Citizens' use of Health Information Technology between 2013-2021 in Denmark: A longitudinal study

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Abstract

An increasing number of citizens with multiple chronic conditions and technological innovations enabling new types of treatments pressure the Danish healthcare sector economically.
The solution so far has been increased patient responsibility and the application of digital healthcare solutions.
This longitudinal study examines how Danish citizens between 2013-2021 interact with Health Information Technology (HIT) and digital data.
Results show that the Danes' use of HIT and digital data has increased over the period. Additionally, the numbers reveal that education, gender, age and chronic conditions influence how HIT and digital health data are used, which is relevant from a health inequity perspective.

Keywords

Citizen survey, Health Information Technology, Digital health, Digital data, eHealth

1 INTRODUCTION

Citizens' use of digital health, eHealth and Health Information Technology (HIT) are becoming increasingly important within a Danish context. This is largely due to the demographic changes resulting in an increasing number of elders, citizens with multiple chronic conditions and relatively fewer labour-active citizens [1], [2]. Simultaneously, technological innovations and cultural alterations in the healthcare sector have transformed treatment options and the role of healthcare professionals (HCPs) and patients [2]. An increased implementation and integration of digital health that affects clinical practice; requiring, adaptiveness and continuously updated digital knowledge and skillsets among healthcare professionals [1]–[4]. Digital skills that are equally important for patients to acquire and possess as the use of telemedicine and patient-reported outcomes (PROs) are spreading across the Danish healthcare system [1], [5]. The digital development has gotten momentum after the COVID-19 crisis that forced and enabled the healthcare sector to apply known technologies, such as video consultations, more extensively and introduce new solutions, for example, the corona-chatbots used to answer citizen questions related to COVID-19 [4]. The growing use of eHealth means that accessibility and security are pivotal; especially, since current health policies emphasise that patients' health data should be utilised to the greatest extent [1], [3], [4]. Hence, the current healthcare and societal challenges are countered through the use of HIT and eHealth innovations potentially enabling better use of resources while placing increased individual responsibility on the citizens [1], [3], [5]. Thus, a digitalised and functional healthcare sector requires actively participating patients who are willing - and able - to self-manage their conditions; a challenge, considering

that not all citizens have the same digital capabilities and diverse participation preferences when handling their health [1], [5]. Hence, the intentions incorporated into the political strategies are one thing, another is how citizens factually make use of HIT and digital data as part of their everyday life. Thus, questions indicating how often and in what way citizens make use of HIT and digital healthcare are relevant. Moreover, in a time where health inequities are focal in health politics, empirical data elucidating how gender, health status, chronic illness, education and age are linked to citizens' actions in a digitalised healthcare system.

It is in this context 'The citizen survey' has been conducted by researchers at the Department of Planning at Aalborg University biannually since 2013. The five surveys examine citizens':

- Use of HIT and digital data collection
- Communication with HCPs
- Attitudes towards HIT
- Use of health portals
- Perceptions of how HCPs make use of HIT in clinical practice [6]–[9]

Five relevant themes; however, to narrow the scope this paper focuses primarily on Danish citizens' use of HIT and digital data collection over time.

2 METHOD

The results are based on longitudinal data collected every second year between 2013-2021 via a cross-sectional design. To ensure the quality and representativeness of data, the surveys have been conducted by MEGAFON, who is a company specialized in collecting data through the use of quantitative methods [10]. The original conceptualisation and methodology behind the cross-

sectional and longitudinal design emerged through a collaboration between the authors and colleges at the Department of Planning at Aalborg University. The formal analysis, data curation, visualisation and writing of the original draft in the present study were conducted by the first author while the other authors contributed by reviewing and editing the paper.

Since the longitudinal data is based on five different cross-sectional studies, the total number of participants slightly varies, and respondents might not be identical for each iteration. However, the samples are randomly selected based on members of the MEGAFON panel, which is a group of citizens carefully and systematically selected to ensure representativeness and generalisability [10]; mandatory validation factors when conducting and assessing quantitative studies [11]. In addition to the quality of the sample, the size also affects the validity of data. Hence, Table 1, lists the number of respondents in each of the five surveys.

Year	Respondents (N)	Internet/phone interviews (n)
2013	1058	931/127
2015	1059	950/109
2017	1033	933/100
2019	1055	955/100
2021	1002	900/102

Table 1 Number of respondents and type of collection

As Table 1 illustrates, respondents vary between 1002-1059 over the years. The number of respondents completing the internet questionnaire is between 900-955 while the number of citizens included through telephone interviews ranges between 100-127. Hence, around 10% of the respondents are included through telephone interviews which is a deliberate choice, to reach some of the citizens that (for different reasons) are excluded when studies are based merely on internet questionnaires. All respondents are anonymised.

In the respective study, a statistical significance level of 95% (p-value of 0.05%) is applied. Accordingly, with 1000 respondents, which is included in all the surveys, there is a 95% probability that results are real and reflect the examined population +/- 1,35% probability that results are caused by randomness.

Hence, the results in this paper are statistically representative in a Danish context and describe citizens' use of HIT and digital healthcare over time. Due to continuous new knowledge, changing societal tendencies, technological innovations and varying health policies, questions have over time been altered, removed and replaced; a process displayed in Table 2.

	Year				
Question	2021	2019	2017	2015	2013
01	x	x	x	x	x
02	x	x	x	x	x
05	x	x	x	x	x
06	x	x	x	x	
07	x	x	x	x	
08	x	x	x	x	
09	x	x	x	x	x
09A	x	x	x	x	x
10	x	x			
11	x	x			
12A	x	x	x	x	
12C	x	x			
18A	x	x	x		
14F	x	x	x		
19	x		x	x	
19B	x	x	x		
19C	x	x			
20	x	x	x	x	
25	x	x			

Table 2 Questions included across surveys over time

Table 2 shows to what extent the questions included in this paper are included in the five surveys. The cross symbolises continuation and blank spaces indicate change - or that no such question has been included formerly. Hence, the reason several of the boxes are blank in 2013 and 2015, as new types of questions or alterations were added in later iterations of the survey. Consequently, it differs how far back data pertaining to each variable has been collected.

The latest questionnaire from 2021 consists of 34 different questions including background variables. Table 3 provides an overview of the variables included in this paper. Only the essentials of the questions are categorised and displayed in the table; however, the exact questions are in most cases included in the results section.

Question	Category	Type of variable
01	Age	Interval
02	Gender	Nominal
05	Education	Ordinal
06	Supporting/helping an elder, handicapped, or ill person in their contact with the healthcare system	Nominal
07	Types of IT used	Nominal
08	Health status	Ordinal
09	Chronic condition	Nominal
09A	Type of Chronical condition	Nominal
10	Interaction with health institutions (physical/phone)	Nominal
11	Interaction with health institutions (digital)	Nominal
12A	Type of IT used when communicating with GP digitally	Nominal
12C	Reasons for communicating with GP digitally	Nominal
18A	Citizen asked to collect data	Nominal

14F	Citizen asked to complete a questionnaire on treatment	Nominal				
19	How do you follow your public health data	Nominal				
19B	Individual initiated collection of health data	Nominal				
19C	Information search on health and diseases	Nominal				
20	How have you used the internet and mobile apps	Nominal				
25	Granted relatives access to healthcare data	Nominal				

Table 3 Type of content and variables

As table 3 shows most of the variables included in this paper are nominal and concern:

a) The type of HIT citizens uses
b) How citizens use HIT
c) Citizens' experiences with HCPs' use of HIT
d) Citizens' attitudes towards HIT

The nominal variables are divided into different qualitative response categories and in most cases, respondents are allowed to provide more than one answer to a question. The background variables (Age, Gender, Education, Health status and Chronic condition) differentiate by either being on a different scale and/or having different response categories.

3 RESULTS

The results section is divided into the following five areas 'Population', 'Communication', 'Collection of data', 'Data monitoring' and 'Relatives' access to data', describing different aspects of the citizens' use of HIT and digital data. In each section, the numbers comprising the graphs and tables are scrutinized and a profile of the typical citizen linked to a specific subject is constructed. These profiles are based on absolute numbers; consequently, these profiles are strongly shaped by the characteristics of the population that are listed in Table 4. In other words, the profiles do not indicate how different groups of the population relatively use HIT and digital healthcare.

Some of the tables contain the (n/%)-symbol, which is used to explain the displayed type of numbers. The n-symbol indicates the actual number of citizens and the %-symbol is the percentual size. As an example, 201/19,3% of the citizens participating in the study are between 18 and 29 years of age (Table 4).

3.1 Population

In this section general characteristics of the population are described pertaining to age, gender, education, health status and chronic conditions, primarily based on the numbers included in Table 4. These factors are considered background variables and used to analyse citizens' use of HIT and digital data in more detail. The included abbreviation avg. in Table 4. refers to the fact that the numbers are averages of the examined period.

Age (avg.)(n/%)		Gender (avg.)(n/%)		Education (avg.)(n/%)		Health status (avg.)(n/%)	
18-29	201/19,3%	Male	528/50,7%	Primary/ elementary school	65/6,3%	Very good	248/23,85%
30-39	159/15,3%	Female	513/49,2%	Secondary/ middle school	18/2,2%	good	493/47,53%
40-49	182/17,5%			High school	100/9,6%	Neither bad or good	195/18,83%
50-59	175/16,8%			Vocational education	188/18%	Bad	88/8,5%
60-69	157/15,1%			Further education (< 3 years)	132/12,7%	very bad	12/1,1%
70-	168/16,1%			Bachelor's education (3-4 years)	309/29,7%		
				Higher education (4 years+)	221/21,2%		

Table 4 Population characteristics

The variables age and gender are weighted to ensure that they resemble the Danish population. Around 50% of the Danish population have a bachelor's degree or higher education; in contrast, around 18% have finished high school or a shorter type of school as their highest completed education.

Citizens' perceptions of their health status are relatively consistent between 2013 and 2021 with an average majority of 71,38% of the citizens who believe their health status is good/very good. In the same period, the number of citizens suffering from one or more chronic conditions has increased by 14,9 percentage points, from 32,3% in 2013 to 47,2% in 2021 (Figure 1). Hence, it is interesting how the Danes' perception of their health status remains constant while the number of citizens suffering from one or more chronic conditions increases.

In the segment of the population suffering from a chronic condition between 2013 and 2021, 90,9-95,9% state that they have a physical condition whereas 11,6-18,3 % are challenged by mental issues (Question 09A). Hence, numbers indicate that some of the citizens suffer from both physical and mental conditions.
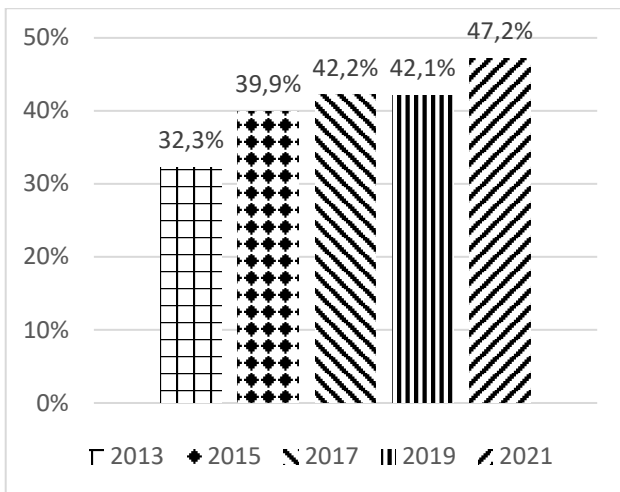
Figure 1 Citizens with one or more chronic conditions.

Considering the increasing number of elderly and citizens who are suffering from one or more chronic conditions, one might assume that the number of citizens supporting/helping an elder, handicapped, or ill person in their contact with the healthcare system has increased from 2013-2021 (Question 6).
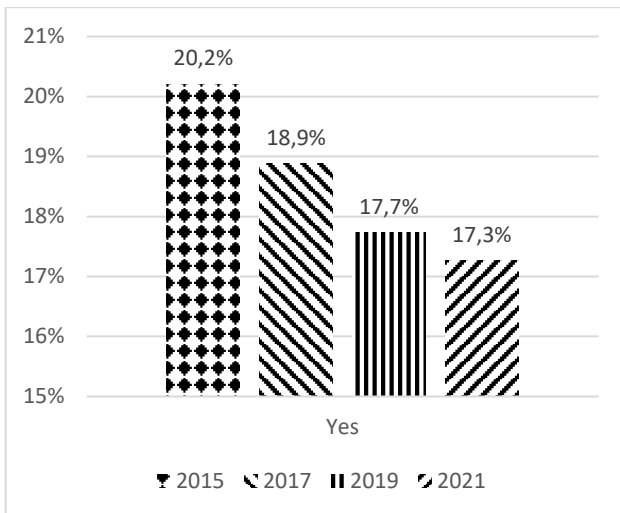

Figure 2 Supporting/helping an elder, handicapped, or ill person in their contact with the healthcare system.

However, as Figure 2 reveals, there has on the contrary been an incremental decrease in the number of citizens supporting an elder, handicapped, or ill person in their contact with the healthcare system.

The characteristics of the typical citizen who supports/helps an elder, handicapped, or ill person in their contact with the healthcare system is a male (55,5%), 40-69 years old (34%), holding a bachelor's degree or higher education (55,3%), with a good/very good health status (71,5%).

3.2 Communication

This section describes how citizens make use of HIT when communicating with their GP from at home and in these cases for what purposes HIT is used.

Specifically, citizens are asked 'When communicating with your GP from home what equipment are you then using?' (Question 12A) and 'For what purposes have you used IT when communicating with your GP?' (Question 12C).
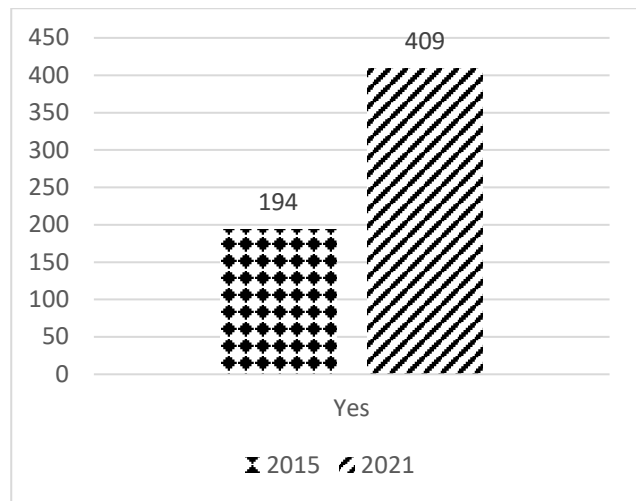

Figure 3 Citizens using smartphone at home to communicate with their GP.

In this context, smartphones are a focal technology, which citizens increasingly use to communicate with their GP (Figure 3). In 2015, 18% of the population used smartphones in their communication with their GP, which increased to 41% in 2021, an increase of 111%. In the same period, the relative number of citizens who made use of iPad/tablet when communicating with their GP shifted from 15 to 17%, whereas the use of computers rose from 43 to 52%. Thus, the use of smartphones has increased relatively most, compared to iPad/tablet and computers. Nonetheless, computers are still the preferred HIT when communicating with the GP.

The characteristics of the typical citizen who uses a smartphone at home to communicate with their GP is a male (53,6%), 18 to 49 years old (62,7%), holding a bachelor's degree in education (34,2%), and with good health status (45,5%).

For what purposes citizens then use IT when communicating with their GP is a different matter, which is displayed in Table 5.

Purposes	2019 (n/%)	2021 (n/%)
eConsultation (email)		465/46%
Video consultation		65 /6%
Uploaded readings from home monitoring		68 /7%
Booking an appointment	467/44%	402/40%
Prescription renewal	383/36%	424/42%
Referral to a specialist doctor	81/8%	81/8%
Corona test		229 (23%)
Answers test results	252 (24%)	219 (22%)
Answers blood test/lab results from specialist doctors or hospital	251 (24%)	273 (27%)

Table 5 Types of purposes when using IT in the communicating with the GP

Table 5 indicates that the purpose of using IT when communicating with ones GP is relatively stable from 2019 to 2021. Under normal circumstances, this would not be a

surprise considering the short period between the surveys; however, the surveys were conducted before and after the COVID-19 outbreak in 2020, which should be taken into account when interpreting the data. In this context, 6% using video consultation in 2021 is a relatively low number, whereas 46% having used eConsultation in the communication with their GP is less surprising, making it the most frequent purpose of use.

The characteristics of the typical citizen who uses eConsultation to communicate with their GP is a female (51,6%), citizen of all ages, holding a bachelor's or higher degree of education (58,6%), with a good health status (44,8%) and with one or more chronic conditions (55,3%).

3.3 Collection of data

In this section different types of data collection conducted by the citizens are described.

On the subject of data collection, citizens were asked: *"Did your practitioner ask you to collect data meant for your treatment?"* (Question 18A), referring to digital as well as a paper-based collection of data.
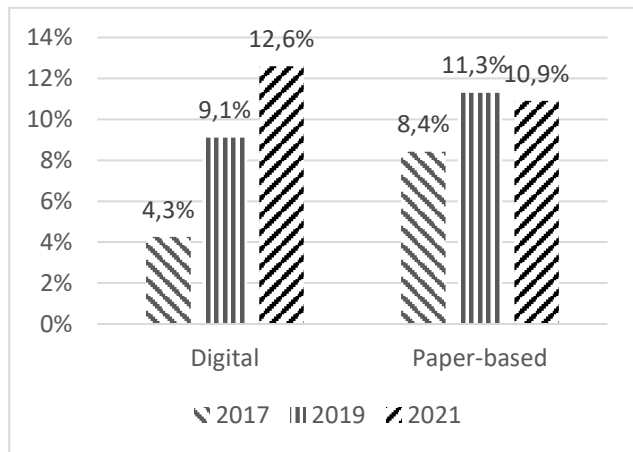

Figure 4 Citizens' collection of data for treatment requested by a practitioner.

From 2017 to 2021 citizens' digital data collection requested by a practitioner increased by 8,3 percentage points, from 4,3% to 12,6%, a relative increase of 193%. Paper-based data collection has fluctuated since 2017 but is at 10,9% in 2021. Hence, the number of citizens collecting digital and paper-based data is close to similar in 2021 but the tendency is that digital data collection requested by a practitioner is a growing phenomenon.

The characteristics of the typical citizen who is requested to collect digital data for treatment by a practitioner is a female (54%), 50 years or older (57,9%), holding a bachelor's or higher degree of education (58,9%), with a good health status (44,5%) and with one or more chronic conditions (66,7%).

In question 19B citizens are asked, "Have you on your own initiated collection of health data (e.g. from a fitness tracker or an app) and showed it to your health practitioner?" (Figure 5).
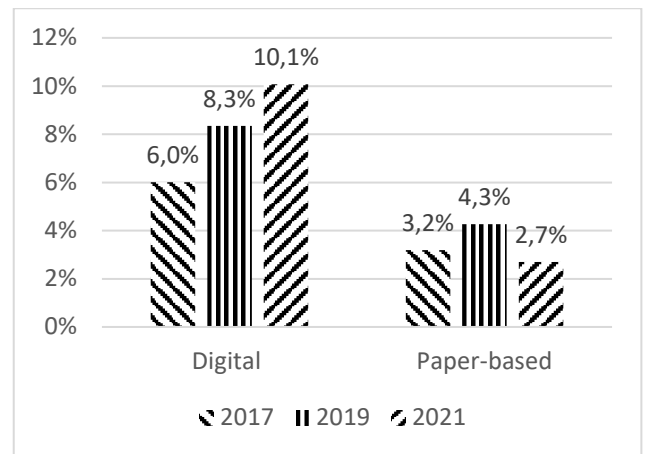

Figure 5 Individual initiated health data collection.

Even though the data type and the used HIT might be different, the same pattern is repeated. From 2017 to 2021, the number of citizens collecting digital data on their own initiative increased by 68,3% (4,1 percentage points) and the paper-based collection of data varied between 2,7 and 4,3%. Comparing the results displayed in Figures 4 and 5, what is interesting is the relative difference between data collected digitally versus paper-based in 2021. The frequency of the two approaches is close to similar when initiated by a practitioner, 12,6% and 10,9% (Figure 4), whereas 4 times as many initiated digital data collection on their own compared to the paper-based collection, 10,1% and 2,7% (Figure 5).

The characteristics of the typical citizen who initiates the collection of digital health data on their own are independent of gender, mainly between 18 and 29 years (21,6%) and 50 to 59 years of age (20,8%), holding a bachelor's or higher degree of education (55,8%), a good health status (40,2%) and one or more chronic conditions (56%).

The third question in this section concerns citizens' evaluation of treatment based on digital and/or paper-based questionnaires (Figure 6). Specifically, citizens are asked: *"In your contact with the healthcare services, have you then been asked to complete a questionnaire to evaluate your treatment?"* (Question 14F).
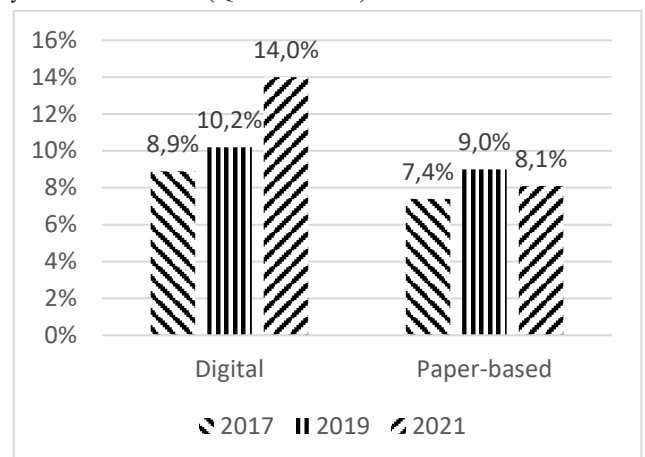

Figure 6 Citizens' completion of questionnaires to evaluate treatment.

Figure 6 shows that citizen evaluations via digital questionnaires are a growing phenomenon indicated by a

5,1 percentage point increase, which is an increase of 57,3% between 2017 and 2021. Once again, the same pattern is repeated, as the rate at which paper-based questionnaires are collected over the period fluctuates and seems to be declining.

The characteristics of the typical citizen who has evaluated their treatment via a digital questionnaire are independent of gender and age, with a bachelor's degree in education (31,5%), a good health status (47,5%) and one or more chronic conditions (59,7%).

3.4 Data monitoring

Section 3.4 concerns citizens' use of digital platforms and websites. Examining this issue, citizens were asked: *'How do you follow your public health data on the internet?'* (Question 19).

Websites or apps	Computer		Smartphone or tablet	
	2015	2021	2015	2021
e-Boks	37,2%	45,2%	19,3%	47,1%
GP's homepage	22%	17,9%	9,5%	20,4%
Sundhed.dk	33,4%	50,5%	7,7%	55,1%
Borger.dk	29,6%	29,6%	8,8%	26%

Table 6 Websites and apps used by citizens to follow their public health data

The data displayed in table 6. reveals a significant increase in the use of smartphones/tablets in a Danish context, independent of the website. The most pronounced increase concerns the Sundhed.dk app, the Danish health portal where citizens can check their COVID-19 results. It was used by 7,7% of the citizens in 2015 and by 55,1% in 2021; an increase of 616% (47,4 percentage points). Another frequently used website is eBoks, visited by 45,2% (via computer) and 47,1% (via smartphone or tablet) of the population in 2021, highlighting how eBoks is a key website in mediating communication between citizens and the public sector. Based on these numbers, smartphones/tablets were in 2021 used as frequently as computers by citizens when accessing public health data.

When asking about the citizens' use of the Shared Medication Record (app), the data does not allow to distinguish between computers and smartphones/tablets why this information is not included in Table 6. However, the results are similar to the notable development in the use of smartphones and tablets; hence, 6% of the Danish population made use of the Shared Medication Record (app) in 2017, which increased to 29,7% in 2021, which is an increase of 396% (23,7 percentage point).

In answering Question 19, citizens were also able to reply that they did not follow their public health data online. Hence, 42,3% did not follow their public health data online in 2015 a number declining to 12,6% in 2021. In other words, 87,4% of the population followed their health data online in 2021 compared to 57,7% in 2015, which is an increase of 51% (29,7 percentage points).

The characteristics of the typical citizen who follows public personal health data on Sundhed.dk via smartphone or tablet are, a male (53,7%), between 18 and 29 (20,9%) or 40 and 49 years of age (20,%), holding a bachelor's or higher degree of education (55,1%) and a good health status (47,6%).

The citizens were also asked: 'Have you, within the latest year, had experience with any of the following activities by using the internet, email or an app?' (Question 20).

Activities	2015 (n/%)	2021 (n/%)
Health apps	215/20,3%	661/66%
Questions for HCPs	264/24,9%	189/18,9%
Communication with peers	87/8,2%	106/10,6%
Questions on diet and training	58/5,5%	88/8,8%
Discussions on diet and training	66/6,2%	62/6,2%
Diaries on diet and training	146/13,8%	207/20,7%
Self-help programs	212/20%	220/22%
Healthcare services in another language	213/20,1%	203/20,3%

Table 7 Citizens' activities on the internet, email and apps.

As displayed in Table 7, the most significant change in citizens' activities concerns the use of health apps as it has increased by 45,7 percentage points (225%) between 2015 and 2021. Communication with peers, the use of self-help programs as well as discussions and questions on diet and training are as frequent activities in 2015 as in 2021, while questions for HCPs have dropped by 6 percentage points (25%).

The characteristics of the typical citizen who uses health apps are male (54,9%), 18-29 years old (26,7%), with a bachelor's or higher degree of education (55,9%), a good health status (47,6%) and not suffering from one or more chronic conditions (55,3%).

3.5 Relatives' access to data

Since December 2015 patients have, through a digital power of attorney, been able to grant relatives access to their health data [12]. Thus, citizens are asked: *'Have you made use of the option to provide your relatives with access to your health data?'* (Question 25)
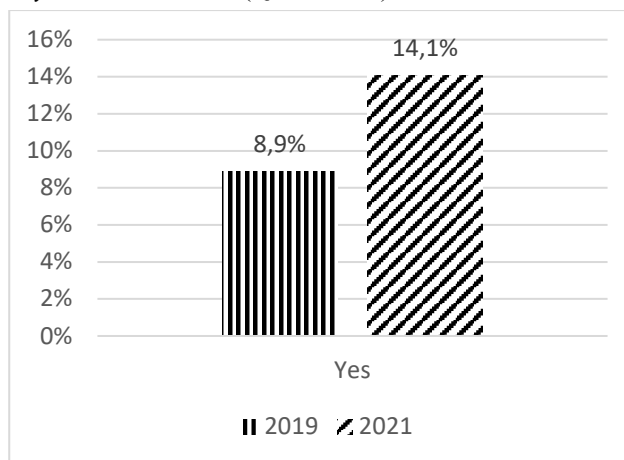

Figure 7 Citizens who granted relatives access to their health data.

As Figure 7 illustrates, citizens who allow relatives to access their health data has from 2019 to 2021, increased by 5,2 percentage points (58,1%), which might reflect the growing amount of elderly and citizens with one or more chronic conditions.

The characteristics of the typical citizen who granted relatives access to their health data are largely independent of gender, 70 years or older (23,9%), holding a bachelor's or higher degree of education (55,5%), a good health status (41,3%) and one or more chronic conditions (55,3%).

4 DISCUSSION

Based on the results section, three patterns are apparent; firstly, the Danish population are increasingly making use of HIT and digital healthcare services, secondly, the collection of digital patient data is becoming increasingly important and thirdly, the majority of citizens, and therefore most of the digital health users, have a bachelor's or higher degree of education and perceive their health status as good or very good.

4.1 Use of HIT

The widespread use of digital solutions is in the results section exemplified by citizens' extensive use of smartphones when communicating with a GP (Table 3), the Sundhed.dk app (Table 6) and health apps (Table 7), which have increased by 111%, 616% and 225%, respectively, from 2015 to 2021. Another noticeable finding is the number of eConsultations, which were used by almost half of the population in 2021 (Table 5). Results aligned with studies conducted by The Danish Organization of General Practitioners (PLO), revealing that eConsultations comprised 3,5% of all consultations in 2008 and 19,2% in 2021 [13], indicating increased use of eConsultation in healthcare. A development synergising with the results from a recently published report by Statistics Denmark on the use of IT in the Danish population in 2021. Accordingly, 92% between 16-74 years communicated with the public sector digitally, 68% made use of digital self-service solutions and 85% were active on social media [14]. Based on these numbers, the use of HIT in Denmark seems to be growing, which to some extent probably is caused by the COVID-19 crisis, similar to the experiences in other countries [15].

4.2 Patient-generated health data

Another main finding is how the collection of digital data by citizens is becoming a more normalised practice. Hence, from 2017 to 2021 the collection of data requested by a practitioner (Figure 4), digital data collection initiated by the citizen (Figure 5) and completion of digital questionnaires (Figure 6), has increased by 193%, 68,3% and 57,3%, respectively. Numbers verifying the increased importance of patient-generated and patient-reported data in a Danish context and 'the active patient', reflecting the need for increased patient participation if a healthcare system is to be based on patient-reported data [5].

4.3 The typical HIT-user

The third main finding concerns how particular segments of the population are the primary users of digital healthcare. Accordingly, in absolute numbers, the typical citizen using the digital health solutions has a bachelor's or higher degree

of education, perceives their health status as good or very good and often has one or more chronic conditions. Regarding age and gender, there seems to be no clear pattern. These findings probably mirror the fact that the majority of citizens, relatively consistently over the examined period, categorise their health status as good/very good (71,38%) and have a bachelor's or higher degree of education (50,9%). Simultaneously, the number of citizens with one or more chronic conditions has increased by 46,1% from 2015 to 2021 (Figure 1). In this light, it is noteworthy how the number of citizens who support an elder, handicapped, or ill person in their contact with the healthcare system has declined incrementally from 20,2% in 2017 to 17,3% in 2021 (Figure 2). A relatively moderate number considering that on average 40% of the Danish population were engaged in voluntary work in 2021 [16].

4.4 Consequences and solutions

On the one hand, these numbers might indicate that citizens to a higher degree are becoming digital competent and capable of self-managing their conditions. This could be perceived as a manifestation of current health policies' emphasis on citizens' individual responsibility and engagement in their health and disease handling [4], [5]. On the other hand, these results might also explain why inequity in health persists as a pivotal problem in a Danish context. Thus, this study confirms a concern raised by Professor Morten Sodemann in the article 'The healthcare system is drowning in trivialities' [17], in which he claims that the healthcare system is shaped according to the needs of the middle class who represents the majority of the population, making this approach a good business. Consequently, the minority of the population, the resource-demanding citizens who are most in need, are neglected and excluded from vital health services [17]. Arguably, awareness of access barriers (e.g. access to the internet and digital services), and capability barriers (e.g. literacy, digital skills, language difficulties and domain knowledge) are important to consider in order to ensure an inclusive digital healthcare system [18]. To achieve this, the design and usability of digital healthcare systems are decisive [4], which is a focal point in Chris Showell's and Paul Turner's work titled 'The PLU Problem: Are We Designing Personal ehealth for People Like Us?' [19]. In this paper, a dichotomy between People Like Us (PLUs), the designers of eHealth, and the Disempowered, Disengaged and Disconnected (DDDs), the citizens most in need of the services offered by the digital healthcare services, demonstrates how potential inequities in eHealth emerge and persist due to inherent biases in the design phase favouring the preferences of the PLUs [19]. A problem confirmed by the results in this study considering the similarity between the characteristics of the typical HIT-user and the profile of the majority of the population. Therefore, to ensure that digital solutions are useable and accessible to the DDDs, the eHealth systems should be designed according to their needs [19].

4.5 Scandinavian similarities

When comparing the results to studies conducted in Sweden and Norway similar patterns occur. In the paper 'Mobile Access and Adoption of the Swedish National Patient Portal' [20], Hägglund et al. (2020) show that the

use of Mobile phones when accessing the national health portal has increased from 38 to 77% and that the monthly number of visits has increased by 400% over 7 years, 2013-2020 [20]. In a Norwegian context, Zanaboni et al. (2022), finds that the majority (50,7%) of the respondents consider their self-reported health as good/very good and that 58,6% visit their electronic health record regularly or when needed [21]. Thus, numbers that might indicate similarities in HIT use and perceptions of health status across the Scandinavian countries.

5 CONCLUSION

This study reveals that the use of HIT and digital solutions is increasing in a Danish context. Accordingly, the use of health apps, smartphones and the national health portal (Sundhed.dk) has increased over the examined period. Moreover, the study discloses that the typical user of HIT and the eHealth system has a bachelor's or higher degree of education, a good/very good health status and often suffers from one or more chronic conditions. Based on the study findings we conclude that citizens' increased use of the digital healthcare system and the growing production of patient data are consistent with current Danish health policies and digital strategies; underscoring, the importance of patient participation, self-management and PROs. However, the minority of citizens, the 10-20% of the population with short education and a bad/very bad health status might not be able or wish to participate and self-manage their health conditions. Therefore, we encourage awareness when designing the future digital healthcare system to ensure that solutions are based on the preferences and needs of the DDDs.

Abbreviations

DDD   Disempowered, Disengaged, Disconnected
HCP   Healthcare professional
HIT   Health Information Technology
PLO   The Danish Organization of General Practitioners
PLU   People Like US
PRO   Patient-Reported Outcome

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