Hard facts. Clear stories.

Copenhagen Economics

UNLOCKING THE BENEFITS OF ONLINE ACCESS TO PRESCRIPTION MEDICINES ACROSS THE EU

Large-scale evidence on patients, carers and pharmacy owners asking for a greater choice that improves access to medicines and health outcomes

ASOP EU
30 JANUARY 2024

This study is on behalf of the Alliance for Safe Online Pharmacy in the EU (ASOP EU). For further information on ASOP EU, **see here**.

AUTHORS

Christian Jervelund, Partner
Dr Bruno Basalisco, Director
Dr Malwina Mejer, Senior Economist
Dr Marco Islam, Economist
Mads Thorkild Nissen, Analyst

ABOUT COPENHAGEN ECONOMICS

Copenhagen Economics is an expert-driven consulting company, built on a deep knowledge of applied economics and one of the leading economics firms in Europe.

We believe sound economic analysis can equip decision makers with the hard facts and clear stories to make better choices for the benefit of society. We are committed to delivering compelling and pragmatic economics solutions with a creative and candid approach.

A brief note on consultancy research

As is standard in our field of professional services, research is designed so that:

i. the client chooses the research question;
ii. we analyse and address the question to the best of our knowledge;
iii. findings and conclusions are our own.

Professional services independence is ensured via a diversified portfolio of business, spanning public sector and private clients across industries. For further information, see www.copenhageneconomics.com. We remain available for and appreciate any questions or comments.

UNLOCKING THE BENEFITS OF ONLINE ACCESS TO PRESCRIPTION MEDICINES ACROSS THE EU

Copenhagen Economics

- We compare the pharmacy experiences of European Union citizens in countries where online access to prescription medicines is permitted (Sweden and Germany) to those in countries where it is prohibited (France, Italy, and Spain)
- We gather evidence through a consumer survey (5,000 participants) supported by 25 in-depth interviews with chronic patients, 25 with pharmacy owners, and 3 with experts affiliated with patients' organisations

SIGNIFICANT DEMAND
for online access to prescription medicines

31%
of the respondents in countries with prohibited online access would like to obtain prescription medicines online

56%
of respondents in Sweden already use this service

BENEFITS OF ONLINE ACCESS

CONVENIENCE
flexible ordering and avoiding pharmacy visits

between 69% and 84%
of respondents value ordering at any time

between 67% and 80%
of respondents value access to a delivery service

15 minutes
estimated average time saved per transaction

up to EUR 1.3bn in the short term and up to EUR 2.3bn in the long term
in convenience benefits from the EU-wide removal of restrictions

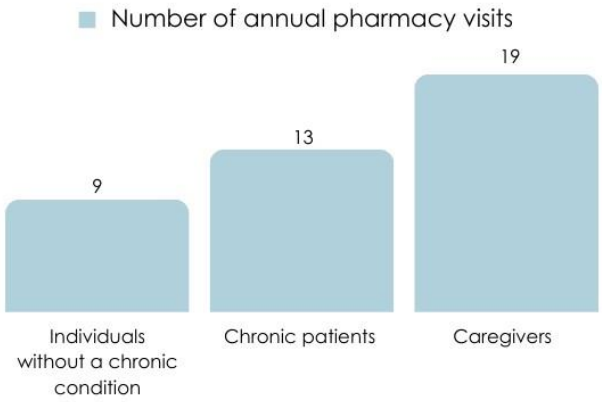
IMPROVED HEALTH OF CHRONIC PATIENTS
due to increased medication adherence

Respondents attribute non-adherence to unavailable medicine, forgetting refills, and time constraints

64%
of chronic patients experiencing time constraints believe online access would improve adherence

57%
of respondents who used online dispensing believe that online access helps to improve their adherence

MAIN BENEFICIARIES



Demand for online access to prescription medicines comes from those most burdened by having to go to the pharmacy:

Chronic patients and their caregivers

Those who perceive pharmacy opening hours as inconvenient

Those with longer-than-average travel times to pharmacies

INCREASED AWARENESS LEADS TO HEIGHTENED TRUST IN ONLINE CHANNELS

LACK OF EXPERIENCE AND AWARENESS
inhibit patients from using online pharmacies

INCREASED USE AND INFORMATION
enhances patients' confidence in digital pharmacy services

75%
of respondents in countries with prohibited online access are unaware of the mandatory EU common logo, designed to identify authorised online pharmacies

Reduced concern
Concerns about safety issues and delivery are significantly lower in countries with online access

53%
of respondents are not aware that online pharmacies use the same safe and secure supply as physical pharmacies

Increased willingness to use online channels
Informing respondents about the EU common logo and that the regulatory framework is the same as for physical pharmacies increases confidence in online dispensing of prescription medicines

OFFERING ONLINE SERVICES

INCENTIVES

Financial incentives

Prescription medicines are an important part of pharmacy turnover for both physical and online operations

BARRIERS

Lack of skills

Lack of technology and marketing skills, as well as difficulties in managing delivery logistics

6 out of 9

Pharmacy owners in France, Italy and Spain would use online services if restrictions on online access to prescription medicines were lifted

RECOMMENDATIONS

1

ENHANCE MEDICINE AVAILABILITY ONLINE
Encourage EU regulators to take the necessary steps towards allowing online access to prescription medicines by amending Article 85(c) in the Community Code of Medicinal Products for Human Use, which regulates the sale of medicinal products at a distance to the public; and encourage EU Member States to provide for regulated options in national laws

2

BOOST MEDICINE ACCESSIBILITY ONLINE
Increase awareness of secure supply-chain safeguards for pharmacies operating online to enhance trust and prevent the risks associated with the use of unauthorised sites and falsified medicines

3

FACILITATE THE DIGITAL EXPANSION OF PHARMACY OPERATIONS
Enable online access to incentivise more pharmacies in more EU Member States to adopt omnichannel strategies, meeting patient demands and improving healthcare outcomes

ASOP EU
Alliance for Safe Online Pharmacy

The study is commissioned by the Alliance for Safe Online Pharmacy in the EU (ASOP EU)

FOREWORD

The importance of this report cannot be understated for two major reasons. The report's findings underscore the need for improved access to prescription medicines for the European population, particularly those who are chronically ill and living in rural areas. These individuals, disadvantaged by the distance to a physical pharmacy, and their carers would greatly benefit if their prescription medicines could be delivered directly to their homes. Additionally, the report reveals the potential for increased adherence to prescribed medication if online access is permitted.

It is noteworthy that in 2011, the EU introduced the Falsified Medicines Directive. The Directive mandates each Member State to make medicines available "at a distance", thereby permitting pharmacies to make over-the-counter (OTC) category medicines available via the Internet, if they choose to do so. This is set against the historical background that eight out of the 27 EU Member States have allowed access to prescription medicines as well as OTC medicines via the Internet successfully and securely for many years.

The Directive introduced safety features, such as a unique data matrix barcode on each prescription pack, which is authenticated by a scanner at the point of dispensing. Moreover, it obliged all pharmacies selling medicines via the Internet to display an EU Common Logo, with the pharmacy linked to a national register, enabling patients to authenticate the website with a simple click. The survey by Copenhagen Economics revealed a low public awareness of this logo, despite it being a legal obligation (Article 85(d)) that each Member State should educate the public about the dangers of falsified medicines and the significance of the EU logo. Similarly, respondents were largely unaware that pharmacies operating online are subject to exactly the same regulations and secure supply chain requirements as physical pharmacies. Upon learning this crucial fact, a follow-up question revealed a far higher propensity for patients to obtain their medicines online.

In addition, it is alarming to note that over 36,000 websites are currently selling falsified medicines to a largely unsuspecting public. Only when the public is educated about where to access genuine prescription medicines will this scourge be better controlled. This is one of the major reasons why ASOP EU commissioned this important report.

This report will add weight to the growing consensus that all EU citizens should have the same rights to access their prescription medicines as in other Member States. This constitutes an essential part of rapidly developing digital pharmacy services that are enhancing healthcare across the EU and beyond and accelerating the omnichannel options for increased choice and flexibility.

Michael Isles
Executive Director
Alliance for Safe Online Pharmacy in the EU

Acknowledgments: ASOP EU would like to acknowledge the contributions of several patient organisations namely: Eurocarers, the International Alliance of Patients' Organizations, the World Federation for Incontinence and Pelvic Problems as well as an unrestricted educational grant from Amazon.

Copenhagen Economics

TABLE OF CONTENTS

LIST OF FIGURES

EXECUTIVE SUMMARY

Over the past decade, online purchasing from authorised pharmacies and retailers has become an accepted practice across many EU Member States.[1] The EU legislation provides a legal framework for safe online access, aligning supply rules with physical pharmacies and providing specific measures against counterfeiting. This sets it apart significantly from the online sale of other products. Despite such a legal framework, Europeans' online access to prescription medicines is surprisingly fragmented. Eight EU Member States allow patients full online access to these medicines, which includes ordering, dispensing, and delivery to a preferred location.[2] In the remaining 19 EU Member States, patients face restrictions as national laws dictate that prescription medicines can only be dispensed at physical pharmacies.

Our research aims to understand how European citizens perceive the option of accessing their prescription medicine online and the impact of such access on health outcomes. Using new data from a survey of 5,000 Europeans, we can compare the experiences of EU citizens residing in Member States that allow online access to prescription medicines with those residing in Member States where such access is prohibited by national law. We complement this evidence with interviews with chronic patients, pharmacy owners, and patient organisations. Finally, we provide a set of recommendations to enhance the existing EU and national frameworks that regulate the remote sale of medicinal products.

Convenience and flexibility We find that patients across the board value the time-saving convenience and enhanced flexibility offered by online access to prescription medicines through registered pharmacies. While almost one-third of respondents (31%) in the countries that currently prohibit online access to prescription medicines would likely obtain prescription medicine online if available, a total of 56% of respondents in one of the surveyed countries with full online access have already used online access to obtain prescription medicines. This suggests a significant potential for online access to prescription medicines to satisfy patients' needs. This potential grows alongside awareness of the safety of online access and actual experience demonstrates the tangible benefits: ordering at any time is valued by 84% of respondents who used online dispensing while direct delivery is valued by 80% of them. In the countries where respondents do not have access to the service these are also the most valued features of online dispensing.

We estimate the convenience benefits of time savings, unlocked by an EU-wide lifting of restrictions on online access to prescription medicines, to range from up to EUR 1.3bn in the short run immediately after the removal of restrictions, to up to EUR 2.3bn in the long run as the market matures. The short-term effect pertains to the anticipated immediate effect of lifting restrictions, while the long-term effect refers to the impact once the necessary technology, skills, and online infrastructure have matured to a level akin to that currently observed in Sweden. Chronic patients and their caregivers would benefit the most due to their more frequent pharmacy visits.

[1] According to Eurostat, 11.3% of Europeans purchased online over-the-counter medicine or dietary supplements in the last three months (online data code: isoc_ec_ibgs).

[2] These are Denmark, Estonia, Finland, Germany, Lithuania, Portugal, the Netherlands and Sweden.

Better health outcomes Non-adherence to prescription medicines imposes a high cost on European healthcare systems that is estimated at around EUR 125bn a year.[3] Our analysis reveals that respondents that are chronically ill find that the three major contributors to their non-adherence in the past are medicine not in stock, forgetting their refill, and time constraints. 57% of respondents who used online dispensing believe that online access helps improve their adherence. This is a significant finding considering that more than one-third (36.1 %) of people in the EU – equivalent to 138mn EU citizens[4] - reported having a long-standing (chronic) health problem in 2022.

Lastly, we found that a majority, six out of nine, of the interviewed pharmacy owners in France, Italy, and Spain expressed their willingness to offer online services if restrictions on online access to prescription medicines were lifted. Furthermore, we documented that prescription medicines are an important part of pharmacy turnover for both physical and online operations. We also noted three critical factors for the pharmacy sector to evolve to meet patients' demands for online access and play a more significant role in improving medicine adherence: access to necessary skills, flexible solutions to information technology infrastructure, and access to third-party delivery logistics.

In light of these findings, we propose the following policy recommendations:

Improve the AVAILABILITY of medicines online by encouraging Member States to take the necessary steps towards allowing online access to prescription medicines. This could be achieved by amending Article 85(c) in the Community Code of medicinal products for human use[5], which regulates the sale of medicinal products at a distance to the public. Such an amendment will encourage Member States to permit online availability of prescription medicines from authorised pharmacies, in accordance with Single Market laws and regulations. Given the nature of medicines, any limitations on online access within Member States should be clearly justified on public health grounds, supported by indisputable evidence and data. Enhanced online access would supplement the offerings of physical pharmacies, contributing to an omnichannel approach. Patients would then have the flexibility to choose the most suitable access channel based on their needs at any given time. This is corroborated by the fact that in Sweden[6], where online access has been permitted for over a decade, physical pharmacies remain the primary access channel for patients' prescription medicines.

Strengthen the ACCESSIBILITY of medicines online by improving the awareness of existing secure supply chain safeguards whether operating offline or online. Our findings suggest that the availability of regulated online channels could bolster trust among EU citizens and heighten awareness about identifying and connecting with authorised pharmacies online. Increased awareness would curtail inadvertent access to unauthorised sites and the associated risk of procuring falsified medicines.

---

3 e.g. Khan & Socha-Dietrich (2018).

4 Calculated as 36.1% multiplied by the EU27 population aged 15 or above. Eurostat (online data codes: hlth_silc_11, tps00001 and tps00010)

5 Directive 2011/62/EU of the European Parliament and of the Council of 8 June 2011 amending Directive 2001/83/EC on the Community code relating to medicinal products for human use, as regards the prevention of the entry into the legal supply chain of falsified medicinal products Text with EEA relevance.

6 In 2019, online pharmacies held a 12% market share in Sweden, according to the Joint Nordic Report (2021) p. 46.

Facilitate the digital EXPANSION of pharmacy operations by removing existing regulatory restrictions. Offering online accessibility to prescription medications not only caters for patients' needs but also incentivises physical pharmacies to extend their services online (e.g. real time online consultations, telemonitoring of adherence) and foster innovation in digital health, potentially saving time for other healthcare providers. Furthermore, policymakers could consider measures that address barriers related to skills and infrastructure.

CHAPTER 1

1. BACKGROUND AND METHODOLOGY

Digital technologies have become increasingly integrated into our daily lives, particularly over the past two decades. This is increasingly evident in patients' prescription journeys, which involve several stages: the issuance of a prescription by a doctor (currently an electronic prescription in nearly every Member State), the procurement of the prescribed medicine, and the ongoing monitoring and refill processes for individuals living with chronic conditions.

The adoption of e-prescriptions signifies a crucial shift, enabling medical doctors to issue accurate, error-free, and comprehensible prescriptions that are stored on a server accessible electronically by the pharmacy or patient. Owing to electronic prescriptions, the error rate in dispensing medical products could be reduced by an average of 6%, and even up to 15% in countries with more advanced digitalisation.[7] With such an infrastructure in place, the convenience of accessing prescriptions online is significantly enhanced, enabling individuals to obtain their required medications from the comfort of their homes. This transition not only streamlines the prescribing process but also improves accessibility, rendering healthcare more user-friendly and adaptable to the specific medical needs of various patient groups.

Scientific literature has highlighted numerous benefits of digitising prescriptions and dispensing them online. The implementation of electronic prescriptions enhances efficiency, minimises medication errors, and improves convenience.[8] Online dispensing includes the convenience benefits of e-commerce, such as the ability to order at any time and save time. However, the advantages extend beyond mere convenience. As this report clearly demonstrates, online access to prescription medicine can enhance adherence, thereby improving healthcare outcomes and yielding related healthcare cost savings.

Although the European Health Data Space (EHDS) facilitates the adoption of electronic prescriptions in the EU, online access to prescription medicines for EU citizens remains fragmented and restricted in most Member States. At present, the EU legal framework allows Member States the discretion to impose restrictions on online sales.[9] As a result, most Member States have implemented various restrictions, including limitations on the types of products that can be sold online (for example, excluding prescription medicines), restrictions on the use of third-party IT infrastructures, and legal obligations for online pharmacies to maintain a physical presence.[10] Currently, only eight Member States permit the online sale of prescription medicines.[11] These countries are represented in light blue in Figure 1.

In this report, we shed light on the perspectives of European patients on online access to prescription medicines. Our focus is on five EU Member States: France, Italy and Spain, where online access

7 European Commission, A European Health Data Space: harnessing the power of health data for people, patients and innovation (Communication) COM(2022) 196 final.

8 See for example: Deetjen (2016), Oktarlina (2020) or Racek & Czirfusz (2021).

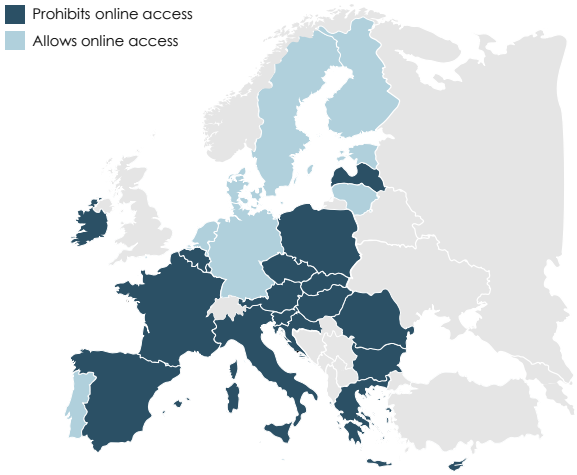
9 c.f. Article 85(c) of Directive 2011/62/EC, General requirements for sale at distance.

10 c.f. EAEP, *Enabling the safe online sale of prescription medicines in Europe*. 20 September 2022. Available here.

11 The Member States are: Estonia, Denmark, Finland, Germany, Lithuania, the Netherlands, Portugal and Sweden.

to prescription medicines is prohibited, and Germany and Sweden, where it is permitted.[12] This approach allows us to juxtapose the expectations and actual experiences of EU citizens regarding online access to prescription medicines.

Figure 1
Countries that allow online access to prescription medicines



Source: European Association of E-Pharmacies (2022)

To gather and scrutinise as much comprehensive evidence on the subject as possible, we employ a variety of data collection methods and empirical analyses. Firstly, we conducted a survey that received 5,000 responses (1,000 per country), with a focus on individuals who have procured goods and services through online channels and who obtained prescription medicine in the past year and on chronic patients. This is crucial, as in 2022, 36.1% of the EU population aged 16 years or over reported having a long-standing illness or health problem.[13] We posit that this group stands to benefit the most from online pharmaceutical services.[14]

To supplement the large-scale survey, we undertook several fact-finding initiatives: a series of 25 interviews with chronic patients, a questionnaire eliciting the point of view of 25 pharmacy owners, and three interviews with three experts affiliated with patients' organisations. We believe that deploying multiple research methods and empirical channels strengthens the overall evidence, while we chose to balance resources to prioritise the large-scale quantitative consumer survey. We appreciate that the scale of the interviews and questionnaires is smaller. We welcome any efforts by the research and policy community to replicate and extend the current research.

Based on the above research effort, carried out in Autumn of 2023, we unearthed several insights which we categorised into the following three themes: convenience, health benefits, and barriers to online access. The insights are presented in the following chapters.

[12] While Sweden the online channel is well-established, Germany faces technical barriers in rolling out electronic prescriptions.

[13] Eurostat (2023), online table: hlth_silc_11.

[14] Our survey data shows that 63% of the respondents have a chronic condition. This intentional oversampling of chronic patients in our study is designed to ensure sufficient statistical power and gain meaningful insights from subgroup analysis.

CHAPTER 2

2. PATIENTS' QUEST FOR CONVENIENCE

- While **31%** of the respondents in Member States with prohibited online access would like to obtain prescription medicine online, if given the opportunity, **56%** of respondents in Sweden already use this service.
- **69%** of respondents value ordering at any time and **67%** value direct delivery.
- The quest for online access to prescription medicines comes from consumers who have the highest burden going to the pharmacy i.e., those suffering from **chronic conditions** and those **living far away** from physical pharmacies or **struggling with opening hours**.
- We quantify convenience benefits that would come from the EU-wide removal of restrictions in a range between **EUR 1.3bn** in the short run to almost **EUR 2.3bn** in the long run.

In the evolving landscape of consumer habits, convenience has emerged as a key factor. The growing popularity of online shopping is a clear example of this shift. Over the last decade, the share of people living in the EU who have shopped online within the last 3 months has increased from 36% in 2014 to 56% in 2022.[15] Similarly, patient behaviour in healthcare is undergoing a transformation: the percentage of consumers who purchased over-the-counter medicines online in the last three months has more than doubled from 5.1% in 2014 to 11.3% in 2022.[16] Patients are seeking streamlined solutions for their healthcare needs, not just for everyday products. The Covid pandemic has accelerated this trend, making digital pharmacies an integral part of healthcare delivery.

This shift has led to the emergence of omnichannel pharmacies that operate online - where legislation permits - providing patients with convenient access to medications, healthcare products, and health advice from the comfort of their homes.

Drawing on the consumer survey and patient interviews, this chapter highlights the aspects of convenience that patients value most (Section 2.1), documents the demand for online access (Section 2.2), and estimates the value of consumer benefits of home delivery (Section 2.3).

15 Eurostat (2022), online table: isoc_ec_ibuy and isoc_ec_ib20.
16 Eurostat (2022), online table: isoc_ec_ibuy and isoc_ec_ibgs.

2.1 ORDERING AT ANY TIME IS VALUED BY MORE THAN 69% OF RESPONDENTS

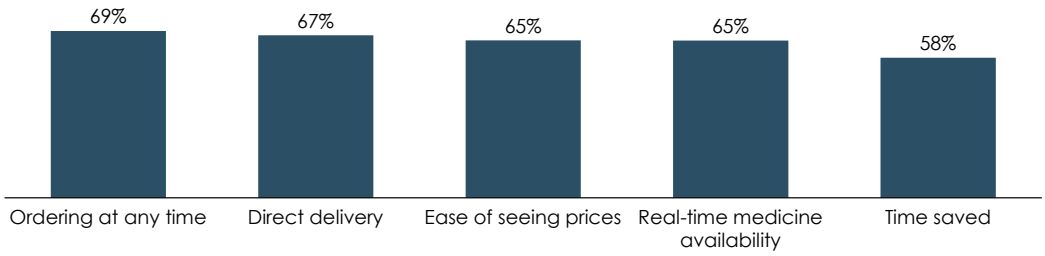
When asked about the primary advantages of online access to prescription medicines, a woman in her forties from Spain highlighted convenience and flexibility (see quote to the right). For Benedikt, a man in his fifties living in Germany, it is about the opening hours (*"you're not dependent on opening hours")* and for Bianka, a 49-year-old living in Italy, it is about ordering from a preferred location (*"you do it from the comfort of your home, or from the office")*. Lastly, Astrid, a 63-year-old female from Sweden, emphasised the practical aspect, describing it as simply *"comfortable and practical".*[17]

> *It would be very good for me, I could buy it* (a prescription medicine) *whenever I want and however I want, regardless of whether it* (the physical pharmacy) *is closed or not.*
>
> Woman in her forties from Spain

These voices are not exceptions. The benefits of convenience and flexibility associated with online access to prescription medicines are widely recognised among Europeans, as confirmed by our survey findings.

The respondents value the ability to order at any time that comes with online access. Physical pharmacies often operate within limited hours, restricting patients' access to medication. In contrast, pharmacies operating online offer the convenience and flexibility of 24/7 accessibility, allowing patients to order their medication at any time. Our survey shows that 69% of respondents consider this option "beneficial" or "very beneficial", see Figure 2. Additionally, a direct delivery service, the ease of viewing prices before ordering, and the ability to instantly check medicine availability are highly valued by most respondents.

Figure 2
The most beneficial factors of online access
Share of responses of "beneficial" or "very beneficial" across all countries

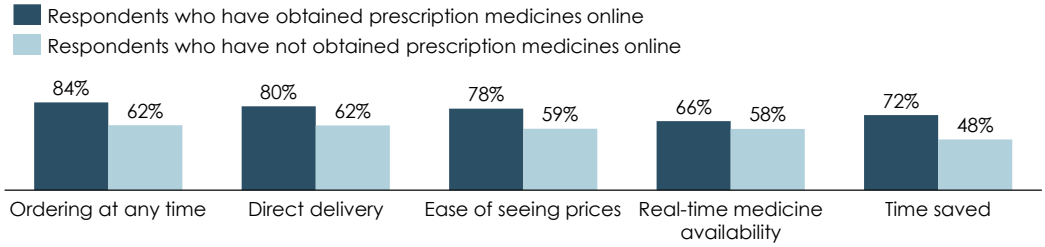


Note: The figure shows the share of respondents who answer "beneficial" or "very beneficial" when asked how they (would) rate certain features of ordering medicines online on a five-point Likert scale.
Source: Copenhagen Economics, Consumer Survey

[17] The quotes are sourced from in-depth interviews with chronic patients. Personal information has been anonymised.

Respondents residing in countries that permit online access to prescription medicines (namely, Germany and Sweden) report placing a higher value on convenience compared to those in countries where such access is prohibited. Within the latter group, there is a noticeable difference: respondents who have previously procured medicines online – as indicated by dark blue bars in Figure 3 - value convenience more than those without such experience – as indicated by light blue bars. Intriguingly, these convenience benefits span the entire prescription journey, from the ability to order at any time (84% versus 62%) to direct delivery (80% versus 62%).

Figure 3
The most beneficial factors in countries with online access
Share of "beneficial" or "very beneficial" responses



Note: The figure shows the share of respondents in Germany and Sweden who answered "beneficial" or "very beneficial" when asked how they (would) rate certain features of ordering medicines online. 1,147 respondents indicate that they have not previously bought prescription medicine online while 853 respondents report that they have.
Source: Copenhagen Economics, Consumer Survey

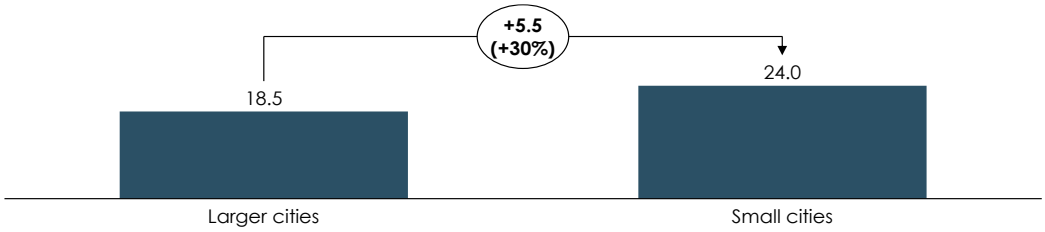
In that prescription journey**, saving time also stands out**. Respondents who have used online access appreciate the convenience more than those who have not tried it yet. As many as 72% of respondents who used online access consider this aspect as "beneficial" or "very beneficial". As time is a scarce resource, consumers are increasingly likely to seek end-to-end solutions that save time and offer flexibility. E-commerce caters to this demand by providing a streamlined experience, enabling individuals to satisfy their needs with time-saving convenience.

Respondents spend 15 minutes less obtaining prescription medicines online compared to visiting physical pharmacies. We derived this result by comparing the actual online and offline experiences of respondents residing in countries with online access. The 15-minute difference is the average time saved between online (13 minutes) and physical pharmacy (28 minutes) access.[18] As can be expected, consumers live in different settings and not all have a physical pharmacy in their proximity, which affects the time they have to spend every time they need to go and obtain prescription medicines at a physical pharmacy. Therefore, behind the average statistics, there is a significant number of patients in the survey sample who face considerable travel time to reach the nearest physical pharmacy. In fact, for 10% of respondents, the travel and process of obtaining prescription medicines via a physical pharmacy visit regularly takes 70 minutes or longer.

[18] We apply conservative assumptions as to the time required for the buyer to participate in the online purchase and delivery (i.e. reception) process – while this is not the main research focus in this report. We also face data limitations as to distance to pharmacy, since our survey focused on capturing travel time.

Furthermore, another way of looking at this is by comparing the experience of those living in denser versus less densely populated areas. Evidence from the survey shows, specifically, that respondents residing in smaller cities spend 30% more time reaching the closest pharmacy than respondents living in larger cities, see Figure 4. We also expect that chronic patients, who need to visit a pharmacy more frequently to refill their prescription medicines, would obtain greater time-savings and therefore benefit more from being able to obtain medicines online. We expand on this in Chapter 3.

Figure 4
Average time to the nearest pharmacy by city size
Minutes



Note: Small cities are defined as cities with less than 1,000 inhabitants and larger cities are defined as cities with 1,000 inhabitants or more. 321 respondents live in small cities and 4,679 live in larger cities. The difference is statistically significant by all standard significance levels.
Source: Copenhagen Economics, Consumer Survey

Finally, **physical conditions such as disabilities or illnesses may significantly hinder patients' ability to travel to a physical pharmacy,** or even make it impossible. There are clear benefits for this group of patients, as is illustrated by personal stories shared during interviews with chronic patients.

For instance, a patient in Sweden suffering from bile salt malabsorption finds online access to prescription medicines particularly beneficial given his condition: "*If you have stomach problems, you eventually learn where every public toilet is (…) This has definitely made me order more from online pharmacies.*"

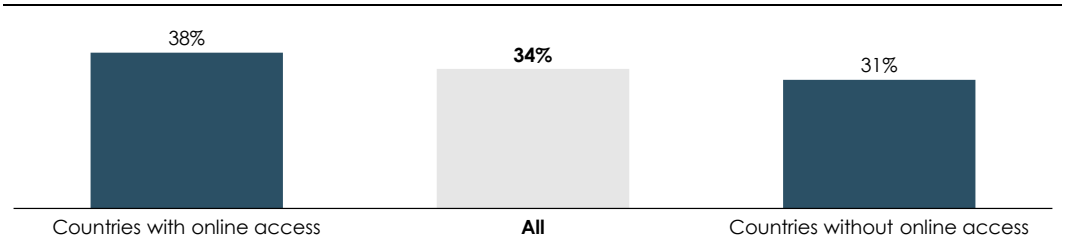
Another perspective is offered by a young female in Spain suffering from chronic fatigue syndrome and multiple chemical sensitivity "*My husband almost always goes; I wait in the car unless it's a change of medication and then I go myself*". Her conditions pose a significant burden on physical visits to the pharmacy and she states that she would find online access "*convenient*". The nearest pharmacy is 6 km from their home.

Notably, a young IT technician from Germany also highlights the fact that online access could benefit those who live alone: "*If you realise that you need this medication now because you picked up the prescription just before the deadline and then suddenly fall ill or suddenly get corona or something, then of course it's [sic] very inconvenient. It can always happen. Especially if you live alone, which I still do, then you don't have anyone who can pick it up for you.*"

2.2 THE REGULATORY FRAMEWORK IMPACTS THE DEMAND FOR ONLINE ACCESS

34% of all respondents indicate that they are "likely" or "very likely" to obtain medicines online. Respondents living in countries with online access to prescription medicines – as indicated in the left bar in Figure 5 - are seven percentage points more "likely" or "very likely" to obtain prescription medicine online than consumers living in countries without online access – as can be seen in the right bar. Various factors influence the demand for online access, and we will analyse them in this section.

Figure 5
Likelihood of obtaining medicines online
Share of responses being "likely" or "very likely" to obtain prescription medicines online



Note: The figure shows the share of respondents who answer that they are "Likely" or "Very likely" to obtain medicines online if given the opportunity. We use 2,000 observations from Germany and Sweden to calculate the average for countries that permit online sales of prescription medicines and 3,000 observations from France, Italy and Spain to calculate the average for countries that do not.
Source: Copenhagen Economics, Consumer Survey

In Germany and Sweden, where online access is available, respondents report their actual demand for online access. Conversely, respondents from France, Italy and Spain, where online access is prohibited, indicate their potential demand in a hypothetical scenario of permitted online access. The discrepancy between 38% and 31% suggests that actual demand for online medication services tends to exceed anticipated demand, which we interpret as an indication that demand increases over time following the introduction of online access to prescription medicines. We will further explore this phenomenon in Chapter 4, where we analyse how consumer trust and perception of safety impact demand.

Despite both Sweden and Germany providing online access to prescription medicines, there is a significant difference between the two. In Sweden, 53% of respondents are "likely" or "very likely" to obtain prescription medicines online, compared to 23% in Germany. This stark contrast can likely be attributed to three factors. Firstly, online pharmacies have been present in Sweden longer than in Germany. Secondly, there has been a significant delay in the rollout of a comprehensive electronic prescriptions system in Germany.[19] For instance, patients are required to scan or mail their prescription orders for home delivery. This reduction in convenience could deter patients from utilising online access channels for prescription medicines. There is also a slow adoption of electronic prescriptions, seemingly driven by low technology acceptance among physicians.[20] This was echoed during interviews with chronic patients (see the quote from the IT technician). Thirdly, the level of general internet literacy is significantly higher in Sweden than in Germany,[21] and previous studies have shown a correlation with the likelihood of obtaining medicine online.

> *There is now the e-prescription, and I am already a fan of digitalisation. I've already used an online pharmacy for another medication. However, I have not yet been offered an e-prescription by a doctor. I noticed that because it was a topic in the media.*
>
> IT technician from Germany

2.3 THE NECESSITY FOR REGULAR PHYSICAL PHARMACY VISITS DRIVES DEMAND FOR ONLINE ACCESS

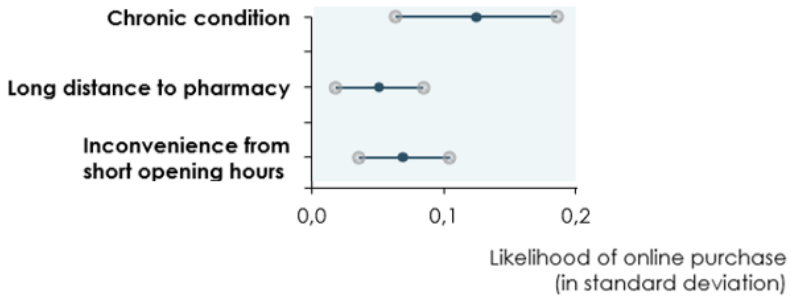
The demand for online access is not solely influenced by country regulations. We will test, using regression analysis, how patient characteristics and preferences relate to the demand for online access to prescription medicines. The results referring to three key factors - suffering from a chronic condition, long distance to the nearest pharmacy, and inconvenience due to the opening hours - are shown in Figure 6, and regression results are reported in Appendix B. Notably, all three effects are statistically significant, indicating that these effects are very likely to be true effects in the population, rather than due to chance in our survey sample.

[19] It was expected to happen on 1 January 2022 but has been postponed due to the lack of technological infrastructure and related delays in testing. C.f. Reuters. Germany to miss the deadline for full rollout of e-prescriptions. Published on 21 December 2021. Available here.

[20] Graf et al., (2023).

[21] Eurostat (2023), online table isoc_ec_ibuy.

Figure 6
Factors affecting the likelihood of obtaining prescription medicine online



Note: The figure displays regression results from an analysis that explores which factors affect the likelihood of obtaining prescription medicine online. The dependent variable – the likelihood of obtaining prescription medicine online – is represented on the X-axis. It is standardised (z-score) to interpret effects in terms of standard deviations. For all displayed variables, the estimated effect is statistically significant (see Table B.2 in Appendix B).
Source: Copenhagen Economics, Consumer Survey

Suffering from a chronic condition increases the demand for online access to prescription medicines. The effect is illustrated as the top line. The dark blue dot indicates how much suffering from a chronic condition increases the likelihood of online access. The effect is reported in standard deviation and amounts to 0.12, indicating a meaningful and positive effect.[22] The effect size for chronic patients is the largest among the three considered factors. Patients who need to obtain prescription medicine on a repeated basis have a greater demand for online purchases, presumably because their burden from frequently visiting physical pharmacies is higher.

Furthermore, **patients who face a greater burden from visits to a pharmacy have a greater demand for online access**.[23] We measure the burden as the perceived challenges related to the proximity of the nearest pharmacy (i.e., distance to the nearest pharmacy) and limitations posed by opening hours. We find that the further away the nearest pharmacy is, the more likely are patients to prefer online access. Similarly, the shorter the opening hours of the nearest pharmacy, the more likely patients are to prefer online access.

[22] The effect size of our dependent variable – the reported likelihood to obtain prescription medicine online – can be interpreted in terms of standard deviations. This is because we standardised the responses from the ordinal five-point Likert scale to make the size effect size more comparable to those of other variables and easier to interpret. Following the logic of Cohen (1988), we interpret effect sizes smaller than 0.2 sd as small effects, between 0.2 sd and 0.5 sd as medium effects and everything greater than 0.5 sd as a large effect.

[23] The regression results show that the effect of the two variables "long distance" and "inconvenience from short opening hours" are in fact positive.

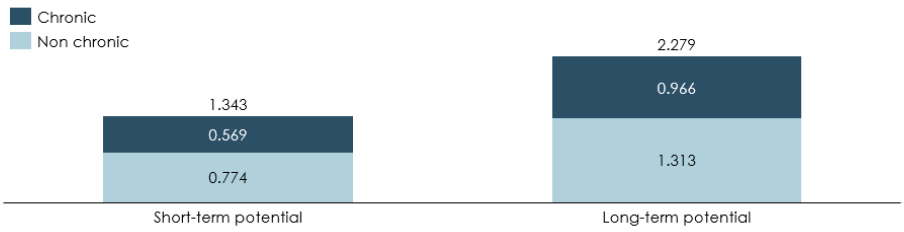
2.4 BENEFITS TO ONLINE ACCESS AMOUNT UP TO EUR 2.3 BN

Time savings stand out as one key benefit of online access. A young female professional living in a rural area of northern Germany, who has a physical pharmacy within a 5-minute drive, told us during the interview: *"With the journey alone, it's already 10 minutes each time and if I drive twice - because they never have this medication in stock - it's even 20 minutes. So, I would say at least 20 minutes. And actually, if you work full-time, 20 minutes is an insane amount"*.

We ascertain that the short-term economic value of potential time savings related to online sales of prescription medicines could reach up to EUR 1.3bn across the 19 EU Member States where online access is currently prohibited, see Figure 7.[24] As the market matures, we project that the long-term effect could approach nearly EUR 2.3bn.[25] The short-term effect pertains to the anticipated immediate effect of lifting restrictions, while the long-term effect refers to the impact once the necessary technology, skills, and online infrastructure have matured to a level akin to that currently observed in Sweden. This indicates a transformative trajectory driven by the growing willingness to embrace online access to prescription medicines over time.

> *If you work full-time, 20 minutes is an insane amount* (of time).
>
> Young female professional from Germany

Figure 7
Total economic value of time savings
Billion euros



Note: See Appendix A for the methodology behind the estimations.
Source: Copenhagen Economics, own calculations

The potential benefits of removing restrictions on online sales are greater for chronic patients who visit pharmacies more frequently than those who do not have a chronic condition. They account for around 42% of the economic value despite constituting only about 36% of the population.[26] This is a consequence of chronic patients visiting pharmacies more frequently than healthy individuals.

[24] EU19 refers to the 19 countries where online sales of prescription medicines are currently restricted. The countries included in EU19 are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, France, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Mata, Poland, Romania, Slovakia, Slovenia and Spain.

[25] We have performed a sensitivity analysis of these results and found them robust. When making the estimation using age-specific groups, results only vary around 5%. We can provide sensitivity analysis upon request.

[26] See Eurostat, online table: hlth_silc_11.

Our methodology, outlined in Box 1 and detailed in Appendix A, likely underestimates the true value of removing restrictions on online access to prescription medicines, as we focus solely on time savings, to which it is possible to assign an economic value. However, consumers value a broad range of other convenience elements. These include the flexibility of ordering online at any time, transparency of price and medicine stock, and ease of refills.

Box 1. Methodology

We have used the following three-step methodology to arrive at these estimates. Firstly, we calculate potential yearly time savings per person by multiplying time savings per pharmacy visit by the frequency of pharmacy visits. Secondly, we calculate the economic value of potential savings per person by multiplying potential yearly time savings with country-specific median wages. Lastly, we scale up to the country's population adjusting for the probability of obtaining medicines online and for the share of online shoppers. The short and long-term effects are captured with the changing willingness to obtain prescription medicines online.

Lastly, patients living in rural areas tend to travel by car to the pharmacy. This is the case for 40-year-old Margot living in France: "*I always go by car because we live in the countryside, so it takes about ten minutes*". For Ula living in Sweden, it is a 7-minute car ride. Despite these brief travel times, it is crucial to acknowledge the difference in transportation modes and associated costs between urban and rural residents. While consumers from rural areas like Margot and Ula often rely on cars, leading to similar time investments as urban residents, the financial aspect of using a car can result in higher overall costs for pharmacy visits for patients living in rural areas. In any case, Gustav, a young professional from Sweden, concludes online access as follows: "(Online access) *It's easy, it's fast, you can usually do it when you want, you don't have to go there* (to the pharmacy) *and you can save on gas or bus fare.*"

CHAPTER 3

3. HEALTH BENEFITS FOR CHRONIC PATIENTS

- Patients with a chronic condition visit pharmacies **45%** more often per year than those without a chronic condition.
- Higher frequency concerns also carers who represent **30%** of respondents in the survey.
- **64%** of time-constrained chronic patients believe online access would improve their adherence.
- A substantial share of chronic patients, from Member States that allow online access, think that online access (**34%**) and delivery (**48%**) benefit their adherence to treatments. If we consider replies from chronic patients who tried online access, the shares are significantly higher and correspond to **57%** and **66%** respectively.

Patients suffering from chronic conditions are particularly significant in studying the health benefits of online access to prescription medicines. A chronic condition is a health issue lasting one year or more, which necessitates ongoing medical care (e.g., high blood pressure or diabetes). Chronic patients differ from those with acute conditions as they need to refill their prescription medicine regularly, leading to a greater burden in terms of pharmacy visits.

Moreover, they need to take their medication on time for the pharmaceutical treatment to be effective.

As we demonstrate in this chapter, chronic patients, with their high frequency of pharmacy visits and continuous medication needs, are a pivotal group to study in the context of evolving digital solutions in healthcare.

3.1 THE FREQUENCY OF PHARMACY VISITS IS HIGHER FOR CHRONIC PATIENTS AND CAREGIVERS

Emelie from France, suffering from hypothyroidism, describes her prescription journey as follows: *"I have a prescription for six months and the packaging for my medication can be done over three months, so I only need to go to the pharmacy twice to pick up the medication for the six months and then I go back to the doctor, who takes a blood test to recheck and revalidate the dosage I need for my medication*." Her prescription journey includes regular check-in points by a medical doctor and necessitates periodic visits to the pharmacy.

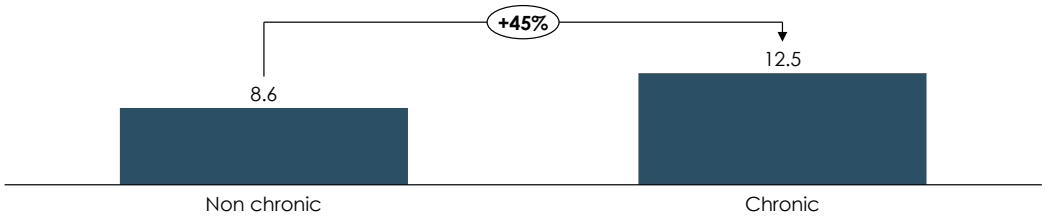
The frequency of pharmacy visits among our survey respondents underscores significant differences between non-chronic and chronic patients.[27] While non-chronic patients report an average of 8.6 visits annually, the frequency of pharmacy visits among chronic patients is 45% higher, with 12.5 visits per year, see Figure 8. These averages pertain to the visits by respondents without caregiver

[27] For this analysis, we exclusively focus on respondents who reported having no caregiver responsibilities. This approach is adopted to isolate the impact of the chronic condition, avoiding any potential confounding effects that may arise due to chronic patients frequently assuming informal caregiver roles.

duties. Accounting for caregiver duties is vital as they would increase the frequency of pharmacy visits and could lead us to overstate the effect attributable to the person's chronic condition.

This difference of almost four visits per year carries substantial economic implications. Firstly, it suggests that chronic patients invest more time in pharmacy visits, impacting their daily routines and potentially their productivity. Secondly, it indicates that chronic patients also purchase significantly more items, leading to greater financial expenditure. Collectively, these factors contribute to a considerable burden for chronic patients and reveal a potential for online services to alleviate some of these challenges.

Figure 8
Pharmacy visits by chronic condition
Number of pharmacy visits per year



Note: The figure displays the number of pharmacy visits per year for respondents without caregiver duties and with or without a chronic condition. The displayed numbers are averages across the five survey countries. Note that the assumed maximum number of visits may not be precise, as the respondents answered "More than once per week", which makes it impossible to directly infer the exact number of visits. The share of the latter type is larger among chronic patients.
Source: Copenhagen Economics, Consumer Survey

However, individuals often obtain prescription medicines not only for themselves but also for those they care for. For instance, Melanie, a 40-year-old interviewee living in France, obtains prescription medicine not just for herself but also for her mother, who, like her, suffers from a chronic disease: "*I also go to the pharmacy for my mum because she's also diabetic.*" Melanie visits a physical pharmacy once a month.

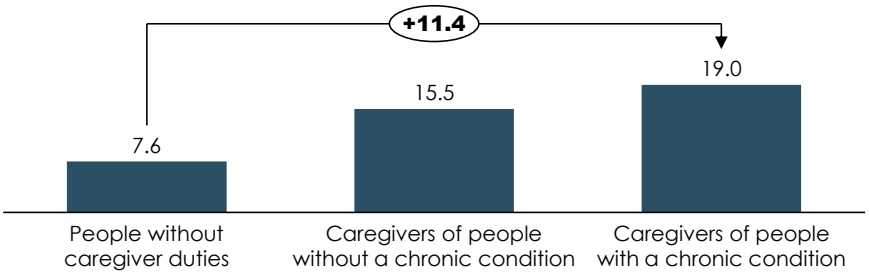
As many as 30% of the respondents in our survey reported obtaining medicine for a chronic patient they care for. This underscores the integral role of informal caregivers in managing chronic illnesses of their close relatives or friends. According to an EU study, it is usually women who assume the role of informal caregivers, with a gender gap of five percentage points across the EU.[28] This gender gap typically decreases with the rate of female labour market participation, a trend we also observe in the survey data.

Informal caregivers report a significantly higher frequency of pharmacy visits. Here the focus is narrowed to a subset of the informal caregivers, namely those who do not themselves have a chronic condition.[29] As the right bar in Figure 9 shows, caregivers for chronic patients reported an average of 19 visits per year to the pharmacy. This is 3.5 visits more than caregivers who

[28] European Commission (2018).
[29] Like before, we exclude caregivers with an own chronic condition to achieve a clean analysis. This approach allows us to avoid any potential confounding effects that may arise due to chronic patients frequently assuming informal caregiver roles.

care for a person without a chronic condition (e.g., a child or an elderly person) and 11.4 more when compared to respondents without caregiving responsibilities.[30]

Figure 9
Pharmacy visits by caregiver types
Number of pharmacy visits



Note: The figure displays the number of pharmacy visits for different caregiver types: respondents without a caregiver role, respondents who care for a person without a chronic condition (e.g., a child), and respondents who care for a person with a chronic condition. For this analysis, we have only considered informal caregivers who do not suffer from a chronic condition themselves. Note that the assumed maximum number of visits may not be precise, as the respondents answered "More than once per week", which makes it impossible to directly infer the exact number of visits. Also, please note that the data underlying this figure includes respondents who reported that they never visit a pharmacy because they obtain their medicine online.
Source: Copenhagen Economics, Consumer Survey

This additional responsibility for informal caregivers not only indicates a higher demand for pharmaceutical services but also underscores the considerable time and effort invested in supporting chronic patients. Again, online pharmacy services could offer significant advantages by reducing the frequency of physical pharmacy visits, thereby alleviating some of the burden.

3.2 ONLINE ACCESS CAN IMPROVE MEDICATION ADHERENCE

Gabriel, a computer scientist residing in France and suffering from gout, recognises that online access might improve his adherence to treatment: *"I take the same thing [sic] every month. If I could have it delivered to my home on the 1st of the month, then I would avoid forgetting [sic], which wouldn't be bad."*

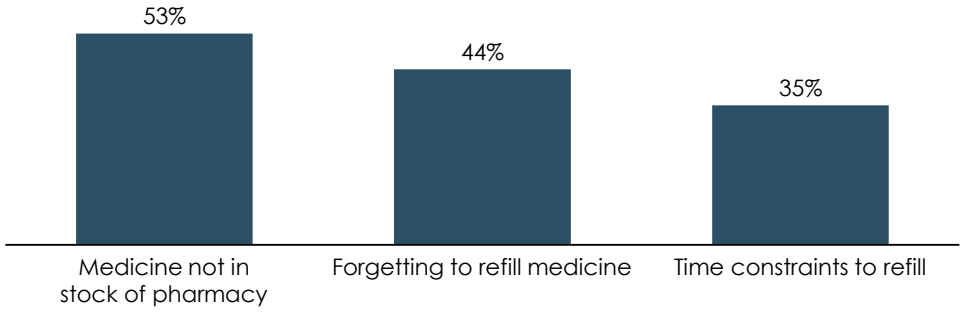
Taking medicine on time is an essential element of chronic disease management. Consistent adherence ensures that the prescribed treatment works effectively and helps to manage the symptoms associated with chronic illness. Non-adherence can lead to disease progression or exacerbation of symptoms, leading to increased healthcare costs due to hospitalisation, emergency visits, or complications.

[30] Both differences are statistically significant ($p < 0.001$ and $p = 0.049$, respectively) and remain in size after controlling for factors such as age or gender (see regression results in the Appendix B).

In the six months preceding the survey, 21% of all chronic patients experienced at least one instance where they were unable to take their prescribed medicine on time. Among this group, 35% reported that time constraints in refilling prescriptions were an "important" or "very important" contributor to these instances. This suggests that time constraints may lead to non-adherence in 7% of chronic patients. This is concerning, as research shows that non-adherence and poor adherence to medication regimens result in avoidable costs amounting to EUR 125bn annually across Europe and contribute to approximately 200,000 premature deaths each year.[31]

The three primary reasons that emerged from the survey as the most significant contributors to non-adherence are: 1) medicine not in stock in the pharmacy,[32] 2) forgetting to refill the medicine, and 3) a lack of time to obtain or refill prescriptions, see Figure 10. Notably, the third reason – time constraints – is particularly relevant in the context of online access. Ordering online combined with home delivery could mitigate instances of non-adherence caused by time constraints during the refill process. As shown in the right bar in Figure 10, a significant share of 35% of the chronic patients with adherence issues reported that time constraints were an important contributor to those situations.

Figure 10
Contributors to non-adherence



Note: The figure shows the three most important contributors to the situations that chronic patients reported which led to their non-adherence. This underlying analysis focuses on the subsample of 638 chronic patients who indicated that they experienced at least one incident of non-adherence during the past six months. The bars show the share of the patients who responded that the respective factor was an "important" or "very important" contributor to those situations of non-adherence.
Source: Copenhagen Economics, Consumer Survey

64% of individuals who experienced non-adherence due to time constraints report being "likely" or "very likely" to order prescription medicine online. As shown in Figure 11, we observe a significant correlation between time constraints and the propensity to use online pharmacies for medication adherence. This correlation could suggest that individuals who report adherence issues due to time constraints are more likely to benefit from the convenience of online services. In comparison, only 34% of those who did not experience time-related adherence challenges

[31] Khan & Socha-Dietrich (2018).

[32] Note that based on the survey responses we collected, we are not able to distinguish whether the reported shortage of medicine in the pharmacy is due to a lack of management by the pharmacy or due to a general supply shortage that would affect all pharmacies across all countries equally.

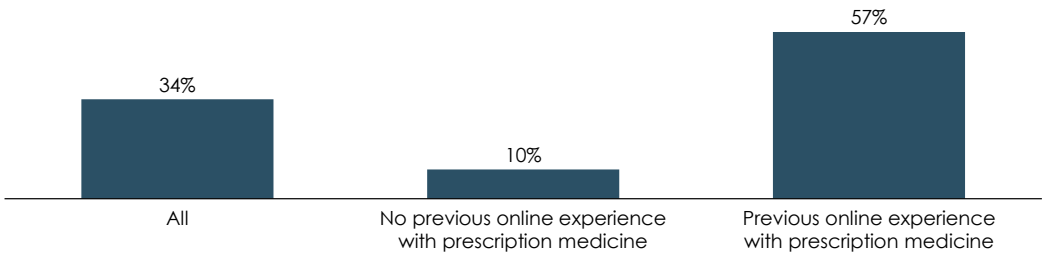
are likely to do so. This trend persists even when accounting for a variety of other factors, with further statistical evidence provided in Appendix B.

Figure 11
Chronic patients' online demand based on time constraints
Percent

Note: The figure displays the share of chronic patients with adherence problems who, depending on whether their non-adherence is caused by time constraints or not, report a high likelihood of using online services to order their prescription medicine. Originally, respondents indicated their likelihood of buying prescription medicine online on a five-point Likert scale ranging from 1 ("Very unlikely") to 5 ("Very likely"). Note that the question is phrased slightly differently in Sweden and Germany than in France, Italy, and Spain to account for the fact that purchasing prescription medicine is already possible in those countries. For this analysis, however, we pooled all responses.
Source: Copenhagen Economics, Consumer Survey

Building on the insights gathered from chronic patients in Germany and Sweden— the two countries included in our study where it is already possible to obtain prescription medicine online—we further examined how online ordering and home delivery could help in adhering to prescribed medication regimens. **Overall, 34% of chronic patients from these countries believe that ordering their medication online would help them either "much" or "very much" in adhering to their prescribed plan**, as shown in Figure 12. Not surprisingly, this sentiment is more pronounced among those who already obtain prescription medicine online. Among respondents with prior experience in obtaining prescription medicine online, 57% report that online access would significantly aid their adherence. In contrast, only 10% of those without such prior experience share this viewpoint.

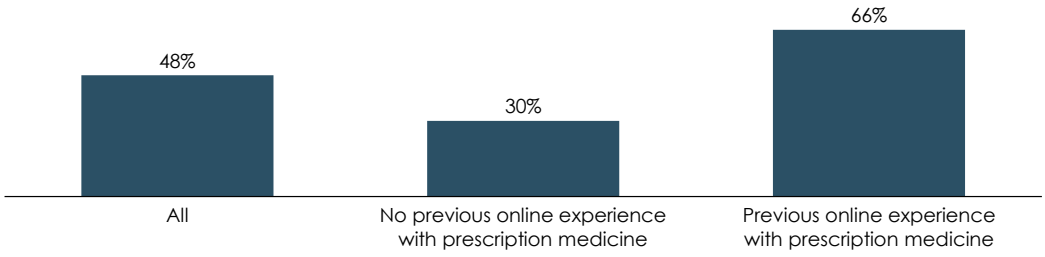
Figure 12
Share of respondents who believe that online access helps to improve adherence
Percent



Note: The figure displays the share of respondents who believe that ordering prescription medicine online helps to improve adherence either "much" or "very much". Participants rated the extent to which online ordering helps them on a five-point Likert scale ranging from 1 ("Not at all") to 5 ("Very much"). We asked the question to all participants in Sweden and Germany who indicated having a chronic condition. For visualisation, we split the analysis by type, that is, whether a respondent had previously obtained prescription medicine online or not.
Source: Copenhagen Economics, Consumer Survey

Similarly, **48% of the chronic patients we surveyed in both countries reported that having their medication delivered would help them either "much" or "very much" in terms of improving their adherence**. Again, this perception is particularly strong among patients with prior experience with online access, where 66% attest to the positive effect of delivery services on adherence, compared to 30% among those who have never bought medicine online (see Figure 13). Both trends hold even after controlling for variables such as age and familiarity with online shopping, with further statistical evidence provided in Appendix B.

Figure 13
Chronic patients believe that home delivery helps to improve adherence
Percent



Note: The figure displays the share of respondents who believe that having prescription medicine delivered helps improve adherence either "much" or "very much". Participants rated the extent to which delivery helps them on a five-point Likert scale ranging from 1 ("Not at all") to 5 ("Very much"). We asked the question to all participants in Sweden and Germany who indicated having a chronic condition. For visualisation, we split the analysis by type, that is, whether a respondent had previously obtained prescription medicine online or not.
Source: Copenhagen Economics, Consumer Survey

3.3 REPRESENTATIVES OF PATIENT ORGANISATIONS RECOGNISE THE BENEFITS OF ONLINE ACCESS

To supplement the evidence collected through the survey, we conducted interviews with three experts affiliated with patients' organisations. Their names and affiliations are listed below. They spoke to us in their personal capacity and shared their perspectives on online access, often referring to chronic patients and their carers.

Ms Mary Lynne van Poelgeest-Pomfret	**Dr. Neda Milevska-Kostova**	**Mr Stecy Yghemonos**
President	Immediate Past Chair	Executive Director
World Federation for Incontinence and Pelvic Problems	International Alliance of Patient Organizations	European Association Working for Carers

During the interviews, **the three experts acknowledged the benefits of online access in terms of convenience and health outcomes**. Mr Yghemonos anticipated that the convenience of online access could alleviate the need for physical pharmacy visits for carers. Ms van Poelgeest-Pomfret emphasised that online access to prescription medicines significantly simplifies the process of obtaining necessary medication when compared to physical pharmacy visits. Furthermore, in line with the survey results, she highlighted that online accessibility could improve adherence by easing access. Finally, Dr Milevska-Kostova spoke more generally about the value of telemedicine for adherence,[33] recognising that online access with digital apps and other supportive tools empowers patients to better follow their treatment plans.

These interviewees pointed out that **online access benefits from being paired with advisory and educational eHealth services**. Mr Yghemonos stressed that "*For an individual caring for a patient with multiple conditions and undergoing complex medication treatment, proper guidance on medication intake is crucial.*" This point is of great importance to Ms van Poelgeest-Pomfret who emphasised the significance of coupling ease of access with education, stating: "*The information about treatment is vital to the patient. It should be presented in a simplified and understandable way*." It is important to note that pharmacists operating in the EU are regulated to provide certain activities and services.[34] These include access by the patient to a counselling service by the resident pharmacist. Patients could receive online counselling on their treatment at any time, from anywhere (e.g. share how best to store medication, talk through potential side effects, and help manage their prescription routine), reducing the time patients spend in seeking care and from the comfort of their homes.

33 See also Votta et al (2022).

34 See Chapter 4 in WHO (2019).

Finally, all interviewees **advocated for an omnichannel solution**. In their view, a digital toolbox solution cannot function in isolation. Mr Yghemonos highlighted the complementary nature of physical pharmacies and online channels, stating: *"Considering the demographics and preferences of informal caregivers, some still prefer physical interactions."* This sentiment was echoed during the interview with the two other experts as well.

CHAPTER 4

4. LACK OF EXPERIENCE AND AWARENESS HOLD PATIENTS BACK FROM USING ONLINE ACCESS

- **75%** of respondents in Member States with prohibited access are not aware of the obligatory EU Common Logo that allows for identifying an authorised online pharmacy.
- **53%** of respondents are not aware that online pharmacies use the same safe and secure supply as physical pharmacies.
- Concerns about safety issues and delivery are significantly lower in Member States that already provide online access.
- Informing respondents, in all countries except Sweden, about the obligatory EU Common Logo and the use of the same safe and secure supply increases the share of those willing to order prescription medicine online by 10 percentage points from 29% to 39%.

Recent research underscores the importance of awareness in influencing consumers' willingness to purchase medicines online.[35] Concerns about safety and safety-related risks can make people hesitant to obtain their medicine online. In this chapter, we build on these findings to better understand how increasing awareness can build trust and ease safety concerns.

To better understand potential concerns about obtaining medicines online, we asked our survey participants to express their degree of concern for five different factors: nonarrival of medicine, delayed arrival, incorrect dosage delivery, receiving fake medicine, and misuse of personal data**.** The first three are operational factors, while the latter two are safety-related. We compare the responses across countries to explore differences between those countries where online access to prescription medicines is allowed (i.e., Germany and Sweden) and those where it is not (i.e., France, Italy and Spain).

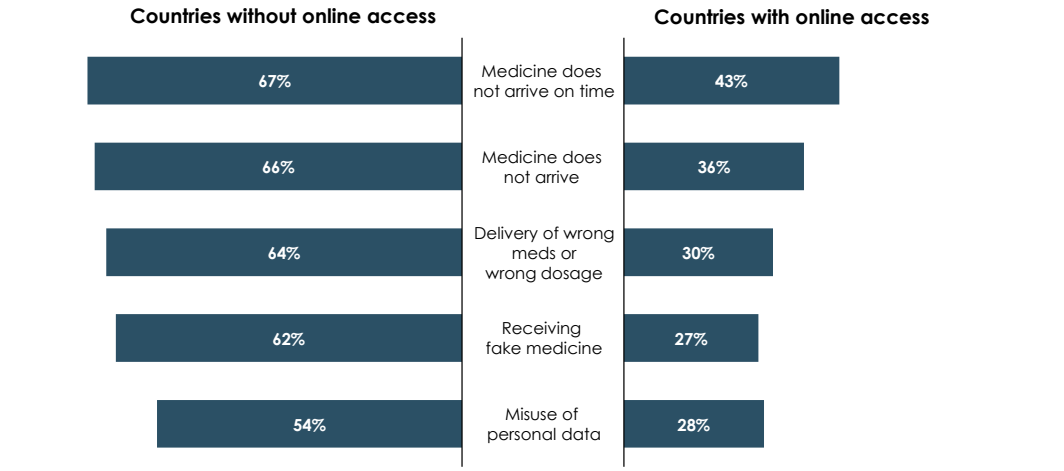
We find that for all five factors, **the expressed concerns are greater in countries where online access is prohibited**. The difference, illustrated in Figure 14, is striking. We interpret this result as indicating that people's concerns are mitigated to some degree once they get used to the experience of using online pharmacy services.[36] Furthermore, respondents across the board are more concerned about the operational factors compared to safety-related factors.

> *I would be concerned if there was a delivery error,* (if) *they got the product wrong, or* (if) *they got the delivery address wrong and delivered it delayed.*
>
> Female professional from Italy

[35] Barbaranelli et al. (2015).

[36] We acknowledge that the significant differences between countries are likely influenced by their overall digitalisation levels and the digital literacy of their populations. Despite this, we are confident in interpreting our results to show that reduced restrictions and increased familiarity with online purchases in pharmacies can alleviate concerns.

Figure 14
Concerns about obtaining prescription medicine online by countries with and without online access
Percent



Note: The figure displays the share of respondents who express concerns regarding five factors when obtaining medicine online. For each factor, participants could respond on a five-point Likert scale ranging from 1 ("Not at all concerned") to 5 ("Very concerned"). We grouped the responses and categorised them as being of high concern when they indicated "4 – concerned" or "5 – very concerned". In addition, we separated the responses by countries with and without online access to illustrate that concerns related to ordering medicine online are more prevalent in those countries where the purchasing of prescription medicine is not currently possible.
Source: Copenhagen Economics, Consumer Survey

In the survey, we queried respondents about their awareness that medicines procured via certified pharmacies operating online use the same safe and secure supply routes as physical pharmacies. We also tested their knowledge about the obligatory EU Common Logo used by authorised online pharmacies, ensuring to display the logo during the survey for clarity. The EU legal framework underpinning these two questions is explained in Box 2.

Box 2. The EU legal framework for online sale of medicines

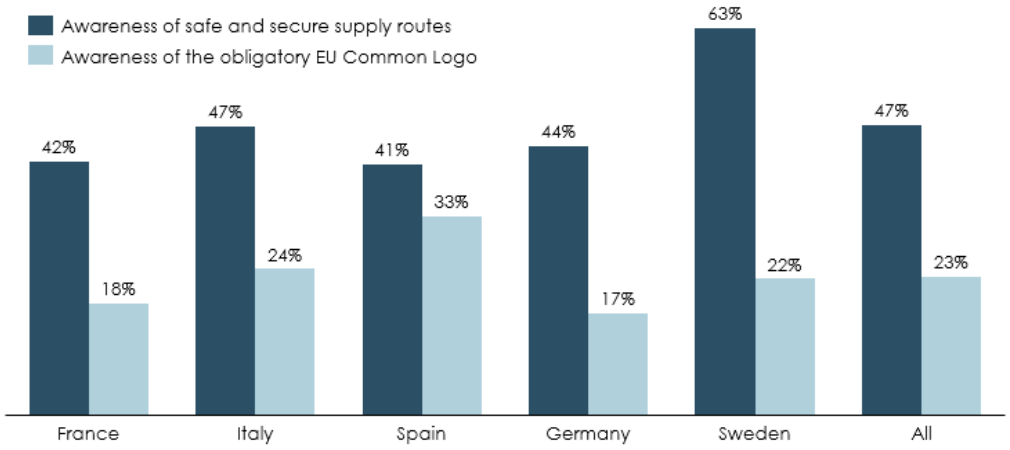
The EU legislation provides a legal framework for safe online access to medicines that sets the same standards that apply to physical pharmacies. The Community Code of Medicines of 2001 (Directive 2001/83/EC) relating to medicinal products for human use, sets up minimum criteria and standards for online pharmacy dispensing, covering both over-the-counter and prescription medicines.

The Falsified Medicines Directive (Directive 2011/62/EU) enacted in 2011 and modifying the Community Code – puts forward principles and rules to limit the spread of falsified medicines, ensuring patient safety. The directive means prescription medicines in the EU have a unique code that must be tracked, verified and decommissioned when dispensed to a patient. In addition, in 2014, the EU introduced an obligatory *EU Common Logo* linked to national register of authorised online pharmacies and retailers, enabling consumers to identify authorised sources of medicines. Furthermore, Article 85(d) of the Falsified Medicines Directive legally obliges Member States to carry out public awareness campaigns about falsified medicines and the EU Common Logo.

For all countries combined, **47% of all respondents report that they are aware that authorised online pharmacies operate through the same safe and secure supply routes as physical pharmacies**. This finding is illustrated as dark blue bars in Figure 15. Interestingly, the awareness of supply routes remains relatively uniform across France, Germany, Italy and Spain, with rates ranging from 41% in Spain to 47% in Italy. Only Sweden stands out in that it shows a significantly higher awareness rate of 63%, reinforcing the indication that Swedes are more accustomed to online pharmacies and their services.

Furthermore, **recognition of the EU Common Logo is notably low across all surveyed countries.** Only 23% of all respondents reported knowing the EU Common Logo before our study, although this rate is considerably higher (34%) among individuals who are "likely" or "very likely" to obtain prescription medicine online. Spain leads with an awareness rate of 33%, while Germany trails with only 17% of the respondents recognising the logo.

Figure 15
Awareness of regulations on the online sale of medicines by country
Percent



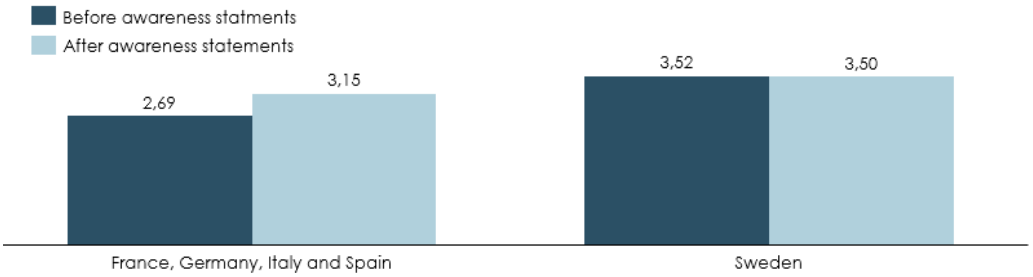
Note: This figure shows the awareness rates for two different aspects: safe and secure supply routes and the use of the obligatory EU Common Logo by authorised pharmacies. Both rates are presented on a country basis to facilitate cross-country comparisons.
Source: Copenhagen Economics, Consumer Survey

The aim of the awareness questions was not only to test the respondents' knowledge about the EU Common Logo and the fact that online pharmacies use the same safe and secure supply routes as physical pharmacies, but also to inform them about the existing safeguards. After these awareness statements, we asked respondents about their likelihood of ordering medication online for the second time. This approach allows us to directly compare responses before and after the information treatment, providing insight into how knowledge about safeguards influences respondents' attitudes toward online pharmacies.

The results are striking. **Before posing awareness questions, 29% of the respondents in France, Italy, Germany, and Spain reported being "likely" or "very likely" to obtain prescription medicine online; after awareness questions, this figure rose to 39%.** As Figure 16 reveals, the change in the likelihood of obtaining prescription medicine online across France, Germany, Italy, and Spain is substantial, increasing from an average of 2.69 on the five-point Likert scale before the awareness treatment to 3.15 thereafter. This increase corresponds to a change of 0.33 standard deviations, which indicates a meaningful medium-size effect.[37]

[37] See footnote 22.

Figure 16
Likelihood of ordering prescription medicine online before and after awareness statements



Note: The figure shows the reported average likelihood of ordering prescription medicine online both before and after our awareness treatment. In both questions, respondents answered on a five-point Likert scale ranging from 1 ("Very unlikely") to 5 ("Very likely"). For all countries except for Sweden, we observed a statistically significant increase in the reported propensity to order medicine online after the awareness treatment.
Source: Copenhagen Economics, Consumer Survey

However, in Sweden, we do not observe a change in the reported likelihood of ordering medicine online pre- and post-awareness statements. We attribute this finding to the already prevalent practice of purchasing medicine online. The finding suggests that Swedes were already well-informed about authorised online pharmacies, so learning more did not significantly change their likelihood of using online access. Therefore, we can deduce that increased awareness also comes from actual experience.

Their results complement our insights on experience, suggesting that increased awareness and exposure enhance patients' confidence in digital pharmacy services. Our analysis reinforces the idea that as awareness of online pharmacies grows, so does the propensity to use online channels to obtain prescription medicines.

CHAPTER 5

5. CHALLENGES FACED BY PHARMACY OWNERS IN OPERATING ONLINE

- Pharmacy owners identify **lack of technology** and **marketing skills** and challenges with organising **delivery logistics as challenges** to operating online.
- These challenges could be addressed through regulatory flexibility to use third-party technical infrastructure that is not currently allowed in France, Italy and Spain.
- Six out of nine pharmacy owners from France, Italy and Spain expressed their willingness to start online services if current restrictions on online access to prescription medicines were lifted.
- **Prescription medicines are an important part of pharmacy turnover for both physical and online operations**. Given patient's interests, allowing online access to prescription medicines will give incentive for physical pharmacies to provide online services.

The data presented in previous chapters underscores current patient demand for online access to prescription medicines. However, the existing restrictions on online access are hindering pharmacy owners from fulfilling this burgeoning demand.

To better understand the viewpoint of pharmacy owners on online access, we conducted a small-scale yet in-depth survey among them. We systematically gathered the views of 25 pharmacy owners across the same set of Member States.[38] We sought a sample that could capture the views both of physical pharmacy owners without any intention to operate online, in addition to some that have started some online operations. Thus, among 25 respondents there are 13 pharmacies with and 12 without online operations. In these interviews, it emerged that, on average, a pharmacy owner has 3.6 employees and operates in one location, or, in some cases, two.[39] This aligns with the fact that pharmacies in the EU operate predominantly as small and medium-sized enterprises (SMEs).[40]

Providing online pharmacy services is not without challenges for small-scale pharmacies. Half of the interviewed pharmacy owners who do not yet engage in online sales indicate a *lack of the necessary technology and marketing skills* as one of the key challenges. This challenge is not shared by pharmacy owners who already provide online pharmacy services.

38 Like in the case of the consumer survey, the structured interviews were conducted by a market research company. We used computer-assisted telephone interviewing technique. Pharmacies were selected randomly from the business register, for physical pharmacies, or from the European list of online medicine retailers: available at the European Medicine Agency website, see link.

39 As an exception, out of 25 pharmacy owners interviewed only two report more than 2 locations.

40 One of the reasons behind the fact that pharmacies operate as SMEs is existing restrictions on ownership (WHO, 2019).

Moreover, pharmacy owners identified the *absence of a simple solution for delivery logistics* as another key challenge. However, unlike technology and marketing skills, this challenge is shared among all pharmacy owners, regardless of whether they already operate online or not. Pharmacy owners are striving to establish a smooth delivery network that ensures timely medicine deliveries across diverse geographical locations. Knowledge gaps and technology constraints are not specific to pharmacy owners. These are well-documented barriers that small businesses face when venturing online.[41]

A majority, six out of nine, of pharmacy owners from France, Italy and Spain expressed their willingness to engage in online sales if current restrictions on online access to prescription medicines were lifted. When asked about their preferred means of offering prescription medicines online, four (out of six) indicated that they would either sell through their own website or use an online marketplace. The remaining two indicated that they would prefer to have their own website. In the broader sample of pharmacy owners, one of the key benefits of selling through a marketplace is *access to an established, easy-to-use online infrastructure* (14 out of 25 respondents).

Addressing IT and delivery challenges often requires substantial investments that could be more manageable for large firms than for individual pharmacists owning a single pharmacy or two pharmacies. For the latter, establishing their own infrastructure and delivery might be a significant barrier to starting online operations. This is the case for pharmacy owners in our sample. Allowing the use of third-party IT infrastructure, as observed in Germany, or promoting third-party delivery services to the patient's preferred location, as seen in Finland[42], could limit the costs of initiating online sales, presenting an attractive way forward. Currently, the three Member States in our sample that prohibit online access also have in place restrictions on the use of third-party IT infrastructures for online access to medicines.

Finally, a large proportion of respondents to the survey, across all countries, indicated that they are interested in using online channels for accessing prescription medicines. Besides, across the OECD countries, prescription medicines account for 79% of pharmaceutical spending,[43] highlighting their substantial contribution to pharmacy business turnover. According to detailed data from the Joint Nordic Report, in Sweden, prescription medicines account for around 70-75% of physical pharmacies' turnover and 50% of that for online pharmacies.[44] [45] Pharmacy owners in our sample reported that, on average, 66% of their revenue comes from prescription medicines. Thus, insofar as prescription medicines are an important part of pharmacy turnover, and given patients' interests, it follows that allowing online access will incentivise physical pharmacies to operate online.

---

41 OECD (2019).

42 As of October 5th 2023, Wolt delivery service is available on the Yliopiston Apteekki online store for prescription medicines and other pharmaceutical products. According to the Wolt press release, orders are delivered from dedicated stores within a 7.5 to 10 km radius depending on the city. A shipping fee of EUR 8.95 is charged for the service. Available at https://wolt.com/en/fin/oulu/article/ya-drive-apr23

43 Chapter on Pharmaceutical expenditures in OECD (2021).

44 Chapter 8 in Joint Nordic Report (2021).

45 One reason behind the lower share for online pharmacies is that they may not dispense prescription medicines that require cold chain storage, with patients typically obtaining such products at the physical pharmacy. Another contributing factor could be the ability to use online channels to access prescription medicines (see p. 47 of the Joint Nordic Report, 2021).

CHAPTER 6

6. RECOMMENDATIONS

Now, at these unprecedented times for EU pharmaceutical regulation, policymakers in Europe could consider the opportunities related to enhancing patient access to prescription medicines in a digitised world. Based on the results presented in this report, our recommendations are as follows:

Improve the AVAILABILITY of medicines online

Historically, restrictions on patients being able to access prescription medicines online were based on public health concerns. Today, these concerns are largely addressed through EU-standardised safeguards like the EU Common Logo, the pan-EU anticounterfeiting system, and a sound legal framework where online prescription medicines require online pharmacies to follow the same secure supply chains as offline physical pharmacies. Electronic prescription systems, including a common and interoperable digital format, that unlock safe and convenient access, are also being widely implemented across the EU.

Given the benefits of online access to prescription medicines in terms of convenience and health outcomes documented in this report, policymakers should take the necessary steps to enable online access. This could be achieved by amending Article 85(c) of the Community Code of medicinal products for human use[46], to encourage Member States to permit online access to prescription medicines through authorised pharmacies, in line with the laws and regulations of the Single Market.

> *In my case, I would use the physical pharmacy more because it is very close to me, but if it were much further away, maybe I would consider online more.*
>
> Asthma patient from Spain

Increased online access would complement the physical pharmacy offer, allowing patients to use the most convenient option depending on their needs. This flexibility is exemplified in the statement of an asthma patient from Spain.

Strengthen the ACCESSIBILITY of medicines online

Our research shows that having online options can increase trust among EU citizens and help them identify and use authorised online pharmacies and retailers. Allowing access through these authorised online channels could therefore prevent patients from accidently accessing unauthorised sites, thus avoiding the risk of obtaining falsified medicines, which is the basis of the recent awareness campaign by the European Medicines Agency against falsified medicines online.[47]

Given that the EU has long-established common systems to safeguard the purchases of medicines online, policymakers and industry should consider strengthening consumer awareness of existing safeguards. The safeguards include the system of electronic prescriptions and the upcoming EU Digital Identity Wallet.[48] Removing misunderstandings and clarifying questions – which are still

---

46 Directive 2011/62/EU of the European Parliament and of the Council of 8 June 2011 amending Directive 2001/83/EC on the Community code relating to medicinal products for human use, as regards the prevention of the entry into the legal supply chain of falsified medicinal products Text with EEA relevance.

47 For details see: https://www.ema.europa.eu/en/human-regulatory-overview/public-health-threats/falsified-medicines-overview/buying-medicines-online#ema-inpage-item-10478.

48 European Commission, Commission welcomes final agreement of EU Digital Identify Wallet, Press Release, 8 November 2023, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_5651

commonplace amongst consumers as we have found – through awareness campaigns will allow patients to make an informed choice when using online channels to access prescription medicines.

Facilitate DIGITAL EXPANSION of pharmacy operations

As seen in this and other contexts, barriers in skills or infrastructure can hamper large and especially small businesses from embracing online solutions.[49] Therefore, policymakers should consider measures that can help strengthen pharmacies' ability to engage in the online world, helping to bridge any gaps that prevent the pharmacy sector from developing omnichannel offerings. The results of our survey with 25 pharmacy owners emphasise the importance of enhancing flexibility in both IT infrastructures and delivery logistics. Additionally, providing online accessibility to prescription medications not only meets patients' needs but also may serve as an incentive for physical pharmacies to expand their services online.

Finally, both policymakers and the research community could dedicate further efforts towards identifying ways to support improved health outcomes via digital transformation of the prescription-to-dispensing-to-care chain of activities. Firstly, it could be socially valuable to assess further how and to what extent increased digitalisation of the patient prescription journey and development of eHealth services can help chronic patients adhere to their treatments. Additional research may test how much this aspect of digital health can lead to better health outcomes and what are the corresponding savings for healthcare budgets that this can unlock. Secondly, the present study is centred upon deploying multiple research methods and empirical channels, so to strengthen the overall evidence. While we chose to balance resources to prioritise the large-scale quantitative consumer survey, we appreciate that the scale of the interviews with chronic patients, experts affiliated with patient organisations and pharmacy owners is smaller. We welcome any efforts by the research and policy community to replicate and extend the research questions tested in this study.

[49] e.g. Coad & Duch-Brown (2017).

REFERENCES

Barbaranelli, C., Podio Guidugli, S., Di Giorgio, D., & Gramazio, M. (2015). Personal determinants of pharmaceuticals products online. *TPM. Testing, Psychometrics, Methodology in Applied Psychology*, *22*(1), 3–21.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences New York. *NY: Academic*, *54*.

Deetjen, U. (2016). *European e-prescriptions: benefits and success factors*.

Coad, A., & Duch-Brown, N. (2017). Barriers to European Cross-border e-Commerce. JRC Digital Economy Working Paper 2017-03.

European Association of E-Pharmacies (2022), Enabling the safe online sale of prescription medicines in Europe.

European Commission, Directorate-General for Employment, Social Affairs and Inclusion, Zigante, V. (2018) Informal care in Europe – Exploring formalisation, availability and quality. Publications Office, 2018, https://data.europa.eu/doi/10.2767/78836

Eurostat. (2022, November). *Self-perceived health statistics*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Self-perceived_health_statistics&oldid=509628.

Fittler, A., Ambrus, T., Serefko, A., Smejkalová, L., Kijewska, A., Szopa, A., & Káplár, M. (2022). Attitudes and behaviors regarding online pharmacies in the aftermath of COVID-19 pandemic: At the tipping point towards the new normal. *Frontiers in Pharmacology*, *13*, 1070473.

Fittler, A., Vida, R. G., Káplár, M., & Botz, L. (2018a). Consumers turning to the Internet pharmacy market: A cross-sectional study on the frequency and attitudes of Hungarian patients purchasing medications online. *Journal of Medical Internet Research*, *20*(8), e11115.

Graf, A., Fehring, L., Henningsen, M., & Zinner, M. (2023). Going digital in Germany: An exploration of physicians' attitudes towards the introduction of electronic prescriptions – A mixed methods approach. *International Journal of Medical Informatics*, *174*, 105063. https://doi.org/https://doi.org/10.1016/j.ijmedinf.2023.105063.

Khan, R., & Socha-Dietrich, K. (2018). *Investing in medication adherence improves health outcomes and health system efficiency: adherence to medicines for diabetes, hypertension and hyperlipidemia*.

Joint Nordic Report (2021) Online pharmacy in the Nordics, www.samkeppni.is/media/skyrslur-2021/Online-pharmacy-markets-.pdf

Miramontes Carballada, Á., & Lois-González, R. C. (2021). Liberalization and Governance in the Geographical Distribution of Pharmacies in Spain. *International Journal of Environmental Research and Public Health*, 19(1), 34.

OECD (2019). Unlocking the Potential of E-commerce, https://www.oecd.org/sti/ieconomy/unlocking-the-potential-of-e-commerce.pdf

OECD (2021). Health at a Glance 2021: OECD Indicators, https://www.oecd-ilibrary.org/sites/2493ee95-en/index.html?itemId=/content/component/2493ee95-en

Oktarlina, R. Z. (2020). E-prescribing: benefit, barrier and adopting challenge in electronic prescribing. *Journal of Medicine*, *21*(2), 98.

Racek, C., & Czirfusz, A. (2021). Advantages of the Introduction of Electronic Healthcare Prescriptions Before COVID Era Experiences in Pioneer Countries Estonia and Finland and the Status in Germany. *Clinical Social Work and Health Intervention*, *2*, 39.

World Health Organisation. (2019). The legal and regulatory framework for community pharmacies in the WHO European Region. ISBN 9789289054249.

Votta, M., Ferraiolo, B., Cardillo, M., Milevska-Kostova, N. (2022). Encouraging Across Europe the Civic & Patient Advocacy Groups' Engagement in The Implementation of National Resilience and Recovery Plans to Reduce the Burden of Covid-19 Pandemic on Patients' Therapeutic Adherence. *International J of Epidemiology and Public Health Research*, 2(1). DOI:http;//doi.org/03.2022/1.1028

APPENDIX A

METHODOLOGY FOR ESTIMATING THE VALUE OF PATIENT BENEFITS

We use the following three-step methodology, illustrated in Figure A1, to estimate the economic value of potential time savings:

- We calculate potential yearly time savings per person by multiplying time savings per pharmacy visit by the frequency. We distinguish between chronic and non-chronic patients in this step to capture the difference in the frequency of pharmacy visits.

- We calculate the economic value of potential savings per person by multiplying potential yearly time savings with country-specific median wages.

- We then project from the number of the country's population adjusting for the probability of obtaining medicines online and for the share of online shoppers. This is done to control for the overrepresentation of online shoppers among survey respondents. A detailed overview of data and sources is presented in Table A1.

In our estimation, we made the following four key assumptions:

- We assume that patients spent two minutes picking up medicines obtained online on average. This covers both individuals who use home delivery, likely to be less than two minutes, and individuals using pickup points, likely spending more than two minutes.

- We assume that time savings calculated in the first step of our methodology and the difference in average time spent obtaining online and obtaining from physical pharmacies are representative of other European countries, where online sales of medicines are prohibited.

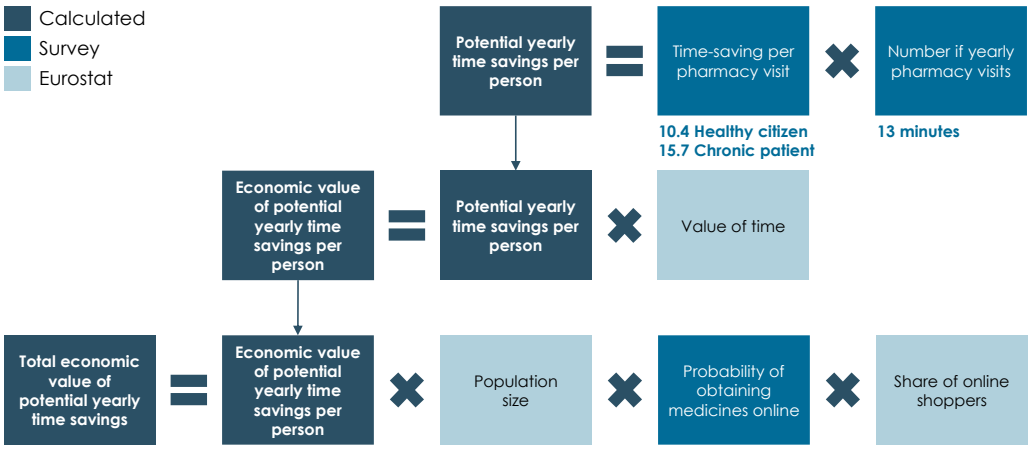
- Additionally, we assume individuals in other European countries on average go to the pharmacy as frequently as consumers across France, Italy, and Spain.

- Lastly, we assume that any bias in our sample can be controlled for by controlling for the share of chronic patients and the share of online shoppers within each country.

Using these key assumptions, we can scale the insights we have gained from our consumer survey to include all 19 EU Member States where online sales of prescription medicines are prohibited.

Figure A1: Illustration of the methodology used to calculate the economic value of potential time savings

Note that the colour of the boxes indicates the source of the data



Note: These steps are made for each of the 19 countries in the EU where online sales of prescription medicines are restricted. We use a country-specific number of pharmacy visits for France, Germany, and Italy, and averages for other countries. For a complete overview of data and parameters, see Table A1.

Source: Copenhagen Economics

Table A1 Step-by-step calculation of the potential benefits of removing restrictions on online sales of medicines in the EU

NAME	FORMULA	VALUE	LABEL	SOURCE
Number of yearly pharmacy visits		France: **9.9 – 12.3** Italy: **11.8 – 18.1** Spain: **9.3 – 18.3** Average: **10.4 – 15.7**	A	Copenhagen Economics, Consumer Survey (October 2023)
Time savings per pharmacy visit		Average: **13 minutes**	B	Copenhagen Economics, Consumer Survey (October 2023)
Potential yearly time savings per person	A * B	France: **2.2 – 2.7 hours** Italy: **2.6 – 3.9 hours** Spain: **2 – 4 hours** Average: **2.2 – 3.4 hours**	C	Copenhagen Economics calculation
Value of time		Country specific	D	Eurostat (2023), table earn_ses_pub2s and corrected by inflations using Eurostat (2023), table prc_hicp_aind
Economic value of potential savings per person	C * D	Country specific	E	Copenhagen Economics calculation
Population size		Country specific	F	Eurostat (2023), table demo_gind and Eurostat (2023), table hlth_silc_11
Probability of obtaining medicines online		Short-term: **31%** Long-term: **53%**	G	Copenhagen Economics (October 2023), Consumer Suver
Share of online shoppers		Country specific	H	Eurostat (2023), table isoc_ec_ibuy
Total economic value of potential time savings in each country	E * F * G * H	Country specific	I	Copenhagen Economics calculation
Total economic value of potential time savings	$\sum_{i=1}^{19} I_i$	Short-term: **EUR 1.343 bn** Long-term: **EUR 2.325 bn**	J	Copenhagen Economics calculation

Note: The ranges presented for the number of yearly pharmacy visits (A) and potential yearly time savings per person (C) are for non-chronic patients and chronic patients respectively. Averages are calculated for the three Member States in our sample (France Italy and Spain) that prohibit today online access to prescription medicines.

Source: Copenhagen Economics

APPENDIX B

STATISTICAL ANALYSIS OF SURVEY RESPONSES

Table B1
Descriptive statistics for all countries combined

VARIABLE	OBSERVATIONS	MEAN	SD	MIN	MAX
Share of Females	5,000	50.5%	50%		
Share of respondents in the age group 18 to 44	5,000	35.5%	47.8%		
Share of respondents in the age group 45 to 64	5,000	35.3%	47.8%		
Share of respondents in the age group 65 to 99	5,000	29.2%	45.5%		
Frequent online shopper	5,000	36.1%	48.0%		
Share of respondents living in a city with less than 1,000 inhabitants	5,000	6.4%	24.5%		
Income group	4,668	3.65	2.34	0.3	13
Level of education	4,121	4.90	1.73	0	7
Share of respondents with a chronic condition	5,000	63.1%	48.2%		
Share of respondents who are caregivers for a person with a chronic condition	5,000	29.8%	45.8%		
Share of chronic patients with adherence issues in the last 6 months	3,044	21.0%	40.7%		
Convenience of visiting a physical pharmacy	3,808	4.55	0.59	1	5
Time spent on last pharmacy visit (in minutes)	5,000	27.95	25.09	5	120
Average number of items obtained per visit	5,000	2.40	1.31	1	5+
Travel time to the nearest pharmacy (in minutes)	5,000	18.83	22.13	5	120
Number of pharmacy visits in last 12 months	5,000	15.51	19.03	0	104
Share of respondents with prior experience of obtaining prescription medicine online (in Germany and Sweden)	2,000	42.5%	49.5%		
Number of medication refills per year among respondents with a chronic condition	2,141	12.19	11.39	1	52
Likelihood of ordering prescription medicine online	5,000	2.85	1.46	1	5

Note: The table shows descriptive statistics for a range of variables collected in our survey. Note that some variables could only be collected for a subset of respondents. This is indicated by a lower number of observations.

Source: Copenhagen Economics

Table B2
Factors affecting the likelihood of obtaining prescription medicine online

	Dependent variable: Likelihood of obtaining prescription medicine online (in standard deviations)			
Coefficients	**All**	**All**	**Countries without online access**	**Countries with online access**
Model	**(1)**	**(2)**	**(3)**	**(4)**
Chronic condition	0.125***	0.129***	0.0562	0.252***
	(0.0311)	(0.0271)	(0.0353)	(0.0428)
Long distance to pharmacy	0.0514***	0.0422***	0.0374*	0.0437*
	(0.0171)	(0.0152)	(0.0198)	(0.0237)
Inconvenience due to short opening hours	0.0705***	0.0736***	0.0719***	0.0784***
	(0.0175)	(0.0157)	(0.0200)	(0.0253)
Germany	-0.691***	-0.721***		-0.716***
	(0.0883)	(0.0411)		(0.0410)
Spain	-0.529***	-0.551***	0.257***	
	(0.0434)	(0.0413)	(0.0408)	
France	-0.805***	-0.800***		
	(0.0428)	(0.0405)		
Italy	-0.169***	-0.211***	0.593***	
	(0.0449)	(0.0406)	(0.0402)	
Age 18-44 (relative to 65+)	0.388***	0.391***	0.436***	0.315***
	(0.0401)	(0.0352)	(0.0455)	(0.0561)
Age 45-64 (relative to 65+)	0.266***	0.245***	0.287***	0.175***
	(0.0398)	(0.0345)	(0.0443)	(0.0549)
Female	0.0617**	0.0464*	0.0284	0.0663
	(0.0299)	(0.0263)	(0.0334)	(0.0428)
Income (in EUR 10,000)	0.0179***			
	(0.00669)			
Frequent online shopper	0.392***	0.383***	0.382***	0.383***
	(0.0311)	(0.0273)	(0.0352)	(0.0433)
Level of education	0.0172*			
	(0.00981)			
City size < 1,000	-0.0847	-0.138**	-0.0847	-0.207***
	(0.0632)	(0.0552)	(0.0757)	(0.0803)
Constant	-0.433***	-0.243***	-1.015***	-0.295***
	(0.0767)	(0.0527)	(0.0565)	(0.0742)
Observations	3829	5000	3000	2000
R^2	0.206	0.189	0.172	0.205

Note: The table shows the regression results of four different econometric models: Model 1 represents the full model, including all country dummies, in addition to income and level of education as control variables. Note that because some respondents did not indicate their income or their level of education, the number of observations is lower than 5,000. In Model 2, we exclude the variables of income and level of education to make use of all survey observations. In Models 3 and 4, we split the analysis by country to show how the results differ between those countries which do not yet allow for online access (i.e., France, Italy, and Spain) and those which allow for online access (i.e., Germany and Sweden). *, ** and *** mark significance levels of p<.05, p<.01 and p<.001, respectively. Source: Copenhagen Economics

Table B3
Caregiver duties and their effects on pharmacy visits

	Dependent variable: Number of pharmacy visits	
Coefficients	**Benchmark: People without caregiver duties**	**Benchmark: Caregivers of people without a chronic condition**
Caregivers of people with a chronic condition	10.360***	3.329*
	(1.046)	(1.819)
Constant	6.247***	8.400**
	(1.846)	(3.838)
Observations	1244	455
R^2	0.190	0.166
Controls	Yes	Yes

Note: The table shows the regression results of two models. Model 1 shows the effect of being a caregiver to a person with a chronic condition on the number of pharmacy visits relative to all people without caregiver duties. Model 2 shows the same effect but relative to caregivers who care for people without a chronic condition. For both analyses, we excluded respondents who reported that they have a chronic condition themselves. We also allow for the following control variables in both regression models: country dummies with Sweden as a benchmark, age groups, gender, income, general online shopping propensity, level of education, and city size.

Source: Copenhagen Economics (2023)

Table B4
Correlation between previous experience of online shopping in pharmacies and beliefs about adherence

	Dependent Variable	
Coefficients	**Share of respondents who believe that ordering medicine online helps to improve adherence**	**Share of respondents who believe that delivery helps to improve adherence**
Previous online buyer	0.451***	0.312***
	(0.0336)	(0.0395)
Constant	0.0962	0.341***
	(0.0645)	(0.0710)
Observations	712	712
R^2	0.222	0.176
Controls	Yes	Yes

Note: The table shows the results of two regression models. Both models show that respondents with prior experience of purchasing medicine online are significantly more likely to believe that ordering medicine online and delivery helps to improve adherence. Both models include the following control variables: country dummies with Sweden as a benchmark, age groups, gender, income, general online shopping propensity, level of education, and city size.

Source: Copenhagen Economics (2023)

Copenhagen Economics

Hard facts. Clear stories.

About Copenhagen Economics

At Copenhagen Economics we believe sound economic analysis equips decision makers with the Hard Facts and Clear Stories to make better choices for the benefit of society. An expert-driven consulting company, clients choose us because of our economic insights, our specialised sector knowledge, our ability to build trustful relations, and our collaborative culture, where we take care to build teams that best meet the needs of the client.

You can read more about the services we operate here.