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Opportunities and Applications of Telepharmacy in Bulgaria

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ABSTRACT

The implementation of telepharmacy offers new opportunities for healthcare delivery and helps address the challenge of limited pharmacist availability. This study aimed to assess attitudes toward providing and utilizing telepharmacy services in Bulgaria. A total of 379 participants, predominantly healthcare professionals, took part, with an average age of 44.38 ± 12.39 years. Data were analyzed using IBM SPSS Statistics v.23. Over 90% of respondents reported using the Internet to search for health-related information, and many indicated that they read medication package leaflets before use. Most participants expressed skepticism toward dietary supplements purchased online. More than 56% stated they would not purchase prescription medications online or via a mobile app, even if legally permitted. A smaller portion indicated willingness to consult a pharmacist for remotely prescribed therapy or to use a mobile app to track their medication regimen. The expansion and acceptance of telepharmacy represent a complex challenge requiring collaboration among public and private sectors, as well as scientific and academic institutions, to achieve effective outcomes and enhance healthcare services.

Keywords: Online pharmacies, Telepharmacy, Information and communication technologies, Pharmacists

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Introduction

The integration of information and communication technologies (ICT) into pharmacy and healthcare creates new opportunities for delivering health services and helps mitigate the challenge of the limited availability of healthcare professionals. Telepharmacy refers to a form of pharmaceutical care in which pharmacists and patients are not co-located and communicate through ICT tools. It has been implemented to deliver pharmaceutical services to remote regions and to address pharmacist shortages [1].

According to the National Association of Boards of Pharmacy, telepharmacy involves providing pharmaceutical care to patients at a distance using ICT [2], essentially applying telemedicine principles to pharmacy practice. It is further defined as "the delivery of pharmaceutical support via telecommunications by licensed pharmacists and pharmacies to patients located remotely" [3]. Telepharmacy services encompass drug selection, order review and dispensing, patient consultation and monitoring, and other clinical services [3, 4]. A defining feature of telepharmacy is that the pharmacist is not physically present at the site of pharmacy operations or patient care. Its primary benefit is the ability to deliver pharmaceutical services in areas with limited accessibility due to geographic or economic constraints [1].

Telepharmacy services include monitoring drug therapy, counseling patients, verifying prescriptions, and overseeing drug preparation through teleconferencing or videoconferencing [5]. The COVID-19 pandemic accelerated its adoption [6]. Modern telepharmacy technology allows a qualified pharmacist at a central location to supervise another pharmacist or pharmacy assistant at a remote site, guiding drug dispensing via audio-video communication [7, 8].

Remote medication distribution through automated packaging and labeling systems also qualifies as telepharmacy. These services can be provided in community pharmacies as well as hospitals, nursing homes, and

other medical institutions [9]. Telepharmacy represents an alternative strategy to expand pharmacy coverage in regions lacking 24-hour services. Advances in electronic health information systems, including electronic health records, provide pharmacists with easier access to patient examination and therapy data, supporting more effective telepharmaceutical care [10].

The core objective of telepharmacy is to ensure access to professional pharmaceutical care in smaller communities that cannot sustain a full-time pharmacist or pharmacy, thereby reducing costs and enhancing patient safety through improved counseling, therapy monitoring, and adherence tracking [11].

The current study aims to evaluate attitudes toward offering and utilizing telepharmacy services in Bulgaria.

Materials and Methods

An anonymous, voluntary, and representative online survey was conducted between December 2019 and February 2020, including 379 participants, predominantly healthcare professionals, with a mean age of 44.38 ± 12.39 years. The survey was designed using Google Forms and comprised two panels: the first collected demographic data (gender, age, education, residence, medical specialty), while the second included 14 questions regarding the provision and use of telepharmacy services (11 using a 5-point Likert scale, 3 allowing multiple responses).

Statistical analyses were performed using IBM SPSS Statistics 23.0. Descriptive statistics summarized frequencies, means, and standard deviations for demographic characteristics and telepharmacy-related variables. Continuous variables were assessed for normality with the Kolmogorov-Smirnov and Shapiro-Wilk tests. Associations between categorical variables were analyzed using the χ^2 test or Fisher's exact test, and correlations were assessed with Pearson's or Spearman's coefficients, depending on variable distribution. Statistical significance was defined as $p < 0.05$.

Results and Discussion

The survey included 379 respondents, with 75.5 percent (n = 286) women and 24.5 percent (n = 93) men. Participants' ages were entered numerically and grouped according to the National Statistical Institute's standards; only adults under 80 years were included. The majority of respondents (n = 296; 78.1 percent) were of working age, between 25 and 64 years. Age distribution is presented in **Figure 1**.

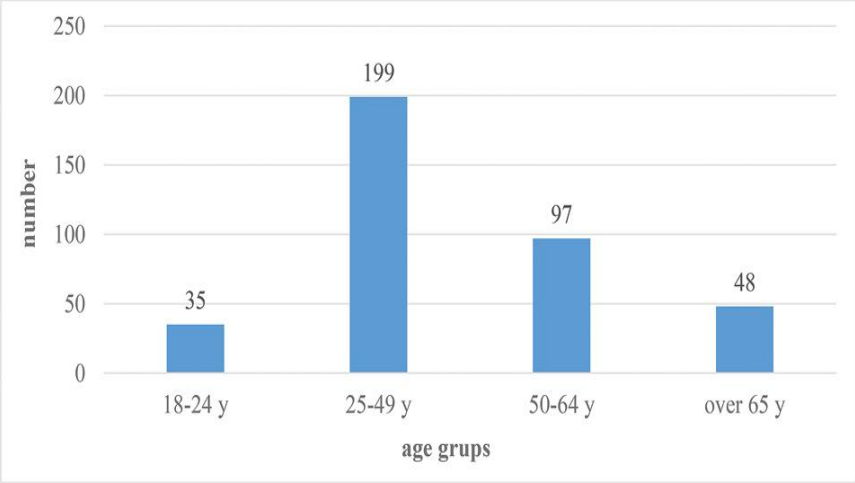

Figure 1. Age Distribution of Survey Participants

The average age of participants was 44.38 ± 12.39 years (Mean±SD), with the youngest being 19 and the oldest 74 years old. No statistically significant differences were observed between genders for mean age ($p = 0.828$) or length of professional service ($p = 0.758$).

Regarding educational attainment, 77.3% of respondents held a higher education degree, and approximately half (53.0%) had completed a master's program. No participants reported having only a primary education. Educational levels of the respondents are shown in **Figure 2**.

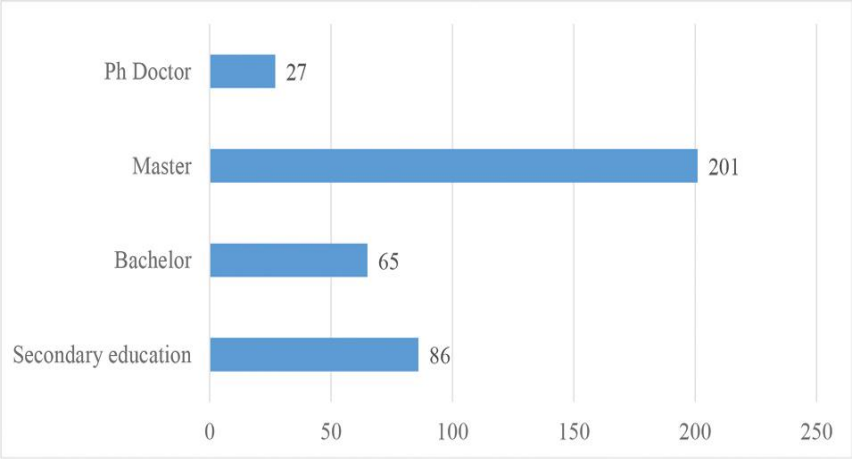

Figure 2. Distribution of Respondents by Educational Level

The evaluation of respondents' educational background indicates that the participants are generally well-educated, possessing relevant knowledge and experience.

Regarding place of residence, the majority live in urban areas (n = 346; 91.3%), while 33 participants (8.7%) reside in rural areas. The study primarily targeted healthcare professionals, with around 75% (n = 285) identifying as such, including 101 individuals who are either master pharmacists or assistant pharmacists.

Over 90% of respondents (n = 342) reported using the Internet to search for health information, and a substantial proportion (n = 221; 58.3%) sought online resources for treatment or self-care. Most participants (n = 278; 73.4%) stated that they read the medication package leaflet before use. A statistically significant trend was observed showing that less-educated respondents are more likely to trust medications prescribed by a specialist ($\chi^2 = 56.232$; $p < 0.05$).

When asked whether food supplements sold online are effective, safe, and comply with legal production standards, only about 10% responded positively. The majority (71.3%) expressed skepticism, while 18.8% reported no opinion. Younger respondents showed a higher tendency to purchase supplements online ($\chi^2 = 38.552$; $p < 0.05$).

Regarding online purchasing preferences for medicines, supplements, or cosmetics, 66.4% indicated they would buy from "online pharmacies licensed and approved by the Executive Agency for Medicines," followed by 42.3% who would purchase directly from the manufacturer or importer's website. A smaller portion (11.7%) stated they would not buy online at all, with older respondents showing more conservative attitudes toward online purchases ($\chi^2 = 118.323$; $p < 0.01$). The distribution of responses is presented in **Figure 3**.

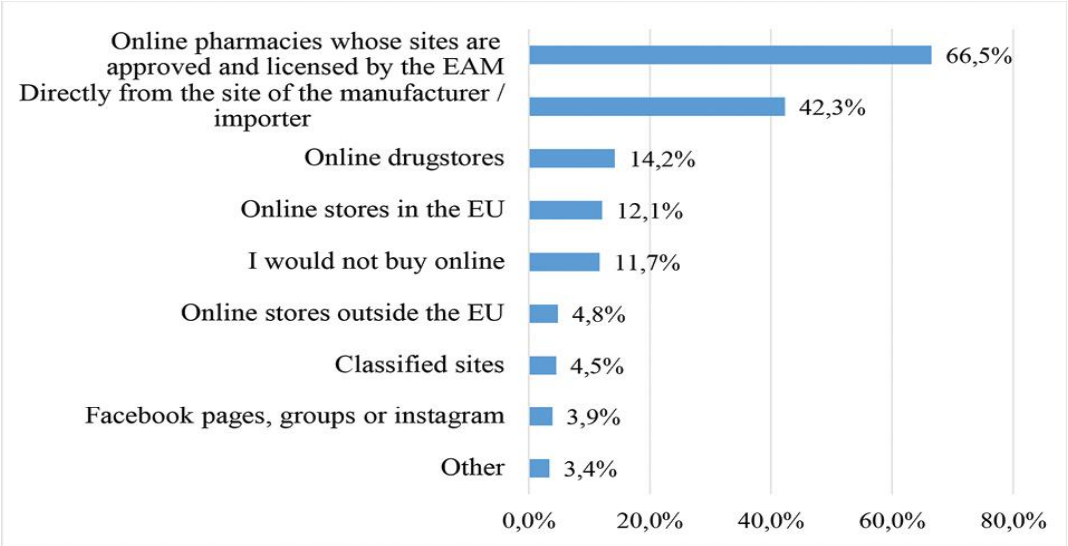

Figure 3. Frequency of Responses to "Where Would You Buy Medicines, Food Supplements, and/or Cosmetics Online?"

When asked which pharmaceutical products they would purchase online, respondents could select multiple options. Approximately half indicated they would buy cosmetics (n = 194; 50.2 percent), followed by sanitary and hygiene products (n = 170; 44.9 percent) and medical devices or accessories (n = 141; 37.2 percent). A notable portion stated they would not purchase any products online (n = 68; 17.9 percent). Meanwhile, 22.2 percent expressed willingness to buy non-prescription medications, whereas only 10.6% would consider purchasing prescription drugs online. The distribution of responses is shown in **Figure 4**.

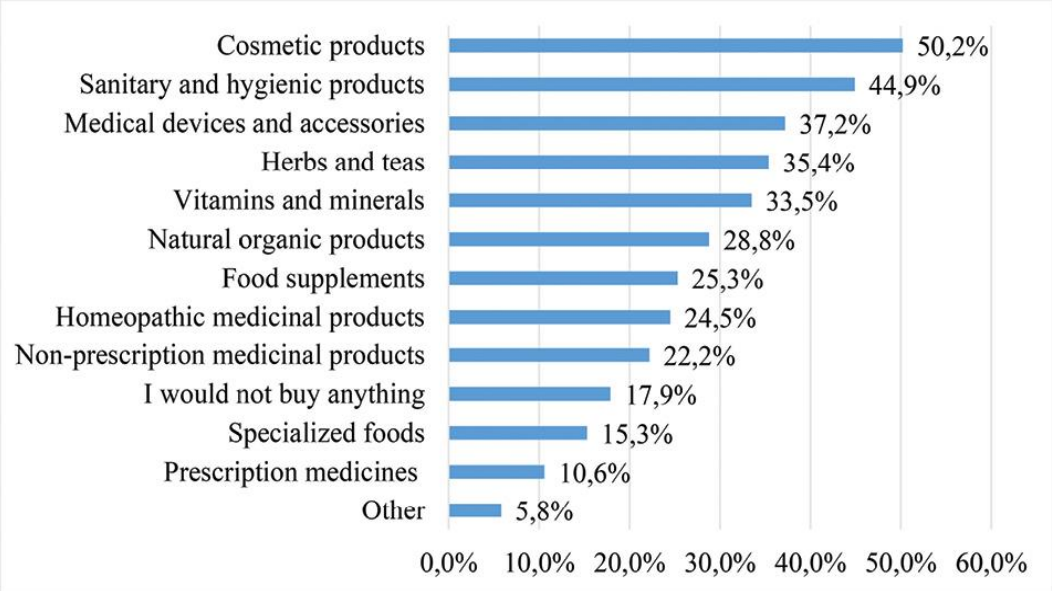

Figure 4. Frequency of Responses to "Would You Buy Prescription Drugs Online or via a Mobile Application?"

When asked whether they would purchase prescription medications online or through a mobile application if legally permitted, over half of the respondents (n = 215; 56.8%) indicated that they would not. This reluctance may reflect the absence of a legal framework for online medicine sales in Bulgaria.

A substantial portion of participants stated they would consult a pharmacist for therapy prescribed remotely (n = 184; 48.5%) and that they would use a mobile application to monitor their medication regimen (n = 127; 33.5%).

The growing need for broader access to medications is driven by the increasing proportion of aging populations and the prevalence of comorbidities [12]. This demographic shift, particularly in high-income countries, has intensified demand for healthcare professionals, including pharmacists, to meet emerging healthcare needs [13]. According to the World Health Organization (WHO), the global pharmaceutical workforce is shrinking, a trend that is especially pronounced in lower-income countries [14]. European projections estimated a shortage of one million healthcare workers by 2020, with nearly 10% expected to be pharmacists, highlighting the urgency of implementing effective solutions. The International Pharmaceutical Federation (FIP) emphasizes that increased use of technology is a critical strategy to address pharmacist shortages, and telepharmacy presents a viable approach to supplement on-site pharmacists.

In Bulgaria, only non-prescription medications can be legally sold online under the Medicinal Products in Human Medicine Act. Such sales are allowed exclusively through pharmacies with a retail marketing authorization or drugstores with a valid registration certificate, and operations are regulated by the Act and Ordinance № 28 of the Ministry of Health, which governs pharmacy organization, operation, and medicinal product nomenclature.

The Internet provides users with worldwide access to health information, services, and support, enabling them to independently choose, order, and purchase medications—often across borders—without the involvement of a healthcare professional. In Bulgaria, e-pharmacies are licensed by the Bulgarian Drug Agency (BDA) and sell over-the-counter drugs, medical devices, dietary supplements, and cosmetics [15].

The strengths of online pharmacies include affordability, convenience, competitive pricing, and the ability to reach remote areas lacking physical pharmacies. However, a major limitation is the potential loss of direct pharmacist-patient interaction, which can increase the risk of misdiagnosis and medication errors. To remain competitive in

the online marketplace, e-pharmacies focus on responsiveness, reliability, user-friendliness, and perceived pricing [15].

Since July 2015, the European Union (EU) has implemented a standardized logo for legal online medicine retailers, designed to help consumers identify legitimate sources and avoid illegal suppliers. Authorized online pharmacies across EU member states are required to display this logo, which includes the national flag and text in the official language of the respective country (https://ec.europa.eu/health/human-use/eu-logo_en).

Our findings align with those of previous studies. Accessing reliable information in the digital era remains a major challenge, particularly during global health crises such as the COVID-19 pandemic [16]. The rapid dissemination of misinformation highlights the need for public health professionals to develop effective communication and engagement strategies on social media. Ensuring the clear, accurate, and timely delivery of information from trustworthy sources, verifying online health content, and enhancing citizens' media literacy and critical thinking are essential steps in combating health-related misinformation [17].

Online commerce provides a convenient means of delivering medications to individuals with limited mobility or those living in remote areas. However, challenges persist, including staffing shortages and the reduced interaction between patients and pharmacists, which can compromise treatment quality. Emerging trends in medicine distribution call for studying patient profiles and identifying factors that drive self-medication without professional consultation, in order to establish safe and effective delivery pathways [18]. Telepharmacy addresses this issue by reducing the gap in access to pharmaceutical services.

Conclusion

The Internet serves as a source for health information, including guidance on treatment and self-medication. Consumers tend to read medication leaflets and are cautious about food supplements purchased online, preferring to obtain pharmaceutical products from licensed online pharmacies authorized by the Executive Agency for Medicines. The absence of legal regulations for online sales of prescription medications contributes to hesitancy among consumers. The concept of telepharmacy, such as remote pharmacist consultations or mobile applications for monitoring therapy, is generally well-received.

Telepharmacy can help mitigate pharmacist shortages and provide high-quality pharmaceutical care in underserved areas. Its successful implementation and acceptance require collaboration among public and private sectors, as well as engagement from scientific and academic institutions, to ensure effective outcomes and the enhancement of healthcare services.

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