# *Accessible eHealth: opportunities and challenges in Italy*

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Digital accessibility is essential to provide inclusive services, and should always be respected in a sector such as digital health, where the target is extremely varied. This manuscript aims to inspect the state of accessibility of eHealth services in the Italian market. Through an assessment of 3 different services, the authors want to highlight their main strengths and weaknesses, in order to understand the opportunities still to be exploited and the challenges to be overcome, also depending on the Italian and European regulations that establish rigid constraints, but do not consider, at the moment, the digital health sector. The results indicate that the level of accessibility is not satisfactory yet, with some good peaks, but many aspects to be improved, in particular on how information is structured and presented.

*Keywords*: eHealth; accessibility; inclusive health; universal design; guidelines; digital inclusion.

## Introduction and related work

In order to be inclusive and available to everyone, eHealth services should follow the recommendations of digital accessibility, where «websites, tools, and technologies are designed and developed so that people with disabilities can use them» (W3C Web Accessibility Initiative, 2024, online).

The concept of digital accessibility is so important that over the years many countries around the world have adopted legislation on the matter. In Italy, in particular, since 2004 the so-called "Stanca act" (Italian law 4/2004) has regulated the accessibility of websites and subsequently also of

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Although it is a collective work overall, Introduction and Related Work shall be attributed to Emilio Greco, Materials and Methods and Conclusions to Giorgia Elisa Cafiero, while Eliseo Sciarretta is the main author for Results and Discussion.

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mobile apps. Some obligations of this law, which were originally aimed at the Public Administration only, have been extended since 2020 (Italian D.L. 76/2020) to private companies, provided that they have an annual turnover exceeding 500 million euros.

In 2025, these obligations are integrated by those deriving from the EAA, the European Accessibility Act (European Parliament and Council of the European Union, 2019), a European directive dated 2019 that aims to regulate the accessibility features of the main digital products and services on the market and which finally comes into force, after being implemented by all member countries.

However, the European directive does not explicitly mention eHealth services, while it does so with other categories of services, such as banking and transport; therefore, the common interpretation is that eHealth services are not currently considered within this law. The European Disability Forum, for example, expressed doubts about the absence of health-related services among those explicitly considered in the EAA: «there are ways in which the Act fell short of our expectations: the scope of services and products it covers is very limited: health care services, education, transport, housing, and household appliances were left out of the Act» (European Disability Forum, 2019, p. 4).

Currently, there is a heterogeneous situation, in which PA and large companies must comply with some rules, while smaller companies are exempt. However, this causes repercussions on citizens and users of services, who cannot experience a consistent level of accessibility of services.

Goddard and Smith (2001, p. 1) stated that «the concept of equity of access to health care is a central objective of many health care systems»; therefore, it should be even more relevant for eHealth, which was born to provide more and better health services to citizens, increasing their wellbeing and changing how these services are provided, optimizing the resources needed (European Commission, 2018).

As emerged from the relevant literature review, «studies on eHealth have shown the benefits of the technology used in care and promoting wellbeing» (Valokivi *et al.*, 2023, p. 836). However, especially in a country like Italy, many differences in how people access these services exist, still. Previous research has often focused on parameters such as age (Schiavone *et al.*, 2021), or geographical origin (Vainieri *et al.*, 2023), highlighting the digital divide between young and old and between urban and rural places. Similarly, several social variables affecting the approach to eHealth can be identified, such as gender, level of education, wealth, «Internet skills, cognitive skills and numerical skills» (Jokinen *et al.*, 2021, p. 265) and many

others; among these, however, (dis)abilities play a leading role, because they can turn into a barrier.

Globally, as recalled by Henni *et al*. (2022, p. 1), «the number of digital health solutions is increasing, but they are not always designed with access and utilisation for people with impairments in mind», while accessible solutions would «foster health equity and achieve health promotion, prevention and self-care». This lack of accessibility turns into a digital divide, where people with disabilities use eHealth services less than people without impairments, and with more difficulties, as shown by Pettersson *et al.* (2023).

This study analyses the accessibility of some important eHealth services available in Italy with the aim of understanding the strengths and the main difficulties, and whether there are evident discrepancies between the services that should already be accessible and those that in theory might not be.

## 1. Materials and Methods

This work aims to provide information on the state of accessibility of eHealth services in Italy, in order to highlight the opportunities and challenges that are still open. The authors have selected 3 services, representative of what the Three-Year Plan for IT in Public Administration 2024-2026 (AGID, 2024) defines as the main references to be considered for the Healthcare Ecosystem:

1. FSE, the Electronic Health Record (EHR) of the Lazio Region (https://www.salutelazio.it/fascicolo-sanitario-elettronico1), as an example of enabling infrastructure;
2. RECUP, the Single Booking Center of the Lazio Region (https://www.salutelazio.it/prenotazione-visita-specialistica), as an example of simplification of the interaction between Public Administration and citizens;
3. Symptomate, a self-service symptom control tool created by Infermedica (https://symptomate.com/it), as an example of telemedicine.

Services have been selected due to their convenience (the authors are residents in the Lazio Region and therefore have simple access to the services provided as citizens); while the choice is to be considered arbitrary, it is worth stating that the aim of the study is not providing feedback on the specific services selected, but rather using them as an example of the different categories of eHealth systems offered.

The selection, however, intentionally places two services offered by the Public Administration (FSE and RECUP) side by side the Symptomate service, provided by a private company with a turnover below the threshold set by Italian law, and which is therefore not currently subject to the legal obligations required for accessibility. This choice is due to the authors' will to investigate possible differences based on the type of service provider.

The authors carried out, in December 2024, an assessment about the accessibility level of the selected services, testing them against the 55 AA level Success Criteria contained in WCAG 2.2 (W3C Web Accessibility Initiative, 2023) and following the method for the determination of conformance established by the European standard EN301549 (ETSI, 2021), coming from WCAG-EM, the Website Accessibility Conformance Evaluation Methodology (W3C Web Accessibility Initiative, 2005). WCAG 2.2 is the most recent published version of the Web Content Accessibility Guidelines, the reference guidelines for digital accessibility issued by the Web Accessibility Initiative (WAI) within the World Wide Web Consortium (W3C). They are based on 4 fundamental principles (Perceivable, Operable, Understandable and Robust) and include numerous Success Criteria, divided into 3 levels of conformance: A (lowest), AA, and AAA (highest). EN301549 is the technical norm referenced by the European Union, which extends the WCAG and establishes that for regulatory purposes only the A and AA level criteria must be respected.

Without any claim to be exhaustive, considering, as mentioned above, that the criteria for the selection of the analyzed services are arbitrary, the results of this assessment can be generalized to provide information regarding which parts of digital accessibility are currently already considered by eHealth services in Italy and which ones still need to be worked on.

## 2. Results

Table 1 shows the results of the analysis carried out on the 3 selected eHealth services: FSE, RECUP and Symptomate.

The first column contains the Success Criterion tested, numbered as reported by W3C. The other columns, instead, state the result of the test conducted on the specific criterion for each of the analyzed services; the value of this result can be:

– “Compliant”, if no error has been detected relating to the criterion of that row;

– "Not compliant", in case at least one error has been detected relating to the reference criterion;
– "N/A" (Not applicable), if it has not been possible to test the service against the specific criterion (generally due to the failure of the test condition to occur).

It should be noted that, for brevity and clarity of presentation, the table does not report the results for all the tests, but only those for tests failed by one of the services analyzed, at least.

The last row of the table contains information about the number of non-compliant criteria detected for each service. In particular, for the FSE service, 12 criteria were tested non-compliant, equal to 22% of the total 55 AA level criteria defined within the WCAG. The RECUP service, on the other hand, recorded 15 non-compliant criteria (27%), resulting in the highest percentage of errors detected. Finally, as for Symptomate, 4 non-compliant criteria were identified; with only 7% of inaccessibility, this is the service that performed best in this test.

*Tab. 1 – Results of the accessibility analysis.*

| | | *Result* | |
|---|---|---|---|
| *Criterion* | *FSE (EHR)* | *Recup* | *Symptomate* |
| 1.1.1 Non-text content | Not compliant | Not compliant | Not compliant |
| 1.3.1 Info and Relationships | Not compliant | Not compliant | Not compliant |
| 1.3.3 Sensory Characteristics | Not compliant | Compliant | Compliant |
| 1.4.3 Contrast (Minimum) | Not compliant | Not compliant | Compliant |
| 1.4.4 Resize Text | Not compliant | Not compliant | Compliant |
| 1.4.10 Reflow | Not compliant | Compliant | Compliant |
| 1.4.11 Non-text Contrast | Compliant | Not compliant | Compliant |
| 2.1.1 Keyboard | Not compliant | Not compliant | Compliant |
| 2.1.2 No Keyboard Trap | Not compliant | Compliant | Compliant |
| 2.4.3 Focus Order | Not compliant | Not compliant | Compliant |
| 2.4.4 Link Purpose (in Context) | Not compliant | Not compliant | Compliant |
| 2.4.5 Multiple Ways | Compliant | Not compliant | Not compliant |
| 2.4.7 Focus Visible | Compliant | Not compliant | Compliant |
| 2.4.11 Focus Not Obscured | Not compliant | Not compliant | Compliant |
| 3.1.1 Language of Page | Compliant | Not compliant | Compliant |
| 3.1.2 Language of Parts | Compliant | Compliant | Not compliant |
| 3.3.1 Error Identification | N/A | Not compliant | Compliant |
| 3.3.3 Error Suggestion | N/A | Not compliant | Compliant |
| 4.1.2 Name, Role, Value | Not compliant | Not compliant | Compliant |
| Number of non-compliances | 12 | 15 | 4 |

These results are even more significant considering, as previously mentioned, that FSE and RECUP are services offered by the Public Administration and should already be fully compliant with the specifications, while Symptomate is not currently subject to the legal obligations required for ac-

cessibility and will not be subject to them even when the EAA comes into force, as the service does not fall within the categories involved.

## 3. Discussion

The results show none of the analyzed services is fully accessible, although the number of errors is variable.

The main problems to be solved are those that have been detected in all services. In particular, the management of text alternatives for visual elements (criterion 1.1.1) has proven to be suboptimal: images, icons and other significant graphic elements should have an associated text description capable of explaining their function even to those who, for various reasons, cannot see the elements. At the same time, graphic elements that are pure decoration should be marked as such and not contain alternatives, so as not to make reading more time consuming. During the tests, instead, some significant images without text alternative were found, as well as some decoration elements with unnecessary alternative.

Criterion 1.3.1 Info and Relationships also proved to be problematic: in this case, on the one hand it is necessary to ensure that the structure of the content is not identified only through visual means (for example with bold text for headings), because otherwise it would be totally ignored by those who cannot see it, on the other hand the structure itself must be hierarchically correct, so as to be effective. Tests have shown how this criterion has been misinterpreted, as some structural elements are not marked as such, while the hierarchy of the structure is not always correct.

Interestingly enough, these results are in line with the findings from a study conducted a few years ago on the websites of several hospitals around the world (Acosta-Vargas *et al.*, 2018): major problems were reported against the same criteria 1.1.1 and 1.3.1, just discussed, in 86% of the websites analyzed. From this point of view, it appears that after 7 years not so much has changed and the aspects to improve are still the same.

About the errors only detected in some of the services analyzed, it should be specified that not all the problems are equally relevant, because the way they impact the usability of the service and the number of people involved may be different. For example, non-compliance with criterion 2.1.1 Keyboard is among the most dangerous, because if any option is not operable also through keyboard, it can completely prevent all people who need a keyboard (instead of mouse or touch-screen) from using that service. On the other hand, non-compliance with criterion 1.4.4 Resize Text, while

undesirable, is not blocking, as people who may need enlarged text can zoom in the whole view as alternative and achieve the same effect.

In this perspective, it is worth reporting some errors found, such as the lack of adequate contrast between foreground and background (1.4.3 Contrast and 1.4.11 Non-text contrast), which could cause viewing problems for many people, especially those affected by color blindness, and the wrong/non-existent definition of the language used (3.1.1 Language of Page and 3.1.2 Language of Parts) which may prevent the use of assistive technologies such as screen readers. About the language, it's important to note a problem that, although not evident in this analysis, is confirmed by other authors, as Savolainen and Kujala (2024, p. 8): the terminology used, above all in eHealth context, while specialized, has to remain «understandable to a broad audience when services are intended for universal use».

Even though the criteria considered and the problems identified may, at first glance, seem to be mostly technical, they affect the perceived usability of the content and of the eHealth services: an image without a text alternative is totally useless for those who cannot see, as is a word in bold style without any other signal of its relevance at a structural level. Furthermore, when dealing with accessibility, the main focus is on visual disabilities, as the output of digital services is generally conveyed through screens, but the range of possible beneficiaries is much wider and involves people with several types of disabilities: for example, allowing correct use via keyboard is an essential requirement both for the blind, and also for those with problems in the upper limbs that prevent the use of a mouse or a touch screen. Besides permanent disabilities, temporary disabilities (i.e., persons with a broken arm) and situational disabilities (for example, parents with an infant in their arms) should be considered too, and therefore the target audience is even broader. Finally, many requirements are designed to guarantee access to people with disabilities but it turns out they are also very useful for people without disabilities: adequate color contrasts, or the ability to change the size of the characters are perfect examples in this regard. Considering all of this, the findings of this study take on even greater relevance, due to the enormous potential impact of accessible design on society.

This non-exhaustive overview shows indeed there are many areas that could benefit from greater attention given to accessible design and implementation, in order to provide inclusive eHealth services. However, focusing only on the mistakes leads to a potentially distorted view of the current state. As previously mentioned, the tests on the analyzed services found errors in a percentage of criteria ranging from 7 to 27. This means that, excluding the not applicable criteria, all the services considered are compliant

with the majority of the requirements. For example, all services comply with the recommendations regarding criterion 2.5.8 Target Size, using appropriately sized interactive elements, criterion 2.3.1 Three Flashes or Below Threshold, as they avoid the use of flashing elements, and criterion 2.4.1 Bypass Blocks, since they provide users with ways to skip blocks of repeated content.

Any remediation strategy should consider that, in order to maximize the inclusiveness of services, it's better to include accessibility from the beginning of the design process, because modifying solutions that were born inaccessible may be expensive and challenging. Unfortunately, many worldwide projects concerning eHealth still struggle to include accessibility in their design process, as shown by Jonsson *et al.* (2023, p. 12), who conclude that «accessibility guidelines and standards were used to a very limited extent in the development and evaluation of eHealth services».

Finally, the authors cannot avoid reflecting on the fact that, among those analyzed, the most accessible service is the only one with no obligation to be so: maybe it's just a case, as the services were randomly selected, still it's a sign showing that, while the laws on accessibility are necessary and useful to start the process, the main drive should be the sensitivity and interest of the providers, since it is possible to offer accessible services even without obligations.

## Conclusions

In this manuscript, the authors analyzed the accessibility level of 3 eHealth services available in Italy in order to obtain information on the state of inclusive digital healthcare, also in relation to current and future legal obligations.

The research showed that the level of accessibility of the analyzed services is not satisfactory, yet, but also that the concepts of inclusive design are starting to be considered in this market. Noteworthy is the result achieved by Symptomate, a service not subject to accessibility obligations. As reported, indeed, the eHealth market is not currently mentioned by the European Directive on accessibility. On the one hand, the authors believe that the legislator should remedy this by including healthcare-related services in the list of those that must comply with accessibility requirements; on the other hand, cases like Symptomate suggest how, in addition to obligations by law, the interest of suppliers in extending their target base by offering accessible services could be the main driving force, thus turning into

an opportunity for the whole sector. As discussed, the potential impact of accessible design on the whole society is huge, and eHealth services should be at the forefront of this battle, given their nature.

However, many points of attention remain to monitor, as well as many WCAG Success Criteria are not met, yet. The major challenges, as discussed, are about how the information is structured and how it is presented, as it should be less dependent on sight and on the visual dimension. To this end, it is necessary for eHealth providers to implement design and development processes that take into account the principles of Universal Design and involve all the techniques for the creation of accessible digital services.

The main limitation of this study is related to the small number of services evaluated, not enough to perform a quantitative statistical analysis that can be held valid for the whole sector. However, the aim of the manuscript is to highlight the main problems in a qualitative perspective. About future work, it could be interesting to extend the corpus of services considered.

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