

HAS TELEMEDICINE FILLED THE GAPS IN AN EQUITABLE WAY? EVIDENCE AMONG THE 50+ IN FRANCE DURING THE COVID-19 PANDEMIC

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Résumé

La pandémie de COVID-19 a entraîné un sévère rationnement de la délivrance de soins, aggravé par une contraction de la demande induite par les restrictions de déplacement ou la peur de la contamination. Il en a résulté une augmentation considérable des besoins de soins non satisfaits, en particulier chez les personnes les plus malades et/ou les plus pauvres. La télémédecine, largement reconnue comme une solution facilitante de l'accès aux soins, s'est développée dans la plupart des pays européens en tant que mécanisme de maintien de la continuité soins, même pour les personnes âgées, et même en France où cette pratique était auparavant peu développée.

Ce travail traite la question de l'équité dans l'utilisation de la télémédecine depuis l'apparition du COVID-19, dans le cas spécifique de la France. Il cherche à mieux comprendre les caractéristiques des utilisateurs des téléconsultations et, en particulier, comment l'état de santé, le profil sociodémographique et la zone de résidence des individus influencent le recours.

Nous utilisons pour cela les données de l'enquête SHARE, à la fois dans sa forme traditionnelle avant la pandémie (vague 8) et dans sa version réduite et adaptée à un recueil téléphonique pendant les pics de l'épidémie (SHARE-Corona vagues 1 et 2). Ces données sont appariées avec des données contextuelles de l'ARCEP sur la qualité de la couverture internet au niveau du département (NUTS3). L'échantillon d'analyse est restreint à la France.

En première approche, nous modélisons conjointement les probabilités de recours à la télémédecine et d'utilisation d'internet à l'aide d'un Probit bivarié. Pour traiter de manière plus appropriée l'endogénéité probable entre ces deux phénomènes entre l'utilisation de l'internet et de la télémédecine, nous adoptons une approche par variables instrumentales en utilisant la qualité de couverture internet comme instrument.

Les données SHARE nous permettent d'analyser simultanément le recours à la télémédecine et la fréquence d'utilisation d'Internet. En outre, la richesse des données nous permet de tester un grand nombre d'hypothèses en relation avec divers comportements et caractéristiques des personnes interrogées : composition du ménage, statut socio-économique, niveau d'éducation, type de zone de résidence (rurale vs. urbaine), état de santé, habitudes de recours aux soins de santé, et éventuels besoins de soins non satisfaits au cours des premiers mois de la pandémie.

Mots-clés – enquête SHARE ; télé-médecine ; recours aux soins ; équité

Abstract

The outbreak of COVID-19 has led to drastic rationing in healthcare compounded by a contraction in demand for care due to travel restrictions and the fear of contamination. As a result, unmet needs dramatically increased during the pandemic among people aged 50 or over in Europe, especially for the sickest and/or poorest. Telemedicine, widely acknowledged as a timely solution for ensuring continuity of access to care, has flourished in most European countries as an important mechanism in maintaining access to healthcare, even for the elderly and also in France where this practice was previously quite uncommon.

This study aims to shed light on the equity issue in the use of telemedicine since the appearance of COVID-19 in the specific case of France. It seeks to understand the characteristics of teleconsultations users and, in particular, how health status, socio-demographic profile and area of residence influence individuals' use of telemedicine.

To this end, we use data from the SHARE survey, both in its traditional form before the pandemic (wave 8) and in its condensed phone-based version during the peaks of the epidemic (SHARE-Corona waves 1 and 2), matched with contextual data from ARCEP on the quality of internet coverage at the department level (NUTS3). The analysis sample is restricted to France.

As a first approach, we model jointly telemedicine use and internet use through a bivariate Probit. To handle more appropriately the expected endogeneity between between the two outcomes, we will adopt an instrumental variable approach, choosing the local quality of internet coverage as an instrument.

SHARE data allows us to measure both the uptake of telemedicine and the frequency of internet use. In addition, the wide of range of data available allows us to test a large number of hypotheses in relation to various behaviours and characteristics of respondents: family composition, socio-economic status, educational attainment, type of living area (rural vs. urban), health, usual patterns of healthcare use, and possible unmet care needs during the first months of the pandemic.

Keywords – SHARE survey; telemedicine; healthcare; equity

1. Issues and challenges

1.1. Context

The outbreak of COVID-19 has prompted countries to adopt rigorous protective measures and carry out major reorganizations of their healthcare systems, leading in turn to drastic rationing in ambulatory/primary care, emergency visits or elective surgeries (Ziedan *et al.*, 2020). This strong reduction in healthcare supply has been compounded by a contraction in demand for care due to travel restrictions and the fear of contamination. As a result, unmet healthcare needs dramatically increased during the pandemic among people aged 50 or over in Europe. During the first wave of the pandemic, 5% of people were denied a medical appointment, 12% forewent care for fear of contracting COVID-19 and 25% had at least one planned medical treatment/procedure postponed. This surge in ‘unmet needs’ was even more marked among those originally the sickest and/or poorest (Arnault *et al.*, 2021).

Telemedicine, widely acknowledged as a timely solution for ensuring continuity of access to care, has flourished in most European countries during the pandemic as an important mechanism in maintaining access to healthcare (Powell *et al.*, 2020) including for the elderly (Smolić *et al.*, 2022). This has also been the case in France (Kamionka *et Bergeat*, 2022) where this practice was previously quite uncommon compared with other European countries (Hashiguchi, 2020).

1.2. Research question

The question remains as to whether the uptake of telemedicine has been equitably distributed across the population. To what extent did this novel solution benefit everyone, in particular those who needed it most – the sickest? Was this solution truly accessible to and used by the poorest, those living in rural areas and those with lower digital resources and skills? Furthermore, did telemedicine help to compensate for the loss of opportunity in access to healthcare suffered by the population during the first few months of the pandemic, specifically the sickest and poorest?

This study aims to shed light on the equity issue in the use of telemedicine since the appearance of COVID-19, in the specific case of France. It seeks to understand the characteristics of telemedicine users and, in particular, how health status, socio-demographic profile and area of residence influence individuals' use of telemedicine. Our main questions and assumptions are outlined below.

Are older people, those with chronic conditions or originally high levels of healthcare use – who have higher needs and as such are likely to be more acquainted with the healthcare system – more susceptible to use this innovative kind of consultation? Are people of lower socio-economic status able or keen to do so? Do people living in urban areas make less use of remote consultations because they are more likely to find a medical office nearby?

Are these potential inequalities caused by the individual's ability to use the internet, as the elderly, the poorest or those living in rural areas may face more obstacle in accessing the internet?

Or, is the decision to use telemedicine influenced by specific preferences that may relate to age, health or socio-economic status? For example, people with a strong preference for the present may have less patience to wait for a later face-to-face consultation. The more risk-

averse individuals may be less likely to use the internet to communicate with a health professional. Did these personal preferences influence the use of telemedicine directly or indirectly through their effect on internet use?

Additionally, this study examines the impact of unmet needs in the early months of the pandemic on the use of telemedicine to assess how telemedicine helped to overcome barriers to healthcare.

2. Relevance and originality

2.1. Brief review of evidence

The economic literature on telemedicine has traditionally focused mostly on the issues of efficiency gains induced and on the circumstances that facilitate its diffusion, both from the institutional perspective – administrative and clinical requirements to access, reimbursement policies – and the provider point of view – individual characteristics and organizational factors influencing the adoption of these new technologies.

The pandemic context has fostered the emergence of this literature, aimed at understanding the applicability of telemedicine in various clinical contexts, identifying its individual, social and geographical determinants, assessing user and provider satisfaction, or evaluating the cost-effectiveness of these services.

A systematic review of the literature (OECD, 2023) summarizes the main findings regarding the impact of telemedicine and its rapid development on these various aspects. The main lessons concerning the determinants of the use of telemedicine are as follows.

Age is a primary driver, in that older people are less likely to use telemedicine both before (Scott Kruse *et al.*, 2018) and since the advent of COVID-19. Gender effects are unclear, with contradictory results in several of the studies reviewed (OECD, 2023). Several US studies also show lower use of telemedicine among ethnic minority groups (OECD, 2023).

Analyses in terms of geographical location reveal that, overall, telemedicine is used more frequently by people living in urban areas, and that there is little correlation between people's distance from healthcare services and the likelihood of using telemedicine.

The few results produced in terms of the impact of socio-economic status, type of health insurance, level of income or educational attainment are not very conclusive and do not point to a clear social gradient in the use of telemedicine. However, among older adults in the United States, Lam *et al.* (2020) demonstrate that “telemedicine unreadiness” was more common in patients who had less education and lower income. It is also shown by Patel *et al.* (2021) that, for a great variety of clinical setting, telemedicine use in the US was lower in socially disadvantaged areas.

Digital resources and skills surely play a major role in the likelihood of seizing the technical opportunities of telemedicine. Lack of digital literacy (Nouri *et al.*, 2020) and the technical difficulties related to personal equipment and internet coverage are major obstacles. Vergouw *et al.* (2020) identified non-familiarity with the online health applications as a main barrier to access to and use of e-health services among older adults.

Finally, the role of risk tolerance in providers' use of telemedicine has been shown (Sitter *et al.*, 2022). However, it has never been studied among patients. Saving time is also a

motivation reported by patients in favour of using telemedicine (Soegaard Ballester, 2018; Loriot et al., 2024). However, the specific role of time preference has not been investigated.

2.2. Contribution to the literature

However, most of these studies are from the US only and narrowly focused: on a particular clinical context – disease management of a particular condition – on consultants of a few health centers and/or on patients insured by some specific PPOs, or on highly specialized e-health service very different from the general framework of “remote medical consultations”.

Our work contributes to the literature by analyzing the uptake of remote medical consultations in the general population in the French context. It enables to analyze the impact of health needs, healthcare use habits, socio-economic status, area of residence, time preference and risk aversion levels of the individuals. In addition, it provides an understanding of how a high level of unmet needs at the onset of the pandemic correlates with a higher level of telemedicine use thereafter. Finally, it strives to better reflect the intrinsic correlation between the usual frequency of internet use of the persons and their probability of using telemedicine and understand the respective impacts of the covariables on these two usages.

3. Data and Methods

3.1. Primary data source

We use SHARE survey data from both the traditional wave 8, conducted before the pandemic (October 2019 - March 2020) and the two specific SHARE-Corona waves conducted by telephone in summer 2020 and summer 2021 respectively.

3.2. Analysis sample

The sample is selected in two stages. It is first restricted to French participants aged 50 and over, living in private household and who have participated in all these three waves (N=1,562). A second selection stage is applied to retain only individuals who have had at least one contact with the healthcare system between the outbreak of COVID-19 and the summer of 2021. The aim of this restriction is to consider a homogenous population of people with a minimal level of healthcare needs and consumption to focus the analysis on the choice of whether or not to use telemedicine rather than the choice of whether or not to use healthcare in general. Additionally, a technical restriction is applied by excluding the few people with missing values for our two main outcomes variables (see below). The final sample size is N=1,347, e.g. a reduction of 14% compared with the first stage.

3.3. Outcomes

Our main outcome variable is the telemedicine use between the outbreak of COVID-19 and the summer 2021, expressed as a binary variable ($Y_2 = 0/1$) and derived from the question of SHARE-Corona wave 2 (CAQ118) originally phrased as follows: “*Since the outbreak of Corona, how many remote medical consultations over the phone, computer, or any other electronic means, did you have, if any, with or without video?*”.

Another key variable is the probability of using the Internet in general ($Y_1 = 0/1$), considered as a proxy for the level of digital literacy of individuals, i.e. their bundle of skills, attitudes and practices with respect to digital resources. The measure is derived from the general question on weekly internet use asked in wave 8, before the pandemic (IT004): “*During the past 7 days, have you used the Internet, for e-mailing, searching for information, making purchases, or for any other purpose at least once?*”

3.4. Covariates

The analysis covers the following sets of covariates:

- Demographics and family composition: age (3 levels), gender, living with a partner (0/1), children (#), grandchildren (#)
- Socio-economic status: education (3 levels), monthly income (quartiles)
- Living area (rural vs. urban)
- Subjective measures of time preference and risk aversion: 5 levels each
- Health: chronic conditions (3 levels : no chronic conditions, 1 condition, 2 or plus)
- Usual level of healthcare use: consultations with GPs (#) and with specialists (#)
- Unmet care needs during the first months of the pandemic: postponed care (0/1), forgone care due to fear of infection (0/1), denied care (0/1).

Apart from the last category, these measures all stem from wave 8 of SHARE, i.e. the year before the pandemic.

3.5. Empirical strategy

As a first approach, we model telemedicine and internet use simultaneously through a bivariate Probit, which produces two separate “seemingly unrelated” equations with a term capturing the correlation of the two binary outcomes. The two equations are estimated simultaneously using identical sets of explanatory variables, under the assumption of joint normality of the residuals.

To complement this first approach, and to handle more appropriately the expected endogeneity between internet and telemedicine use, we will adopt an instrumental variable approach, choosing the local quality of internet coverage as an instrument. This measure arises from ARCEP public data at the department (NUTS3) level.

4. Preliminary results

Around 10% of French respondents have had at least one remote medical consultation during the 15 months between the emergence of COVID-19 and the summer of 2021.

Preliminary results seem to show that that telemedicine was most often used by people with high healthcare needs. It was more used by those who had a higher number of consultations with GPs and specialists before the pandemic and by those whose care had been postponed or cancelled at the start of the pandemic. However, we do not find any effect of the number of chronic conditions per se on the probability of using telemedicine, conditional on previous healthcare use.

Remote consultations were less frequent for the elderly, those with a low level of education, living in rural areas, without grandchildren or those who did not regularly use the internet before the pandemic. We did not find any evidence of a direct effect of income, time preference or risk aversion on the use of telemedicine, although these variables do have an impact on internet use.

It is then conceivable that the surge in the use of telemedicine in France has led simultaneously to an increase in vertical equity, i.e. beneficial for those with highest healthcare needs, and to a decline in horizontal equity, i.e. detrimental for the most socially deprived.

Table 1 – Preliminary results (Biprobit, N=1,347)

	Y ₁ (Internet use)			Y ₂ (Telemedicine use)		
	Coef.	SE	P>z	Coef.	SE	P>z
Gender = man	-0,11	0,10	0,26	-0,02	0,10	0,84
Age (ref. 50-59 yo)						
60-70 yo	-0,33	0,18	0,06	-0,35	0,14	0,01
70-80 yo	-0,86	0,19	0,00	-0,48	0,16	0,00
80+ yo	-1,66	0,21	0,00	-0,62	0,20	0,00
Living with a partner	0,11	0,10	0,29	-0,05	0,11	0,65
Number of children (#)	0,06	0,05	0,23	0,04	0,05	0,40
Number of grandchildren (#)	-0,01	0,02	0,72	0,03	0,02	0,09
Rural area (vs. urban)	-0,32	0,09	0,00	-0,17	0,10	0,08
Education (ref. post-second. and over, ISCED = 4-6)						
Primary or lower-second. (ISCED = 0-2)	-0,87	0,13	0,00	-0,20	0,13	0,13
Upper-second. (ISCED = 3)	-0,55	0,12	0,00	-0,20	0,11	0,07
Montly income quartiles (ref. Q4)						
Q1	-1,12	0,16	0,00	0,06	0,15	0,67
Q2	-0,71	0,15	0,00	-0,10	0,14	0,45
Q3	-0,37	0,16	0,02	0,14	0,13	0,28
Missing	-0,71	0,17	0,00	0,03	0,17	0,85
Time preferences (ref. "Living day-to-day", score = 0-3)						
Score = 4-6	0,32	0,15	0,03	0,26	0,18	0,14
Score = 7-8	0,39	0,14	0,01	0,32	0,17	0,06
Score = 9-10	0,16	0,15	0,30	-0,08	0,20	0,69
Missing	0,37	0,34	0,27	0,21	0,34	0,54
Risk aversion (ref. "Not at all willing to take risks", score = 0-2)						
Score = 3-5	0,35	0,11	0,00	-0,08	0,12	0,52
Score = 6-8	0,63	0,15	0,00	0,16	0,14	0,26
Score = 9-10	0,43	0,33	0,19	0,25	0,32	0,43
Missing	-0,24	0,31	0,44	0,22	0,30	0,46
Chronic conditions (ref. 0)						
1	0,05	0,12	0,70	0,17	0,12	0,16
2+	-0,22	0,11	0,04	0,13	0,11	0,24
GP consultations (#)	-0,01	0,01	0,41	0,02	0,01	0,06
Specialists consultations (#)	0,00	0,01	0,85	0,02	0,01	0,04
Forgone care	0,48	0,17	0,00	0,31	0,13	0,02
Postponed care	0,09	0,09	0,37	0,16	0,10	0,09
Denied care	0,04	0,15	0,81	0,28	0,14	0,04
Constant	2,11	0,27	0,00	-1,44	0,26	0,00
/athrho	0,18	0,08	0,02			
rho	0,18	0,08				
Wald test of rho=0: chi2(1) = 5.30447				Prob > chi2 = 0.0213		

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