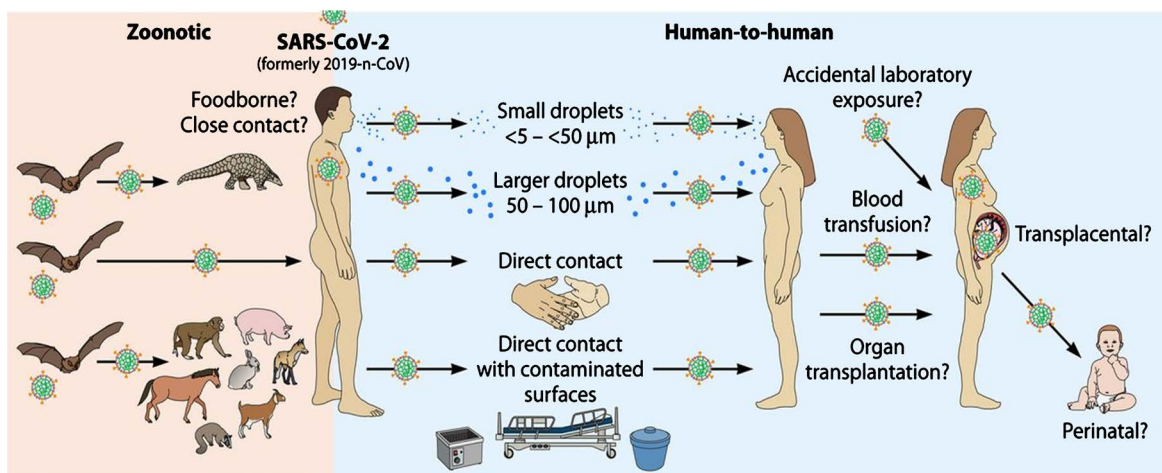


Figure 2. Potential transmission routes for SARS CoV-2 [1].

prevent the outbreak of COVID-19 disease originated from the new coronavirus 2019 [3]. In our country there are many patients of heart diseases, asthma, diabetes and others [5]. In COVID-19 pandemic time people are getting sick for the coronavirus. It is very essential for the people of Bangladesh to buy the medicines. People need to go out to buy medicines from local pharmacies which is very risky. Sometimes all medicines are not available in the pharmacy and in that case people need to roam around to find the medicines. This is time consuming, risky, and costly. Bangladesh is a populated country and especially in Dhaka city. It is very hard to keep physical distance when people go out to buy required medicines [6]. During this COVID-19 period, medicines are highly needed as well as staying at home is also very important. In this situation online e-commerce web based medicine delivery systems can be a great help to deal with the situation.

A medicine delivery system is a solution designed specifically for users who want to order pharmacy products online and get them delivered to their home. A bit more details an online medicine delivery system is an online based web application that operates over the Internet and sends orders to customers through credit cards, shipping companies, or pay on delivery systems. People can buy and

sell their products sitting at home [7]. In this current pandemic situation of COVID-19 e-commerce businesses are becoming more popular. People have started to believe in online business to a great extent [8]. In this COVID-19 pandemic the using and ordering from e-commerce site has become very famous. According to Statista, the size of the local e-commerce market was \$ 1648 million in 2019. It has expanded to \$ 2077 million in 2020 [9] [10].

Due to the huge demand of online medicine delivery system there are very few companies that have recently started e-commerce based online medicine delivery services. Pharmacy.com.bd is one of the online pharmacies in Bangladesh that provides generic and OTC products. Users need to take a picture of their prescription or scan it and make orders with it through their website or on Messenger, Whats App or Imo [11]. The problem is that doctors in our country provide handwritten prescriptions where it is really very hard to read them therefore sometimes wrong medicines are delivered to customers. This website is not user friendly and fast and it has been developed using normal word press. Customers have to wait for 4 - 24 hours to get their products. The products are also limited. Customers need to order a minimum of 1000 Taka products. Another company named Ousud.com which is an independent pharmacy having direct links to pharmaceutical suppliers for medicine and other health care products. They provide customer support through Facebook, email and SMS in Dhaka city only [12]. They do not deliver their products outside Dhaka city which is a great problem. There are 64 districts in Bangladesh and people need to get medicines all over Bangladesh. BanglaMeds, the first online pharmacy in Bangladesh and they provide the home delivery which is only accessible for the residents of Dhaka city from 10 AM to 4 PM. Their website is built with word press and it is not user friendly [13]. The above mentioned companies have online medicine delivery system but they have some limitations. Their website is not user friendly, they do not have many features and the categories of products are limited. They have used normal word press based website to develop their platform. They only deal with a certain number of customers and their service areas are also limited. Their websites are static. Most of them have limited sources of supply.

In this paper, a user friendly, fast, safe, and Multifeatures web based online based e-commerce medicine delivery system has been developed based on the demand of COVID-19 pandemic situation. This system has been developed using (PHP) based Laravel framework with a powerful back end [14]. It is hosted on a dedicated Virtual Private Server (VPS) [15]. This system is lightning fast and optimized very well for search engines. This web application is dynamic. People in Bangladesh usually buy medicine from local stores. But in this pandemic this task is getting harder as COVID-19 is spreading much faster. Because people are not aware and don't wear masks, getting these drugs from stores by going personally is time consuming and risky. Our system solves the problems of going for searching medicines and saves transport cost. But we have a system

which provides medicine from local medical stores as well. We have also categorized the most popular drugs in the front to help the customer to find them as they enter the homepage. We are offering a reliable, safe and fast web-based e-commerce platform, which gives solutions to recent pandemic. We are ensuring a fast delivery system which is safe and reliable. Customers can save both time and money cause with 3 or 4 clicks they can ensure the medicine is delivered in their home. Our products categories are wider and we will provide products delivery to all over Bangladesh with our own delivery men and also we may use efficient courier services in case of remote areas. During delivery, an agent always will wear a mask and gloves and carry hand sanitizer for safety purposes.

It is very simple and easy as well to use this web application. The first important advantage is the ability to quickly find the necessary medical products, using a search bar. The search menu Algolia option has been integrated with our platform to make the products searching very fast [16]. Price of Products will be competitive on our platform. Our system will have a huge customer database and in future we can apply big data analysis and machine learning algorithms based on customers review to attract more new customers and retain older customers.

2. Proposed System Design

An online medicine delivery system is an online based web application that operates over the Internet and sends orders to customers through credit cards, shipping companies, or pay on delivery system. People can buy and sell their products sitting at home. It is getting popular day by day all over the world even in domestic market space. The aim is to make the ordering process and delivery systems of medicines much easier and customer-friendly. It's very important to make a user friendly environment.

This section describes the basic structure of the proposed system. **Figure 3** shows the block diagram of the proposed system. In this section we proposed the system design. The system will provide the necessary features that our system entails. Block diagram illustrates that customers can see the web application and

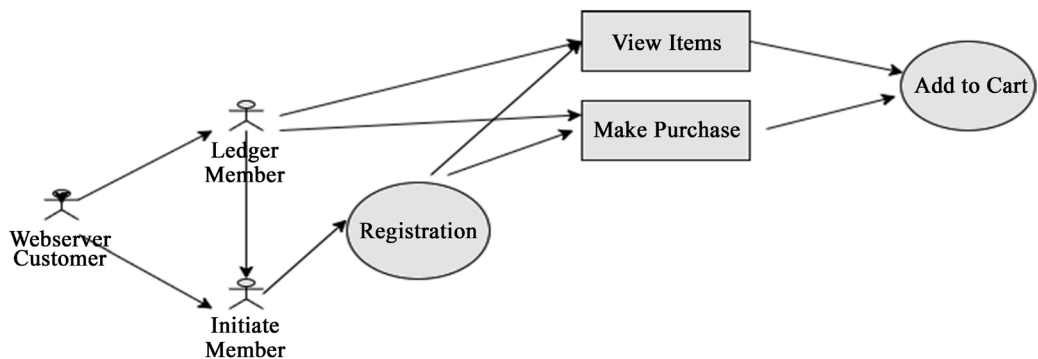


Figure 3. Block diagram of the proposed system.

do the registration with proper information to the website. After completing registration to the website customer can view the products, make purchase by adding to cart. Customers can pay at the time of delivery which is called cash on Delivery (COD). Customers feel more comfortable by doing COD payment because it is more reliable.

Software Design: Module Level

In **Figure 4**, the illustration goes as follows: firstly the user will visit the homepage and log in with his designated username and password. If anyone provides an invalid or incorrect username and password, the system will display an error message. For new customer the provider needs to give proper name and email address to register. After registration is complete the user can purchase any item from the website. There is a search machine form which one can search for specific medicine. After selecting the desired item user can add them to cart and order the item. Then, deliver system will take place. The delivery boy will take the order to nearby store and deliver the item within a short time.

The above figure of the flowchart illustrates the methodology in which our system conducts the processes.

3. System Framework Design

We entail the step by step process on how the system is operated in this section. Through the help of the visual representation it will enable the reader to get a clearer picture of the proposed online based e-commerce web application for medicine delivery system.

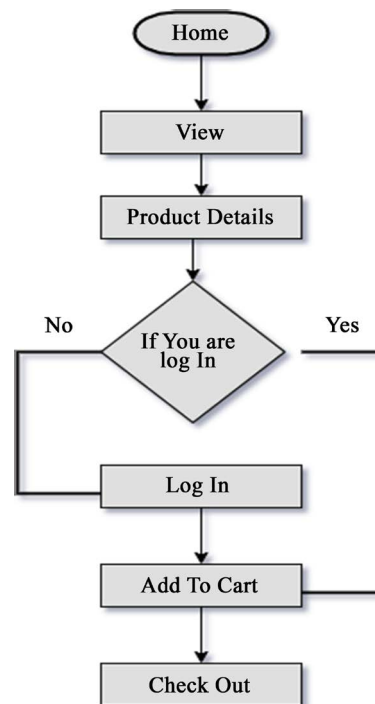


Figure 4. Flow chart of the system.

Steps by Step System Design Framework

Figure 5 shows the homepage of the proposed system. It is mainly the landing page of online medicine delivery system. An user can see this page when first enter to our developed system. The system is very dynamic. This system has three very essential parts such as: backend, front end and database. This platform is a dynamic web application built in Hypertext Preprocessor (PHP) based Laravel framework with a powerful back end. Hypertext Preprocessor or Personal Home Page (PHP) is a scripting language that is widely used to create dynamic Web pages, combining syntax from the C, Java and Perl languages. PHP code is embedded within HTML pages for server side execution. It is commonly used to extract data out of a database on the Web server and present it on the Web page. It is widely used with the MySQL database [17]. MySQL is an open source relational database management system. Information in a MySQL database is stored in the form of related tables. MySQL databases are typically used for web application development. MySQL databases are queried using a subset of the standard Structured Query Language (SQL) commands [18]. We have used MySQL database for this system. It is hosted on a dedicated Virtual Private Server (VPS) [15]. This system is lightning fast and optimized very well for search engines. Algolia is very fast search option which has been used in this paper to develop the system [16]. This home page is actually the front end part of the software system. Basically for this home page front end we have used CSS to make the fronted color. Cascading style sheets Level 3 (CSS3) are used to format the layout of Web pages. CSS3 can be used to define text styles, table sizes, and other aspects of Web pages. CSS helps Web developers create a uniform look across several pages of a Web site. Instead of defining the style of each table and each block of text within a page's HTML, commonly used styles need to be defined only once in a CSS document. Then we have used HTML basic shape of the fronted. HTML5 is a revision of the Hypertext Markup Language (HTML), the standard programming language for describing the contents and appearance of Web pages. HTML5 provides one common interface to make loading elements

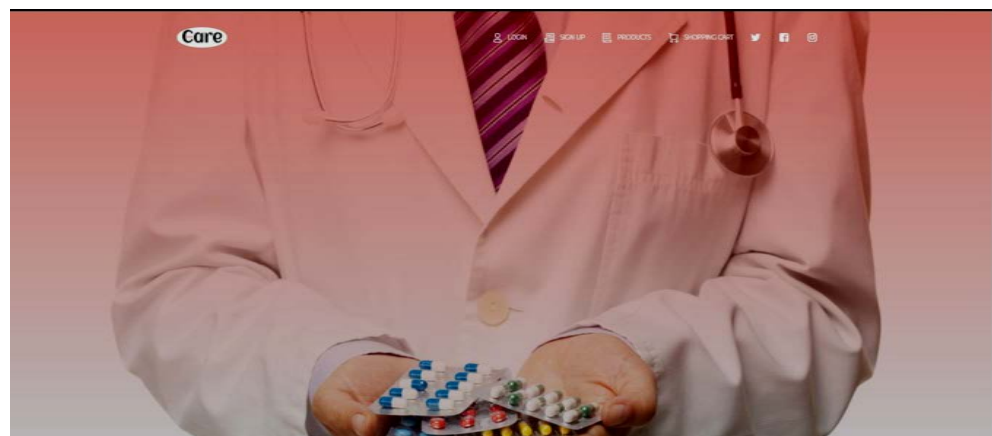


Figure 5. Homepage of the system.

easier. One of the biggest differences between HTML5 and previous versions of the standard is that older versions of HTML require proprietary plug-in and APIs [19] [20]. The background cover photo can be changeable manually. We have made a Ajax both in the system. Ajax (Asynchronous JavaScript and XML) is a group of interrelated Web development techniques used on the client-side to create asynchronous Web applications. With Ajax, web applications can send data to and retrieve from a server asynchronously without interfering with the display and behavior of the existing page. Ajax allows content on Web pages to update immediately when a user performs an action, unlike an HTTP request, during which users must wait for a whole new page to load [21]. Most important part of the system is discussed here.

From **Figure 5** we observe a very interactive homepage that has been designed to the appeal of the users. The homepage consists of the navigation menu at the top of the website, which includes (*i.e.* Login, Signup, Products, Shopping cart). We used a translucent display on the top menu bar which fades when we are top of the page and becomes visible when we scroll down. Additionally, new incoming customers can sign up online and get desired products through the sign up button.

As our homepage takes the advantage of the scrolling method therefore there are other features within this homepage which are discussed in the following two sub sections. **Figure 6** shows the homepage of system 2.

In **Figure 6** we observe the second part of the homepage which can be accessed through scrolling down from the homepage. The second part indicates some of the key features that this system entails. Firstly, there is a search button to find any medicine available in our system. The search is fast and reliable and it has been designed using the latest technology known as Algolia. There is one interesting feature which has been added to the homepage, *i.e.* there is top medicines list where you can find the most popular medicine which people buy all the

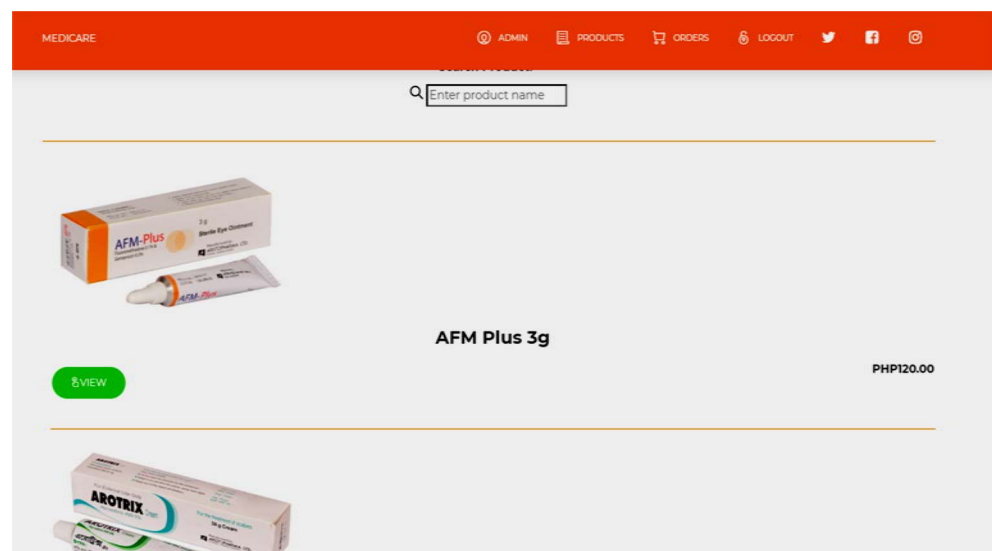


Figure 6. Home page of the system 2.

time. **Figure 7** shows the login page of the system.

Login Page:

In **Figure 7**, it has illustrated that the user can login with a valid username and password that has been registered under the supervision of the admin. The username consists of alphanumeric value and password length must contain at least 6 characters. If anyone forgets to input the wrong username or password, the system will provide an error message.

Sign Up Page:

Figure 8 provides the sign up page of the developed system.

It has illustrated that the user can sign up with first name, middle name, email, complete address of home, contact information, valid username and password. The username consists of alphanumeric value and password length must contain at least 6 characters. If anyone forgets to input the wrong username or password, the system will provide an error message.

Users Product Cart:

Figure 9 shows the user product cart page of the online medicine delivery

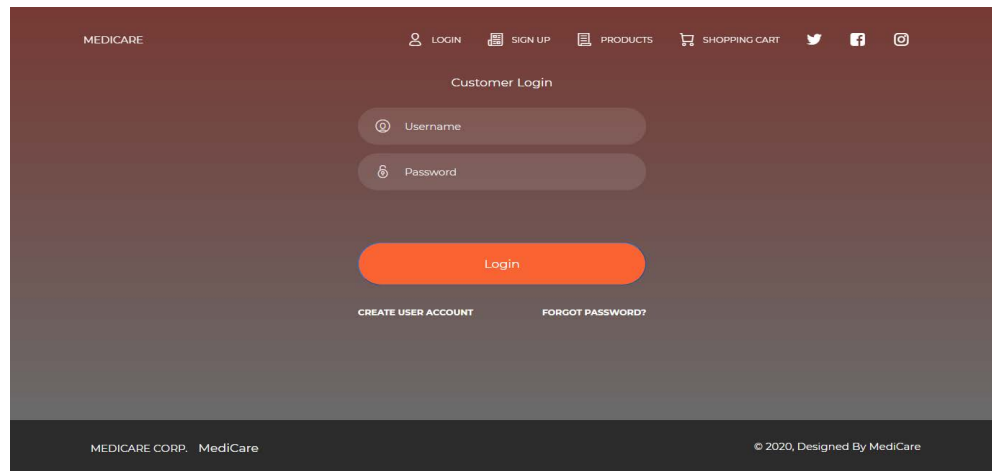


Figure 7. Login page of the system.

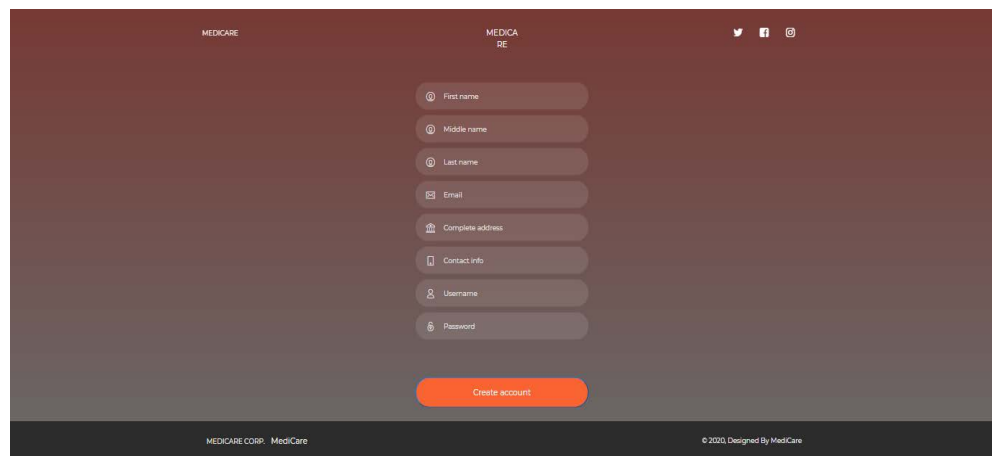


Figure 8. Sign up page of the system.

system. In this section users can buy their selected products. They can see the product quantity, price of individual products. More detailed descriptions about the specific product can be seen. They can update or remove as well of the cart. Finally they can choose the check out option to buy the product.

Admin Panel:

Figure 10 illustrates the Admin panel of the online medicine delivery system. This is a very crucial part of a web application. An admin can control many things on the website. We have the admin panel which mainly has been developed for the administrator of the system who can easily control the website from anywhere providing that he has internet access and the required device. Add product option gives it to the next page where anyone just fills up from and gives

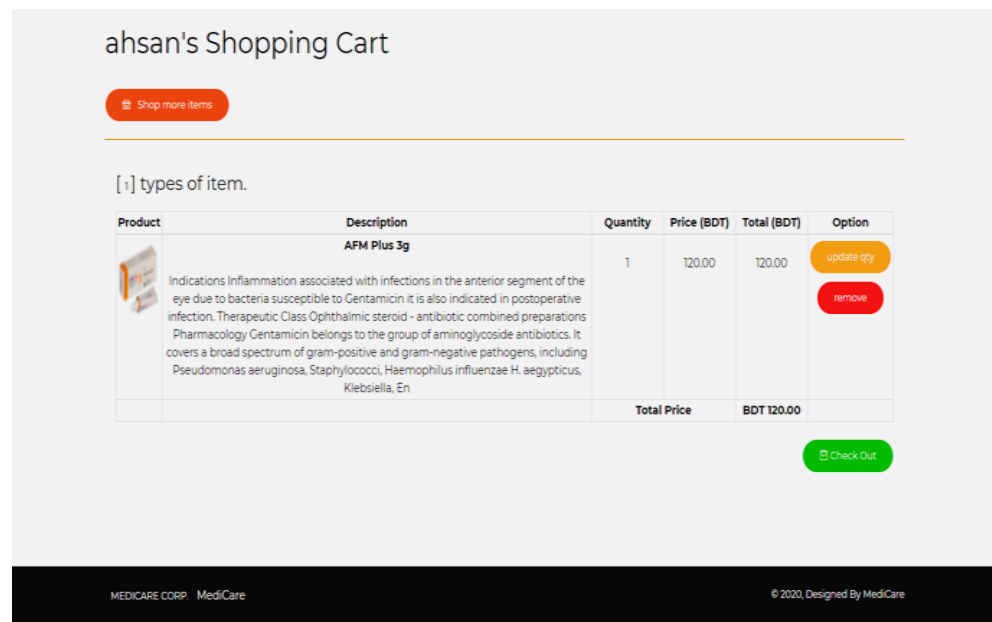


Figure 9. User product cart.

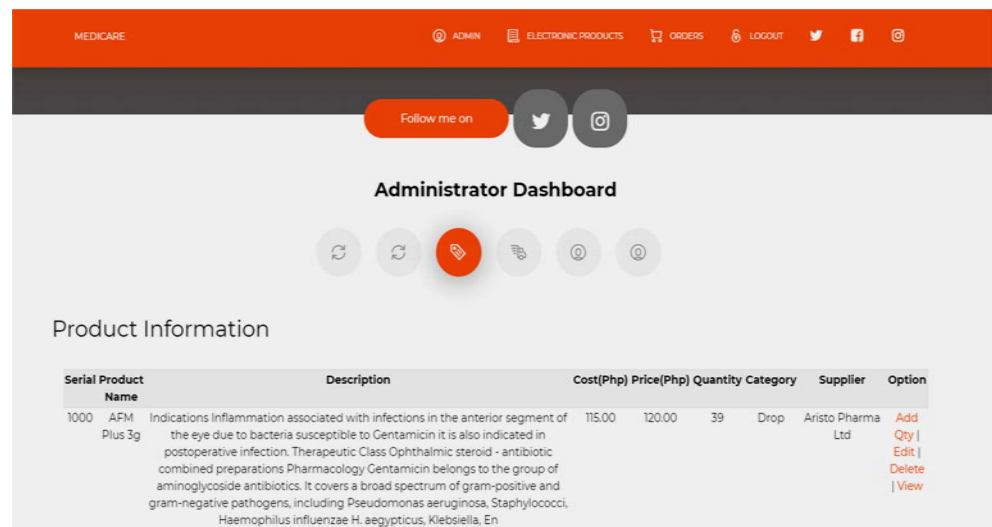


Figure 10. Admin panel of the system.

the input to the new products. Admin can also see the recent activities order list, user panel for any kind of information that happens to the website.

Purchased a Product:

Figure 11 shows the product purchased option. In **Figure 9** this panel is very helpful for admin because here admin can easily select the categories and details of products that the product lists what user can view and select for purchase. More detailed information is provided inside **Figure 11**.

Database System:

Figure 12 illustrates the database of the entire online medicine delivery system. All the information related to the user and the medicine available are stored in this database which acts as a data warehouse. For admin working helping purpose there is also an admin dashboard where admin can see all activities and delivery updates. **Figure 13** provides the admin dashboard of the system.

The screenshot shows a web form titled "Purchased Product Information" with a sub-header "Add Purchased Products". At the top left, there is a "Back to Index" button. The form contains the following fields:

- Product Name:
- Product Description:
- Product Cost (b): (Value e.g. 125.4)
- Product Price (b): (Value e.g. 125.4)
- Quantity: (Value e.g. 123)
- Supplier: (dropdown arrow)
- Category: (dropdown arrow)
- Picture 1 (Front View):
- Picture 2 (Side View):
- Picture 3 (Specifications):
- Serial: (Value e.g. 1234)

At the bottom of the form is a green button with a checkmark and the text "Add Product". The footer of the page contains "MEDICARE CORP. MediCare" on the left and "© 2020, Designed By MediCare" on the right.

Figure 11. Purchased a product.

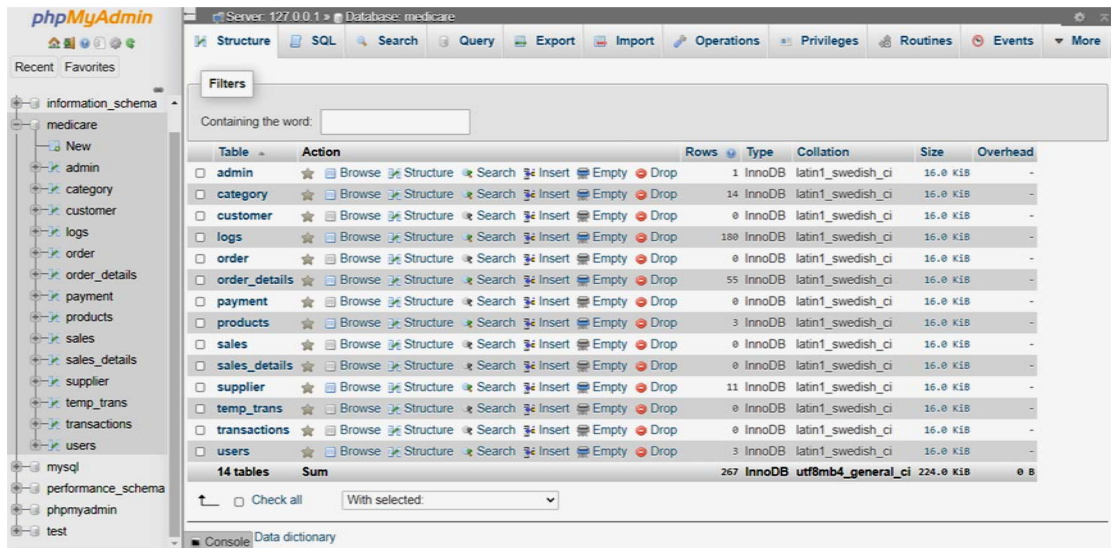


Figure 12. Database of the system.

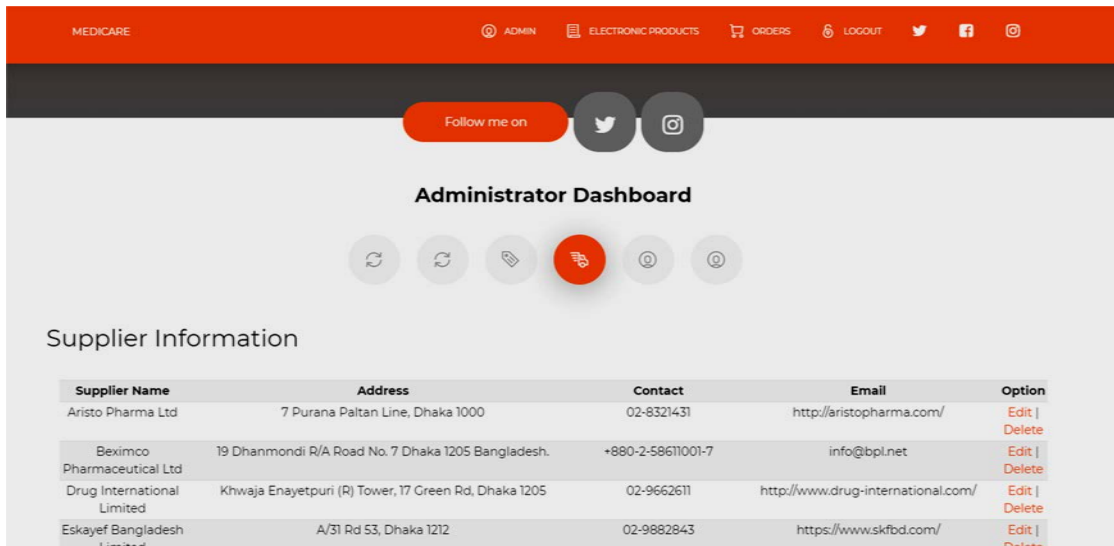


Figure 13. Admin dashboard for the system.

4. Future Work

This chapter discusses the future scope or the implementation of this system. Our online medicine delivery system will be explored with some future plans door to door. In future more extra features will be added. It will include the android mobile application with many advanced features. We have planned to launch this web-application as a business site which will work as an e-commerce site. We will hire some delivery people to deliver the medicines. We also need marketing people to make it available to the wider users of the system. As a startup company it is predicted that it will have huge success by cindering the current demand of this system. After launching when we will have huge customer data and reviews we will apply big data analysis and machine learning technique to get more customers and for suitability of the system.

Future Scope of Work

When we have enough required staffs to operate the business, then we will run this in Dhaka city first for a week as a piloting basis. Then we will move to all over the country. We may need investor to do that. But initially we will operate form the money from our pockets. The money it will generate after selling the products that will make the system sustainable. It is predictable that due to the demanding situation for the COVID-19 this system will be sustainable in the market [8]. We will search for sponsors to share our business plan with investors and they may find benefits in it to invest. Then we will do advertising for our service to attract more clients. This way we can scale up the business more. This is how our site will start growing and there will be a day when people can't think of buying medicines without our site. **Figure 14** shows the future business plan model of the system.

With consumer lifestyles having undergone an unprecedented transformation due to COVID-19, consumer demand patterns can be seen shifting primarily towards purchasing essentials. While supply chain and procurement strategies around the response for COVID-19 are still evolving, the long-term impact on businesses is yet to be seen. They want to facilitate faster delivery of products ordered by the customers. They want their customers to get things delivered at their desired location instead of making them come physically to their store. It is just for giving them a highly positive online shopping experience. The rapid growth of e-commerce has affected offline retailers negatively. The majority of them now see e-commerce as a threat to their business. **Figure 15** is enough to explain how the market of the e-commerce industry is growing rapidly. So, if we talk about e-pharmacy, it is the right time to dig into e-commerce. With the move into the digital platform, many of the vendors will have an option to list and sell their medicines online. The predicted global e-pharmacy market will grow to reach around 128 billion dollars by 2023. It is the right time to dig into the e-commerce industry and stand out among those entrepreneurs who are ready to change the world [7].

5. Design Impact

For the COVID-19 pandemic the whole world is really silent. It looks like everyone is scared about it. But one good thing is that this situation is suitable for

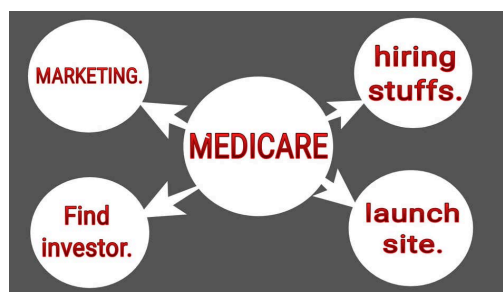


Figure 14. Future business plan model.

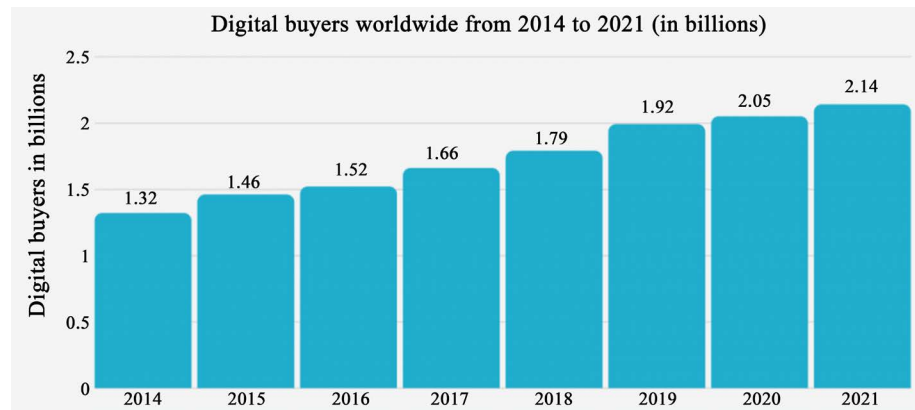


Figure 15. Digital buyers worldwide from 2014 to 2021 [7].

e-commerce businessman to grow and earn more revenue. Now e-commerce is suitable for everyone not only for this purpose but also other purposes. Now it can be seen that the rate of the COVID-19 situation is already growing up [22]. We don't know yet how many days it stays. In this situation people may need to stay at home or maintain social distance if they go out and use masks and other safety measures need to be followed. When someone safety is first an online business can markup with this thing and stay a position. **Figure 16** shows the current trend of COVID diseases. Recently Europe and other countries' second wave of COVID-19 virus has been started which leads to more new cases and new deaths. People may need to stay at home again as a lockdown like before for some countries. Therefore demand for online medicine delivery system will be increased and it will make the system sustainable. In addition the online medicine system helps people in many ways. It saves people's time, money and travel. People can get their items at home easily. The number of chronic patients are increasing in our country and the old people are also huge therefore this system will help the people of different age groups and different professions and different genders in many ways.

This system is innovative here in Bangladesh compared to other available systems in the markets. It is innovative in terms of features, wider range of products, user friendly, safe, secure and fast. The platform has been designed from scratch and standard software tools have been used in this system. It will provide its services to the people of all over Bangladesh 24 hours and seven days a week.

5.1. Economic Impact

The economic impact that this system entails is that by introducing this system in an organization, also cost efficient for the rural level people. This website is the most cost efficient website. Our products will be cheaper from the other pharmacies as we mentioned earlier. We will source the products from the producer directly. This online system will save the time of people and they can spend their time in other work and earn money. Therefore using this system people will be financially benefited.

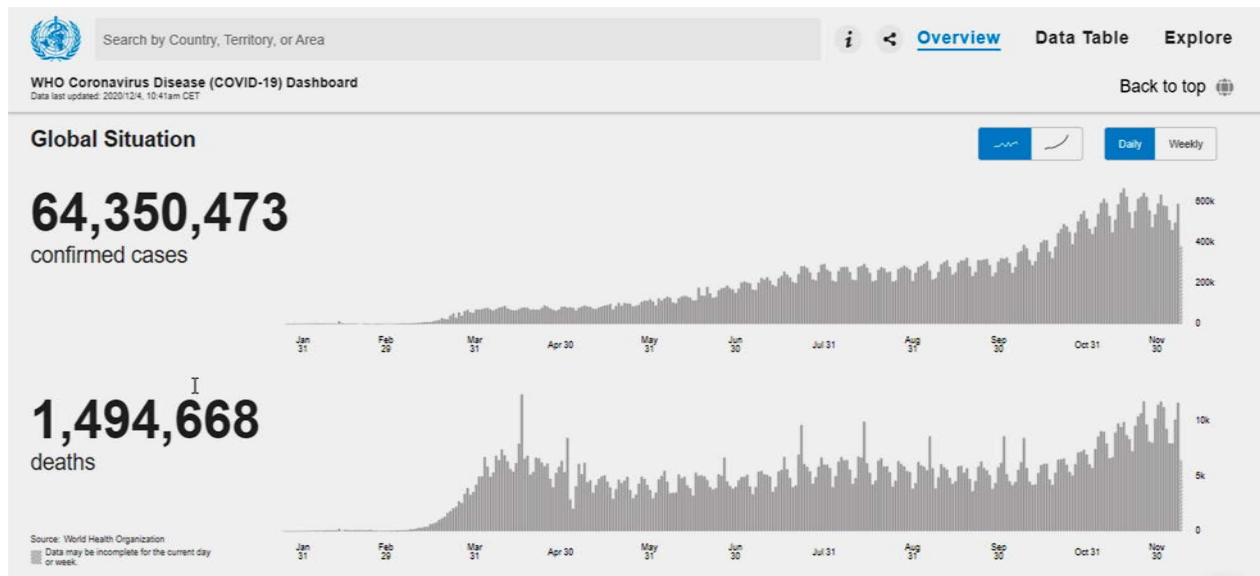


Figure 16. COVID-19 WHO Dashboard.

5.2. Social Impact

An online web based e-commerce medicine delivery system has been developed in this paper. The system is user friendly, innovative, efficient, safe and it has many features. This system will be very good for social impact by providing online medicine. We will offer a reliable and fast web-based e-commerce platform, which gives solutions to recent pandemic and further. We are ensuring a fast delivery system which is safe and reliable. Our web application system has blessed us with a platform in this pandemic situation by giving the opportunity to buy medicine online without facing the current situation. The novel coronavirus disease (COVID-19) has impacted our day to day life in many ways. Production and consumption rate changed significantly to control the spread of COVID-19 pandemic. According to a survey on household consumption in the world, online product delivery has changed substantially due to COVID-19. The health care industry is arguably affected by this disease. Due to restrictions, normal people are having hard time getting to medicine store though these are necessities for humans. This system will allow people to stay at home and to do the online buying of the required medicine. This will help the people. Many jobs will be created when we will launch the system in the market. **Figure 17** shows the coronavirus origin. Coronavirus is the most prominent example of an emerging virus that has crossed the species barrier from wild animals to humans, like SARS and MERS. The origin of SARS-CoV-2 is also suspected to be from an intermediate animal host. The possibility of crossing the species barrier again for the fourth time cannot be ruled out [1]. Therefore the demand of new technology will increase and hence the online medicine delivery system. It is sustainable technology as the world is becoming more industrialized. There are effects of that on the environment. People always need to find new emerging technologies and have to adapt with that changes.

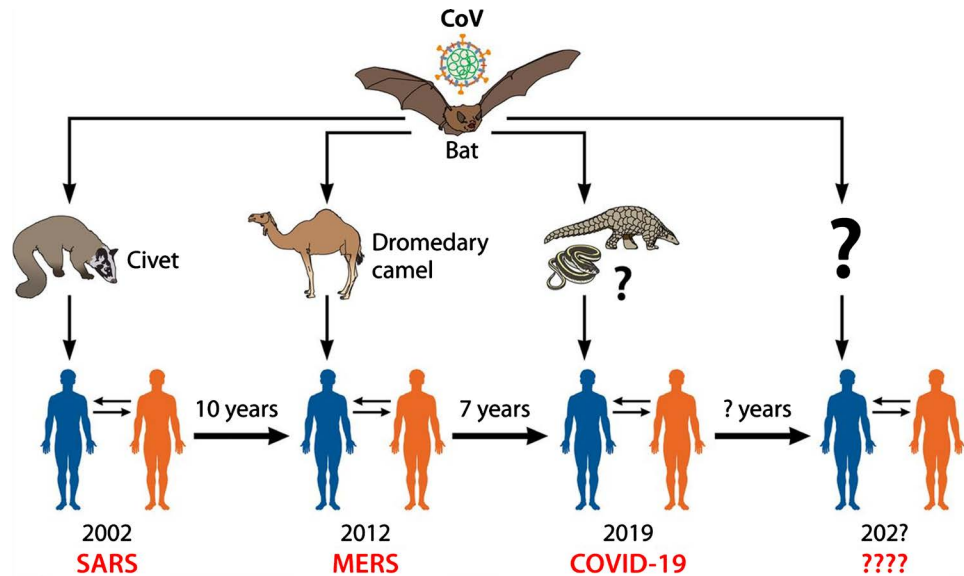


Figure 17. Coronavirus origins [1].

6. Conclusion

E-commerce in Bangladesh is expected to grow exponentially, making it the fastest growing e-commerce market in the world. E-commerce is also witnessing a spurt in medicine service companies, which is expected to reach beyond limits. This paper explores drivers of the growth of such online medicine delivery companies in Bangladesh, the current competition and how this affects the brick-and-mortar medicine business in Bangladesh. The urban lifestyle of the ordinary Bangladeshi is dramatic enough to be favorable for the medicine-on-the-go and home delivery models to grow at high rates. The ever-increasing population of crowded metro cities and longer travel times are drivers for the convenient, ready-to take medicine and cheaper options of having medicine delivered at your doorstep. For some people, buying prescription medicines online offers advantages not available from a local pharmacy. It includes greater availability of medicines for people confined to their homes, or for those who live far from the pharmacy, the ease of being able to compare many sites to find the best prices and products, greater convenience and access to a wide variety of products. The other advantages are easier access to write product information, and references to sources other than what you would typically find in traditional storefront pharmacies, the ability to order products and talk with a pharmacist in the privacy of your home. Internet medicine shopping also claims to save consumers money [23]. Companies that are aware of the huge potential for growth may venture straight in, but only the fittest will survive. The system has a number of advantages as compared to any other services. The web application is scalable and can be extended to a number of cities. It is also mobile compatible. The cost for the development of the application is very low that makes it cost effective. Using this online medicine delivery e-commerce web application system, life expectancy of the people will be increased.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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