

Enhancing Medicine Access with E-Pharmacy using MERN Stack

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Abstract

The worldwide pandemic in 2019 has led major companies to shift from offline to online platforms. This shift has served as a major reason to promote the significance of e-pharmacy in revolutionizing the supply of medicines to consumers worldwide. However, the lack of specific regulatory frameworks has affected the overall market growth of e-pharmacy, causing delays or failures in medicine transactions. The proposed method aims to streamline the transaction process between the consumer and the supplier using verification techniques. The user interface, developed using MERN technology, enhances the availability of medicine, especially for severe diseases like cancer. Furthermore, the research also seeks to reduce the cost of medicine by utilizing government health insurance with additional verification steps to ensure timely, free medicines for those in need. Integrating e-pharmacy with government health insurance policies and verification techniques aims to improve the platform, offering better and free medicine delivery for patients in need.

Keywords: E-Pharmacy, Medicines, User Interface, Claim, MERN, Government Insurance.

1. Introduction

The growing popularity of e-commerce has completely transformed supply chains in the modern world, facilitating much simpler worldwide consumer access to goods and services. However, a lack of proper supply policies or laws has emerged, especially for essential goods like medicines [1]. This results in serious consequences, affecting people's health, especially in emergency conditions. To address this issue, the proposed method aims to develop an E-pharmacy platform using MERN technology [2].

The proposed work enables the consumer to get their prescribed medicines by simply signing in to the user interface. The interface is designed to check patients' health insurance coverage and allow them to purchase medicine at reduced or no cost from vendors [3]. The primary objective of the research is to ensure that everyone, especially the poor suffering from severe diseases, receives their medicines on time and at no cost through government health insurance [4].

Additionally, the proposed work aims to address drug shortages and ensure that medicines are accessible to everyone in need, regardless of their status, by just collecting and analyzing patient details such as patient drug insurance coverage, prescription rates, healthcare expenditures, medication types, and health status. This research seeks to create a more equitable and efficient healthcare ecosystem [5,6].

2. Related Work

The emergence of e-pharmacy has helped people avoid long queues and reduce the time and effort spent going to the nearby pharmacy. It has enabled individuals to purchase their prescribed medicines at the door using their mobile phones. [7].

E-pharmacy not only benefits consumers but also helps vendors by increasing their sales turnover and promoting their business worldwide [8].

AbdAlameer et al [9] presents the details of the essential requirements for building a reliable e-commerce platform and have set up an online computer product selling website that offers direct online sales between the consumers and the seller.

The study in [10] explains about developing an online platform to manage medicine donations using PHP, Apache, and MySQL, and discusses the usability of the e-commerce platform and builds a website by comparing the various languages and the tools available for designing and developing the e-commerce website.

Though the shift from the offline to the online platform has reduced the waiting time and enhanced the convenience of users, it has also introduced new challenges in maintaining consistent services. The study by Song et al. [11] discusses the challenges that affect the growth of online platforms.

Based on the related work studied, the proposed method addressed challenges such as drug shortages and proper medicine delivery by developing a user interface that incorporates verification techniques. This ensures that the right medicine is delivered to the right person at a reduced or no cost, with the help of health insurance coverage. The system is specifically designed for low-income and middle-class individuals in Tamil Nadu, providing them with information about government-provided free health insurance for medical expenses.

3. Proposed Work

The proposed e-pharmacy website is developed using the MERN stack (MongoDB, Express.js, React.js, and Node.js). It was created to simplify medicine delivery and enable low-income and middle-class families in Tamil Nadu to use the government health insurance program (Kaapidu Thitam) for purchasing medications, especially for severe diseases like cancer. The interface collects details about the patient, including their drug insurance coverage, prescription rates, healthcare expenditures, medication types, and health status, and allows them to claim the drug allowance through the website. The registered claims are verified and handled directly by the respective government officials.

3.1 Proposed Model

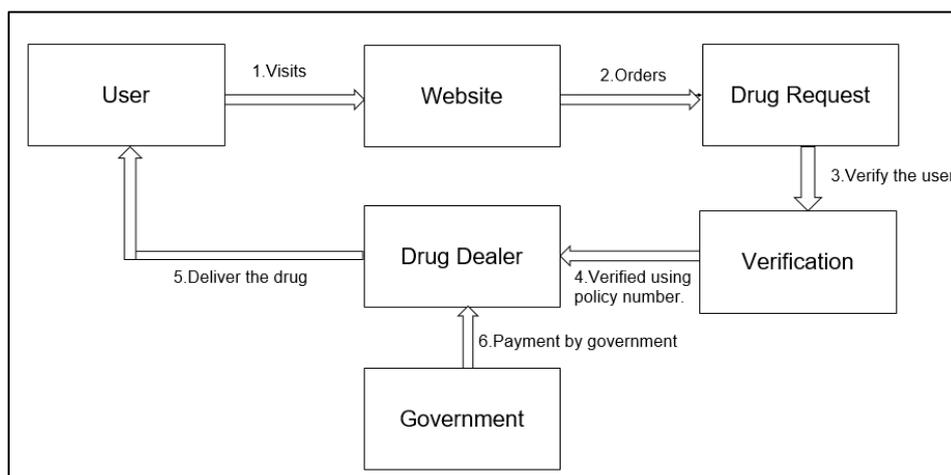


Figure 1. Workflow

Figure 1 depicts the workflow of the proposed e-pharmacy platform. The system is designed to ensure that medicines are delivered to verified users and the payments for the medicines are made by the government through health insurance coverage.

3.1.1 Working

The user visits the website, logs in, and places an order for the prescribed medicine. The order is processed through the drug request system, followed by a verification process. This process collects personal details about the patient, such as the policy number and other relevant information. The collected information is verified, and confirmation is sent to the medicine vendor regarding the user's eligibility to receive the medication under the policy. The government then processes the payment according to the verification details and the policy (Kapidu Thittam) associated with the user, making the payment directly to the vendor.

Information about 500 patients, including their prescription details, health insurance coverage, policy number, and medical expenses, who used the pharmacy services for six months, was collected and stored in a MongoDB database. The collected patient data is cleaned by integrating Python with Node.js, using libraries such as Pandas for handling missing values and regex for standardizing formats.

The API is created using Express.js to interface with the government API for verifying the policy number. The patient details are securely transmitted using the Node.js crypto module to the verification process, and Redis is used for caching verification results to improve response times for repeat requests.

4. Results and Discussion

The proposed e-pharmacy platform is developed using the MERN stack. React.js is used in developing the front-end of the user interface with interactive, responsive, and secure forms of data entry. The interface provides real-time feedback through React state management. Node.js is used in creating the back-end, and Express.js handles the server-side application, managing API requests, and handling business logic. The back-end is responsible for processing the data received from the front-end and interacting with the MongoDB database to store and retrieve patient information, prescription details, and other relevant data. MongoDB's document-oriented structure provides flexibility in managing the varying types of data associated with patient records and prescription histories.

Figures 2-9 visualize the pages of the e-pharmacy platform developed. New users use the sign-up page to register, while registered users log in using the sign-in page. Users can

select items and add them to their cart with a click. Payments through the website are secured using a secure payment gateway.

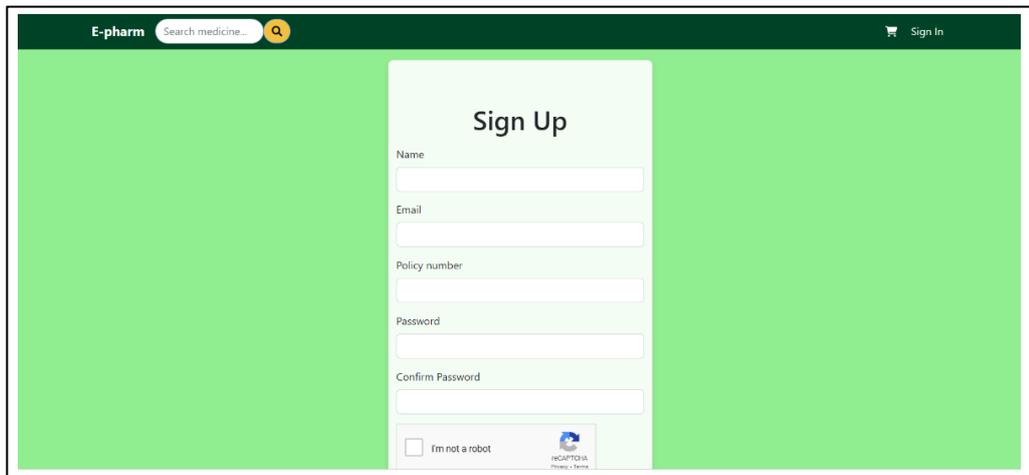


Figure 2. E pharmacy Sign-up Interface

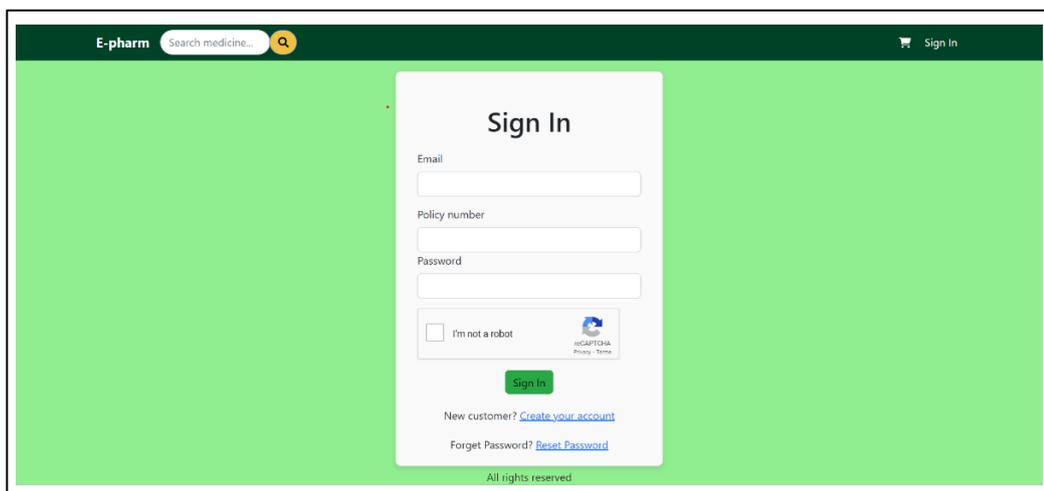


Figure 3. E pharmacy Sign-in Interface

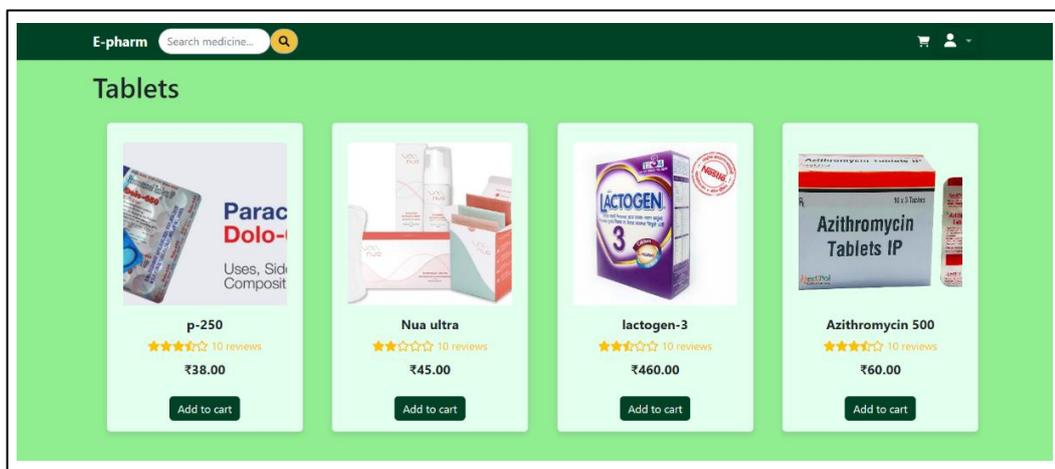


Figure 4. E-pharmacy User Interface

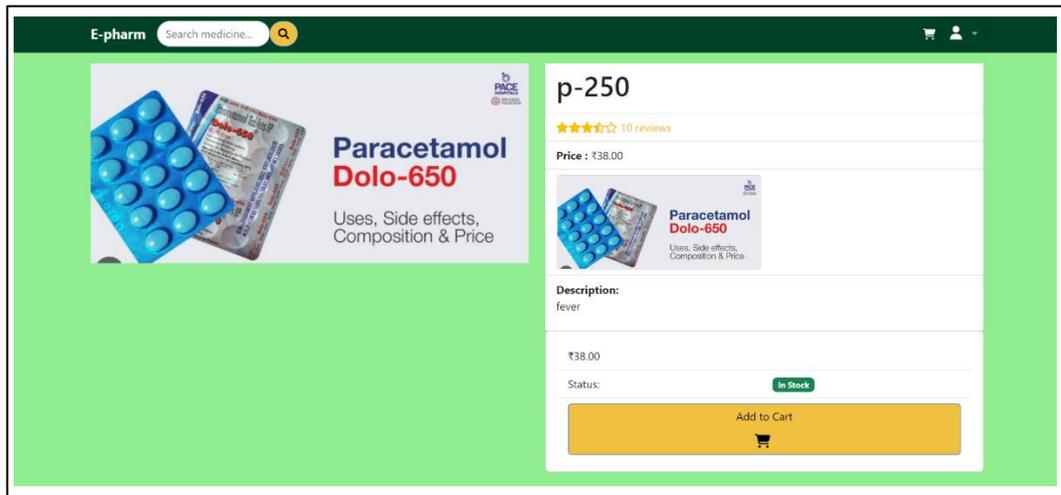


Figure 5. Specific Product Information

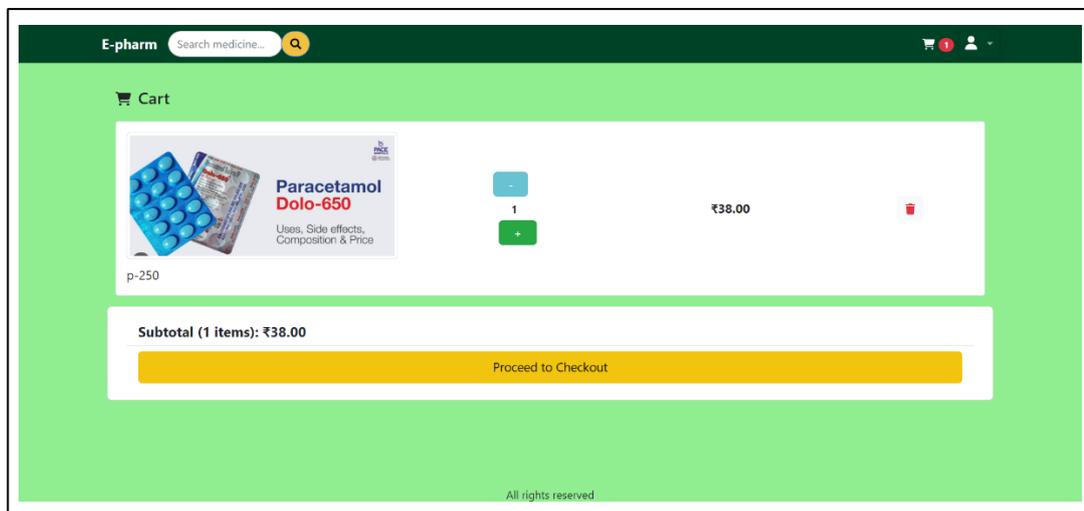


Figure 6. Product Cart Details

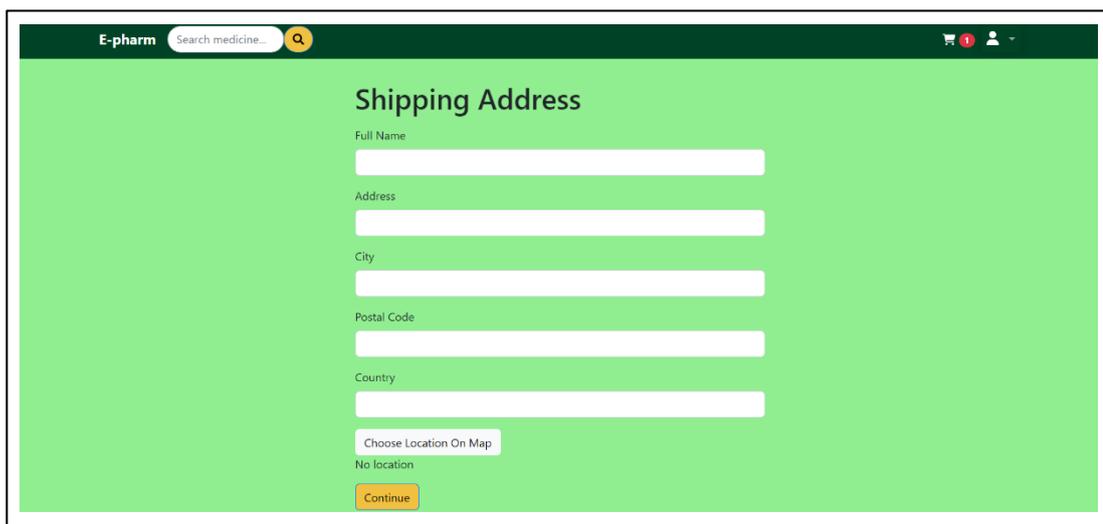


Figure 7. Product Deliver Address

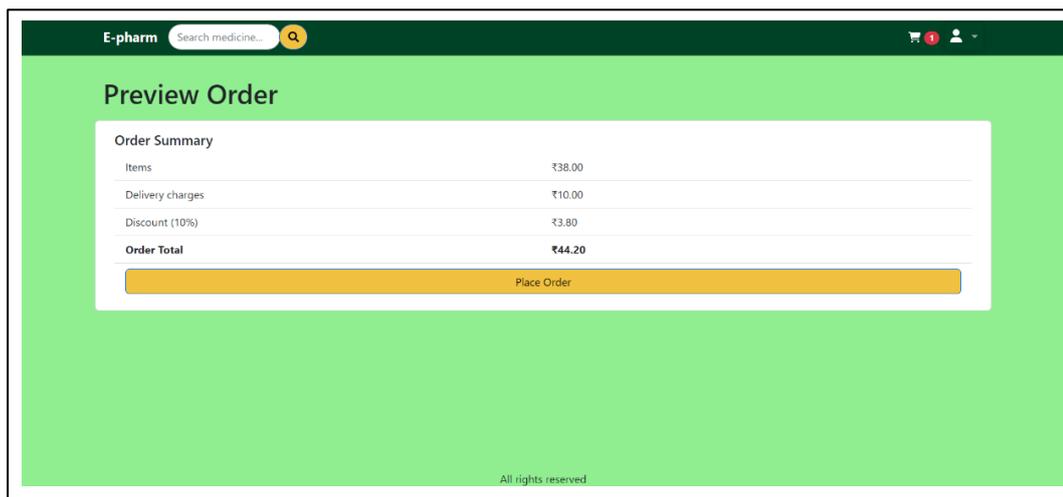


Figure 8. Final Checkout

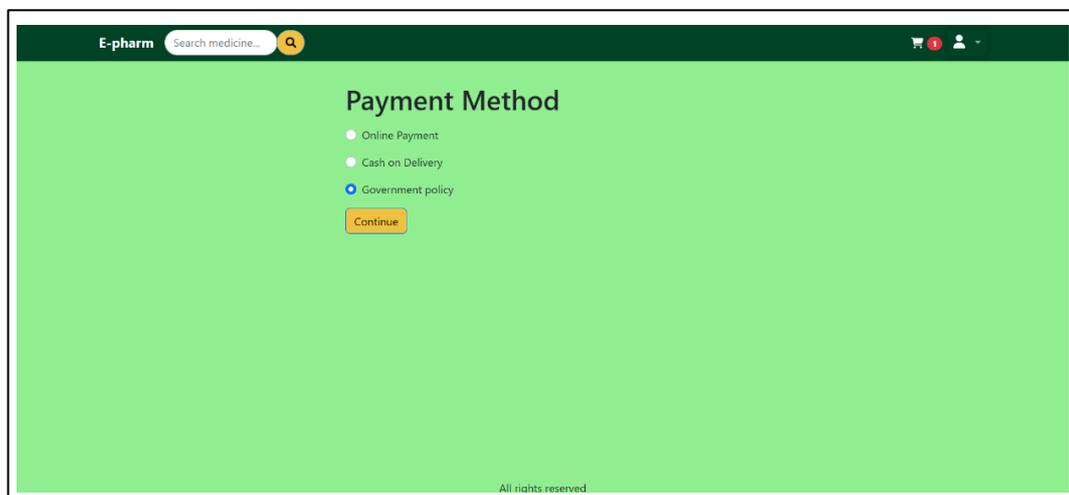


Figure 9. Final Payment Method

Figure 10 shows the impact of the proposed e-pharmacy platform on the pharmaceutical company's income.

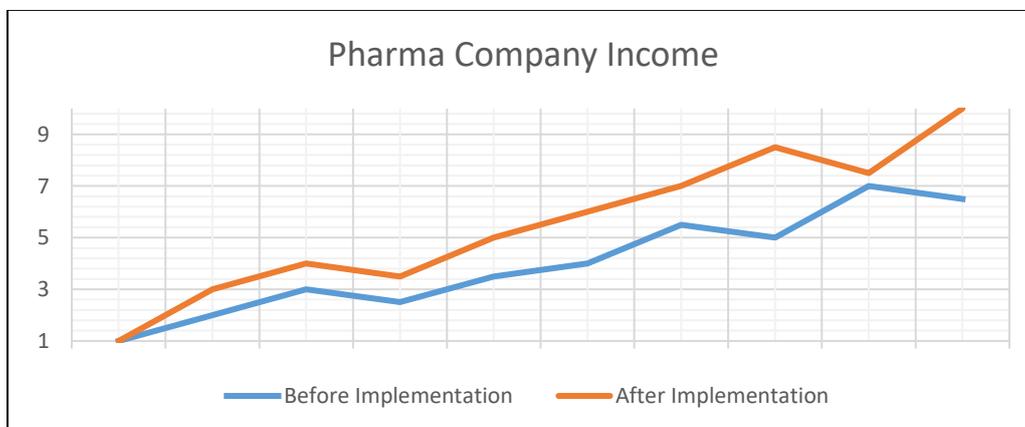


Figure 10. Pharmaceutical Company's Income

Figure 11 denotes the increase in the number of patients benefiting from the platform. The green line represents the number of patients benefiting after implementation, while the red line represents the number of patients benefiting before implementation.

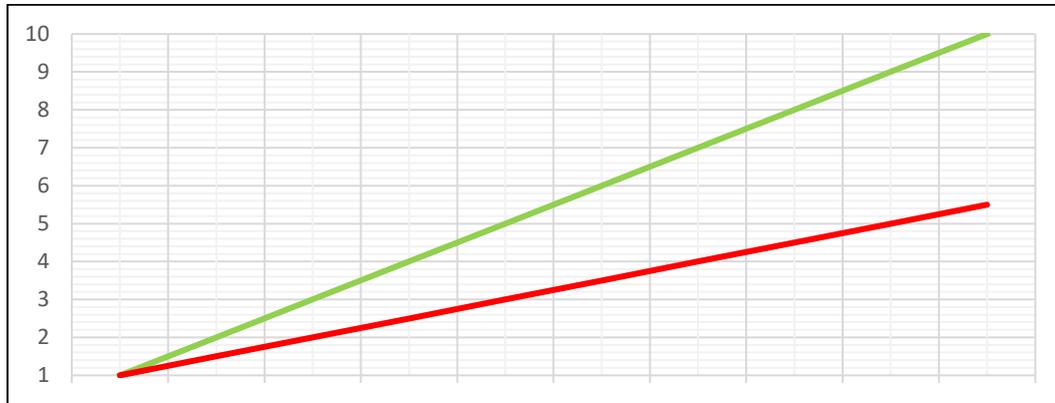


Figure 11. Patient Benefits

5. Conclusion

The proposed e-pharmacy application ensures that patients or consumers with health insurance coverage can easily buy prescribed medicines at reduced or no cost. The website is developed using the MERN stack and includes a verification process to confirm the health insurance coverage of patients. Currently, the site supports 500 patients with Tamil Nadu health insurance (Kaapidu Thitaam). In the future, the website will be updated to support more patients and use machine learning for verification purposes. The platform is designed to ensure that even a common person can receive their prescribed medicines on time.

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