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Comparative Analysis of Consumer Buying Behavior for Medicines in Offline and Online Pharmacies

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ABSTRACT: The rapid growth of e-commerce has transformed the pharmaceutical sector by providing consumers with convenient access to medicines through online pharmacies. Despite these advancements, many consumers continue to prefer offline pharmacies because of greater trust, face-to-face interaction with pharmacists, and immediate professional consultation. At the same time, concerns related to online pharmacies, such as authenticity of medicines, data privacy, delivery delays, and limited personal guidance, remain important but are not yet fully understood. With the increasing demand for accessible healthcare services, both online and offline pharmacy channels play significant roles in meeting consumer needs. However, various factors influence consumers' purchasing preferences and overall satisfaction with each mode. Therefore, this study aims to identify the key parameters that contribute to higher customer satisfaction and influence buying behavior. A public survey titled "Comparative Analysis of Consumer Buying Behavior for Medicines in Offline and Online Pharmacies" was conducted in Moradabad, Uttar Pradesh, India. Survey responses were analyzed and visualized using a Power BI dashboard to derive meaningful insights.

Keywords: Artificial Intelligence, Business Intelligence, knowledge, pharmacies Power BI, survey, customer

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1. Introduction

Consumer behavior involves examining how individuals, groups, or organizations make decisions about acquiring, using, and discarding products, services, experiences, or ideas to fulfill their needs. It also looks at how these actions affect both consumers and society. Gaining insight into consumer behavior is essential for successful marketing, as it enables marketers to pinpoint the right audience and develop and promote offerings that appeal to them. [1]

The pharmaceutical industry holds a prominent position in the economy of any nation. Meanwhile, the Internet has become one of the most extensively used technologies and digital platforms, attracting widespread global attention. Its influence is undeniably significant in many areas of modern life. In the Asia-Pacific region, India stands out with the highest number of internet users and ranks third globally in terms of internet usage. According to Equity master, India's pharmaceutical market was valued at approximately US$ 41 billion in 2021, placing it seventeenth worldwide in terms of market value. [2,3]

An online pharmacy is a digital platform where sellers offer both generic and branded medications through websites and mail-order services. These platforms function as internet-based pharmacies, giving consumers convenient access to a wide range of medicines, including

over-the-counter (OTC) drugs, alternative or complementary treatments, and prescription-only medications. These digital pharmacies are commonly referred to as e-pharmacies, cyber pharmacies, or simply online pharmacies.[4]

The internet has become one of the most powerful and widely used platforms, offering vast opportunities for companies—commonly known as e-commerce businesses—to promote and sell their products and services worldwide. E-pharmacy is a branch of e-commerce where sellers provide medicines, health-related products, and similar items through digital platforms like mobile apps or websites.[5]

Businesses are investing in e-commerce industry for online pharmacy services due to the growing demand for online health-care products and services globally.[6]

Consumers can benefit from e-pharmacies in many ways, such as cost savings, time efficiency, convenience, increased availability and authenticity of medications, ease of access to medications, refund policies, facilitated cost and side effect comparison of medications, improved customer information and information exchange, customer privacy, home delivery, expedited distribution, and convenience for some patients and elderly people who are unable to leave their homes.[7]

In India, 1MG, PharmEasy, Netmeds, and Medlife are a few well-known online pharmacies. These platforms provide a variety of services, such as lab testing, e-consultations, and e-pharmacy.[8]

Analytics is the study of analyzing unprocessed data in order to make inferences and use those findings to inform decisions. In business intelligence, visualizations such as dashboards, bar charts, and scatter plots are crucial tools because they enable managers to swiftly and effectively make informed decisions about their business plans.[9]

Particularly useful to managers are dashboards, which display numerous charts and graphs that provide the most recent data regarding datasets. [9,10]

To create dynamic and informative dashboards and reports, a variety of data visualization technologies are available, including Tableau and Power BI. Additionally, data visualization is done via Qlik Sense, Looker Studio, Sisense, and Domo.[11]

Artificial Intelligence (AI) and Business Intelligence (BI) have shown enormous promise in bringing about a new era in the healthcare sector by significantly improving the way data is interpreted and handled.[12]

Microsoft Power BI is a data analytics and business intelligence application that helps users make decisions based on insights from interactive dashboards. Power BI facilitates sharing with colleagues within the company and publishing dashboards and reports. Area charts, stacked charts, tree maps, bubble plots, cards, gauge charts, slicers, matrices, histograms, line charts, pie charts, doughnut charts, and geospatial maps are examples of interactive and dynamic visualization charts for real-time data that facilitate improved visualization and decision-making through dashboards and reports. [13,14] A BI application

prototype has been created that enables the visualization of indicators and activity analysis based on the findings.[15]

2. Review of Literature

Ajax R, *et.al.,* 2025 explored the era of big data, organizations require advanced tools to transform raw data into actionable insights. Data visualization tools improve the efficacy of business intelligence (BI), which is essential for decision-making, by displaying complex data in an understandable, graphical manner. This study examines how visualization tools like Tableau, Power BI, and Google Data Studio enhance pattern recognition, support real-time data analysis, and influence critical business choices. Data-driven cultures can be promoted, performance can be optimized, and trends can be found by using dashboards, infographics, and interactive reports. The difficulties of data visualization, such as data accuracy, user accessibility, and interface with current BI systems, are also examined in the study. Implementing data visualization technologies ultimately enables businesses to make better, quicker decisions, increasing their total productivity and competitiveness in the digital market. [16]

Julianto T., *et.al.,* 2024 explores the Bekasi City area to evaluate the impact of price, product, and accessibility on purchasing decisions for medications in online and offline pharmacy services. This study used a quantitative methodology to gather data from 200 respondents who used pharmaceutical services both online and offline. The respondents were given questionnaires. Price and accessibility can have a small impact on customer purchase decisions, according to the study's findings, but the availability of a larger selection of products—especially from online pharmacies—has a greater impact.[17]

According to Mishra P. *et al.,* 2024, consumers' purchasing behavior towards e-pharmacies is examined from the standpoint of consumption values. They also provide a value frame of reference that aids in comprehending the reasons behind consumers' purchases, which influences their behavior after initial adoption. Additionally, the moderation study of online customer interaction adds another level of insight into consumer purchasing patterns with regard to e-pharmacy.[18]

In 2024, Bahamda A.L. *et al.,* conducted a cross-sectional study to evaluate Saudi Arabian consumers' attitudes, perceptions, and satisfaction with e-pharmacy services. They discovered that, despite a moderate level of satisfaction with personalized care and service quality, customers continue to prefer traditional pharmacies.[19]

Ponduri, S. B., *et al.,* 2023, looked at the quick changes in the pharmaceutical and medical industries. Online pharmacies, or e-pharmacies, have replaced traditional pharmacies. One way to sell and deliver medications to clients' doorsteps is through an online pharmacy. The primary focus of this study is on the variables that affect internet pharmacy' acceptance and uptake. Exogenous influences, situational factors, buyer's habits, perceived risk, trust, customers' health literacy, social influence, hedonic motivation, price value, effort expectation, performance expectancy, and prior internet purchasing experiences are all known to have an impact. There are still some restrictions, such as the possibility of fraud and illicit websites. Companies must utilize marketing campaigns to boost confidence and implement a return mechanism for unneeded medications before they expire in order to get around these restrictions. It also implies that only prescriptions from doctors should be used to market illegal substances like H and X. This study offers a paradigm to improve researchers' comprehension of e-pharmacies' acceptance and uptake. [20]

Limbu, Y. B., *et.al*., 2023 explored that 35% of American customers have bought medication for themselves or someone in their care from an online pharmacy (also known as an e-pharmacy, internet pharmacy, or cyber pharmacy), according to a poll by the Alliance for Safe Online Pharmacies. Online pharmacies use electronic means, such as websites, social media, or mobile applications, to sell or dispense pharmaceutical medications or other medical treatments that are subject to government regulation. Because online pharmacies offer convenience, accessibility, and cost savings, consumer purchases from them are still increasing quickly.[21]

According to Dudziak A. *et al.*, 2023, researchers and marketing experts study consumer behavior in the market because it is a significant aspect of economics. They added that the 4Ps concept is a crucial factor to take into account. One of the fundamental techniques of marketing management is the 4P idea, sometimes referred to as the "marketing mix," which is made up of four components: promotion, distribution (sometimes called "place"), price, and product. Customers' perceptions of a product and its marketability are influenced by these elements. [22]

The study conducted by Abdulla, M., *et al.* in 2022, examines the impact of the COVID-19 pandemic on e-commerce and online shopping in China, the United States, and the United Kingdom. The data from 2019—the pre-pandemic year—and 2020—the COVID-19 peak year—will be compared in this research. This is accomplished by using the Google Scholar website to gather information from 28 foreign databases and internet sources. Microsoft Excel and Microsoft Power BI are the two programs used in this article for data analytics and data

visualization techniques. Microsoft Power BI was chosen as a data visualization tool because it facilitates intuitive collaboration and can create a variety of visualizations, including pie charts and bar graphs. COVID-19 has led to an increase in online sales in all three countries. It went up from $1,232.6 to $1,414.3 billion in China, from $598.0 to $791.7 billion in the US, and from $89.0 to $130.6 in the UK (United Kingdom). Additionally, e-commerce has grown. From $2297.0 billion in China to $795.0 billion in the US (United States) and $180.0 billion in the UK, it has grown.[23]

Roy P, *et.al.,* 2022 study looks at consumer purchasing patterns and determines what factors affect consumers' decisions to shop online and offline prior to, during, and after the COVID-19 pandemic. They emphasized factors like offers, payment options, and convenience—all of which are crucial considerations when buying medications. [24]

Bansal, S., *et.al.,* 2022 worked on the study, which was conducted at the Department of Pharmacology, PGIMER, Chandigarh, is to evaluate the Indian population's knowledge, attitude, and practices (KAP) on e-pharmacies. Prescription medications were found to be the most popular medications that respondents were willing to purchase online, followed by cosmetics and dietary supplements. The majority of consumers use the Internet to look for prescriptions, but they prefer to speak with a doctor before making a purchase, according to our findings. Therefore, if users have some clear instructions, awareness, and information, the future of online pharmacies can be better.[25]

Ismajli, A, *et.al.,* 2022 evaluated the effect of the COVID-19 pandemic on online shopping in the context of Kosovo and came to the conclusion that the pandemic had a positive effect on online shopping since, according to the data we have collected, online shopping has increased during this time. [26]

In their 2021 study, Moon, J., *et al.*, examined the traits of customers who shopped offline during the pandemic. In order to examine the factors that will be used to choose online or offline shopping channels during the pandemic, participants were also asked how frequently they would use both modes of shopping once society had stabilized from COVID-19.[27]

Becker, L. T, *et. al.,* 2019 explored Power BI is a user-friendly—but potentially underutilized—tool that may be used to aggregate, analyze, visualize, and distribute data from the diverse data sources that are encountered in library operations. [28]

Fatima S, *et. al.,* study focusses on the online purchasing habits of pharmaceuticals. Researchers also sought to understand how consumer purchasing habits differed between

generic and non-generic medications. 128 respondents completed a survey, and they used a questionnaire to gather primary data. Since medications can be an emergency, they concluded that internet pharmacies have to take steps to enhance their distribution system. Due to delayed delivery, many respondents had negative experiences with internet pharmacies. Also, in order to serve clients in a better way, generic medication ideas ought to be offered when they seek for medications. To help people in times of need, payment terms and conditions might be updated to include features like a 15-day credit. There are additional duties for the vendor when selling medications online. Having insufficient information can cause serious issues. Additionally, consumption warnings must to be made explicit. Customers should be educated by the details of each medication, including dose according to age group and any side effects. Since improper drug handling can result in major health risks, online pharmacies should do more than just sell; they need also educate and raise awareness among their clientele because taking medications is never enjoyable.[29]

According to Bhargava, M., et al. (2018), data visualization is the process of understanding the significance of data through visual context and is a component of analytics. There are a variety of dynamic and interactive data visualization techniques, and when it comes to visual context, there are a variety of items like tables, matrices, plots, graphs, slicers, stacked column charts, histograms, bar charts, and other visual contexts. Additionally, they emphasized interactive data visualization using the Microsoft Power BI tool. Microsoft Power BI is a suite of business intelligence and analytics tools for data analysis, insight sharing, and speedy response times. Its dashboards are accessible on all devices, including desktops, mobile devices, and applications. The user or individual can more easily and conveniently comprehend the data with the aid of images and filters. They stated that there are seven steps in the Power BI Process model: GET DATA, FETCH, PROCESS, ANALYSE, VISUALISE, EDITING, and WEB.[30]

3. Objectives:

The objectives of the topic are:

- To collect research material from the consumers to enable the segmentation regarding the purchasing behavior for medicines.
- To identify consumer attitudes and compare customer behavior, satisfaction, and trust levels between online and offline pharmacies.
- To list down the problems associated with online pharmacies and offline pharmacies.

- To analyze the impact of offers, delivery speed, customer service on customer choices.
- To provide recommendations to improve both online and offline pharmacy services as per the customer insights.

4. Methodology:

The methodology will include:

- Primary data collection through survey questionnaire
- Study of the existing research paper to analyze the consumers insights from different regions.

5. Design of Google Form for a Survey

The questionnaire contained various sections regarding the Demographic, purchasing behavior, online and offline pharmacy experience and the future predictions.

- **Name of the consumer:**
- **Demographic Questions (For segmentation & customer profiling)**
  - **Gender:** Male, Female.
- **Purchasing Behavior (Online vs. Offline Preference)**
  - **How often do you buy medicines?**

    Weekly

    Monthly

    Quarterly

    Rarely
  - **Where do you mostly buy your medicines?**

    Online Pharmacy

    Offline Pharmacy

    Both equally
  - **What factors influence your choice of pharmacy?**

    Price

    Convenience

    Availability of medicines

    Customer support

    Discounts & Offers

    Prescription Requirements

Closer Location

- **Online Pharmacy Experience**
  - **How satisfied are you with online pharmacies?**

    Very satisfied

    Satisfied

    Neutral

    Dissatisfied

    Very dissatisfied
  - **Which factor builds trust in an online pharmacy**?

    Well-known brand

    Customer reviews

    Doctor/pharmacist recommendation

    Secure payment & return policy
  - **Have you faced issues with online pharmacies?**

    Yes (Delivery delays, Fake medicines, technical issues)

    No

6. **Offline Pharmacy Experience**
   - **How satisfied are you with offline pharmacies?**

     Satisfied

     Neutral

     Not Satisfied
   - **Do you always buy medicines from the same pharmacy/store?**

     Yes, I prefer a single store

     No, I switch based on offers/convenience
7. **Future Preferences & Predictions**
   - **Would you switch to online pharmacies if they offered better discounts?**

     Yes

     No

     Maybe
   - **Would you completely switch to online pharmacies if regulations & services improve?**

     Yes

     No

     Maybe
   - **What features would make online pharmacies more attractive?**

Faster delivery

Cheaper prices

Subscription plans

Better customer support

Wide product range

Easier returns

8. Implementation of Project

A survey was conducted in a group of people and the response from total 136 respondents has been recorded, from which the results has been concluded.

8.1 Demographic Segmentation

Out of total 136, 66 were female and 70 were male respondents, from which the consumer buying behavior for Medicines in Offline and Online pharmacies were evaluated. This is depicted by using donut chart in the dashboard (as in **Figure 1**).

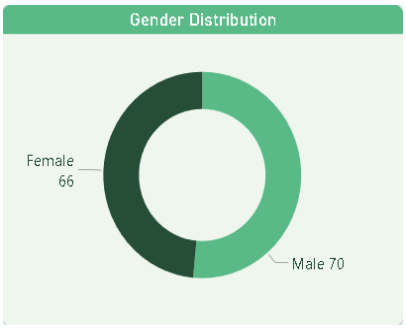


Figure 1. Graphical representation showing gender distribution

8.2 Purchasing Behavior Of Consumers

According to the survey, purchasing frequency of consumers are such that 57 respondents buy medicines on monthly basis, 35 candidates need medicines rarely, 20 among them buy weekly, 15 users buy medicines quarterly, 9 buys medicines daily. This is represented by the help of stacked column chart in the dashboard (represented in **Figure 2**).

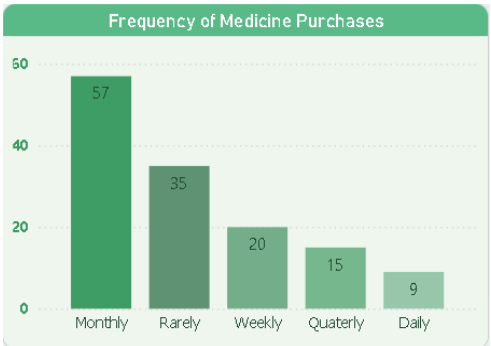


Figure 2. Graph representing frequency of medicine purchases by users.

Among the total respondents, 62 consumers buy medicines through offline pharmacy, 46 consumers buy medicines through online pharmacy and rest 28 consumers use offline and online pharmacy equally. This is represented by the help of stacked bar chart in the dashboard (shown in Figure **3**).

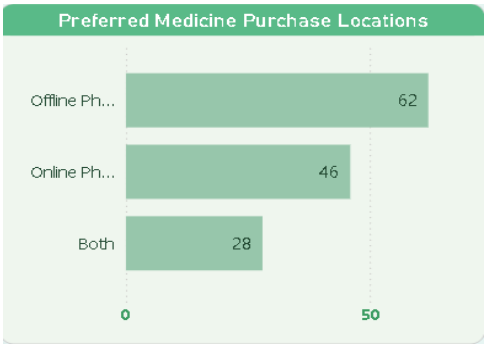


Figure 3. Graphical representation showing preferred medicines purchase location

The major factors which influence the consumers towards offline and online pharmacy are discounts and offers as 34 consumers are attracted due to this reason, 31 respondents marked attraction due to availability of medicines, 21 respondents relay on convenience for purchase, 17 users need prescription based drugs, 13 gave importance to customer support while purchasing medicines, 13 consumers attracted towards affordable price and 7 respondents gave preference to closer location for buying drugs easier. Stacked bar chart is used to represent the responses in the dashboard (depicted in Figure **4**).

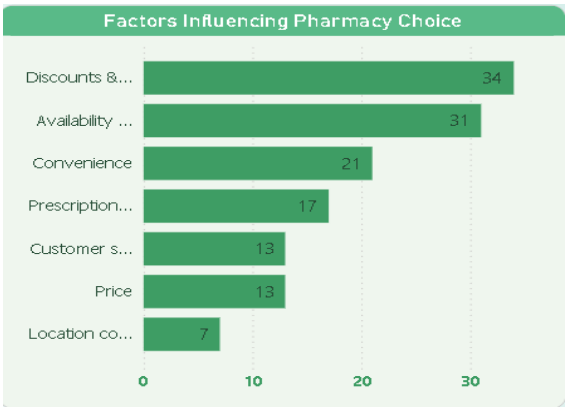


Figure 4. Stacked bar chart representing factors which influence the consumers towards offline and online pharmacy

8.3 Satisfaction Level With Online Pharmacy

According to the survey, 09 consumers responded that they are very satisfied with the online pharmacy, 63 consumers responded that they are satisfied, 45 responded neutral satisfaction level towards the offline pharmacy, 8 candidates responded for the dissatisfaction towards offline pharmacy and also 8 felt highly dissatisfied with the online pharmacy. This is represented by the help of stacked column chart in the dashboard (shown in Fig. **5**).

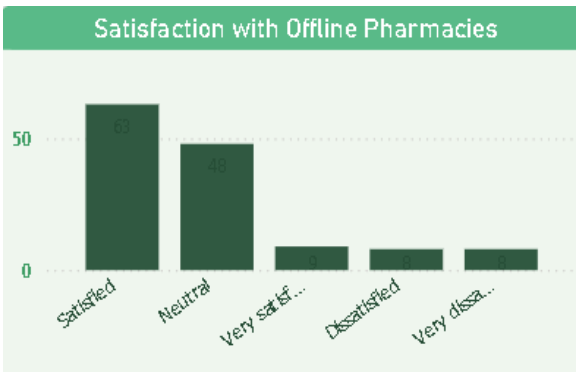


Fig. 5: Graphical representation presenting consumer's satisfaction level with online pharmacy

As per the consumers, there are various factors which builds trust in an online pharmacy are such as 47 use it due to well-known brand, 35 users used it due to good customer reviews, 29 founds a secure payment mode & return policy and rest 25 users trust upon doctor/pharmacist recommendation in online pharmacy. Donut chard is used to represent the consumer response in the dashboard (depicted in Figure **6**).

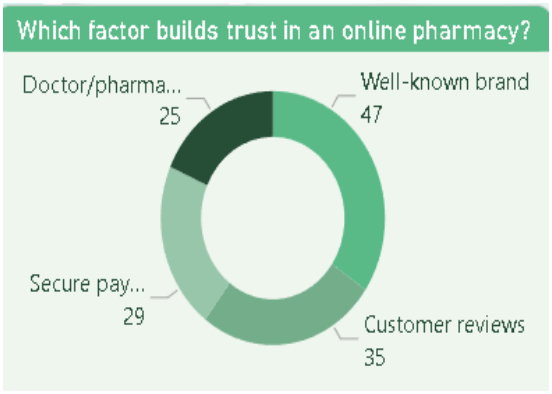


Figure 6. Pictorial representation showing the factors which builds trust in an online pharmacy

According to the survey, 44 consumer faced issues with online pharmacies such as late delivery, fake medicines and rest 92 consumers never face any problem. This is represented by the help of pie chart in the dashboard (represented in Figure **7**).

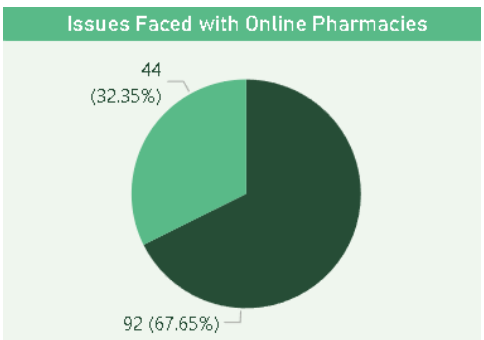


Figure 7. Graphical representation showing number of consumers faced issues

8.4 Satisfaction Level With Offline Pharmacy

Moreover, 58 consumers responded that they are very satisfied with the offline pharmacy, 45 consumers responded that they are satisfied, 32 responded neutral satisfaction level towards the offline pharmacy and also 1 candidate responded for the dissatisfaction towards offline pharmacy. This is represented by the help of stacked column chart in the dashboard (as in **Fig. 8**).



Figure 8. Graph representing consumer's satisfaction level with offline pharmacy

Responses from the consumers clearly depicts 68 candidates prefer single store for buying medicines. Rest, 68 Candidates move according to the offers/convenience to the different stores. Stacked column chart is used to represent the responses in the dashboard (represented in Figure **9**)

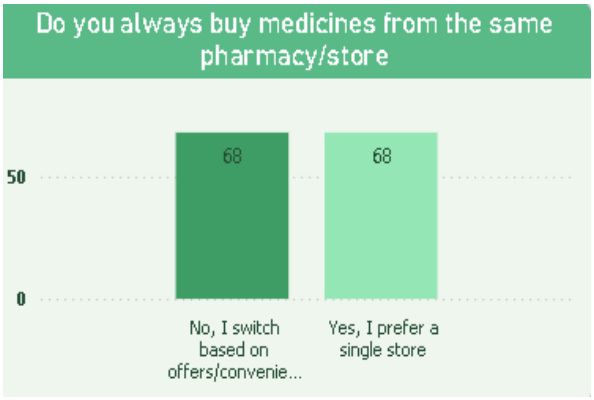


Figure 9. Pictorial representation showing the preference of consumers for buying the medicines from same or different stores

8.5 Future Predictions

According to survey, 116 respondents think to move towards online pharmacies if they offered better discounts. 14 are still in confusion and 4 users denied to move towards online pharmacy even after better discounts. Stacked bar chart is used to depicts the consumers response (depicted in Figure **10**).

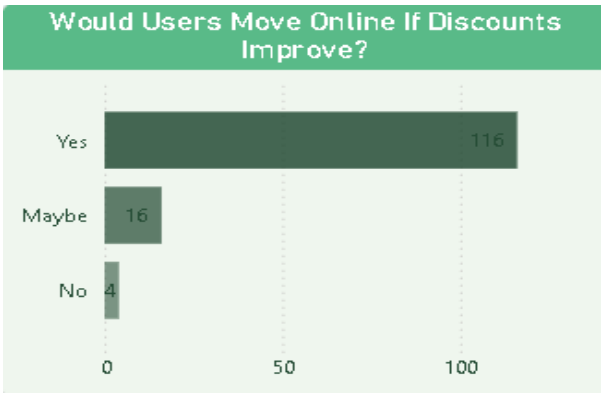


Figure 10. Graph representing the interest of consumers to move towards online pharmacies due to better offers

According to survey, 100 consumers will go for online shopping if they improve regulations and services for the customers. 14 are still in confusion and rest 14 users denied to move towards online pharmacy even if they improve services and regulations. This is represented by the help of stacked bar chart in the dashboard (marked in **Figure 11**).

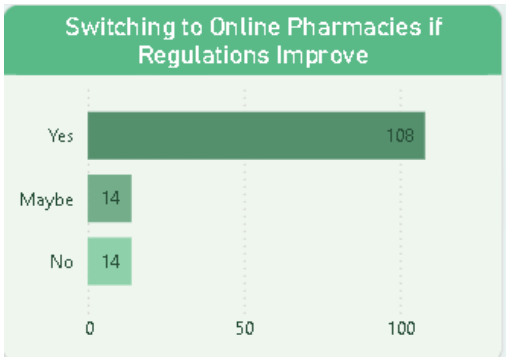


Figure 11. Graphical representation showing consumer's behavior for online shopping if they improve regulations and services

According to the consumers, various features make online pharmacy attractive, such as 55 users attracted due to faster delivery, 34 purchase online medicines due to better customer support, 27 attracts towards the cheaper prices, 9 consumers move towards online pharmacy due to easier returns, 6 consumers found the subscription plans as an attractive feature and rest 6 shows interest in the wide range products. This is represented by the help of stacked column chart in the dashboard (shown in **Figure 12**)

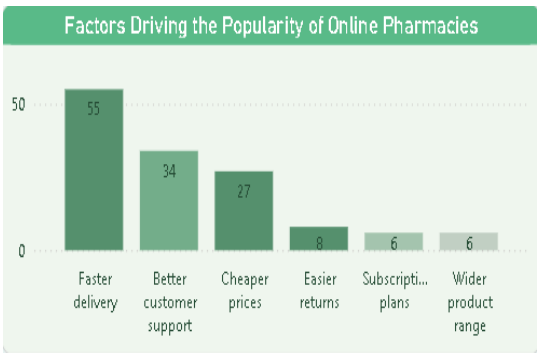


Figure 12. Graph showing various features that make online pharmacy attractive.

9. POWER BI DASHBOARD

Here is a Power BI dashboard (as depicted in Figure 13 and Figure 14), which helps visualize the data in the form of various graphs and to analyze the findings on the basis of results by applying various filters.

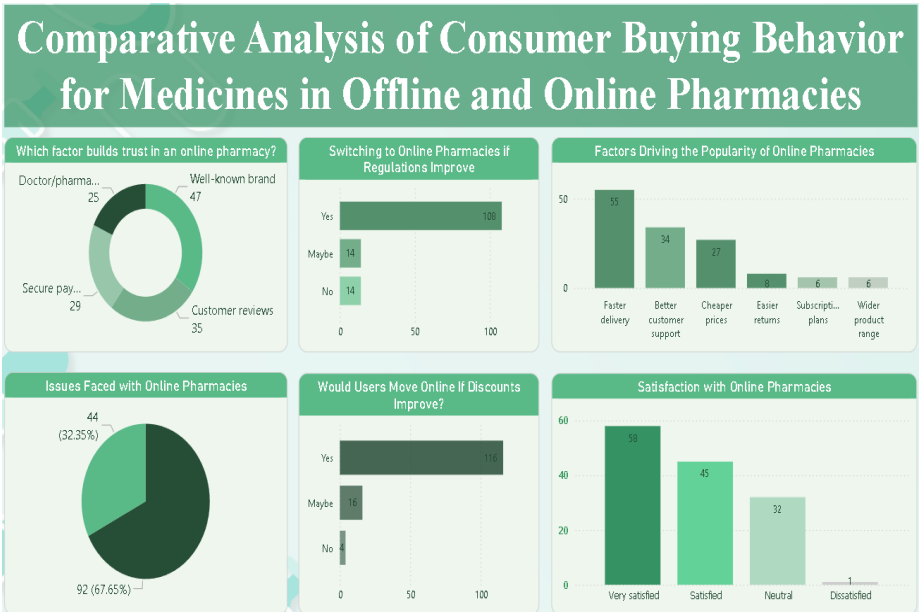


Figure 13. Representation of Power BI dashboard (A)

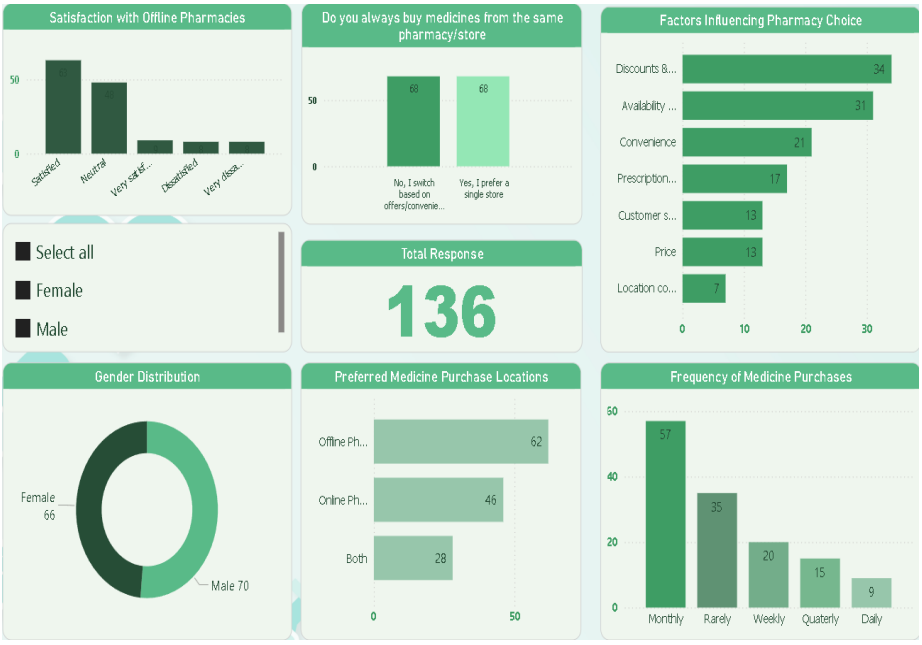


Figure 14. Representation of Power BI dashboard (B)

10. Conclusions

According to survey, most of the consumers likely to go with offline pharmacies instead of online pharmacies as per their preference**.**

India should implement strong telemedicine and e-health regulations in order to advance the e-pharmacy system.

- Self-medication may be encouraged by online pharmacies, which may result in the irrational use of medications. So, a proper consultation and the effective communication need to be given to the patients while confirming the orders and they can suggest for the proper consultation if required in case of severe conditions.
- Online pharmacy can enhance the awareness among the people regarding their facilities such as availability of medicines and the offers as many people are still not aware for the same.
- Online pharmacy must prefer the better options by suggesting the generic medicines in order to help the patients by avoiding high payable bills. Also, the refund policy needs some improvement in order to gain the trust of consumers.
- Although online pharmacies provide a greater selection of medications, information, and deals around-the-clock, but still many times they delayed the delivery of the medicines to the patients which can unintentionally cause the harm to the patient's life.
- People are much concerned about the quality of products, as they felt the offline pharmacies are taking better care of it. So, it is suggested to always give high quality of products as a single error can be life threatening.
- The Indian government should set rules and regulations for online pharmacies and create an example that could benefit consumers.

In contrast, to develop offline pharmacies in a better way, there are many factors by which the owner can work upon, such as:

- Providing different offers on the maximum retail prices (MRP), in order the attract the consumers to the store, as consumer itself responded to move to different stores as per the convenience/offers.
- Offline Pharmacies can enhance their business by delivering the medicines at the doorstep at a affordable prices.
- Offline Pharmacies needs to collect the patient's information and the prescription details while selling of drugs which can decrease the misuse of the drugs, also this helps to reduce the trend of self-medication.
- Offline Pharmacies can introduce the consultation system to the patients by referring the correct way to take medicines and also, needs to suggests the same composition of drugs to the patients to make the drugs available at affordable prices.

With these factors, the online and offline pharmacies can become far better for the consumer's as well as for the owner of the pharmacy. Moreover, with these implementations our country can rise in healthcare system.

Author Contributions

Generation of idea- S. G.; writing—drafting manuscript- S. G.; writing—review S.G; The paper reading has been done by the author also being verified..

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Informed Consent Statement

"Not applicable."

Data Availability Statement

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Conflicts of Interest

There is no conflict of interest, according to the authors.

Abbreviations

Abbreviation	Definition
E-Pharmacy	Electronic Pharmacy
OTC	Over the Counter
AI	Artificial Intelligence
BI	Business Intelligence
KAP	Knowledge, attitude, and practices
MRP	Maximum Retail Price

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