

Impact of COVID-19 on the Macedonian E-Pharmacy Market with Survey Analysis

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Abstract – Since the past years, an ever-increasing number of online, internet, or mail-order pharmacies have operated with the constant expansion of the Internet. Most online pharmacies are authorized and legalized, offering medical services like standard local pharmacies. In these pharmacies, the customer makes its purchase through a computer device (computer, laptop, mobile, tablet) directly connected to the application or website of the E-pharmacy, entailing the necessary medicaments for a refill or new prescription without the need for any additional tools for accessing the website or the application. In this paper are presented the results of a survey on the Macedonian pharmacy market which was divided into several sections, and all the data was analyzed and explained. Results reflect a robust pandemic-facilitated boost in e-pharmacy adoption. Notably, offers/discounts and detailed drug information emerged as statistically significant in influencing consumer decision-making, whereas contactless delivery and deficiencies in the billing system had no visible effect. E-Pharmacy service satisfaction was improved during the pandemic but remained neutral for most users, which reflects untapped potential in building trust through better customer experience and data safeguarding.

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These findings have broader policy and public health implications for policymakers and stakeholders within emerging economies. The catalytic role of the pandemic in e-pharmacy adoption highlights the need for high-quality digital health infrastructure and mass education campaigns for public awareness to sustain this momentum. For healthcare providers, prioritizing open prices, researched drug data, and personalized customer relationship management might bridge the current satisfaction gap. Regionally, this article serves as a model for Western Balkan nations with similar challenges of healthcare digitization, capturing the merging of crisis-driven behavioral change and long-term innovation in services. This study must be followed by research into mobile health integration and cross-cultural comparison in order to maximize equitable access in developing digital health environments.

Keywords – Covid-19, preCovid19, postCovid19, e-pharmacy, medicine.

1. Introduction

Health is one of the most important aspects of life; without it, achieving goals and fulfilling dreams becomes impossible. People constantly take all kinds of measures in order to stay healthy and fit, they exercise, drink vitamins, change the nutrition, and even try to provide their family and loved ones with opportunities for a healthier and better life. The website created in this research is just a single cornerstone offering some of these possibilities. Some of the characteristics and of using online pharmacy are considered in [1], [2], [3]. More information about its advantages and disadvantages are analyzed in [4], [5], [6]. COVID-19 pandemic accelerated digital transformation across various industries as lockdowns and social distancing measures restricted in-person activities. In the online pharmacy sector, demand surged as consumers sought safer, contactless ways to access medications, leading to a notable increase in adoption and satisfaction with online pharmacy services.

The key lessons from the COVID-19 outbreak in China are summarized in [7] and [8] investigate the impact of COVID-19 on the online pharmaceutical and pathological sectors in India.

In this paper, is analyzed the impact of COVID-19 on online pharmacy in Macedonia.

The survey on the impact of COVID-19 on the Macedonian e-pharmacy market was conducted between May 9th and May 27th, 2024. This procedure was performed in person over a structured questionnaire adapted to enable the approach.

A structured questionnaire was distributed online, and 51 individuals responded to the questionnaire with 22 questions. The "Impact of COVID-19 on Macedonian E-Pharmacy Market" questionnaire was designed to gather data on how the COVID-19 pandemic has affected the use and perception of online pharmacies in Macedonia. It aims to understand changes in consumer behavior, satisfaction levels, and preferences related to e-pharmacy services before, during, and after the pandemic. The questionnaire was divided into three main sections: User Basic Information, Growth of E-Commerce after COVID-19 with Special Reference to E-Pharmacy, and Consumer Preference and Buying Pattern of Medicines through Online Pharmacy.

In the section "User Basic Information," are presented demographic characteristics of the data, including gender, age, educational background, employment status, and salary range. This information will help analyze the responses to different demographic segments.

The third section focuses on the respondents' usage of online pharmacy services before, during, and after the COVID-19 pandemic. It includes questions about the frequency of use, satisfaction levels, and whether the pandemic influenced their decision to use these services. The goal is to assess consumer behavior and satisfaction changes over time, providing insights into how the pandemic has accelerated the adoption of e-pharmacy services.

The satisfaction with the online pharmacy application/s used before COVID-19, during COVID-19, and after COVID-19 is discussed in Section 4.

The fifth section explores the factors influencing consumer preferences and buying patterns when it comes to purchasing medicines online. Questions address the impact of offers/discounts,

recommendations, detailed drug information on websites, customer relationship management, contactless delivery, privacy, and the absence of a proper billing system in physical pharmacies. This section aims to identify key drivers and barriers to using online pharmacies, as well as overall satisfaction with the service.

In Section 6, the satisfaction with customer relationship management in online pharmacies and the privacy of online pharmacies is analyzed. Section 7 concludes the paper.

2. User Basic Information

The data set offers a comprehensive look at the demographic and socio-economic characteristics of 51 respondents, shedding light on their gender, age, education, employment status, and salary range.

The respondents are predominantly male, making up 60.8% of the sample, while females constitute 39.2%. This gender disparity highlights a significant male presence in the data set, which could influence the overall findings based on gender-related behaviors and preferences.

The age of the respondents varies widely, offering insights into different life stages and experiences. The youngest age group, 18-24 years, accounts for 9.8% of the respondents. The largest age group, 25-35 years, represents 43.1% of the sample, indicating a strong presence of young adults. Middle-aged individuals, 36-50 years, make up 19.6%. The oldest group, those aged 51 and above, comprises 27.5%.

This age distribution suggests a significant concentration of respondents in their prime working and early career stages, with a notable portion also in mid to late adulthood.

Education levels among respondents are diverse, reflecting various stages of academic and professional achievement. A small fraction 2%, have not completed any formal schooling. Similarly, 2% have received trade, technical, or vocational training. High school graduates, including those with equivalent qualifications, form 33.3% of the sample. Nearly half, 49% hold a bachelor's degree, marking the largest educational group. Master's degree holders constitute 9.8%, while those with PhDs make up 3.9%.

The high percentage of respondents with a bachelor's degree or higher (62.7%) indicates a well-educated group, likely impacting their engagement with and attitudes towards various services and technologies, including e-pharmacies.

Employment status reveals a largely employed and economically active group. Only 2% are students, suggesting limited representation from the youngest, possibly still-educating segment. Self-employed individuals represent 9.8% of the respondents. A substantial majority, 76.5%, are employed, highlighting economic stability and regular income sources within this sample. Unemployed respondents actively seeking work account for 5.9%, while 3.9% are not currently looking for employment. A small portion, 2%, is retired.

This employment data underscores a predominantly working population, with most respondents actively engaged in the workforce.

The salary range provides an insight into the economic status of the respondents.

Those earning below the national average constitute 21.6%. An equal proportion, 39.2%, earn approximately the national average or above it. This even split between average and above-average earners highlights a balanced economic distribution, suggesting varied purchasing power and potential spending behaviors among respondents.

Overall, this data set paints a picture of a predominantly male, well-educated, and economically active group of individuals, with a strong representation of young adults in the 25-35 age range. The high levels of education and employment suggest a potentially tech-savvy and financially stable population, likely influencing their engagement with online services such as e-pharmacy. The insights drawn from this demographic profile can help tailor strategies to meet the needs and preferences of this specific cohort, especially in the context of the e-pharmacy market and its evolution post-COVID-19. Table 1 shows the detailed characteristics of the respondents.

Table 1. Demographic characteristics of the responders

Basic characteristics of the data set		Frequency	%
Gender	Male	31	60.8
	Female	20	39.2
Age (years)	18-24	5	9.8
	25-35	22	43.1
	36-50	10	19.6
	51+	14	27.5
Employment status	A student	1	2.0
	Self-employed	5	9.8
	Employed	39	76.5
	Unemployed and looking for work	3	5.9
	Unemployed but not currently looking for work	2	3.9
	Retired	1	2.0
Salary range	Below national average	11	21.6
	Approximate average	20	39.2
	Above national average	20	39.2

3. Usage of an Online Pharmacy Application Before COVID-19, During COVID-19 and After COVID-19

In the period before the pandemic, online pharmacy applications were far from mainstream in Macedonia. Only 9.8% of respondents had used an online pharmacy application. This low figure suggests that most people preferred traditional, in-person pharmacy visits. It indicates either a lack of awareness about the benefits of online pharmacies or a general mistrust of their efficacy and reliability. A striking 90.2% of respondents had never used these services. This overwhelming majority underscores a strong dependence on conventional pharmacy methods and highlights the significant potential for growth in the e-pharmacy sector that has yet to be tapped.

The arrival of COVID-19 marked a significant turning point for the use of online pharmacy applications. During the pandemic, the use of online pharmacy applications more than doubled, rising to 23.5%. This substantial increase was driven by the need for social distancing and the convenience of home delivery during lockdowns. Many people, who might have previously been hesitant, turned to online pharmacies to avoid the risk of infection and to comply with movement restrictions. Despite this increase, 76.5% of respondents still did not use online pharmacy services. While this indicates that a majority still relied on traditional pharmacies, the drop from 90.2% to 76.5% shows a considerable shift in consumer behavior towards digital solutions for healthcare needs.

In the aftermath of the pandemic, some of the changes in usage patterns persisted. Post-pandemic, 21.6% of respondents continued to use online pharmacy applications. Although this represents a slight decrease from the 23.5% usage during the pandemic, it is still a significant increase compared to the pre-pandemic figure of 9.8%. This retention suggests that many consumers recognized the ongoing benefits of online pharmacies, such as convenience, accessibility, and often, the ability to compare prices and read reviews. The percentage of non-users slightly increased to 78.4% from 76.5% during the pandemic. This small rise indicates that some individuals reverted to their traditional pharmacy habits once the immediate threat of COVID-19 diminished. However, the overall usage of online pharmacy applications remained much higher than it was before the pandemic, signaling a lasting impact on consumer behavior.

A graphical representation of this comparison based on descriptive statistics, [9], [10], [11] is given in Figure 1.

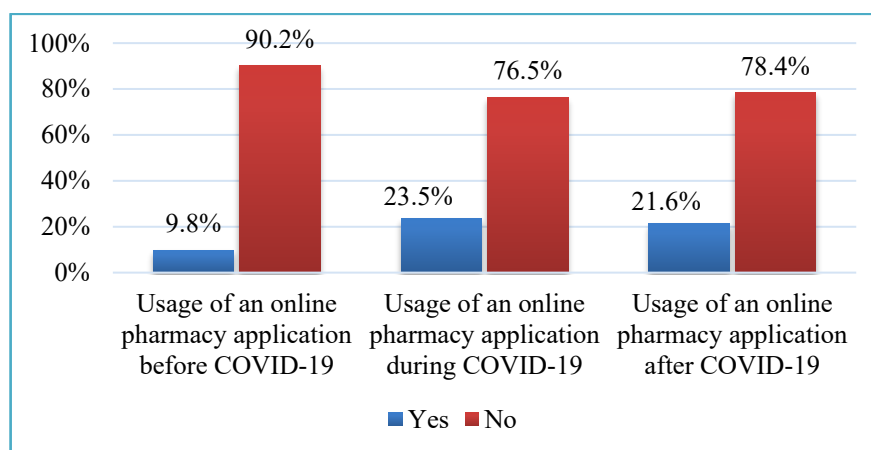


Figure 1. Usage of an online pharmacy application

The COVID-19 pandemic has had a transformative impact on the adoption of online pharmacy applications in Macedonia. Before the pandemic, usage was minimal, with only a small fraction of the population using these services. The necessity for social distancing and the convenience offered by online pharmacies during the pandemic led to a substantial increase in their use. Although there was a slight decline in usage post-pandemic, the levels remained significantly higher than pre-pandemic times. This suggests that the experience of the pandemic has led to a lasting change in consumer behavior, with many people continuing to appreciate the benefits of online pharmacies even after the immediate crisis has passed.

The Macedonian e-pharmacy market, therefore, appears to have undergone a significant shift, with digital solutions becoming a more integral part of healthcare for a notable portion of the population.

4. Satisfaction with the Online Pharmacy Application/s used Before COVID-19, during COVID-19 and after COVID-19

Figure 2 offers a snapshot of how satisfaction with online pharmacy applications evolved before, during, and after the COVID-19 pandemic.

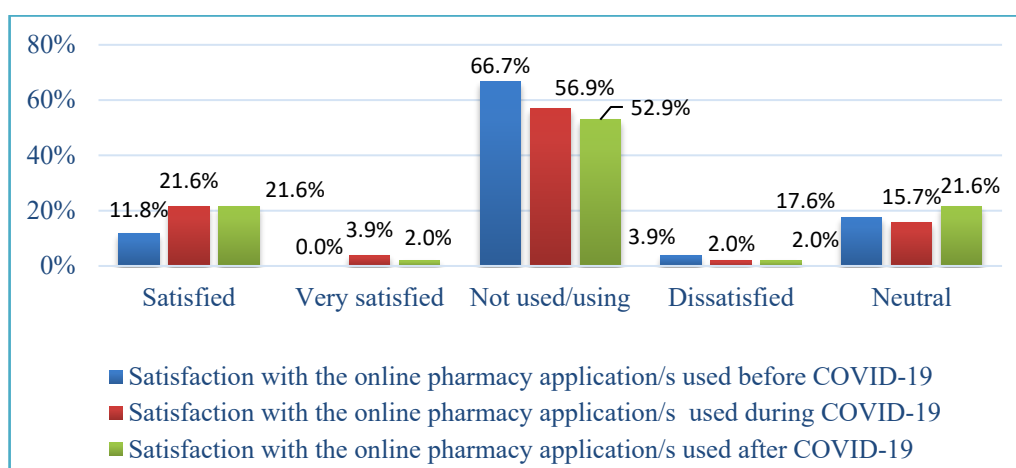


Figure 2. Satisfaction with the online pharmacy application

Before the COVID-19 pandemic, online pharmacy applications were not widely used or appreciated. Only 11.8% of respondents reported satisfaction with their online pharmacy experiences. This low percentage suggests that, while some users found these services adequate, the majority were indifferent or dissatisfied. Notably, none of the respondents (0%) were very satisfied, indicating that exceptional experiences with online pharmacies were virtually non-existent at this time.

A dominant 66.7% had never used or were not using online pharmacy applications, reflecting a strong preference for traditional, in-person pharmacy visits. A small percentage (3.9%) expressed dissatisfaction, pointing to some shortcomings in the online pharmacy services available at the time. 17.6% of respondents were neutral, indicating that a significant portion of users had no strong feelings about their online pharmacy experiences.

Furthermore, the COVID-19 pandemic brought about a significant shift in how people interacted with online pharmacies. Satisfaction levels nearly doubled to 21.6%. This increase reflects a growing appreciation for the convenience and safety of online pharmacies during a time when physical visits were risky or impossible. For the first time, 3.9% of respondents reported being very satisfied. This shift suggests that some online pharmacies improved their services or that users' needs and expectations were better met during the pandemic. The proportion of non-users decreased to 56.9%, indicating that more people turned to online pharmacies out of necessity or preference during the pandemic. Dissatisfaction dropped slightly to 2.0%, hinting at improvements in the overall user experience. The percentage of neutral responses declined to 15.7%, suggesting that users were forming more definitive opinions, whether positive or negative, about their online pharmacy experiences.

Post-pandemic, some of the changes in user satisfaction have persisted. The percentage of satisfied users remained steady at 21.6%, suggesting that the improvements and conveniences discovered during the pandemic continued to be appreciated. The percentage of very satisfied users slightly decreased to 2.0%, indicating a minor reduction in highly positive experiences, possibly as expectations normalized post-pandemic. The percentage of non-users further decreased to 52.9%, showing that a significant number of people who adopted online pharmacies during the pandemic continued to use them. The proportion of dissatisfied users remained unchanged at 2.0%, suggesting consistent levels of dissatisfaction with no major service declines. Neutral responses increased to 21.6%, indicating a return to more varied user experiences and a balanced perspective on the utility of online pharmacies in the post-pandemic period.

The data highlights the impact of the COVID-19 pandemic on consumer satisfaction with online pharmacy applications among Macedonian shoppers. Before the pandemic, these services were not widely used or highly regarded. However, during the pandemic, as physical distancing became crucial, many turned to online pharmacies, leading to increased satisfaction and the first notable instances of high satisfaction. Post-pandemic, these changes largely endured, with sustained higher levels of satisfaction and continued use of online pharmacies. The slight increase in neutral responses post-pandemic suggests that while the immediate pressures of the pandemic have eased, leading to more varied experiences, the fundamental shift towards the acceptance of online pharmacy services remains strong.

5. Factors Influencing Consumer Preferences and Buying Patterns for Purchasing Medicines Online

The shopping convenience and sales promotions influence behavioral intentions toward online pharmacy stores are analyzed in [12], [13], [14], [15].

In this section, the factors influencing consumer preferences and buying patterns for purchasing medicines online in Macedonia are explored. Questions address the impact of offers/discounts, recommendations, detailed drug information on websites, customer relationship management, contactless delivery, privacy, and the absence of a proper billing system in physical pharmacies. This section aims to identify key drivers and barriers to using online pharmacies, and since all variables of the data set related to these questions are categorical, the chi-square test of independence, [16], [17], [18] is used.

The chi-square test of association is used to test for association between two or more variables and can be used regardless of how many levels there are in each variable. In technical terms, it tests if there is a significant relationship between two categorical variables. The test has the null hypothesis that the variables are independent and the alternative hypothesis that they are not independent.

The following hypotheses are tested:

1. H_0 : *There is no significant relationship between the willingness to buy medicines online and offers/discounts for buying medicine from online pharmacies.*

H_1 : *There is a significant relationship between the willingness to buy medicines online and offers/discounts for buying medicine from online pharmacies.*

The conclusion for this hypothesis is based on the results in Table 2.

Table 2. *Willingness to buy medicines online and offers/discounts for buying medicine from online pharmacies*

		Would you like to buy medicines online		
		Yes	Maybe	No
Offers/discounts are reasons for influencing consumer preference for buying medicine from online pharmacy	Disagree	0.00	0.02	0.04
	Neutral	0.06	0.18	0.21
	Strongly disagree	0.02	0.00	0.02
	Strongly agree	0.08	0.04	0.00
	Agree	0.14	0.19	0.00

2. H_0 : There is no significant relationship between the willingness to buy medicines online and the recommendation to the customer to purchase from online pharmacies.

H_1 : There is a significant relationship between the willingness to buy medicines online and the recommendation to the customer to purchase from online pharmacies.

The conclusion for this hypothesis is based on the results in the Table 3.

Table 3. Willingness to buy medicines online and the recommendation to the customer to purchase from online pharmacies

		Would you like to buy medicines online		
		Yes	Maybe	No
Recommendation is a reason for the customer to purchase online pharmacy	Disagree	0.00	0.06	0.04
	Neutral	0.06	0.17	0.16
	Strongly agree	0.08	0.06	0.00
	agree	0.14	0.13	0.08

3. H_0 : There is no significant relationship between the willingness to buy medicines online and the detailed information about the drug on the pharmacy website.

H_1 : There is a significant relationship between the willingness to buy medicines online and the detailed information about the drug on the pharmacy website.

The conclusion for this hypothesis is based on the results in the Table 4.

Table 4. Willingness to buy medicines online and the detailed information about the drug on the pharmacy website

		Would you like to buy medicines online		
		Yes	Maybe	No
Detailed information about the drug on the pharmacy website is a reason for influencing consumer preference for purchasing medicine from an online pharmacy	Disagree	0.00	0.06	0.04
	Neutral	0.04	0.14	0.17
	Strongly disagree	0.00	0.04	0.02
	Strongly agree	0.08	0.06	0.00
	Agree	0.17	0.14	0.04

4. H_0 : There is no significant relationship between the willingness to buy medicines online and contactless delivery of medicines from online pharmacies.

H_1 : There is a significant relationship between the willingness to buy medicines online and contactless delivery of medicines from online pharmacies.

The conclusion for this hypothesis is based on the results in the Table 5.

Table 5. Willingness to buy medicines online and contactless delivery of medicines from online pharmacies

		Would you like to buy medicines online		
		Yes	Maybe	No
Contactless delivery of medicines influences consumer preference for buying medicine from online pharmacies	Disagree	0.06	0.08	0.02
	Neutral	0.06	0.21	0.21
	Strongly agree	0.04	0.04	0.00
	agree	0.14	0.10	0.04

5. H_0 : There is no significant relationship between the willingness to buy medicines online and the lack of a proper billing system in most of the onsite pharmacy shops.

H_1 : There is a significant relationship between the willingness to buy medicines online and the lack of a proper billing system in most of the onsite pharmacy shops.

The conclusion for this hypothesis is based on the results in Table 6.

Table 6. Willingness to buy medicines online and the lack of a proper billing system in most of the onsite pharmacy shops

		Would you like to buy medicines online		
		Yes	Maybe	No
The lack of a proper billing system in most of the onsite pharmacy shops is a reason for influencing buying medicines from online pharmacies	Agree	0.08	0.02	0.02
	Strongly agree	0.04	0.00	0.00
	Strongly disagree	0.00	0.02	0.00
	Disagree	0.02	0.02	0.00
	Neutral	0.16	0.37	0.25

Table 7. Chi-square value and p-value for the first hypothesis

Hypothesis No. 1	Results of the test		
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi Square	20.859	8	0.008

Since the *p*-value is less than 0.05 (Table 7), the test is significant, and the null hypothesis is rejected with an acceptable risk of a Type I error less than 0.05. So, the conclusion is that there is a relationship between the willingness to buy medicines online and offers/discounts for buying medicine from online pharmacies.

Table 8. Chi-square value and p-value for the second hypothesis

Hypothesis No. 2	Results of the test		
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi Square	7.604	6	0.269

Since the *p*-value is larger than 0.05 (Table 8) the test is significant, and it fails to reject the null hypothesis with a significant level of 0.05. So, the conclusion is that there is no relationship between the willingness to buy medicines online and the recommendation to the customer to purchase from online pharmacies.

Table 9. Chi-square value and p-value for the third hypothesis

Hypothesis No. 3	Results of the test		
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi Square	17.023	8	0.030

Since the *p*-value is less than 0.05 (Table 9) the test is significant, and the null hypothesis is rejected with an acceptable risk of a Type I error less than 0.05. So, the conclusion is that there is a relationship between the willingness to buy medicines online and the detailed information about the drug on the pharmacy website.

Table 10. Chi-square value and p-value for the fourth hypothesis

Hypothesis No. 4	Results of the test		
	Value	Df	Asymptotic Significance (2-sided)
Pearson chi Square	10.791	6	0.095

Since the *p*-value is larger than 0.05 (Table 10) the test is significant, and it fails to reject the null hypothesis with a significant level of 0.05. So, the conclusion is that there is no relationship between the willingness to buy medicines online and the contactless delivery of medicines from online pharmacies.

Table 11. Chi-square value and p-value for the fifth hypothesis

Hypothesis No. 5	Results of the test		
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi Square	12.790	8	0.119

Since the *p*-value is larger than 0.05 (Table 11) the test is significant, and the test fails to reject the null hypothesis with a significant level of 0.05. So, the conclusion is that there is no relationship between the willingness to buy medicines online and the lack of a proper billing system in most of the onsite pharmacy shops.

In conclusion, the study highlights that offers/discounts and detailed information about the drug on the pharmacy website are significant factors that influence consumers' willingness to buy medicines online in Macedonia. On the other hand, recommendations, contactless delivery and the lack of a proper billing system in most of the onsite pharmacy shops do not have a statistically significant impact on this willingness. These findings can help online pharmacies tailor their strategies to enhance consumer engagement and sales by focusing on discounts and providing detailed drug information on their websites.

6. Satisfaction with Customer Relationship Management in Online Pharmacies and the Privacy of Online Pharmacies

The survey about online pharmacy usage in Macedonia reveals important insights into customer satisfaction with the relationship management aspect of these services. The data, summarized in Table 12, provides a snapshot of user sentiments ranging from satisfaction to dissatisfaction, as well as neutral feelings.

Table 12. Satisfaction with customer relationship management in online pharmacy

User sentiments	Frequency	Percent
Satisfied	10	19.6
Very satisfied	2	3.9
Very dissatisfied	1	2.0
Neutral	38	74.5

Approximately one-fifth of the respondents, or 19.6%, reported being satisfied with customer relationship management (CRM) in online pharmacies. This indicates that a significant minority of users find the CRM efforts to be adequate and beneficial, likely appreciating aspects such as responsiveness, communication quality, and support services.

A smaller segment, 3.9%, expressed a high level of satisfaction, indicating that these users have had exceptionally positive experiences. This group is likely benefiting from superior customer service practices, such as personalized interactions, timely responses, and effective problem resolution.

The vast majority of respondents, 74.5%, felt neutral about the CRM in online pharmacies. This dominant neutral stance suggests that while users do not have major complaints, they also do not find the service particularly impressive or memorable. This significant portion of neutrality points to a potential area for improvement, as enhancing CRM efforts could convert neutral experiences into positive ones.

Only a small fraction, 2.0%, reported being very dissatisfied with the CRM. This minimal dissatisfaction level indicates that outright negative experiences are rare, but for those few, the issues might be significant, possibly involving poor communication, slow response times, or unresolved problems.

The survey results reveal a mixed but predominantly neutral sentiment toward customer relationship management in Macedonian online pharmacies. While a notable minority of users are satisfied or very satisfied, the overwhelming neutrality suggests that there is substantial room for improvement. By focusing on enhancing CRM practices, online pharmacies could potentially increase user satisfaction, turning neutral or indifferent users into advocates for their services. Efforts could include improving communication channels, personalizing customer interactions, and ensuring timely and effective support. This approach would not only improve customer experiences but also strengthen the overall perception and reliability of online pharmacies in Macedonia.

In [19], [20], [21], [22] along with the online pharmacy aspects such as convenience and cost savings particularly the privacy concerns and potential risks associated with online drug purchases are analyzed.

Also, in this is consider privacy satisfaction from online pharmacy in Macedonia. Table 13 details the frequency and percentage of various privacy satisfaction levels, highlighting a range of user experiences from excellent to very poor.

Table 13. The privacy of online pharmacies

User sentiments	Frequency	Percent
Good	9	17.6
Poor	4	7.8
Very poor	2	3.9
Neutral	31	60.8
Excellent	5	9.8

A notable 17.6% of respondents rated the privacy of online pharmacies as "good." This suggests that nearly one-fifth of users are confident in the privacy measures these pharmacies have in place. These users likely appreciate the efforts made to protect their personal and medical information, finding the privacy protocols to be adequately secure.

A smaller segment, 9.8%, rated the privacy as "excellent." These users represent those who have had exceptionally positive experiences, possibly benefiting from robust encryption, clear privacy policies, and transparent data handling practices. This high level of satisfaction indicates that some online pharmacies are successfully implementing top-tier privacy measures that meet or exceed user expectations.

The majority of respondents, 60.8%, feel neutral about the privacy of online pharmacies. This predominant neutral stance suggests that while users do not have significant concerns about privacy, they are also not particularly impressed by the measures in place. This could indicate that while privacy practices are sufficient to avoid negative feedback, they are not distinguished enough to earn higher praise from most users.

Negative Perceptions, Poor (7.8%) and Very Poor (3.9%): Combined, 11.7% of respondents rated the privacy as either "poor" or "very poor." These users may have experienced or perceived lapses in privacy protections, such as inadequate data security, unclear privacy policies, or breaches of confidentiality. This negative feedback highlights areas where some online pharmacies might be failing to meet the expected privacy standards, thereby diminishing user trust.

The survey results regarding the privacy of Macedonian online pharmacies present a varied landscape of user perceptions. While a significant minority finds the privacy measures to be good or excellent, the majority of users remain neutral, indicating that there is room for enhancement. Improving privacy features could involve more transparent communication about data protection practices, stricter security protocols, and regular audits to ensure compliance with privacy regulations. Addressing the concerns of the minority who rated privacy as poor or very poor is crucial for building trust and ensuring that all users feel secure when using online pharmacies.

By focusing on these improvements, online pharmacies in Macedonia can enhance user confidence and foster a safer, more trustworthy digital environment for managing health needs.

7. Conclusion

This study is a detailed analysis of the shifting dynamics of the Macedonian e-pharmacy market, and more so about the COVID-19 pandemic. The study reveals a significant shift in consumer mindset, demonstrating that the pandemic played a crucial role in accelerating the adoption of online pharmacy services in Macedonia. Before the pandemic, e-pharmacy usage was marginal; however, the urgent need for contactless service during lockdowns prompted a marked increase in adoption, some of which has been retained even in the post-COVID-19 period.

One of the most important conclusions drawn is that the key factors influencing consumer willingness to use e-pharmacy services are offers and discounts, as well as the availability of detailed drug information on websites. They have a statistically significant effect on users' decisions, and the implications are that valuable benefits and unrestricted access to information are major forces in inducing trust and motivation to use digital healthcare services. Paradoxically, other factors such as contactless delivery, peer recommendations, and bill capping in physical pharmacies, typically assumed to have an impact, did not have a statistically significant effect. This indicates that while convenience and logistics matter, consumers prioritize value and informed decision-making above all.

In terms of customer relationship management and privacy, the study reveals a predominance of neutral sentiment. Although outright dissatisfaction is rare, a large portion of users remain ambivalent, highlighting the untapped potential for service providers to build stronger emotional connections and trust with their users. Enhancing customer relationship management and demonstrating a commitment to privacy—through personalized communication, timely support, transparent data handling, and robust security practices—can be a powerful strategy for e-pharmacy platforms to gain a competitive advantage.

From a policy and market development viewpoint, the study highlights the need for focused investment in digital infrastructure, public awareness campaigns, and regulations that boost consumer trust in e-health services. Due to the low adoption rate before the pandemic, the ongoing rise in usage shows that e-pharmacy adoption is not just a temporary response but can also become a stable, long-term healthcare option in Macedonia.

The implications of the findings of this research extend beyond the immediate Macedonian context. As nations throughout the Western Balkans and wider Eastern Europe continue to modernize their healthcare delivery systems, this study offers a model for the way that crises like pandemics can act as accelerators for digital change. The discussion also highlights the role that user education, interface intuitiveness, and value-based incentives play in facilitating sustained digital health participation.

Furthermore, the study lends evidence to the growing importance of e-pharmacy websites as a component of public health infrastructure. Closely regulated and subject to continuous user feedback, e-pharmacies can help relieve traditional pharmacy services, particularly in rural or under-resourced areas, and thereby enhance accessibility and equity in healthcare.

Future research could also explore the role of mobile health apps and the integration of e-pharmacy features into broader digital health ecosystems, comparative studies across different countries or regions to identify cultural, regulatory, or infrastructural differences in e-pharmacy adoption, and qualitative insights, such as interviews or focus groups, to better understand user motivations and emotional responses.

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