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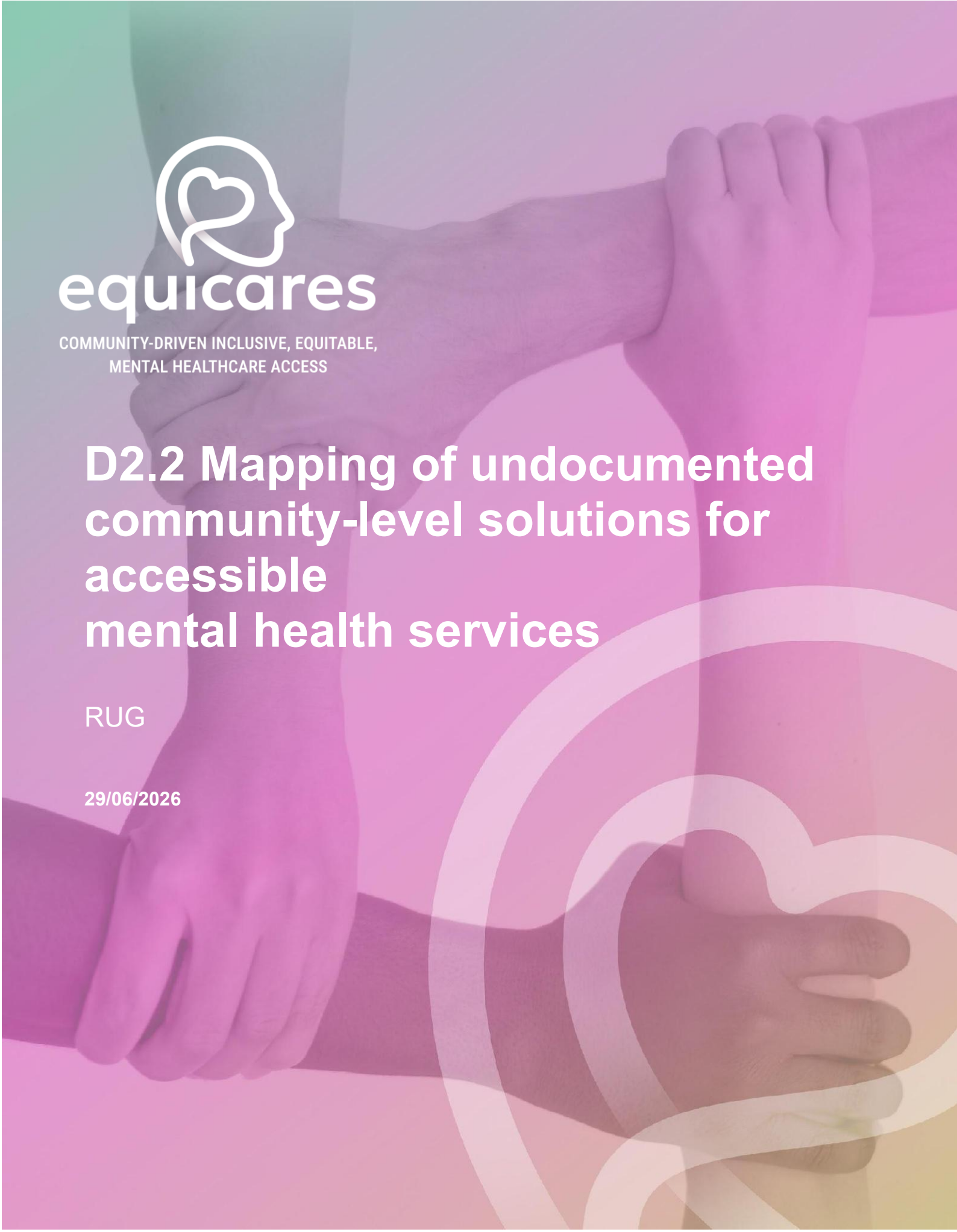
COMMUNITY-DRIVEN INCLUSIVE, EQUITABLE, MENTAL HEALTHCARE ACCESS

D2.2 Mapping of undocumented community-level solutions for accessible mental health services

RUG

29/06/2026



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Executive Summary

Context of project and aim of deliverable

EQUICARES is a Horizon Europe project aimed at understanding how to improve equitable access to mental health care (MHC) for vulnerable populations across different European regions and globally. The project specifically investigates structural and personal barriers standing in the way of equal access and solutions that are able to minimize these barriers.

This report details the results of task T2.2 within the EQUICARES project, which focuses on a "Bottom-up mapping of innovative solutions for accessible mental health services" across European pilot regions. This was done using a combination of digital ethnography, spatial microsimulation, and agent-based modelling.

In the context of EQUICARES, innovative solutions (in mental health care) are not defined as the creation of entirely new treatments, but as a redesign of how services are organized, delivered, and accessed to improve accessibility and acceptability for those in vulnerable situations. This often includes moving away from conventional specialist-led, facility-based models toward flexible, community-integrated care. The primary aim of deliverable D2.2 is to map these innovative, often undocumented community-level solutions and provide a typology that can inform future systemic reforms and the development of Smart Health Labs within the remaining runtime of the project.

Digital ethnography-Supply side

To understand the "supply side" of MHC innovations, we adopted and implemented a digital ethnographic approach and method. Digital Ethnography allows for the collection of detailed qualitative data from online sources, such as websites and social media of MHC service providers, covering a wide geographic range without the need for physical immersion. The final sample consisted of 77 MHC providers across eight pilot regions in Bulgaria, France, Germany, Greece (Thessaloniki and Athens), Ireland, Spain, and Turkey.

Through thematic analysis, the report identifies seven clusters of innovation:

1) Advocacy and Systemic Change: These services are focused on pioneering patient rights, reducing stigma, and knowledge sharing with policymakers. Examples include the Observatory for the Rights in the Field of Mental Health in Greece and the Foundation “Health Problems of Minorities” in Bulgaria.
2) Community-based Solutions & Task-shifting: These solutions leverage peer support and trained community members to provide guidance, creating a sense of belonging and low-threshold entry points. Notable examples include Clubhouse France and the Escuela de Pacientes in Spain.
3) Multidisciplinary Solutions: This comprises teams combining psychologists, social workers, and medical specialists. Multidisciplinary teams often also include individuals from the community or

population being supported, as they are able to translate and culturally mediate between (medical or psychological) professionals and their target group for MHC services.

4) Holistic Solutions: These are services that address multiple life areas, such as legal advice, labor market integration, and family support, alongside mental health. The SIHHAT program in Turkey and Caritas Mannheim are included in this cluster.
5) Digital and Tele-health Solutions: This cluster provides location-independent support via helplines, chats, and interactive online classes available 24/7. This includes Pieta in Ireland and the Virtual Brain Twin project in France.
6) Personalization & Professionalization of Care: Solutions in this cluster innovate by tailoring services to specific needs (e.g., LGBTQIA+ youth or individuals with intellectual disabilities) and training MHC workers to be more culturally sensitized.
7) Art-based Solutions: These services use playful and creative interactions, such as music or drama therapy, to offer non-clinical entry points into the MHC system.

The digital ethnography also analysed social media presentations, finding that platforms like Facebook and Instagram are used to normalize mental health topics through infographics, simple communication and invitations to community events, while YouTube and Spotify (podcasts) are utilized for accessible education.

Agent-Based Models and spatial microsimulation-Demand side

To bridge the gap between "supply" (MHC services) and "demand" (individuals in need), we employ and integrate two Computational Social Science methods. Computational Social Science methods combine social theory with data science and utilize, among other, simulations techniques to analyse human behaviour and model interaction between individuals or between individuals and organisations. The two methodologies are:

1) Spatial Microsimulation: This technique creates geographically detailed synthetic microdata by reweighting individual-level survey data from a previous work package in the EQUICARES project to align with official small-area demographic and socio-economic data (described as small area constraint variables in spatial microsimulation terminology), such as age, gender, and education. The resulting weights are used in maps in order to visualize spatial differences in mental health outcomes and access, such as subjective mental health and waiting times for mental health care appointments. Furthermore, the synthetic weights generated using spatial microsimulation are used in the Agent-Based Models in order to understand the demand for mental health care in our pilot regions.
2) Agent-Based Models (ABMs): This dynamic simulation analyses how citizens (agents) form social networks and interact with other individuals and MHC providers. The social network is built based on homophily, that is the tendency for individuals to connect with others of similar age, gender, or education, which affects the propagation of information through word-of-mouth. By linking the interactive model to the mental health outcomes of the prior survey via the synthetic population data generated through spatial microsimulation, we are able to model how interactions with mental health care providers can reduce the risk of negative mental health in the population.

A critical component of the ABM is the creation of "what-if scenarios." These simulate the establishment of a hypothetical new MHC service targeted at a specific vulnerable group (e.g., elderly

in Hatay, Turkey, or ethnic minorities in Pavlikeni, Bulgaria). The models show that while an additional service generally reduces the "at-risk" share of the population, the impact is often heterogeneous. For instance, the Athens pilot showed substantial gains, whereas other regions experienced diminishing marginal returns, suggesting that a single service may be insufficient in highly populated or complex areas.

Limitations

Digital Ethnography: Data is limited to what is publicly available online. Language barriers necessitated the use of automated translation tools, which may miss cultural intricacies or specific tones of communication. General factual information, however, was conveyed and collected relatively without bias.

Spatial Microsimulation: The accuracy and quality of the small area estimation depends on the availability of official small area data and the quality of social survey microdata. Some regions provided fewer variables (only age and gender), leading to less demographic detail. Furthermore, the models are static snapshots of a given moment in time and do not simulate transitions over time.

Agent-based models: The results are intended as outputs to provide insights into the processes linking providers with users and what-if comparisons rather than precise forecasts. The effectiveness of simulated services is limited by the fact that they were modelled using the "average" characteristics of existing providers rather than being perfectly tailored to target group needs of any specific target group in a region.

Conclusion

In total, 77 innovative mental health care service solutions were identified and mapped across the eight EQUICARES pilot regions, with 5-17 services screened in each pilot area through computational social science methods (spatial microsimulation and agent-based modeling), thereby meeting the relevant GA KPI for T2.2.

The report concludes that sustainable equity in mental health cannot be achieved through conventional models or isolated interventions alone. While community-driven innovations like task-shifting and holistic care effectively lower access thresholds, systemic barriers like workforce shortages and deep-seated stigma remain pervasive. Key findings highlight that dissemination strategies must be fit for the target group; for example, younger populations are best reached via social media. Ultimately, achieving progress requires coordinated structural transformations that utilize evidence-informed and culturally adapted strategies across diverse European regions.

Next steps

Building on these findings, the next phase of the EQUICARES project involves the development and testing of Smart Health Labs and targeted interventions that have the possibility to improve MHC accessibility. Every pilot region will design and implement a specific innovative solution that matches their regional needs and cultural context, supported by the insights in this report and the upcoming

Atlas on Mental Health and Care Innovative Solutions (T2.5). These solutions will be evaluated for effectiveness and cost-efficiency (WP4) to generate concrete policy recommendations for the European mental health care landscape.

Keywords: *Mental health care, innovation, digital ethnography, spatial microsimulation, agent-based modelling.*

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List of Terms and Definitions

Table 1: Terms and Definitions

Abbreviation	Definition
ABM	Agent-based model
DX.X	Deliverable (Number as part of the project)
GA	Grant Agreement
MHC	Mental health care
NGO	Non-governmental organization
TX.X	Task (Number as part of the project)
WP	Work package

1. Introduction

1.1 Aim and contribution

This report (deliverable D2.2) comprises the results of the activities carried out under the task T2.2 - “Bottom-up mapping of innovative solutions for accessible mental health services in pilot areas through digital ethnography” within the EQUICARES Horizon Europe project. The overall goal of this project is to understand discrepancies between mental health care needs and access in different European regions (and low-to-middle income countries around the world) and the innovations that are being introduced to increase the accessibility of mental health care for vulnerable populations.

In Europe, the project works with eight pilot sites in seven European countries (Bulgaria, France, Germany, Greece, Ireland, Spain and Turkey), in which innovative solutions to structural and personal barriers to mental health care (MHC) access are investigated. The geographies as well as the cultural and demographic contexts differ between the pilot regions, making it possible to examine a broad range of different health care systems and settings (Comber et al., 2011).

The main objective of this task is to provide an overview and improved understanding of the available innovative solutions for better mental health care accessibility at the community level. Our work undertaken in this task relies on a combination of three state-of-the-art methodologies - digital ethnography, spatial microsimulation and agent-based modelling. In the first step, we perform a digital ethnography of innovative mental health care service solutions in the pilot regions of the EQUICARES project. Local pilot partners provided a number of local MHC services as a starting point for the ethnography. This was expanded upon via an investigation of the networks of these providers and a snowballing of further services available, leading to a total of 77 service providers. A detailed thematic analysis of the characteristics, services and innovations offered by the MHC service providers enabled us to develop a typology of innovative solutions. In the second step, to understand the need for mental health services, we performed spatial microsimulations for the countries that the pilot regions are a part of. Spatial microsimulation, which basically combines individual level survey data and small area constraint variables, produces a detailed, individual level dataset at the local level, including information on mental health utilisation and some demographic characteristics. In the last step, we create a series of agent-based models (ABMs) to model the interactions between MHC service providers and their clients, as well as the impact that the services have on their mental health indicators. Further, the ABMs allow for an estimation of the effect of potential new entrants to the local environment MHC service providers on the need for MHC services in the region by creating “what-if scenarios”. These scenarios inform our discussion of opportunities and limitations of innovations in MHC for improved accessibility.

1.2 Contextualization within EQUICARES project

The deliverable builds upon the work performed in previous tasks and work packages within this project: WP1 provides the basis for this research by offering an overview of the barriers and facilitators of access to mental health care (D1.1) and the current larger context factors affecting the equality of

the accessibility (D1.3). These findings have been further substantiated by tasks 1.4 and 1.5, which performed surveys among the local vulnerable populations on their (need and ability to) access the MHC services in their region. These survey data get used as the necessary microdata in the spatial microsimulations. The digital ethnography builds on the understanding of innovations in mental health care as brought forward in D2.1 and D2.2. The information of all services included in the digital ethnography and the results from the spatial microsimulations and ABMs will be included in the Atlas of innovative mental health care solutions (D2.5). The insights into innovative mental health care services and their potential impact on mental health quality of life and accessibility of MHC will be used in the development of Smart Health Labs in the pilot regions of the project. The remainder of this introduction provides a short overview of the key points from the previous reports relevant to the present deliverable.

1.2.1 Barriers to mental health care access

Access to equal MHC in the WHO European Region is hindered by a complex interplay of demand-side factors (individual and community level) and supply-side factors (healthcare system level). These barriers are systematically categorized throughout the EQUICARES project through the Levesque Framework into five dimensions: approachability, acceptability, availability, affordability, and appropriateness (Levesque et al., 2013). According to expert consensus, inequities are primarily driven by macro-level megatrends such as workforce shortages, fragmented care pathways, insufficient public funding, and pervasive stigma (D1.3, Q-Plan, 2026).

- **Refugees and Migrants:** These groups face substantial hurdles including language barriers, limited terminology to describe illness, and a lack of understanding of host-country healthcare systems. Their precarious legal status and fear of deportation often deter them from seeking care, while the absence of professional interpreting services leads to miscommunication and mistrust. Refugee women specifically report fears of being judged as inadequate mothers, which can prevent them from accessing perinatal support.
- **Roma Communities:** The Roma population experiences systemic discrimination, social exclusion, and deep information gaps regarding available services. Financial barriers are particularly acute for this group, as nearly one in four Roma individuals lack national health insurance, limiting their access to all but emergency care in some regions. Stigma that the Roma community has towards MHC, as well as stigma towards the Roma population, paired with a lack of cultural sensitivity in care providers often produces miscommunication and stands in the way of building trust.
- **LGBTQIA+ Individuals:** Barriers for this community are rooted in minority stress, societal discrimination, and the lack of affirming, culturally competent care. Many LGBTQIA+ individuals find that services operate within heteronormative frameworks that fail to recognize their unique identities, leading to low engagement and retention in therapy.
- **People with Disabilities:** This population often encounters "diagnostic overshadowing," where mental health symptoms are incorrectly attributed to their physical or intellectual disability. Furthermore, service providers frequently demonstrate a lack of specialized training and awareness regarding the rights and communication needs of individuals with disabilities.
- **Ethnoreligious Minorities:** Communities such as Black, African, South Asian or Roma populations in Europe encounter institutional racism and cultural dissonance. The same is true for individuals practicing a minority religion in many European countries. There is often a

preference for informal, spiritual, or traditional sources of help over biomedical models, which may be perceived as irrelevant or culturally insensitive.

- **Older Adults and Youth:** Older people are often marginalized by ageism, mobility challenges, and the digital divide, which limits their access to telehealth. Youth, especially those from minority backgrounds, face a lack of age-tailored services and significant disruptions when transitioning from child to adult mental health services. Different life stages are not well addressed and respected in the way that traditional health care is set up, leading to a lack of understanding and differentiation in services addressing mental health across the life course.
- **Cross-cutting structural barriers**: Socioeconomic inequalities and lower education levels create cascading barriers across all vulnerable groups, reducing health literacy and the capacity to advocate for care. The traditional medical approach to MHC limits the possibilities to address a person and their problems holistically rather than from a psychological or psychiatric perspective only. Established health care systems are rather rigid and often do not leave enough room for cultural adjustment of services to different vulnerable groups. Additionally, public health crises (like COVID-19) and climate-related disasters exacerbate these inequities by disrupting service continuity and shifting delivery to digital platforms that remain inaccessible to those without the necessary resources or skills. Experts emphasize that advanced equity requires coordinated structural reform rather than isolated service adjustments.

1.2.2 Mental health care access and innovation

Innovation is often seen as progress based on completely novel concepts or ideas. In the context of MHC that would translate into entirely new treatments or approaches to treating mental health issues. However, completely new MHC services and solutions are an absolute exception. In most cases, development in the MHC field builds on theory, trials, studies and empirical evidence, and therefore is time-consuming and difficult to establish. To also capture lower-threshold changes and improvements in MHC delivery, in the context of the EQUICARES project, we define innovation in MHC not simply as the creation of entirely new treatments, but as the redesign of how services are organized, delivered, and accessed to improve equity and effectiveness for vulnerable populations. More specifically, innovation is characterized by a departure from the "conventional" model of specialist-led, facility-based, and appointment-driven care. Deliverable D2.3 - Innovative solutions in Low- and Middle-income countries (Koç University, 2026) provides a more detailed review of the different types of innovation in the field of MHC. In this report, we follow their definition of innovation which allows us to identify process and low-threshold innovations that can possibly be recreated in other places and contexts across different European countries.

Also aligning with the definition of innovation in MHC according to the World Health Organization (WHO, 2026), it involves implementing novel processes or systems that lead to improvements in health outcomes and equity. In the previous work already concluded in WP1 and WP2 of this project (Zentralinstitut für seelische Gesundheit, 2025, Q-Plan, 2026; Koç University, 2026), innovative mental health solutions are identified by several core features:

- **Targeting Demand-Side Barriers:** Innovations actively address stigma, mental health literacy, trust, cultural mistrust, and appropriateness of services rather than assuming that merely providing a service ensures it will be used. Stigma, trust and cultural mistrust have been identified as important barriers to MHC access in many vulnerable groups (T1.4 & 1.5).

- **Non-Traditional Workforce Models:** Task-sharing and task-shifting are practiced, meaning that peer support workers, community mediators, and trained lay helpers are engaged in the service delivery to extend reach beyond limited specialist capacity.
- **Flexibility and Integration:** Successful innovations often operate across multiple system levels (macro, meso, micro) and integrate mental health into primary care or other sectors like education, housing and community services.

These factors are considered in all steps of the investigation of innovative European MHC solutions discussed in the following sections of this report, starting from inspiring the classification of innovations as described by MHC service providers themselves, over the clustering of innovative solutions, to the interpretation of the clusters identified through the analysis.

1.3 Short introduction to key methods

1.3.1 Digital ethnographies - the supply side

With the ultimate goal of understanding which innovations in MHC improve accessibility of services in various European regions and supporting their implementation across different countries, the first step is to understand the landscape of MHC service providers and which services, treatments and solutions they offer. To this end, qualitative data needs to be gathered on the service providers, their services and innovations. We deploy a digital ethnography to collect this information. This method is a relatively new way to gather data in an online digital setting within the context of social sciences research (Varis, 2015). The benefit of conducting the data collection online rather than in person (as would be the case in a traditional ethnography) is that information from all target regions is available online and accessible from anywhere without the need to travel to the physical locations. Detailed information can be extracted from websites and social media accounts of MHC service providers while (public) interactions between the providers and their clients can also be observed, adding an important angle to our understanding of the access to MHC services (Delli Paoli & D'Auria, 2021). Through the process of collecting information on the innovations in MHC service delivery in the pilot regions, we are able to identify patterns and accessibility adjustments that might work well across different geographic contexts and specific target groups, within and outside of the EQUICARES project. For EQUICARES, this can then inform the development of the Smart Health Labs (to improve MHC accessibility) in the pilot regions. For other stakeholders, the information gathered on innovative services in European MHC will be presented and further disseminated as part of an *Atlas of innovative solutions in mental health care.*

1.3.2 Spatial microsimulations - the demand side

While the MHC services investigated in the digital ethnographies represent the "supply" side of practices that aim to improve the accessibility of MHC, the "demand" side are the individuals with mental health problems or needs seeking support from providers of MHC. To be able to understand how these two sides interact, we first need to identify these individuals: how many there are, where they are located, and what their main characteristics and needs are. In practice, obtaining observations of all individuals within a population is often challenging, particularly at a detailed geographical level. Consequently, researchers commonly use methods that generate synthetic populations designed to replicate the characteristics of the real population as closely as possible. One

widely used approach is spatial microsimulation (Ballas, 2004; Morrissey et al., 2008). In essence, spatial microsimulation integrates detailed individual-level information from a survey (here, the EQUICARES survey from T1.4) with small-area demographic data derived from censuses and administrative records. By reweighting survey respondents to align with known population totals for each geographic area, we produce a detailed synthetic population for the pilot regions and their surrounding areas (e.g., Ballas et al., 2007; Broomhead et al., 2019). Section 3 of this report provides a detailed account of the implementation of spatial microsimulation within EQUICARES. It outlines the data used, describes the key stages of the methodology, and presents the procedures undertaken to assess the reliability of the results. The section then demonstrates how the resulting synthetic population can be used to map indicators of mental health quality of life and, importantly, it provides the demand-side input required for the ABM presented in Section 4.

1.3.3 Agent-based models - interactive analyses

The successful establishment of MHC providers relies, to a large degree, on the willingness of each individual to interact and engage with the providers and receive their services. Within an ABM framework, the MHC providers (supply side) and the individuals (demand side) are represented and function as they would in the real world (Bonabeau, 2002). On the demand side, individuals make cognitive decisions based on their sociodemographic and sociopsychological characteristics, personal experiences, and interactions with others (Gilbert and Terna, 2000 and Jackson et al., 2017, Rodríguez-Arias et al., 2025). In particular, interactions between individuals are modelled through a construction of a social network (represented by a graph). The graph is updated such that changes in mental health status are incorporated in the model. The ABM analysis allows us to examine the adoption of MHC services by the vulnerable population groups involved in the EQUICARES project. Based on the model's results, we can better understand the factors that influence one's decision to engage with a MHC service provider, the benefit that one receives through the engagement, and how providers can better adjust their dissemination channels to effectively reach out to their target groups.

1.4 Reading guide

The remainder of this document is structured as follows. The first empirical section, Digital ethnography, addresses the supply side of the MHC system in the EQUICARES sites, describing how data was collected on the MHC providers identified by pilot partners and what lessons on innovative solutions could be learned from that. The second empirical section, Spatial microsimulations, describes the generation of the synthetic populations, and the third empirical section provides the description of the ABMs. Finally, in the last section we present the integration of all results, coming to an understanding of which innovations can improve accessibility of MHC across EQUICARES contexts.

2. Digital ethnography

2.1 Why digital ethnography

Digital spaces have become increasingly important for communication between not only individuals but also companies, service providers, and their clients, following the development of and broad acceptance of instant messaging and social media. In addition to two-way communication, digital spaces also offer information and resources that gain importance for individuals in their daily lives in today's knowledge-based economy (Delli Paoli and D'Auria, 2021). This, of course, is a development that is relevant to research in social sciences, which often uses data and information on social interactions. The somewhat new method of *digital ethnography* will be addressed in this paper, as it particularly lends itself to the application to our research question. Although there is no real consensus in the literature on what constitutes a digital ethnography and which steps need to be taken (Delli Paoli and D'Auria, 2021), there are some general guidelines that we follow to build our approach to this online data collection on innovation in MHC.

Throughout this paper, we will be using the term digital ethnography to refer to the collection of detailed, mainly qualitative information from online data sources. The method of digital ethnography was most recently popularized by restrictions imposed by the global COVID-19 pandemic. Via digital ethnographies, researchers were still able to conduct immersive research in (online) communities of interest (Barendregt, 2021) to research and understand online interactions between users and organisations, users and users, and organisations and organisations.

Having developed from conventional ethnography rather recently, there is an ongoing discourse about the similarities and differences between digital and conventional ethnography. There are three main dimensions to differentiate digital from conventional ethnography in the context of this project - the **conceptual** level, the **operational** level, and the **technical** level. On the *conceptual* level, there is a difference in the way that data is collected, as in traditional ethnographic research immersion is a physical experience and direct participation of the researcher is often required for observation of data points. In digital ethnography, the researcher often takes on the role of a silent observer. Thus, active participation of the researcher is not necessary and data can be collected without the knowledge of the research subjects. On the *operational* level, the data that can be collected in a digital ethnography setting can be primary or secondary, qualitative, quantitative or quantifiable, whereas conventional ethnographic research focuses on observation and does not typically allow for the addition of information from secondary sources. On the *technical* level, the online environment allows digital ethnography to easily include a temporal factor in their data collection and analyses as online contents and exchanges often come with a clear timestamp, while traditional ethnographies are focused on collecting data in the present time of the research. Additionally, an extended time of immersion in the study population is required of the researcher in conventional ethnographies. This is not the case for digital ethnography where the researcher can engage on-and-off with the community over a flexible period of time.

Concludingly, the largest benefits of conducting digital ethnographic research lie in more efficient processes, lower cost of conducting the research, and a wider geographic area that can easily be covered. The biggest disadvantage lies in the lack of a direct interaction between the researcher and the individuals in the study population. However, in the EQUICARES project, the study populations are engaged by the local pilot partners in other tasks and work packages, so that their views and ideas still are heard and respected in our work as a consortium. For a more detailed description of

differences between the two approaches, the wider literature, such as Padricelli et al. (2019) or Varis (2015) can be consulted.

For the purposes of this study, with seven pilot countries, different vulnerable communities, and language and embeddedness complications, digital ethnographies allow for the collection of detailed data on a broad range of MHC services and interventions, across a wide geographic range. While the study documented in this deliverable is a one-time investigation, the ABMs, for example, could be reproduced in different contexts. The outline of the digital ethnography illustrated below allows for the current investigation to be replicated more easily than a conventional ethnographic research project.

2.2 Setup and data collection

Just like conventional ethnographic research, a digital ethnography needs to flexibly adapt to the community and environment it aims to investigate (Pink et al., 2016). The research population for our digital ethnography as part of the EQUICARES project were MHC providers that introduced innovations that aim to facilitate easier or more equal access to MHC across eight European pilot areas in seven different countries (Bulgaria, France, Germany, Greece, Ireland, Spain and Turkey). To gain a first starting point for data collection on mental health care innovations (see Figure 1 for a schematic overview of the digital ethnography) in the target regions and addressing the target vulnerable populations, the pilot partners (experts) in the respective regions provided the researchers with a list of innovative MHC providers and solutions in the region that they were aware of. Relying on their professional networks and their personal knowledge of the region and its MHC service environment, substituted with broad web searches on MHC innovations, the regional pilot partners provided the required information to the principal investigator. The list of MHC service providers and solutions generated this way was expanded upon by the principal investigator of the ethnography via adding partner organizations found on the websites of the ones originally listed.

The final sample of innovative MHC solutions consisted of 77 providers from the pilot regions - 6 from Bulgaria, 14 from France, 6 from Germany, 16 from both Greek pilot regions combined, 13 from Ireland, 17 from Spain, and 5 from Turkey. All of these solutions were analysed through a digital ethnography. See Table 2 for their main characteristics per country. The full list of screened service providers can be made available upon request.

Table 2: Characteristics of MHC solutions per country, most common categories displayed per country, specifics differ per service provider and solution.

	Number of mapped services	Main target groups	Main barriers addressed (e.g. stigma, language barriers, affordability)	Part of the mental health care system supported	Type of service/ innovation
Bulgaria	6	Roma community	Stigma, cultural barriers	Community care	Community-based
France	14	People with (intellectual) disabilities, general population	Appropriateness of care	Primary, secondary, community care	Community-based, personalization of care, professionalization of care workers
Germany	6	Migrants/ refugees, all	Language and cultural barriers, affordability	Primary, secondary,	Holistic & culturally adjusted care

		vulnerable groups		community care	
Greece	16	People with (intellectual) disabilities, youth	Affordability, accessibility, appropriateness of care	Secondary, community care	Community-based, multidisciplinary approach
Ireland	13	LGBTQIA+	Stigma, appropriateness of care	Primary, secondary, community care	Advocacy, personalization of care
Spain	17	People with mental health issues	Affordability, accessibility, appropriateness of care	Primary, community care	Advocacy, community-based
Turkey	5	Migrants/ refugees, earthquake victims	Affordability, accessibility, language and cultural barriers	Primary, secondary, community care	Holistic approach, culturally adjusted care

The data collection via a digital ethnography was carried out by a postdoctoral researcher from the University of Groningen with prior experience in mixed methods research and digital ethnography. To ensure that the data was comparable between MHC services from different regions and countries, a spreadsheet was used to collect all information deemed necessary for the analysis of innovative MHC solutions that could improve accessibility in a standardized way. The information that was collected from the service providers' websites comprised the following variables:

- the main services that they provide (summarized by the ethnographer),
- the type of innovation that they introduced (categories mirroring the ones identified in D2.3),
- which target group they address (in line with regional focus set in GA),
- their years of operation,
- legal form,
- what channels of communication they use to interact with their clients (e.g., in person, phone, email, chat, social media),
- what funding sources they rely on (categorical information, organized by type of funding/ grant giving institution),
- how large their social media following is (per social media platform), granted that they have a social media presence
- how many clients are served per year, if that information was available on the provider's website or in their public reports
- costs of the services (in categorical format)

The costs of the services for the clients have been classified as "free", "low", "medium", or "high", always in relation to the median monthly income of the respective country. More specifically, free services do not charge the end user at all, low-cost services sometimes request a small financial contribution for participation in their events/ services equal to the cost of a drink at a local café, medium-cost services include services that require a larger co-pay by clients (usually capped at 15-25% of the cost of a medication/ treatment), and high-cost services were identified as services that required a financial commitment of more than 10% of a median salary in the respective country. Further, the number of other service providers that were linked on a MHC providers website was recorded as a measure of their size of network in the mental health care sector. A schematic overview

of the data collection process can be seen in Figure 1. The data collected as part of the digital ethnography also provided important information for the subsequent computational social science methods applied in later steps.

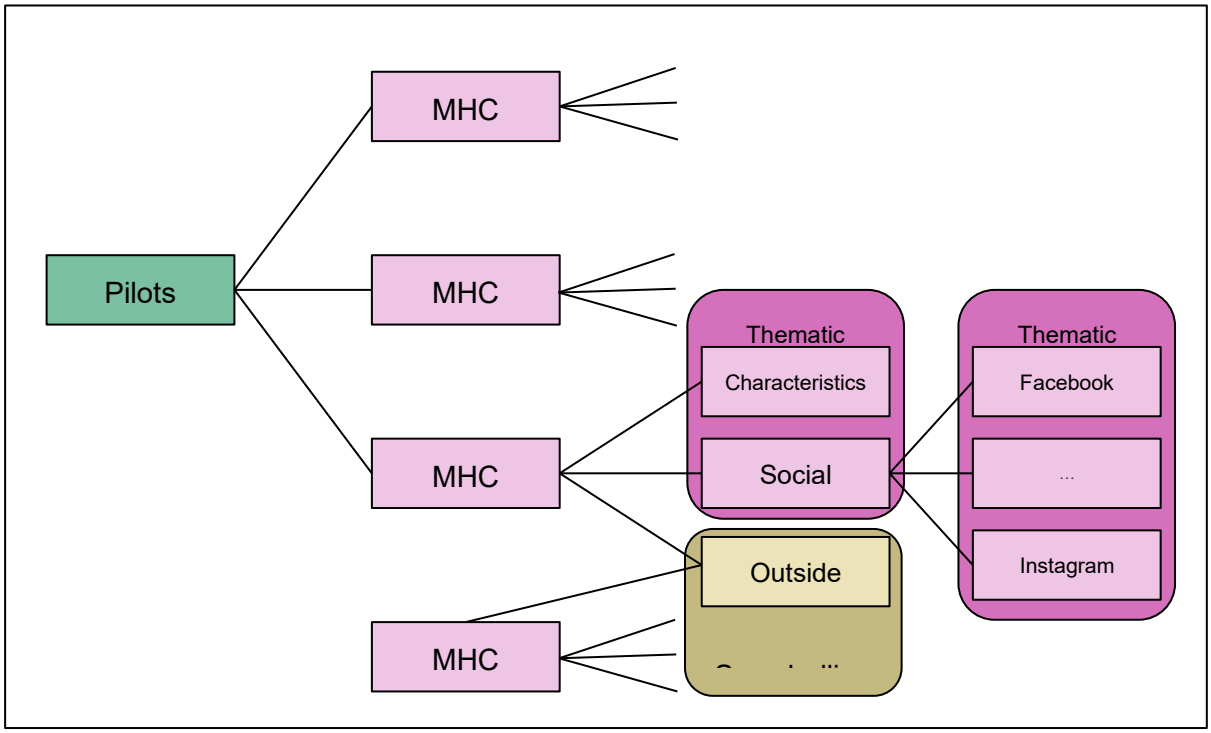

Figure 1: Schematic overview of digital ethnographic method, all branches apply to all MHC providers, for visibility purposes, the diagram has been simplified

To better understand how MHC providers reach out and present themselves to their clients, donors and potential future employees, their social media accounts were analysed in terms of the contents shared and the tone of communication. Twelve of the 77 organisations in our sample had no social media presences, some providers do not host their own websites but have dedicated webpages on the websites of the relevant governmental institutions. About two thirds of the investigated MHC service providers had a presence on more than one social media platform. The most frequently used social media platforms in our sample of providers were Facebook and Twitter. The least frequently used social media platforms were Threads and Bluesky - most likely due to their relative newness compared to other social media. The most unique way of connecting with an audience was found in a Spanish MHC service provider that has twelve podcast episodes available on Spotify. An overview of the distribution of MHC services across different social media platforms can be seen in Figure 2.

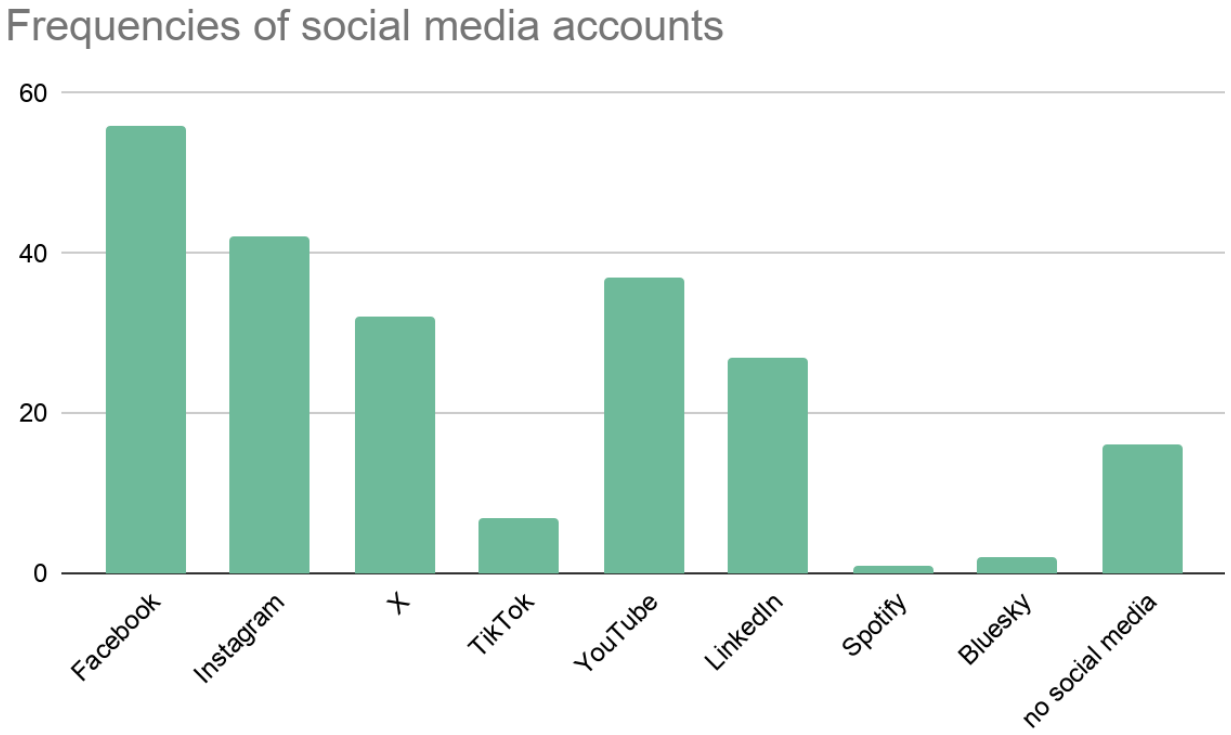

Figure 2: Frequency chart of MHC providers' social media presences

2.3 Ethnographic analysis

A thematic analysis was performed for the information collected from the MHC service providers' websites and social media. The choice of this method stems from the possibility to apply an inductive grouping of the cases based on shared similarities and patterns in the qualitative data.

The thematic analysis was conducted in two steps: Firstly, the relevant information on all previously identified innovative MHC solutions from the websites and social media accounts was summarised and entered into the structured data collection spreadsheet. Codes for types of innovations were applied deductively, based on the prior work on innovations in mental healthcare applied in the EQUICARES context (D2.3, Koç University, 2026). For all summaries of qualitative information, the original wording by the organisations themselves for especially important information, such as the services provided and the main target audience, was used to capture accurate and reliable information. In the case of most MHC services, this included direct translations from the local language to English.

Secondly, the innovative MHC solutions were clustered into groups with similar innovations. This was done using digital sticky notes on a large virtual canvas, with separate sticky notes for each category of collected information. Then the clusters were formed based on the similarity between the MHC solutions along the main variables of innovation type. Subsequently, the additional categories of information (legal form, target group, funding sources, form of interaction with clients) were examined and clustered as well, so that the higher order clusters reflected the types of innovation and the

subclusters reflected similarities in target groups or form of organization. In the last step, all clusters - higher-level and subclusters - were analysed at a higher level to understand the bigger picture of how MHC innovations successfully address and diminish the barriers to equal accessibility of mental health care services.

The contents posted and themes addressed on the social media channels of the providers were also analysed and occurring patterns were investigated. Here, themes were identified inductively and in broad terms, since in-depth understanding was not the main goal of the investigation. All ethnographic analyses were carried out by one researcher to ensure consistency of the coding across all cases.

2.4 Results ethnography

In line with previous work published within the scope of the EQUICARES project, the results of the digital ethnography of innovative solutions is structured by the type of innovation. A total of seven clusters was identified via thematic analysis and will be discussed in the remainder of this section, along with the results of the cross-cutting analysis of the social media profiles of the MHC providers.

2.4.1 Advocacy and systemic change

The first cluster that clearly emerged from a shared approach and mission is pioneering systemic changes to the field of mental health and advocating for patients' rights and raising awareness among policymakers and the general population. Eleven MHC services from five countries fall into this cluster. While they target different groups with their services (ranging from ethnic minorities over members of the LGBTQIA+ community to the general population), they are united in their efforts to reduce the stigma associated with mental health struggles and their services in providing objective and value neutral information to their target audiences. In doing so, some of the providers are more active in the public provision of information and knowledge sharing, others more actively engage in bilateral communication with policymakers and governmental institutions. This is often dependent on their position within the MHC system and specific form of organization, which, in turn, depends on the country of operation and its legal framework. In this cluster, for instance, we observe NGOs in Ireland, France and Bulgaria, and more public or governmental actors in Spain. Regardless of the organizational form, most advocacy and information services offered within this cluster have been available for more than ten years already and all of them are offered for free and in their respective local languages. In terms of funding, the service providers in this cluster mostly rely on national and regional funding, with only three of the services operating without any external funding. One noteworthy finding for this group is that, contrary to our expectations, not all of the service providers in this cluster had a large following on social media despite their main goal of dissemination of knowledge, information and general awareness. One service aimed at reducing stigma and discrimination against the Roma population did not have any social media presence. The main point of innovation in this cluster is difficult to summarize as the systemic changes initiated by the individual organizations are highly dependent on the national context that they appear in. In general, an innovation relating to advocacy or systemic changes could take the shape of changing procedures in working with individuals with mental health issues, changes in the way affected people are included in policymaking, or information about mental health being presented to new, previously unaware audiences. More practical applications of these innovations are community events including vulnerable groups, relatives, local authorities, MHC professionals and members of the local general population.

Table 3: Solutions - advocacy & systemic change (selection of services)

Name	Country	Services (summary)	Target group	Legal form
Observatory for the rights in the field of mental health	Greece	Support for individuals with mental health issues and their families (also legal support), support for and contact with self-help groups	Individuals with mental health issues, professionals	Collective
Red Local de Acción en Salud	Spain	Support for municipalities to develop and implement local health plans (regarding environmental, social and lifestyle factors relating to [mental] health)	Policymakers, municipalities	Governmental initiative
Foundation "Health Problems of Minorities"	Bulgaria	Training of Roma health mediators who assist professionals and Roma individuals in navigating (mental) health care, support for implementation of health mediators	Roma community	NGO
OMéDIT Normandie	France	Toolbox for good practices on neuroleptic drug use including gamification (card game) and interactive elements	Professionals	Public healthcare
Gay Community News	Ireland	News from, for and about the queer community, increasing visibility	LGBTQIA+	NGO

2.4.2 Community-based solutions & task-shifting

The second cluster in our sample comprises 19 MHC solutions that are run or supported by the community that they are providing the services for. More specifically, this means that the MHC services are often provided in group settings and involve the sharing of experiences and best practices by individuals dealing with mental health issues, while receiving professional guidance or support. Sometimes, in the case of task-shifting, services, consultations and guidance are performed by (trained) members of the community themselves. The idea behind these solutions is that individuals affected by mental health issues often know very well what helps them and what doesn't. Sharing their experiences and being part of a community that makes them feel seen, heard and like they belong can have a positive impact on the mental health of the participants. In terms of accessibility, the peer support groups can be organized anywhere where there are people willing to participate, some of the identified services even facilitate online group meetings. Target groups for services in this cluster mostly are individuals with (intellectual) disabilities, children and youth, or individuals experiencing mental health issues.

While it still holds true that the organizational form of the MHC providers depends on the legal context of the countries, for the community-based solutions, we find that most service providers appear to be NGOs. All services in this cluster have been operating for more than 10 years and are provided for free. The majority of these providers receive funding from different levels of their government, four providers in this cluster receive no external funding. Most services had a large following of several thousand people across their social media channels, only three of the services had no social media presence. It is striking that they all mainly focus on in-person interactions with their clients and between community members, underlining that face-to-face personal interaction is an important factor for community building. It is also noteworthy that all solutions in this cluster had a comparably large

base of clients (120-59500, with a mean of about 9248 and a median of 3388), showcasing that the threshold for participation is low enough for many people to easily access the services.

The point of innovation in this cluster is the embeddedness of MHC directly in the community in need, where peers help each other more often than professional care providers. Additionally, trained members of the community might be more easily available than local MHC professionals, increasing the number of potential MHC providers per person. Further, as evidenced by some of the services presented in D2.3 (Innovative solutions in Low and Middle Income Countries, Koç University, 2026), reaching out to peers or non-professionals about one's mental health might be less stigmatized in certain regions and cultures, making solutions that engage in task-shifting more accessible to a target group that might not be reached by MHC services more closely linked to the public healthcare system. Concludingly, the services in this cluster function as complementary to those of the institutional MHC system and make services more accessible through shorter wait times and more decentralized service offers.

Table 4: Solutions - community-based & task-shifting (selection of services)

Name	Country	Service (summary)	Target group	Legal form
Gesundheits-treffpunkt Mannheim	Germany	Central point for access to a broad range of self-help groups and communities for various needs	All vulnerable groups	Association
Clubhouse France	France	National NGO with local offices, support and social & professional rehabilitation for individuals with any form of disability	Individuals with intellectual disabilities	NGO
Arsis	Greece	Psychosocial, legal and life support for children and teenagers unaccompanied by parents, commitment to social inclusion	Unaccompanied minors	NGO
Escuela de Pacientes	Spain	Structured, peer-led education for individuals with chronic illnesses and their caregivers, focus on autonomy & coping skills	Individuals with chronic diseases, family	Governmental initiative
Connect you city	Greece	Providing communities and activities for children, teenagers & young adults, targeted psychosocial support (e.g., for autism)	Youth	NGO

2.4.3 Multidisciplinary solutions

The cluster of multidisciplinary services includes 14 MHC services which operate in teams combining different fields and perspectives on mental health, half of which have been operational for over 15 years already. For most service providers, the teams consist of psychologists, social workers, family doctors and nurses, some teams also include medical specialists like psychiatrists, neurologists or paediatricians. While their organizational form is still dependent on the legal setting of the respective country, there are comparably more public actors in this cluster than in the other ones with two German and three French and one Turkish provider being a part of the public healthcare system. The other providers are organized as NGOs or non-profits. Only two of the 14 services target the general

population, most providers designed their services for a narrower audience - individuals with (intellectual) disabilities, children and youth, migrants and refugees, the traveling community, older adults, individuals with addictions or diagnosed psychiatric disorders. Although their target groups might be different, the approaches of the service providers in this cluster are very similar. Their main form of interacting with their clients is in person, in the local language and often a range of common languages amongst their target population, e.g., Arabic or Persian for the service providers working with refugees. Funding for these services is partly dependent on whether or not they are a part of the national healthcare system. All multidisciplinary MHC service providers in this cluster that operate in the form of NGOs or non-profits received public funding at some level of governance, either from their own country or the EU. While the majority of multidisciplinary service providers have a decent number of followers across their social media channels (three providers did not have social media presences) and they are well-connected with their clients, their connections to other MHC service providers follow a more polarized pattern. About a third of the service providers in this cluster do not have any visible connections with other MHC service providers (in the form of links on their website or shared resources), the second third has some connections that are mentioned (1-3 weblinks to other providers), finally, the last third comprised providers with large networks, ranging from 15 to 64 links to other providers, projects and resources. As with the previous cluster, multidisciplinary teams in MHC do not constitute an innovation by themselves. However, small tweaks and adjustments, as present in our sample, can make the services more accessible to a wider audience through small steps of innovation. Examples of this in the present sample of providers can be seen in the adoption of different languages, cultural mediators and translators who are involved in the work of the multidisciplinary teams as well as in the increased focus on awareness for cultural, generational and experiential differences in the education of the teams. The intention is that, eventually, this leads to better care and an increased acceptability thereof for a wider audience.

Table 5: Solutions - multidisciplinary (selection of services)

Name	Country	Service (summary)	Target group	Legal form
EPAPSY - Penteli Psychosocial Rehabilitation Boarding House	Greece	Accommodation, support, and psychosocial rehabilitation for individuals with mental disorders (average age over 72 years)	Older adults	Non-profit
PSZ Nordbaden	Germany	Psychological help/ treatment for migrants/ refugees with mental health problems, victim support	Migrants/ refugees	Public healthcare
Exchange House Ireland	Ireland	Psycho-social support for the traveller community in Ireland	Traveller community/ Roma	NGO
Clinique des Boucles de la Seine	France	Psychological and social rehabilitation with the help of a multidisciplinary team, in-patient service only	Individuals with intellectual disabilities	Semi-private healthcare
PRAKSIS	Greece	Healthcare and support for vulnerable populations, e.g., via an open day centre for homeless individuals	All vulnerable groups	NGO

2.4.4 Holistic solutions

The 13 MHC service providers in the fourth cluster apply a holistic approach to MHC and support. More specifically, their services target more than just one area of the life of an individual receiving their support. This could be in the form of MHC that provides skills to manage one's mental health but also engages family and friends of the clients or helps them integrate into the local community and the labor market. Other services provided within the scope of holistic MHC are legal advice, education and prevention programs, and support in accessing public resources and managing administrational processes. The specific combination of services offered is naturally dependent on the target group of the provider's services. Many different target audiences are covered by the services in this cluster, but most of them address marginalized groups in society – migrants and refugees, the Roma community, individuals with mental health issues, mothers and children, or, as in the case of Turkey, earthquake victims. The providers in this cluster are of various ages and all but one provider offer their services for free. This solution is operated by a French provider and is a part of the public healthcare system, therefore, their services might require a copay that is not covered by the local health insurances. For the remaining solutions, this cluster appears to be the most heterogeneous in terms of organizational form, with NGOs, non-profits, associations, project initiatives and public healthcare providers all represented. Their funding comes from public institutions across all levels of government as well as from project-based EU and UN funds. The majority of providers in this cluster offer their services in more than one language, often the local language and English. All services that work with many refugees or migrants (about a third of this cluster) also offer their services in the most common native languages of the refugees, often relying on members of the migrant community for translations and cultural adjustment of content and communications. In-person interactions are the standard in this cluster. Three of the service providers in this cluster do not have (their own) social media presence. Six MHC providers do not have any links to other service providers, indicating a limited professional network that they are engaged in. Incidentally, they also had a smaller social media following than the better-connected services.

Table 6: Solutions - holistic (selection of services)

Name	Country	Service (summary)	Target group	Legal form
SIHHAT program	Turkey	(mental) health care specifically for migrants/ refugees	Migrants/ refugees	EU funded project
Proyecto Hombre	Spain	Prevention, treatment and recovery from addictions, including family and employment, and research	Individuals with addictions	NGO
Trust for social achievement	Bulgaria	Educational and developmental support for Roma children, youth and other vulnerable populations	Roma community	Non-profit
Caritas Mannheim	Germany	(Integration) Support and counseling for new migrants and refugees in their native language	Migrants/ refugees	Religious non-profit
Social Polyclinic of Thessaloniki	Greece	Free social polyclinic for individuals in precarious situations providing free (mental) healthcare	All vulnerable groups	NGO

2.4.5 Digital and tele-health solutions

The fifth cluster in our sample includes five MHC services that offer their service digitally or via phone, rendering them location-independent to some extent. Urgent mental health support is often available in the form of a helpline that offers callers a listening ear and potentially some support in how to manage a (personal) crisis. Alternatively, there are service providers who offer the same service in the form of a chat. This makes instant support services more accessible in two ways: people in need of MHC services can reach out from anywhere in the world (given they have access to a landline or are in an area with cellular reception) and individuals with a hearing impairment are able to make use of an equivalent, text-based service, also independent of their location. While the target groups per service differ and a range of vulnerable populations, such as members of the LGBTQIA+ community, students or refugees, are addressed in our sample most regions or countries have helplines for all important crisis situations available, if needed by an individual. They mainly operate as NGOs or non-profits, relying on funding from the EU, their regional governments or charity donations. Digital tools that have an overlap in service provision with some phone or text-based MHC services are offering information, online classes and trainings, as well as interactive tools to support good mental health, again targeting a range of audiences. The added accessibility factor of interactive digital tools such as online classes is that they are available 24/7 and do not require the availability of a responding MHC provider in real time. The digital as well as the phone-based services are offered for free and mostly exclusively in the local official language. While most of the service providers in this cluster are not very well connected with other service providers, their social media channels enjoy a large following across different platforms.

While helplines and chat support are not innovations in MHC per se, the integration of both, phone and text-based services, by one service provider for a more inclusive target group can be seen as an innovation that aims to improve the accessibility of a line of well-established MHC services.

Table 7: Solutions - digital & tele-health

Name	Country	Service (summary)	Target group	Legal form
Pieta	Ireland	Suicide prevention and support, helpline, text and phone contact with therapists	General population	NGO
National LGBT Helpline	Ireland	Helpline, online chat and peer support groups	LGBTQIA+ community	NGO
Nightline Normandy	France	Nighttime helpline/ listening service, especially for migrant and non-local students	Students	NGO
En buena edad	Spain	Multilingual digital platform supporting holistic wellbeing of older adults, includes interactive elements	Older adults	Public healthcare
Virtual Brain Twin	France	Project creating virtual brain twins for psychosis patients to develop personalized care and treatment plans	Psychosis patients	University

2.4.6 Personalization & professionalization of care

The sixth cluster comprises twelve innovative solutions that focus on personalization of MHC, cultural adjustment of services and the professionalization of MHC workers. Often, these three processes go hand in hand as professionals that are more sensitized to and aware of the individual needs of their clients can better tailor their services and interactions to meet the needs of specific target groups. Six of the seven pilot countries are represented in this cluster, all but Germany. They target youth, refugees, the Roma community, the LGBTQIA+ community, individuals with intellectual disabilities, and combinations thereof. A quarter of the service providers in this cluster is open for all individuals experiencing mental health issues or the general population. The form of organization varies by country; NGOs, networks of NGOs, non-profits, associations, and public healthcare providers are part of this cluster. The funding for the services provided as part of this cluster comes from public sources and all services, except for two, are offered for free. One of the solutions that charge a comparably fee to its clients is providing housing and support for autonomous living for individuals with intellectual disabilities, taking into account their needs and preferences for social and cultural activities, the other one is providing private healthcare supporting a gender transition. The other solutions consist of different combinations of personalization of care and professionalization of MHC workers. Personalization happens via better understanding of clients by actively asking for their preferences and needs and providing tailored advice and services based on the self-reported information of the users of the services. Professionalization of MHC workers occurs in the form of trainings or education for MHC workers or volunteers in the MHC system to provide a high standard of care delivered by people who are familiar with the struggles and experiences of their target audience. Again, most service providers in this cluster are well-established with operational years ranging from 4 to 42. In terms of embeddedness in a network, we again see a polarity of connections - the NGO networks in this cluster have a higher number of connections with other service providers based on the nature of their organization, most other types of providers are connected to a lower number of other providers in their professional networks. This does not seem to be reflected in their social media followership, indicating that a larger professional network does not directly translate into a larger base of clients. The solutions in this cluster, via personalization of services to fit the needs of specific target groups as well as awareness-raising among the MHC workers, work to reduce stigma and increase acceptability of the services. The process includes taking the wants and needs of the individuals seriously and speaking the same language as the client, literally and metaphorically.

Table 8: Solutions - personalization & professionalization of care (selection of services)

Name	Country	Service (summary)	Target group	Legal form
BeLonG To	Ireland	Support services & training professionals in working with lgbt youth and families	LGBTQIA+ youth, professionals	NGO
Family physicians in MHC	Turkey	Trainings for general and family physicians to identify mental health care needs in migrants and refugees at an early stage	Migrants/ refugees, earthquake victims	Public healthcare
SASTIPE project	Bulgaria	Gathering insights into Roma mental health, facilitation of	Roma community	EU funded project

		culturally adjusting healthcare via mediators		
PRISM - Prévention Ressource Information en Santé Mentale (Les Pep 76)	France	Professionals who can be solicited to support adjustment of care or provide expert advice on mental health needs and solutions for children with disabilities	Children with disabilities, professionals	Association
Fakali	Spain	Training, mediation, and awareness-raising activities on Roma values and culture for MHC professionals	Roma community	NGO network

2.4.7 Art-based solutions

Two of the innovative solutions identified by the pilot partners engaged art and creative activities as part of their approach to MHC. One is a festival organized by an NGO around the topic of mental health in Ireland, open to the general population, and the other one is a somewhat more traditional MHC provider in France that also makes use of art therapy and cultural activities in their MHC services. The French provider serves individuals with mental health issues and, as a private health care provider, charges for their services. The costs might partially be covered by the health insurance of the individuals. The festival in Ireland is financed by public funding and charity donations. These two solutions have in common that they interact with their target audience in person, include creative activities and do not have a wide (online) network of other MHC providers that they are connected with. For the French provider, LinkedIn is their most prominent social media presence with the largest following, where they mainly target MHC professionals and potential employees with reports, event invitations and job vacancies. The Irish mental health festival has relatively larger follower bases on Facebook and Instagram, showcasing that they mainly target the visitors of the festival directly on the social media platforms which are more targeted at entertainment and leisure activities. The innovation in these two solutions lies in the application of activities that are outside the scope of traditional MHC and more clinical approaches. Further, they increase accessibility of MHC by offering more playful interactions and entry points into the MHC system.

Table 9: Solutions - art-based

Name	Country	Service (summary)	Target group	Legal form
First Fortnight	Ireland	Mental health festival, art, music and drama therapy	General population/ children, adolescents	NGO
Private health center Vyv Normandie	France	Private day clinic for mental health services offering traditional therapy approaches as well as art therapy and socio-cultural activities	Individuals with mental health issues	Private healthcare

2.4.8 Social media presentation

In addition to the clusters of innovative solutions in MHC, social media presences of MHC providers were investigated to understand how they reach out to and communicate with their target audiences.

The social media presences of all MHC providers included in the digital ethnography were not only investigated quantitatively but also qualitatively in terms of the contents shared on each platform. Therefore, it is not surprising to find that the content across different social media platforms is more dependent on the way that people engage with the different platforms and what target audiences they have rather than on the specific target audience or innovation of the MHC service provider. As mentioned earlier, a very unique media presence was reported by a Spanish provider of mental health services by offering podcast episodes on a range of mental health topics on their official Spotify account. The few other MHC providers that produced a podcast only shared them on YouTube or embedded them into their own websites. Podcasts were used by the providers in our sample to explain, normalize and destigmatize mental health problems and MHC. If a provider had made a podcast, it was always recorded in the respective local language, making it accessible to the general public by using everyday language instead of highly clinical and professional terms, while still being factually correct. Similar to the use of podcasts, but more commonly utilized by MHC providers, are educational videos on YouTube. Generally serving the same purpose as the podcasts, just with more visual support, the YouTube videos often are used to explain difficult mental health topics in an easy and accessible way. Some videos go beyond pure education and also offer support in reducing stigmatization of mental health needs and care and providing good examples by showing the lived experiences of people with mental health struggles and how they overcame them. LinkedIn generally is more geared towards professional topics and connections. Therefore, MHC providers used LinkedIn to share information targeted at network partners, MHC professionals, and other important societal stakeholders, rather than end users of their services. Content shared on LinkedIn often came in the form of reports, studies, announcements of upcoming professional events, or postings of job vacancies. X is not used by many MHC service providers, possibly that is a consequence of the changes in content moderation and contents favored by the algorithm since Twitter changed ownership.

As Instagram and Facebook are used mainly for social and entertainment purposes, the service providers share invitations for upcoming events, pictures and reports from past events, infographics and introductions to their services on these platforms. Most of the time, the same content was posted simultaneously on Facebook and Instagram, if a MHC provider had a presence on both. Seven of the service providers in the sample also had a TikTok account which they were active on. In line with the design of that platform, they posted short videos with information aboutMHC and mindfulness as well as short clips with lived experiences on their TikTok accounts. Overall, three quarters of the MHC service providers had a combined total of more than 1,000 followers across all social media platforms, indicating that they reach a large community of (potential) users, even if far fewer individuals interact with their services in person in a year.

2.5 Limitations of digital ethnography

One major shortcoming of digital ethnography is the fact that data collection is limited to the information that is available on the websites and social media profiles of the mental health care providers. This means, in this research, only organisational-level data that is publicly accessible from provider websites was used. No private (online) spaces were accessed for data collection, no interaction with individuals took place as part of the data collection and no personally revealing information was gathered or analysed at any point of the digital ethnography. Regardless, all information necessary to understand their innovative potential and contribution to increased

accessibility of MHC in their region is typically addressed on their website and or social media accounts. In the same vein, the level of depth of the qualitative information might be lower than would be the case in a traditional ethnography, especially since our digital ethnography approach does not include interactive exchanges with the MHC providers. While their contact information is available, the time restraints of this project made it impossible for us to include a survey among or personal contact with the service providers. Yet, the main purpose of this study is to find innovative solutions to the limitations of traditional MHC services and understand how and why they work in specific settings. For this purpose, extensive in-depth information about the delivery of MHC services was not necessary to gain an understanding of which innovations are available across Europe. An investigation of the innovative MHC landscape through digital ethnography is possible with readily available information from the MHC providers' websites and social media accounts. Considering the geographical spread of the pilot regions, their busy schedules and the sensibility of the work that they perform daily with vulnerable populations, performing traditional ethnographic research in all physical locations would not have been feasible for the timeline of the EQUICARES project. As all relevant data was available online from MHC providers' websites, this method was the most efficient data collection tool.

A second limitation is the fact that all pilot regions are set in different European countries with different native languages, which leads to the websites and social media presences to appear in a range of languages, not all of which our research team is fluent in. To gather and process the information in this digital ethnography, many times the researchers relied on online translations made possible by Google's autotranslate function or other online translators, such as DeepL. While some details like the tone of a message and the cultural intricacies of a provider's self-presentation are most likely to get lost in these translations, the data captured and translated is still accurate enough to identify the approaches of the MHC providers in attempting to break down barriers to the accessibility of MHC resources. Translations were not verified by native speakers or local partners and therefore no information was analysed that related to tone or specific choice of wording in the self-presentation of the MHC services. As the processing of the data mainly relied on the bigger picture rather than specific details and interpretations of such, we believe the translation to have no strongly biasing effect on our results.

3. Spatial microsimulations

3.1 Overview

In EQUICARES, spatial microsimulation is used to translate survey evidence into geographically detailed synthetic microdata for the project's pilot areas. This approach allows us to produce small-area estimates for characteristics and outcomes that are typically not available in official statistics at the spatial resolution needed for policy analysis and modelling, as well as for subsequent suitable analysis and ABM.

Microsimulation models are designed to create large datasets describing the attributes of micro-units, such as individuals and/or households (Ballas, 2004, Morrissey et al, 2008). These models can be applied on their own or coupled with ABM (see section 4 below) to explore how interventions, shocks such as unexpected changes in the variables of interest, or behavioural mechanisms may affect different groups of people. The units produced by microsimulation are frequently called synthetic individuals/households: they resemble real residents statistically (in terms of observable characteristics) but do not correspond to identifiable people, which safeguards privacy while still enabling micro-level analysis.

The work reported in this deliverable builds on a series of previous applications by members of the team in the development of spatial microsimulation models capable of generating small-area microdata using different estimation strategies. These include deterministic reweighting based on Iterative Proportional Fitting (IPF) (e.g. Panori, Ballas and Psycharis, 2017; Lovelace and Ballas, 2013; Ballas, 2004), synthetic reconstruction (Ballas and Clarke, 2000) and combinatorial optimisation methods such as simulated annealing (Kavroudakis, Ballas and Birkin, 2013). Across these various models, the simulation outputs (i.e. the attributes of the synthetic individuals) cover a broad range of policy-relevant variables, including income, household composition, socio-economic group, and, more recently, well-being indicators and perceptions related to social inclusion which is the aim of the present deliverable.

Over time, microsimulation has become a widely used tool in economics, social policy analysis as well as health and health inequalities (e.g. Ballas et al. 2006, Ballas et al., 2007;Edward and Clarke 2009, Koh et al. 2018, Broomhead et al., 2019). While many established applications are national and "aspatial" (for example, models used to evaluate the distributional effects of tax-benefit reforms, such as EUROMOD, do not explicitly take geography into account and as a result their estimations are at the aggregated country level), microsimulation becomes spatial when the synthetic micro-units are explicitly linked to geographical locations. In spatial microsimulation, the goal is to build large-scale, geographically referenced microdata that reflect as closely and consistently as possible, the composition of the population across small areas (e.g., municipalities, local communities, or broader NUTS areas, depending on data availability). In this report, "small areas" refer to geographical units related to each pilot region, not to the pilot countries as a whole. Depending on data availability, these units may correspond either to the pilot area and neighbouring areas, allowing comparisons between the pilot and its surrounding context, or to smaller units within the pilot area itself, allowing us to examine variation inside the pilot region. For each pilot, we aimed to use the smallest spatial scale for which reliable official constraint data could be obtained. In this sense, spatial microsimulation

functions as a powerful small-area estimation approach: it enables estimation and mapping of variables not available in official small-area statistics.

A key motivation is the typical data gap: official statistics provide reliable aggregate counts at small area level (from a census or administrative registers), while surveys contain rich variables (e.g., perceptions, behaviours, service access) but are rarely representative at very fine geographic scales. Spatial microsimulation bridges this gap by combining:

- small-area constraints from official sources, and
- survey microdata with detailed individual/household information.

The resulting synthetic micro-populations can also serve as a natural "population" for ABM, supplying initial agent attributes and their spatial distribution. This modelling tradition has been used in several well-known applications, including models that combine national survey data with census small-area tables to generate geographically detailed microdata, which can then be used to study the social and spatial implications of policy change (Ballas et al. 2005, Panori et al. 2017).

3.2 Constraint variables and methodology

In EQUICARES, spatial microsimulation combines two core inputs:

1. Individual-level survey microdata (EQUICARES survey from T1.4), including socio-demographic characteristics (e.g., age, sex, education), and additional variables relevant to the project's research and modelling aims (e.g., mental health, access to services, behaviours, perceptions, well-being outcomes).

2. Small-area aggregate data from official, mostly federal, statistical sources (census and/or administrative registers that are freely available for everyone to download) for each pilot area, describing the demographic and socio-economic profile of the population within each small spatial unit.

By integrating these sources, we construct static spatial microsimulation models for each study area. "Static" here means that the models generate a detailed cross-sectional snapshot for a given reference year; they do not, by themselves, simulate demographic or socio-economic transitions over time. Dynamic evolution and scenario testing can be introduced later through the ABM component, which can use the synthetic population as its baseline (Antosz et al., 2019).

Operationally, the process starts from a survey dataset that can be viewed as a list of individuals (and possibly households), each with identifiers and attributes (e.g., age, sex, education, labour status, household features). The model then uses small-area constraint tables from official sources to reshape the survey representation so that each small area's synthetic population aligns with the known local totals. In this context, constraint variables refer to variables for which we know the official population totals at small-area level. For example, if official statistics report how many people in each area belong to different age groups, gender categories, or education levels, these variables can be used as constraints in the microsimulation model. The role of the constraints is to guide the reweighting procedure so that the synthetic population generated from the survey data reproduces these known official distributions as closely as possible.

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Specifically, the spatial microsimulation models are estimated separately for each pilot area using survey microdata collected by partner organisations and small-area aggregate totals from official sources. In each pilot, the reweighting procedure aligns the survey records to the available small-area distributions of the following constraint variables:

- Pilot area: Pavlikeni & Strazhitsa, Bulgaria - Responsible for survey dissemination and collection: AMALIPE - Constraint variables: gender; age; education
- Pilot area: Seville, Spain - Responsible for survey dissemination and collection: FISEVI - Constraint variables: gender; age
- Pilot area: Attica, Greece - Responsible for survey dissemination and collection: GIVMED - Constraint variables: gender; age; education
- Pilot area: Hatay, Turkey - Responsible for survey dissemination and collection: KOC UNIVERSITY - Constraint variables: gender; age
- Pilot area: Rouen, France - Responsible for survey dissemination and collection: LADAPT - Constraint variables: gender; age
- Pilot area: Thessaloniki, Greece - Responsible for survey dissemination and collection: SEERC - Constraint variables: gender; age; education
- Pilot area: Mannheim, Germany - Responsible for survey dissemination and collection: ZI - Constraint variables: gender; age

A final harmonisation step ensures that the category definitions in the survey microdata match those in the official small-area tables (e.g., by collapsing education categories where the survey is more detailed), so that both sources share a consistent classification prior to IPF reweighting procedure of the spatial microsimulation models per pilot area starts.

In EQUICARES, we implement a static, reweighting-based spatial microsimulation. The survey microdata are informative but not representative at the fine spatial scale required, so we adjust them within each small area to reproduce the official marginal distributions of selected constraint variables (e.g., age, gender, and education). This is done by assigning each survey record an area-specific weight indicating how many residents it represents. The weights are estimated using IPF, which iteratively updates them until the weighted survey totals converge to the official constraint totals in each area. To document this process, convergence graphs are provided in the Appendix for the EQUICARES pilot areas. These graphs show how the weights assigned to selected survey records change across IPF iterations. At the beginning of the procedure, the weights may change more noticeably as the algorithm adjusts the survey records to match the official constraint totals. As the iterations proceed, these changes are expected to become smaller and the weight lines should gradually stabilise. When this happens, it indicates that the IPF routine has converged, meaning that additional iterations produce little or no further change in the weights. In this sense, the convergence graphs provide a visual diagnostic check that the reweighting procedure behaves as expected and that the final synthetic populations are consistent with the selected small-area constraints. The output of spatial microsimulation is a set of geographically referenced synthetic microdata (and weights) that can be used for small-area estimation, mapping, and as the baseline population for the project's ABM; the same workflow can be applied across pilots as long as suitable small-area constraint tables are available.

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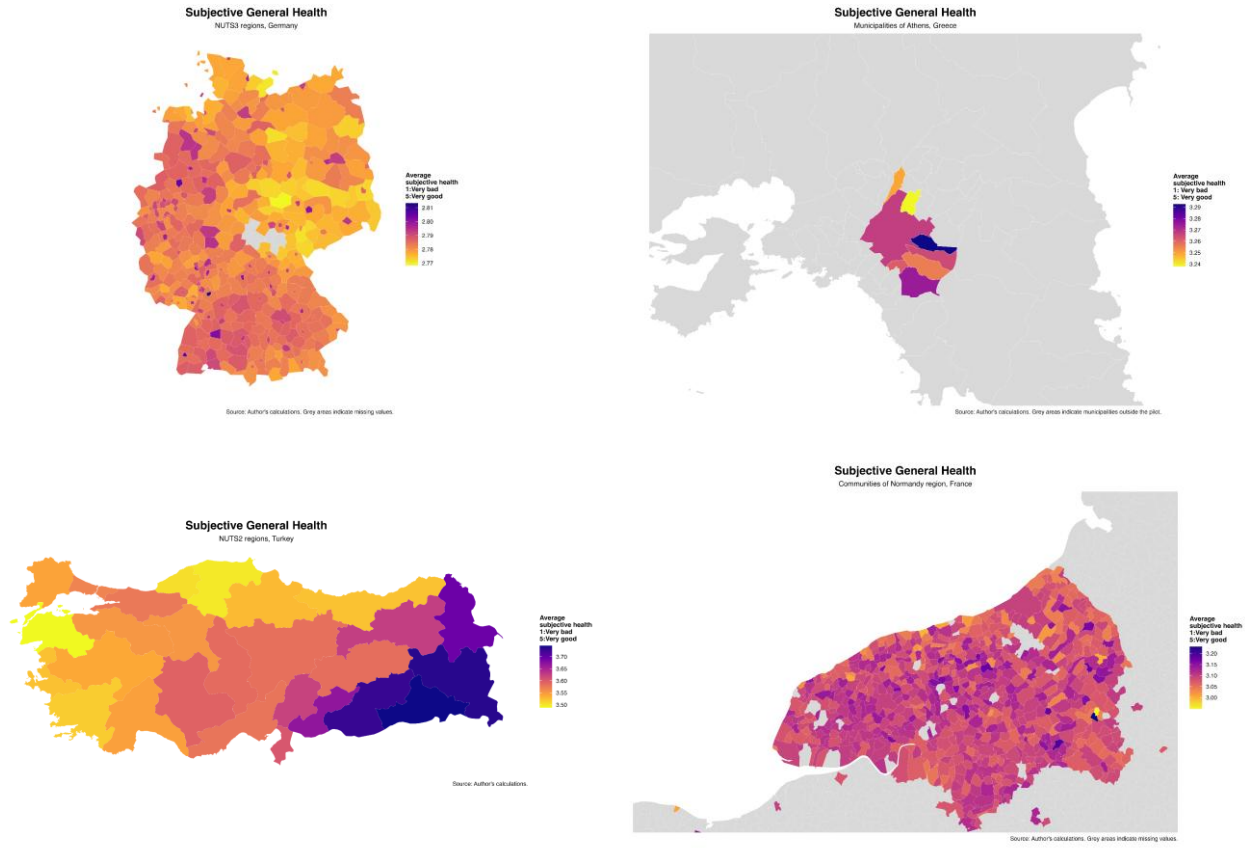
3.3 Mapping of spatial microsimulation output

In this report, we use the outputs of the spatial microsimulation models to visualise how key health- and care-related indicators are distributed across the EQUICARES pilot areas. The maps provide an intuitive way to compare places because they add geography to the survey information and allow us to examine spatial differences in both health outcomes and access to services. Specifically, we present three mapped outputs: subjective general health (Figure 3), mental health care utilisation in the previous 12 months (Figure 4), and waiting time for a mental health appointment the last time care was needed (Figure 5). Each of these three figures consists of five maps (one for each pilot area where shape files are readily available allowing us to visualise the spatial distribution of some health related variables of interest). The spatial scale of the maps vary depending on the data availability of the constraint variables. Specifically, in each figure we present the spatial distribution of a health-related variable for Germany (top-left), Athens (top-right), Turkey (middle-left), Normandy (middle-right), Thessaloniki (bottom). Together, these figures offer a compact overview of the general population regarding (i) population health status, (ii) use of mental health services, and (iii) access to care, highlighting where needs and barriers may be more pronounced across the pilot territories in the general population.



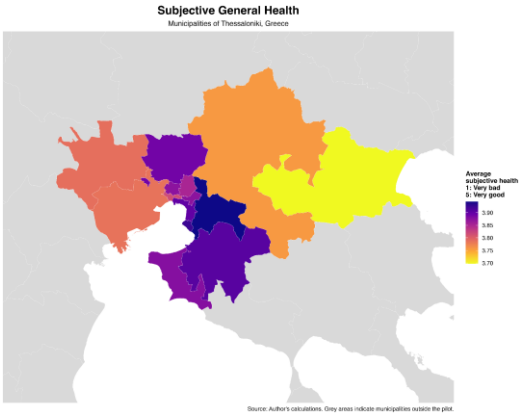
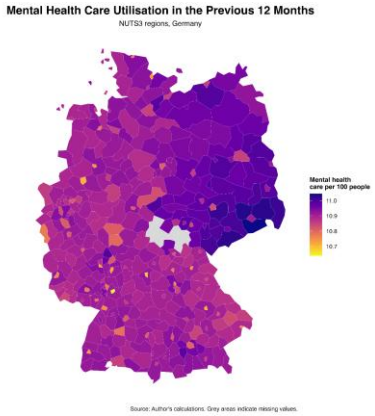
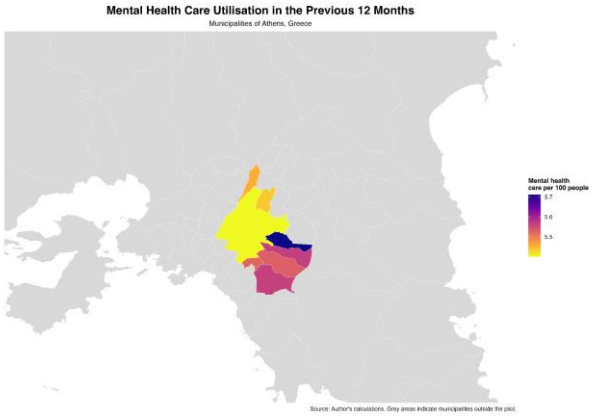
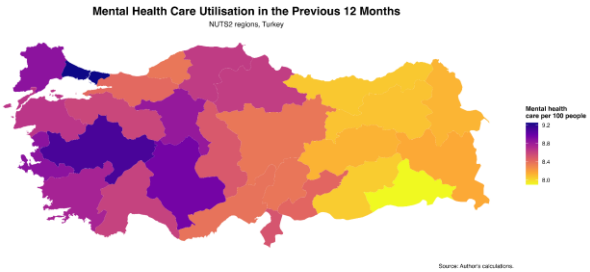
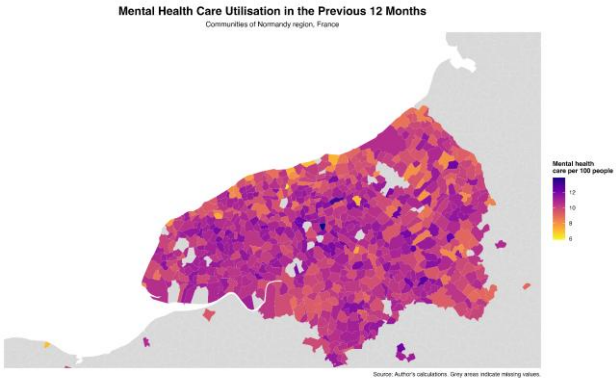


Figure 3: Subjective general health from spatial microsimulation models for pilot areas with readily available shapefiles.









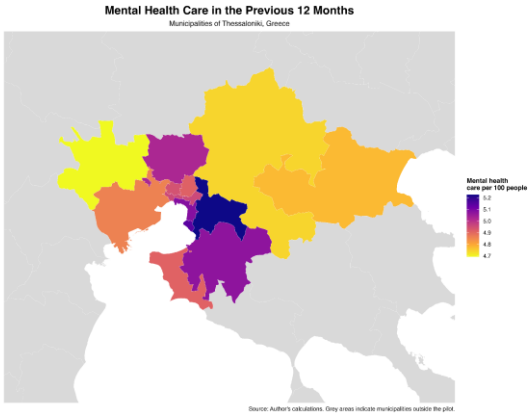
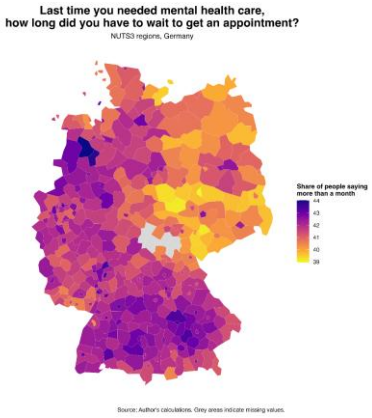
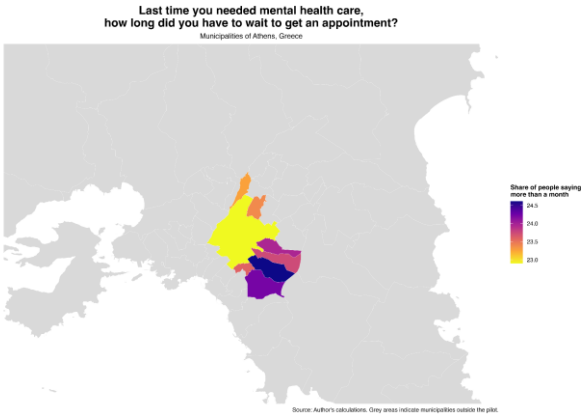
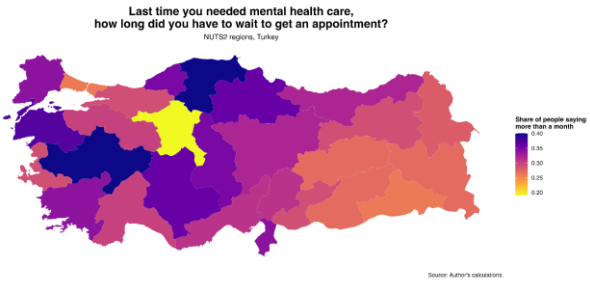
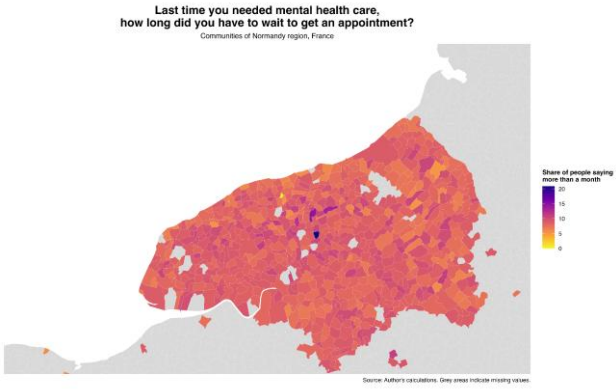


Figure 4: Mental Health Care Utilisation in the previous 12 months from spatial microsimulation models for pilot areas with readily available shapefiles.









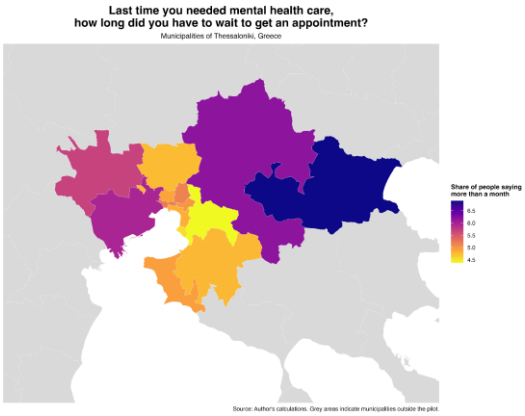


Figure 5: Waiting time for a mental health appointment (last time care was needed) from spatial microsimulation models for pilot areas with readily available shapefiles.

The descriptive maps presented in this section refer to the general population and are intended to provide an overall spatial picture of three health-related variables in the pilot areas. They do not separately present results for the vulnerable groups. This choice is made in order to keep the spatial microsimulation results focused on the baseline population structure. The role of vulnerable populations are addressed more directly in the ABM analysis presented in Section 4.

3.4 Limitations of spatial microsimulations

Spatial microsimulation is well suited to EQUICARES because it provides a consistent way to produce small-area microdata across different regions using a common modelling logic. However, several limitations should be acknowledged.

A first limitation relates to data availability and quality at small-area level. The realism of the synthetic populations depends heavily on whether national statistical authorities provide sufficiently detailed and consistent local marginals for the constraint variables. When only a small set of constraints is available (e.g., age and gender), the model can reproduce these marginals accurately, but it may remain less constrained with respect to other dimensions (e.g., household structure, labour market status, migration background). In EQUICARES, constraints differ slightly across pilots—some include education while others do not—which may affect the level of demographic detail that can be reliably reconstructed and the degree of cross-pilot comparability for education-related indicators.

A second concern regards the limitations linked to the survey microdata itself. Spatial microsimulation assumes that the survey contains sufficient variability and coverage of population groups relevant to each pilot area. If certain groups are under-represented in the survey (or if the survey sample is relatively small for a particular pilot), the model may rely on reweighting a limited set of records to represent local populations, which can increase uncertainty and potentially create extreme weights. This is especially relevant in small areas or in pilots where the survey does not capture some local heterogeneity.

Third, the standard approach implemented here is static. The synthetic microdata represents a snapshot for a given reference year and does not, on their own, simulate demographic or socio-economic transitions over time. While this is appropriate for producing baseline small-area estimates

and a starting population, any analysis of change, adaptation, or scenario dynamics requires additional modelling assumptions and is handled more naturally within the ABM component.

Finally, validation is inherently constrained by the availability of independent small-area “ground truth” data. In practice, we can perform internal validation (checking how closely the synthetic populations reproduce the constraint totals), but external validation (i.e. comparing synthetic estimates of non-constrained variables against independent local statistics) is often difficult because such statistics do not exist at the same spatial resolution or are not comparable across countries. When additional small-area indicators are available, there is also a trade-off between reserving them for external validation and using them as additional constraints to improve the synthetic populations

4. Agent-based models

4.1 Introduction to agent-based models

An agent-based model (ABM) is a dynamic simulation method that is used to analyse the behaviour of multiple individual entities (agents). These agents might be, among others, citizens in a society, other biological organisms, or firms. Over a given time period (usually referred to as ticks), individual agents interact with the environment and/or other agents and must act to their best of interests based on a set of decision-making rules (which include preferences, needs, and learning experience, among others) at each tick (see also, Bonabeau, 2002). Examples of studies in social and health sciences that implement ABM include Bradburd et al. (2006) who examine the complex interplay between renter types and availability of rental properties under rent controls, Broomhead et al. (2019) who examine changes to the healthy food environment and associations with tooth decay, and Rodríguez-Arias et al., (2024) who focus on the process of citizen acceptability of a social innovation.

4.2 Short outline of ABMs

For the scope of this project, we built an ABM to examine how MHC services can effectively reach out to people in vulnerable situations. To this end, we design an ABM with two types of agents, the citizens and the services/providers, and examine how an individual in need might decide to engage with a suitable provider. This decision-making process is based on an interaction both with the providers and other citizens. The model is estimated independently for each pilot area in the project. By adjusting the decision-making rules or altering the characteristics of the agents, we are able to create what-if scenarios, which can assist policymakers and stakeholders in evaluating the societal impact of an additional mental health care service.

4.3 Agents

4.3.1 Citizens (individuals)

The citizen is the first type of agent that enters the model and the one who must reach a decision at each tick. Each citizen is an individual entity, such as the population's heterogeneity is accounted for in the model. The citizens form a synthetic population that was created in an earlier step using the project's survey and spatial microsimulation techniques (see the previous section) to represent the actual population as closely as possible. At each tick, citizens must decide whether they are engaging with a MHC provider that better suits their needs, to receive some benefit and improve their welfare. Their decision is based on their profile, a set of variables that describe demographic and social characteristics, their physical and mental health status, and their perception of MHC providers. These variables are obtained from the responses of the survey conducted in WP1, Task 1.4 and were created for the synthetic using spatial microsimulation methods described in Section 2.2. Most variables are quantified and transformed such as they range from 0 to 1. A few variables such as age, gender, and sexual preferences are used without any further changes, whereas some are used to construct composite indices that better reflect the model's setup. For example, we average the responses to the survey questions/variables evaluating the technical quality of care received to create a general measure of perceived appropriateness related to MHC services for each citizen based on

the Levesque Framework supply side dimensions. Table 10 presents the new constructed indices and the variables used to estimate each index. For the sake of brevity, we report here only the numbers of the questions used. We list the questions in the Appendix. Mental health need is an index constructed as the average of the responses related to the mental health status over the last two weeks and proxies one's need for a MHC service. The index ranges from 0 to 1 and a value closer to 1 suggests a greater need for MHC.

The last index is the overall accessibility of a citizen to local MHC services, and it is constructed as the average of the other indices.

Table 10: Indices constructed from the survey variables

Index	Questions used to construct the index
Mental health need	Q17-Q22
Availability	Q37, Q38, Q40, Q41
Approachability	Q42-Q44
Acceptability	Q54
Affordability	Q56, Q58
Appropriateness	Q63, Q66, Q72
Access	Q17-Q22, Q37, Q38, Q40-Q44, Q54, Q56, Q58, Q63, Q66, Q72

4.3.2 Social network

In a community, such as the pilot areas, complex social dynamics emerge and decision strategies are influenced by citizens' interactions within the community (Antosz et al., 2019). To account for such social dynamics, we adopt a HUMAT-type framework and represent social relationships as a network (Will et al., 2020, Jager et al., 2025). Each node represents a single citizen and edges connect citizens that interact with each other. Citizens that are connected with an edge can affect each other's decision to engage with a provider through word-of-mouth. Connections between individuals are established based on homophily traits rather than simple physical proximity (McPherson et al., 2021).

To construct the network, we consider four homophily traits: (i) gender, (ii) age, (iii) education, and iv) ethnicity/citizenship (identified through survey questions related to country of birth, country of residence, and citizenship). For each citizen, we define the homophily profile:

$$B_j = \{GenderGroup, AgeGroup, EducationGroup, EthnicityGroup\}.$$

Gender is coded as male/female. Age is grouped into three broad categories (young, middle, older) using sample-specific cut points; the cutoffs differ between pilots, to ensure comparable group sizes across pilots. For each pilot, the population is partitioned into three age groups of equal size. Education is grouped into three levels (primary, secondary, tertiary, based on the education system of each country). Ethnicity/citizenship consists of three groups: i) natives, ii) non-natives who have acquired citizenship, and iii) migrants without citizenship. All categories in each group are ordinal. For example, a young and an older individual have a smaller chance of being connected than a young and a middle aged one.

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Each citizen j is assigned a target number of social ties k_j (degree). In the absence of detailed "social activity" measures in the current survey, as in our analysis, degrees are drawn from a bounded distribution (Poisson with truncation), ensuring (i) a realistic spread in connectivity and (ii) an even total number of stubs so that the network can be completed. Let *N* denote the population size in the pilot area. The model constructs a set of stubs by giving each node exactly half-edges, so the total number of stubs is $\sum \quad k$, and the target number of full edges is $\frac{1}{2}\sum \quad k_j$.

We then employ a stub-matching procedure to pair stubs into edges. A standard configuration model pairs stubs uniformly at random, which can produce self-loops and multiple edges. These features are not meaningful in this setting, so we enforce a simple graph by rejecting self-loops and duplicate edges. Beyond this, we deviate from uniform matching by incorporating homophily: stubs are preferentially paired within the same homophily block.

Operationally, each citizen belongs to a block identified by:

$$block_j = GenderGroup_j \times AgeGroup_j \times EducationGroup_j \times EthnicityGroup_j.$$

When selecting a partner for a stub belonging to node, candidate stubs from nodes in the same block receive a higher sampling weight (controlled by a within-block preference parameter). This generates assortative mixing (homophily) while preserving enough cross-block ties to keep the network connected.

Empirical social networks exhibit clustering in the sense that "friends of friends" are more likely to be connected (Hamill and Gilbert, 2009). After the initial stub-matching, we introduce triadic closure: with a baseline probability, a node triggers an additional edge between two of its neighbours if they are not already connected. This step increases transitivity and yields a more realistic local network structure. Furthermore, edges between two individuals bear different weights reflecting the strength of the connection. Information emitted by an individual exerts a stronger influence on connections with a stronger tie. For an existing edge between two individuals the edge weight is calculated as the average of the four homophily traits $w_{ij} = \frac{1}{4}(d_{GenderGroup} + d_{AgeGroup} + d_{EducationGroup} + d_{EthnicityGroup})$,

where the function d_X, for homophily trait X, takes values between 0 and 1, depending on the distance between the categories in which individuals i and j belong. If the two individuals belong in the same category, then d_X takes the value 1.

The network provides the channel through which information about services diffuses and social influence accumulates through word-of-mouth. In each tick, citizens who have had a positive (or negative) experience with a provider generate a word-of-mouth signal. This signal is propagated to neighbours through weighted edges and updates each citizen's information environment, which then affects exposure to providers and ultimately engagement decisions. In this way, the network links individual heterogeneity (need and barriers) to social dynamics (peer influence and diffusion), allowing the model to capture within-community feedback mechanisms that cannot be represented with purely individual-level decision rules. Figure 6 presents an example of a social network. For illustration purposes, we consider a synthetic community with 50 individuals. This is a random subsample of the synthetic population created to study the pilot areas of the Pavlikeni and Strazhitsa municipalities in Bulgaria. The width of an edge represents the strength of the relationship between the two connected

individuals. A wider edge indicates a stronger connection which means that this connection has a greater influence when promoting a MHC service and that the connection is less likely to break during the ABM.

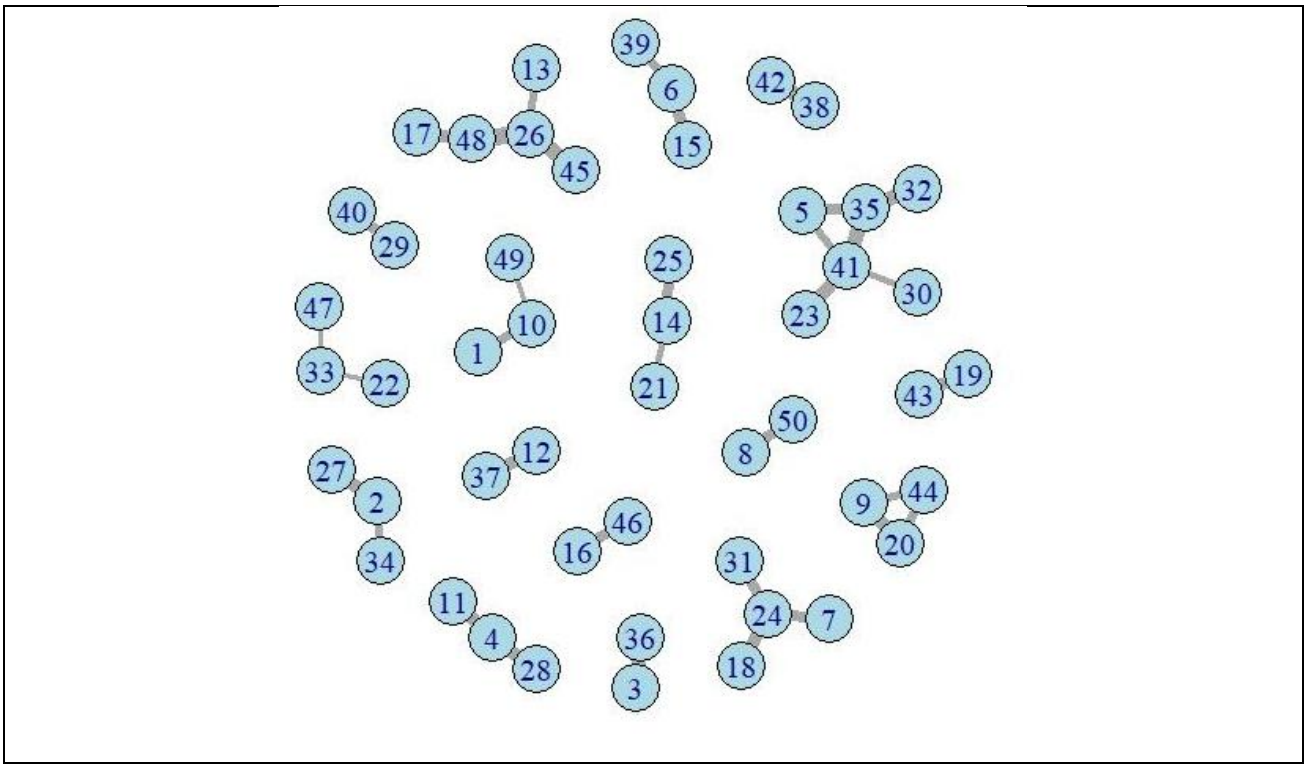

Figure 6: Illustration of a social network.

4.3.3 Mental health care service providers

The MHC service providers are the second type of agent that enters the model. Each provider represents an organisation that offers support relevant to mental health. Similar to citizens, each provider has a profile. In particular, a service is characterised by the type of service, its target group, the fee cost, whether it is subsidised, their communication strategy, and whether it offers remote access. The target groups are identified through the service's statement and are aligned with the target groups mentioned in the GA (youth, elderly, migrant/refugee, LGBTQIA+ community). Cost and subsidy are discretised variables. A provider can have a high, low, or no fee (an existing fee is classified as low or high based on each country's economy and purchasing power). A provider can be subsidised or not and in case it is, it can be either entirely or partially. We consider a binary variable on whether a service can be accessed remotely (for example, a provider can offer services by phone or online). An important characteristic of each service it's how it reaches its potential users (i.e., individuals belonging in its target groups). Providers reach citizens through a combination of online presence, informational outreach, and contact mechanisms. For each provider, we construct a dissemination index, ranging from 0 to 1, based on online presence (website and social media metrics), number of contact options (phone, email, forms, other), and the availability of remote interaction options. This dissemination index reflects exposure and is constructed, for MHC provider s as a weighted average:

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$dissemination_s = 0.25website_s + 0.30socialmedia_s + 0.20contactchannels_s + 0.25remoteaccess_s$,where $website_s$ and $remoteaccess_s$ are binary variables taking the value one if the provider maintains a website and can be reached remotely, respectively. $socialmedia_s$ and $contactchannels_s$ are the share of the social media followers and contact channels, respectively, over the maximum number of social media followers and contact channels for providers in each pilot area. Providers with stronger dissemination are more likely to be noticed by individuals. Furthermore, individuals with stronger ties to others are more susceptible to word-of-mouth exposure. In particular, an individual who has successfully engaged with a mental health care service and received some benefit (i.e., their mental health index improved) might suggest the service to their connections. If the tie is strong, there is a higher probability that the connection will be convinced to engage with the said service.

The purpose of a provider is to improve the wellbeing (and mental health status) of the individuals that make use of their service. This improvement is expressed in the ABM as an increase in the mental health, the approachability and the accessibility index of each individual. To quantify this increase in the ABM, we assign a benefit value for each index to the providers based on their service type. Based on the self-description of each identified provider, we group them in six service types that are commonly found in the related literature: Clinical treatment, collaborative care, peer support, information hubs, mediator-based services, and digital support. Each of these types of service are assigned a benefit value based on the related literature (discussed in the next paragraph).

Interventions based on clinical treatment are defined as the conventional treatment pathway for mental health conditions including cognitive behavioural therapy and related interventions (Hofmann et al., 2012). They can produce moderate-to-large symptom reduction in mental health issues. According to the meta-analysis of Powell et al., (2024), low-intensity cognitive behavioural therapy reports a sizeable pooled effect relative to control (with Hedge's approximating 0.6). Collaborative and integrated care relies on a wide range of specialists to treat a patient's physical and mental health needs in a unified, holistic manner and serves a systematic strategy for integrating behavioural health into primary care, improving access and outcomes, particularly for depression and anxiety (Reist et al., 2022). Gilbody et al. (2006) estimate a standardised mean difference of 0.25 over a six-month period for depression. Peer support interventions and community groups aim to increase awareness, acceptability, and self-help. Their impact on symptoms and recovery outcomes is smaller compared to the previous service types but are consistent over time (Smit et al., 2023). Similarly, peer navigation programs, where support is provided through people with similar lived experience and mutual-aid groups, have a stronger acceptability effect such as reducing social exclusion and the stigma effect and modest direct effect on the impact of symptoms (Liang et al., 2026). Mediator-based services in mental health use neutral, trained mediators to provide a safe, confidential, and stress-free environment in the workplace or community (Riza et al., 2020). In our case, mediator-supported services focus mainly on ethnic minorities within the population, such as the Roma communities. They improve engagement and trust (acceptability) and reduce access barriers, even when symptom outcomes are modest in the short run (often because the primary effect is on uptake and continuity, Verrept, 2019). Finally, online digital support services, which include services delivered or accessed through online, phone, or chat channels, exhibit small but statistically significant reductions in distress (Hedge's g = −0.17, Li, et al., 2026). These services are highly scalable and can improve approachability, with small direct symptom impacts (Huat et al., 2024). Table 11 summarises the benefits for each service type per tick. The values are based on what is described above and are normalised such that they range from 0 to 1 and the added value is calculated on a monthly basis

(since the ABM runs on monthly frequency). For example, if an individual engages successfully with a mediator-based service for a month, their overall mental health need is going to be reduced by 0.05.

Table 11: Positive effect by service type

Service type	Mental health index	Approachability	Acceptability
Clinical treatment	0.18	0.02	0.02
Integrated care	0.07	0.02	0.03
Peer support	0.04	0.03	0.04
Navigation program	0.01	0.06	0.02
Mediator-based services	0.05	0.05	0.05
Online social support	0.02	0.05	0.02

4.3.3 Execution loop

The core of the ABM are the mechanisms through which individuals update their profile and decide whether to engage with a mental health care provider. These mechanisms apply for every period (tick) that the model runs. For the empirical analysis, we set the ABM horizon to 24 months, where each month represents one tick. During each tick we observe three processes, the emergence and propagation of information about services through the social network, individual engagement decisions under access constraints and targeting, and the resulting updates in individuals' profiles.

At the start of each tick t, we identify citizens who are eligible to seek MHC. An individual is eligible if their current mental health need index exceeds a cut-off, $\tau = 0.6$. A provider without a specific target group can target all eligible individuals, however, individuals who belong in a specific population subgroup have a higher chance of engaging with a provider that focuses on that specific subgroup (for example, elderly people are more likely to engage with a provider that focuses explicitly on elders rather with a provider that focuses on general population or on younger people). Eligible citizens are exposed to each provider through the provider's dissemination means. The exposure probability is a function is:

$$p_{j,s,t}^{exp} = f(D_s, A_{j,t} W_{j,t}),$$

where D_s is the dissemination strength of provider s, $A_{j,t}$ is individual's j approachability index at time t and $W_{j.t}$ accumulates the individual's exposure through word-of-mouth. Word-of-mouth accumulates through the social network. Each month, citizens who successfully engage with a provider emit a positive or negative signal based on their experience. These signals propagate across weighted edges, so that neighbours with stronger ties exert greater influence. The word-of-mouth stock is updated as a smoothed combination of past word-of-mouth stock and newly received signals, capturing persistence of reputation and gradual information accumulation.

For each suitable provider that an eligible individual is exposed to, the individual estimates a utility gain through the function:

$$U_{j,s,t} = \beta_B mh_{j,t} E[Q_{j,s,t}](1 + \lambda Match_{j,s}) - \beta_c Cost_{j,s,t} - \beta_v Avai_{j,s,t} + \beta_A Acc_{j,t} + \beta_W W_{j,t},$$

`

where the $Match_{j,s} \in [0,1]$ increases expected benefit when the provider's targeting aligns with the citizen's group attributes (e.g., migrants engaging with migrant-focused services). Cost and friction terms are derived from provider fee/subsidy and citizen-level barrier indices and acceptability (proxied by trust) captures stigma-related reluctance. For the parameters, we select the following values: $\beta_B = 1.2$, $\beta_c = 1.2$, $\beta_A = 1.2$, $\beta_A = 1.2$. These values can be modified to assess the validity of the results.

Given the utilities for the providers and an option of no engagement, the citizen selects an option using a stochastic softmax mechanism. This ensures that decisions are probabilistic rather than deterministic, allowing for unobserved idiosyncratic factors while preserving systematic behavioural responses to model inputs: In particular, the probability that individual j engages with provider s is given by:

$$Pr_s = \frac{exp\ (U_{j,s,t})}{\sum \quad exp\ (Uj, s', t)}$$

Realistically, choosing a provider does not guarantee a successful engagement. The probability of a successful engagement increases with the citizen's approachability and acceptability, with provider dissemination (as a proxy for organisational reach and accessibility), and with targeting match but it decreases with net costs (fee net of subsidy). The components that decrease the probability of a successful engagement capture barriers such as failing to secure an appointment, dropping out early, or being unable to overcome access constraints, which often occur in rural areas such as the pilot areas examined in the project. In the model, the success probability is drawn from a Bernoulli distribution.

Users that experience a successful engagement provide a rating which functions as an internal measure of perceived quality and satisfaction. The rating process differentiates between first-time and returning users. First-time users rely more heavily on reputation (word-of-mouth) and dissemination when forming expectations of quality. Returning users rely more heavily on their own appropriateness experience (their prior service fit), with word-of-mouth still exerting influence.

Upon successful engagement, individuals update their profiles. The most important characteristic that is updated is their mental health index:

$$mh_{j,t+1} = mh_{j,t} - \delta_s rating_{j,t} mh_{j,t}$$

where δ_s is the provider's effect on mental health, based on its service type (see Table 11). The approachability and acceptability indices are updated in a similar manner. An increase in approachability captures learning about how to navigate services and an increase in acceptability capturing trust-building and reduced reluctance (stigma cost) through successful engagement. Citizens who successfully engage for the first time also update the associate feature, which affects how ratings and expectations are formed in future months.

The word-of-mouth mechanism allows individuals who have received the full benefit to generate signals. The sign and magnitude of the emitted signal depend on the citizen's rating. Obviously, positive (negative) experiences generate positive (negative) word-of-mouth signals. Strength (or effectiveness) of the signal is scaled by the citizen's approachability (those who can communicate and disseminate information more effectively exert a stronger influence) and propagate through the network via weighted edges. The resulting neighbour-level influence updates each citizen's word-of-mouth accumulated stock, which feeds back into exposure and provider selection in subsequent ticks.

Once the profiles are updated, the model moves to the next period. This loop is repeated until the end of the model's horizon.

The MHC services that enter the model closely resemble social enterprises in the sense that they provide services with an explicit social objective, address unmet community needs, and often operate through mixed funding, stakeholder engagement, and locally embedded service delivery, rather than through purely profit-maximising market provision. This ABM is suitable for analysing interactions between individuals from vulnerable groups and social services (Melchior et al., 2024). The model combines sociodemographic information with psychometric indices such as perceived wellbeing, mental health status, and perceived acceptability, and treats "soft" social characteristics as explicit state variables rather than unobserved background factors (Boshuijzen-van Burken et al., 2020). One's decision on whether to make use of the existing services rely both on objective constraints (cost, stigma, accessibility) and on subjective perceptions and social influence propagated through the network. This results in a model that can identify how individuals with similar experiences cluster, and how differences in the profiles of different services yield different engagement levels across target groups.

4.4 Results of ABMs

For each pilot area we consider two ABMs. The first ABM, which we call the baseline model, includes only the MHC services that have been identified in previous through digital ethnography. Therefore, the baseline model serves as an actual representation of each pilot area. The second ABM, which we call the simulation model, examines a hypothetical scenario where one additional MHC service has been established in the pilot area. The new service focuses on the target group mentioned in the GA. Specifically, in each pilot area there are two target groups but here we focus on the larger one within each pilot. In some cases the two groups can be merged together. For example, in the case of Seville, the two groups are Roma and Latinoamerican migrants so we consider a single target group, migrants. Table 12 reports the target group for each of the newly introduced MHC services. To maintain realism in this scenario, the characteristics of the new service are assumed to be the average of the existing ones. For example, the fee cost is the average of the fee costs of the services that already operate in the area. Obviously, more specific alternative scenarios could be analysed (for example, we could examine how subsidised services would perform). The purpose of the simulated ABM is to examine how a single additional service focusing on a specific population group could decrease the share of population with an increased mental health need index.

Table 12: Target group of each simulated mental health care service

Country	Pilot area	Target group
Türkiye	Hatay	Elderly
Greece	Thessaloniki	Elderly women
Greece	Athens	Youth

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Bulgaria	Pavlikeni	Ethnic minorities
Bulgaria	Strazhitsa	People with mental disabilities
France	Rouen	People with physical disabilities
Spain	Seville	Migrants
Germany	Mannheim	Elderly

Figure 7 presents the share of the population that is at risk of mental health need over time. An individual is said to be at the risk of mental health need if their associated mental health need exceeds the value of 0.6. For each pilot area, in each subplot of Figure 7, the solid (dashed) line presents the share of population at risk of mental health need in the baseline (simulated) model over the 24 periods, months, that the model runs. The results from the ABM are best to be treated as a comparison between the baseline and the simulated scenarios rather than a precise forecast. To this end, the focus is on identifying where an additional provider is likely to have high leverage.

The first general observation is that across all pilots, adding one additional mental health service produces heterogeneous effects on the at-risk share. In some settings, the simulated scenario generates a clear additional reduction, most notably Athens, whereas in others the difference is small or nearly negligible from the baseline. This pattern is consistent with diminishing marginal returns in the sense that places where baseline provision or access conditions already support engagement, a single additional provider is bound to limited additional system-level change. In the case of Athens, the additional provider focuses specifically on the youth which comprise a substantial share of a large (within the project's context) population. As a result, the available slots provided by the new MHC service where immediately occupied by potential users whose mental health index improved over the analysed horizon. The example of Athens could demonstrate the full effect of an additional MHC service which utilises its entire capacity.

The second general observation is that in some areas such as Pavlikeni, Strazhitsa, and Seville there is a gradual, almost linear, decline while in some areas the decline is steeper during the first months and is followed by a slower decline during the remaining months of the model. The latter indicates that the ABM reaches a part of the population that remains hard to shift within the simulated horizon. The reason for this could be persistent access barriers or ineffective exposure channels from the side of the provider for the remaining part of the vulnerable population. This urges for a well-designed approach to the issue where the service to be established must take into account the characteristics of each target group. The characteristics of the additional service should be aligned with the specific needs and access barriers of the intended target group. For example, a standard clinical service may have limited additional impact where the main obstacle is lack of trust or poor knowledge of the care system. In this case, a mediator-based, peer-support, outreach, or information-navigation service may be more effective in improving approachability and acceptability. Additionally, a service targeting a younger population is more likely to be successful if it utilises social media and internet platforms as means of dissemination.

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We now turn to each pilot area for a more thorough examination of the findings. Both Bulgarian pilots show a small but consistent improvement in the simulated scenario (the dotted line is slightly below the solid line throughout the horizon). The effect is moderate, but it is persistent and cumulative, indicating that the additional provider increases engagement enough to move the at-risk share downward at a slightly faster pace. The marginal effect suggests that barriers may still be binding (e.g., approachability, availability), or that the added provider's targeting overlaps with existing services. The two pilot areas in Greece, Athens and Thessaloniki, appear to have different trajectories, especially in the baseline scenarios. Athens exhibits the largest marginal gain in the simulated scenario. That is, the simulated mental health need index drops substantially below the baseline one early on and continues to diverge over time. The additional provider appears to offer coverage for a relatively large target group (youth). Thessaloniki is one of the pilot areas that shows a decline early on and then a plateau in both scenarios. The added provider helps but does not transform the trajectory. The model reaches a threshold around the first twelve months. The additional service shifts this threshold a bit lower but does not change the shape of the line. The results from Rouen, Mannheim, and Hatay are similar to the results for Thessaloniki. That is, we observe a steep decline of the index early on and during the later months in the model, the effect of the mental health care services is feeble. However, the magnitude of the decrease when we add one more provider differs between the three pilot areas, indicating the heterogeneity in our sample. This points towards the importance of correct calibration regarding the characteristics of the additional service as well as the fact that a single additional provider might be a "conservative" scenario. The latter actually holds for all cases, regardless of whether a cut-off point is reached or not. This is also true for Seville, the last pilot area we examine. While we observe a persistent gradual decline for the index in Seville, the difference between the baseline and the simulated model is quite small.

We identify three reasons for the potential limited effect of the services in the simulated scenarios. First, while the additional provider is assumed to focus on the vulnerable group stated in the GA, the rest of the characteristics of the provider are not calibrated to suit the needs of the target group (for example, the additional service does not follow a dissemination strategy designed specifically to suit the needs of the target group). Rather than that, we take the average of the already existing services. This could potentially affect the dissemination power of the new service. Second, although the analysed target group could be in a more vulnerable state compared to other target groups, it isn't necessarily the most populated group in the pilot area. The simulated MHC provider focuses specifically on the target group and excludes a potentially large number of individuals at risk. Third, the simulated scenario assumes a single additional provider which could be insufficient in largely populated areas.

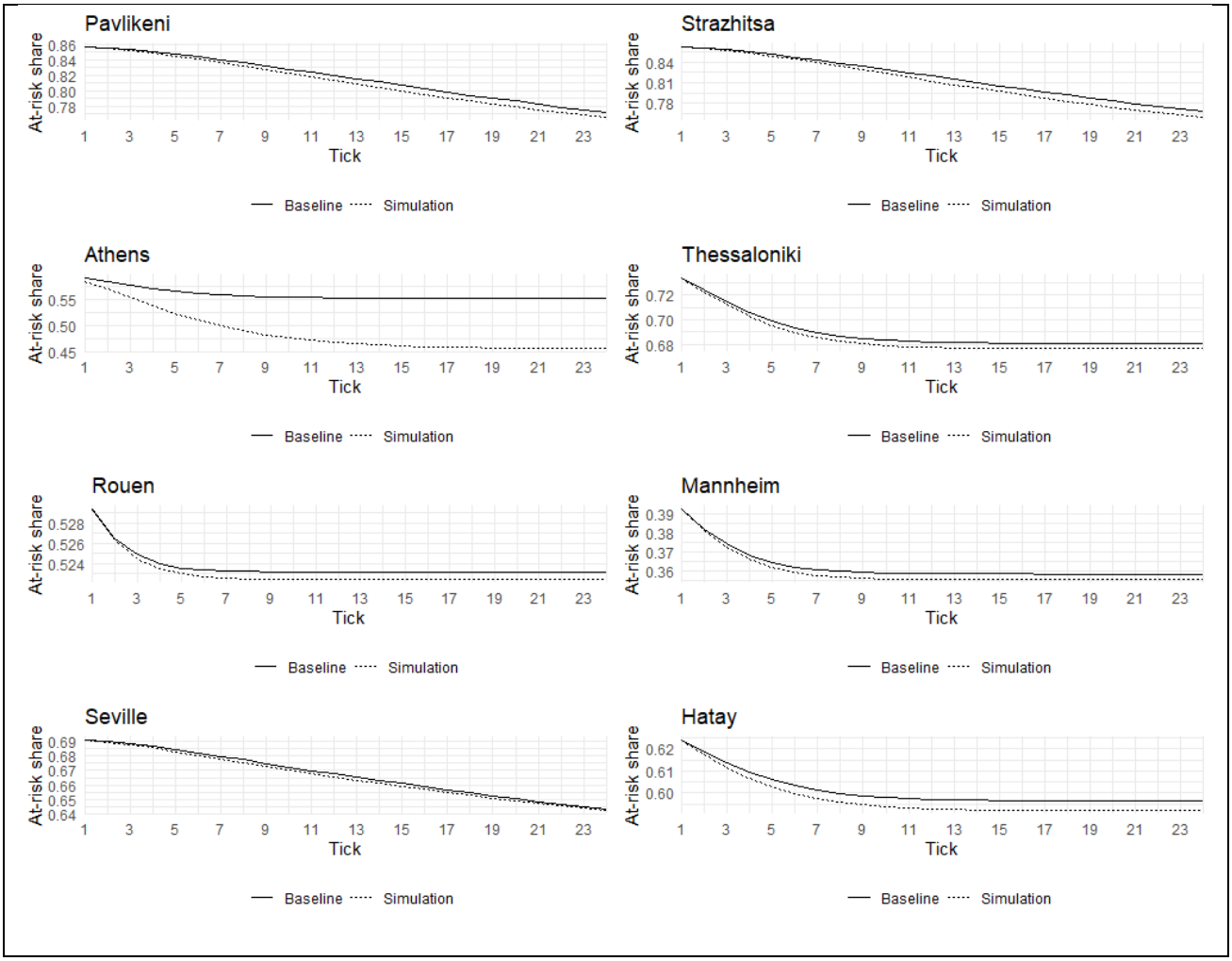

Figure 7: Share of population at risk of mental health issues at each period.

Notes: The baseline model considers only the existing MHC services while in the simulation an additional service is considered. For each pilot area, the additional service focuses on the target group reported in Table 12. The y-axis represents the percentage of people with a mental health need index greater than 0.6.

5. European mental health care landscape

5.1 Restrictive factors

The barriers to MHC access identified in previous tasks and reports generated as a part of the EQUICARES project, as well as in prior professional and academic publications, continue to be a limiting factor for mental health care interventions and solutions. While this report presents clusters of innovations that each aim to tackle a certain access barrier, regions, communities and individuals still face the following challenges:

A first barrier concerns availability and capacity, as also reported in D1.1 (Zentralinstitut für Seelische Gesundheit, 2025), D2.3 (Koç University, 2026). The results from the ABM indicate that the addition of a single new mental health care provider is often insufficient to transform the overall trajectory of mental health vulnerability in the local population. In some pilot areas (e.g., Mannheim or Seville), the additional provider reduces the share of population at risk of negative mental health quality of life but does not change the shape of the declining curve. This suggests that not all needs are addressed sufficiently by the addition of one service for the vulnerable group targeted in our project. For example, in larger or more heterogeneous areas, the effect of a new provider might reach one specific vulnerable group, based on the service type of the provider. If the number of people belonging to the target group is small then the provider's effect is exhausted very soon (Glasgow et al., 1999).

A second barrier emerging from the analysis concerns the information and dissemination, as also referred to in D1.3 - Mega-trends that have negatively affected equal access to mental health care services (Q-Plan, 2026). Many individuals are not aware of existing services or if the services are appropriate for their needs (see, e.g., Golden McAndrew, 2012). An integral part of the ABM includes how an individual is exposed to a MHC service. If the provider's dissemination strategy is unfit for the target group, then it is unlikely that many individuals will engage. In addition, the probability that one is informed about a suitable provider depends on the social network of the provider and the one of the individuals. If these two overlap, chances are higher that the individual is aware of the MHC services offered. Individuals that are analysed in this project are potentially socially isolated or disconnected from community networks such that they may remain outside the reach of available services.

A third barrier is stigma, and low acceptability of care, previously addressed in D1.1 (Zentralinstitut für Seelische Gesundheit, 2025) and D1.3 (Q-Plan, 2026). Stigma can be related to mental health stigma, referred to negative stereotypes, shame, or anticipated discrimination associated with experiencing mental health problems or seeking professional support, or to social stigma, which arises when individuals expect discrimination or misunderstanding because they belong to a vulnerable or marginalised group, such as migrants, refugees, or people with disabilities. While many existing services aim to reduce stigma, raise awareness, and build trust (through advocacy, peer support, or community-based approaches), stigma remains a persistent restrictive factor (Thornicroft, 2008; Corrigan et al., 2014). Stigma can prevent people from recognising their own need, contacting services, or continuing treatment. This barrier affects all target groups and the decision to seek help is shaped not only by the availability of services but also by fear of discrimination, lack of confidentiality, previous negative experiences, or concern that professionals will not understand their

lived realities. The latter is identified through the survey responses on the appropriateness of the services.

5.2 Innovations and potential

The innovative solutions identified in this deliverable address a multifaceted array of structural and personal barriers to mental health care (MHC) access, previously systematically categorized through the Levesque Framework dimensions of approachability, acceptability, availability, affordability, and appropriateness. Specifically, the solutions investigated in this report target demand-side barriers such as pervasive stigma, lack of trust, and cultural mistrust by integrating MHC into familiar community settings and leveraging non-traditional workforce models like task-sharing and task-shifting. These models have the ability to mitigate workforce shortages and the "diagnostic overshadowing" often experienced by vulnerable populations (Spedding et al., 2014). Multidisciplinary teams utilizing cultural mediators and translators may be able to effectively dismantle linguistic hurdles and cultural dissonance for refugees and ethnic minorities, while digital and tele-health solutions have the potential to overcome geographical isolation and physical mobility constraints (Kósa et al., 2020; Butzner & Cuffee, 2021).

To expand these innovations and increase access for broader target groups, the EQUICARES project emphasizes the transferability of low-threshold innovations across varied European contexts. Broadening reach necessitates enhancing the dissemination power of service providers; findings indicate that leveraging multimedia tools like podcasts and educational YouTube videos in local languages can normalize mental health care and needs, reaching isolated individuals through word-of-mouth dynamics within their social networks. Digital tools serve as a critical force multiplier; for instance, interactive online classes and text-based chat or phone call services, which are available at any time of any day, offer immediate, location-independent support for those deterred by traditional, appointment-driven models (Moock, 2014). Adjusting and combining the innovations described in this report and in D2.3 (Innovations deployed in low- and middle-income countries) to the local needs of certain vulnerable communities can help further increase the equality of access to mental health care. Even if not all barriers can be broken down by a singular innovation, improvements regarding the strongest barrier can help many individuals access the care they need to sustain or improve their mental health quality of life.

6. Final remarks

6.1 Conclusion

Achieving equitable mental health care for vulnerable populations requires moving beyond conventional models toward innovative, community-driven service redesigns. Mental health care needs are not equally distributed across space, thus different places may require different solutions to improve access for all to MHC. Innovations in MHC, such as task-shifting and holistic multidisciplinary care, as also highlighted by previous literature, help to effectively lower access thresholds for marginalized groups. Community-based solutions are popular and often successful in reaching the general local community as well as very specific target groups (as evidenced by the digital ethnography). However, the combined analyses reveal that isolated interventions are often insufficient to overcome systemic barriers, such as workforce shortages and deep-seated stigma, as evidenced by the limited change in mental health quality of life. Therefore, true progress depends on coordinated structural transformations. All initiatives aimed at improving equal mental health care access across European countries should utilize evidence-informed, culturally adapted strategies to bridge the persistent gap between mental health needs and service accessibility across diverse European regions.

6.2 Next steps

Our next steps within the EQUICARES project are informed by the work that investigated the need for mental health care innovations for vulnerable populations in our pilot regions (WP1) and the supply of mental health care innovations available in the respective regions and beyond (WP2). Based on a match in specific regional needs and transferable existing innovations, Smart Health Labs will be developed and tested in the pilot regions. Every pilot designs their own innovative solution that best meets the needs of their target groups and fits their cultural context, supported by this report and the MHC Atlas. In general, solutions that take into consideration the culture and life structure of the vulnerable group they are addressing, while also reaching people where they are physically and mentally, have the most potential for direct positive impact. The applied solutions (WP3) will then be evaluated in terms of effectiveness and cost efficiency (WP4), before more general policy recommendations can be generated.

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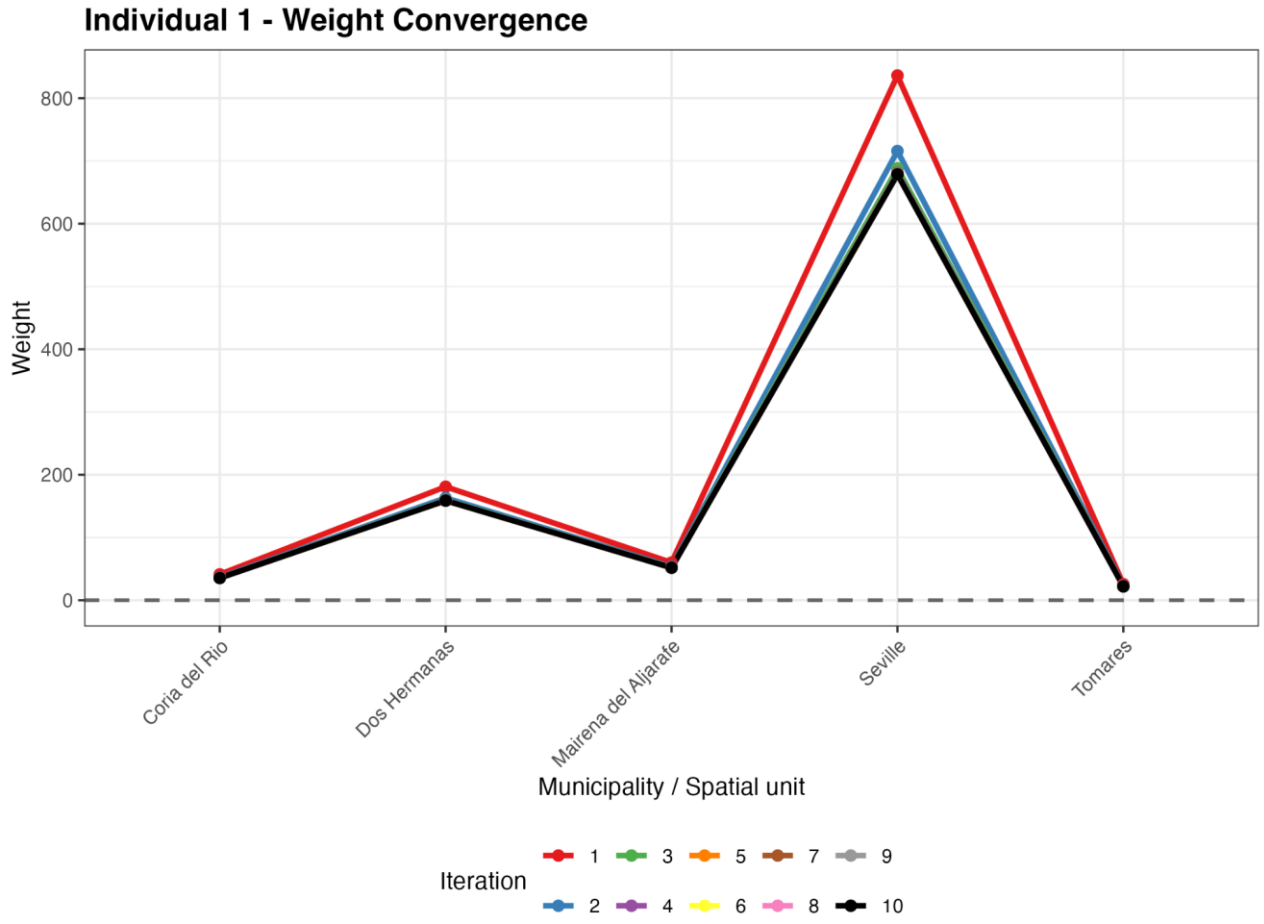
Appendix

Once we run the spatial microsimulation models and we obtain the synthetic weights for the individuals, we examine whether the IPF procedure converges to their “true” values. To do so, we produced a set of convergence plots that track how the weights attached to two randomly selected survey respondents (usually the first two individuals) evolve across different iterations of the algorithm. In all pilots the reweighting routine was allowed to run for up to 10. In practice, the adjustment of the weights stabilised well before this upper limit of the tenth iteration. For our illustration purposes, below we show the convergence graphs of two individuals per pilot area under examination.



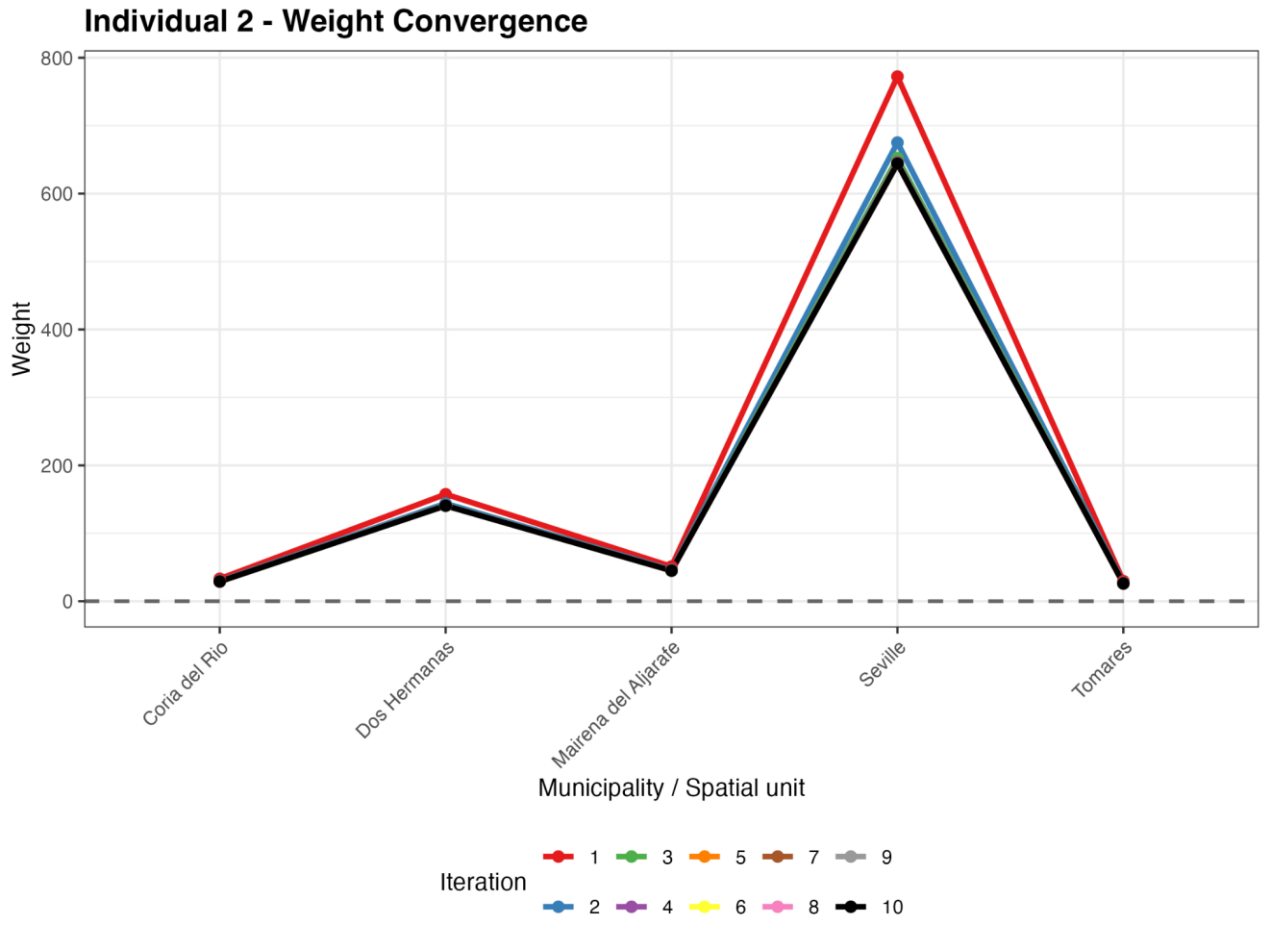
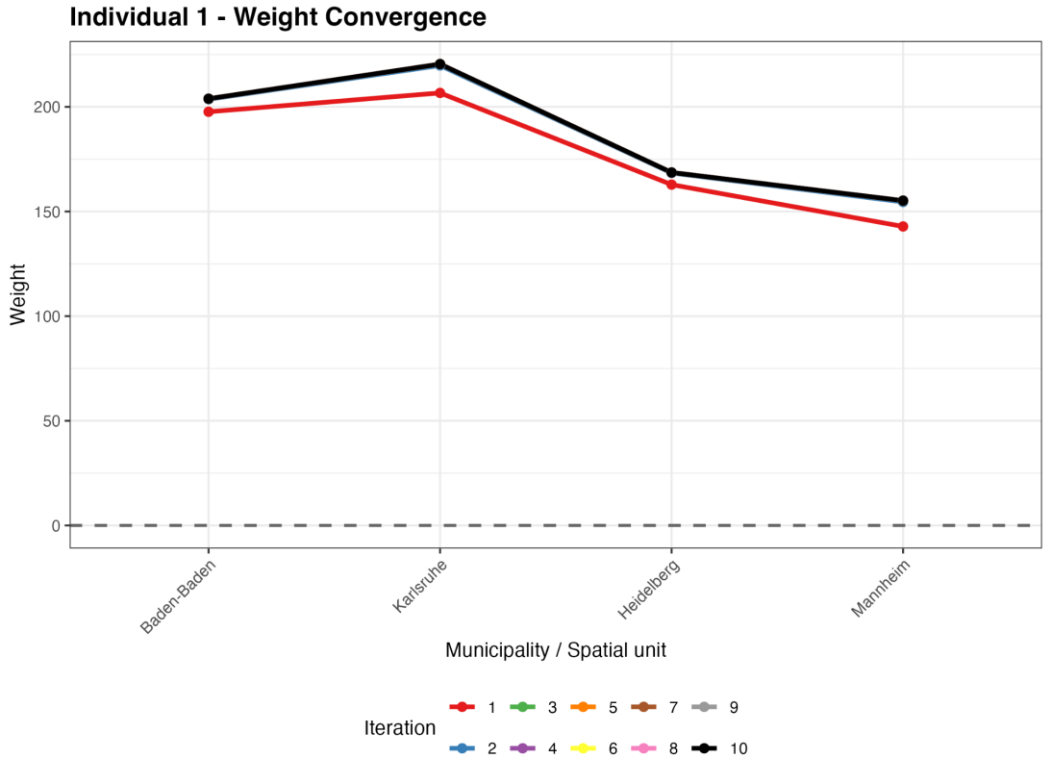


Figure A1: Convergence graphs of spatial microsimulation weights for the municipality of Seville and other neighbouring municipalities.



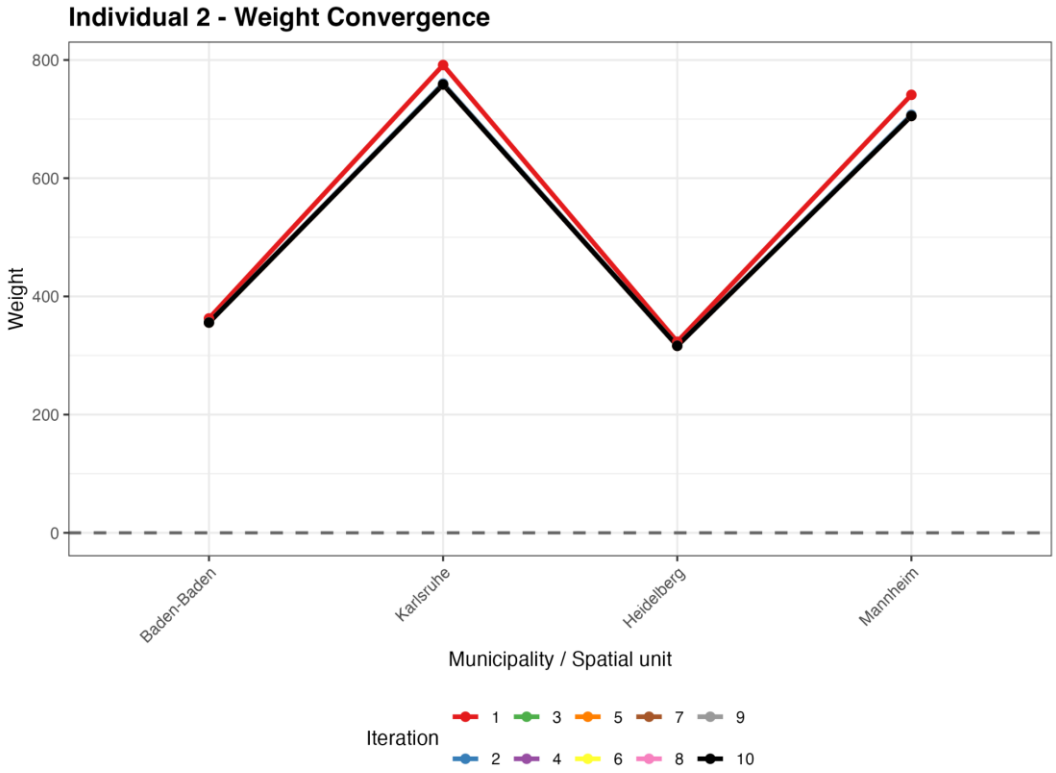


Figure A2: Convergence graphs of spatial microsimulation weights for Mannheim and other neighbouring NUTS3 regions.

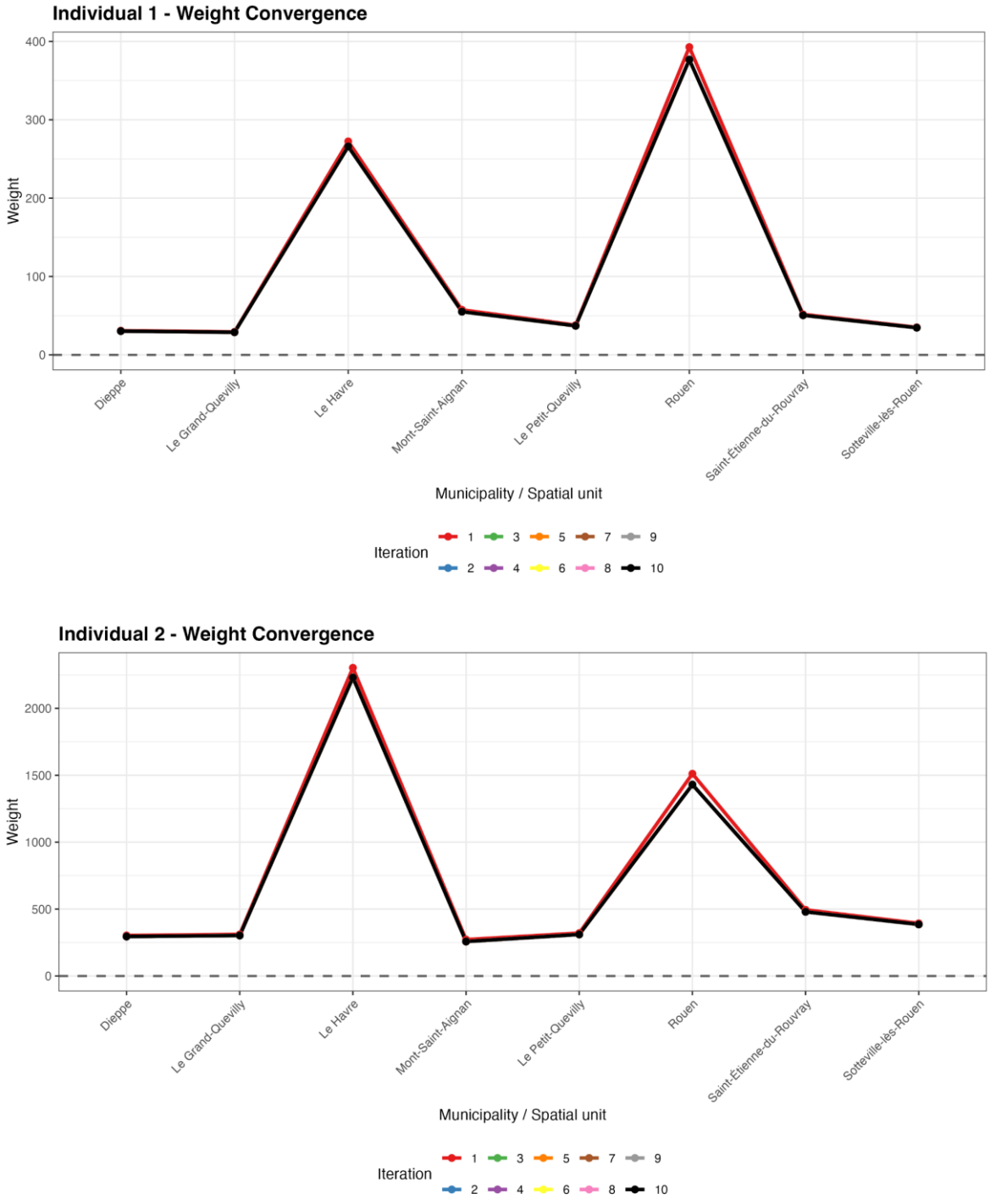
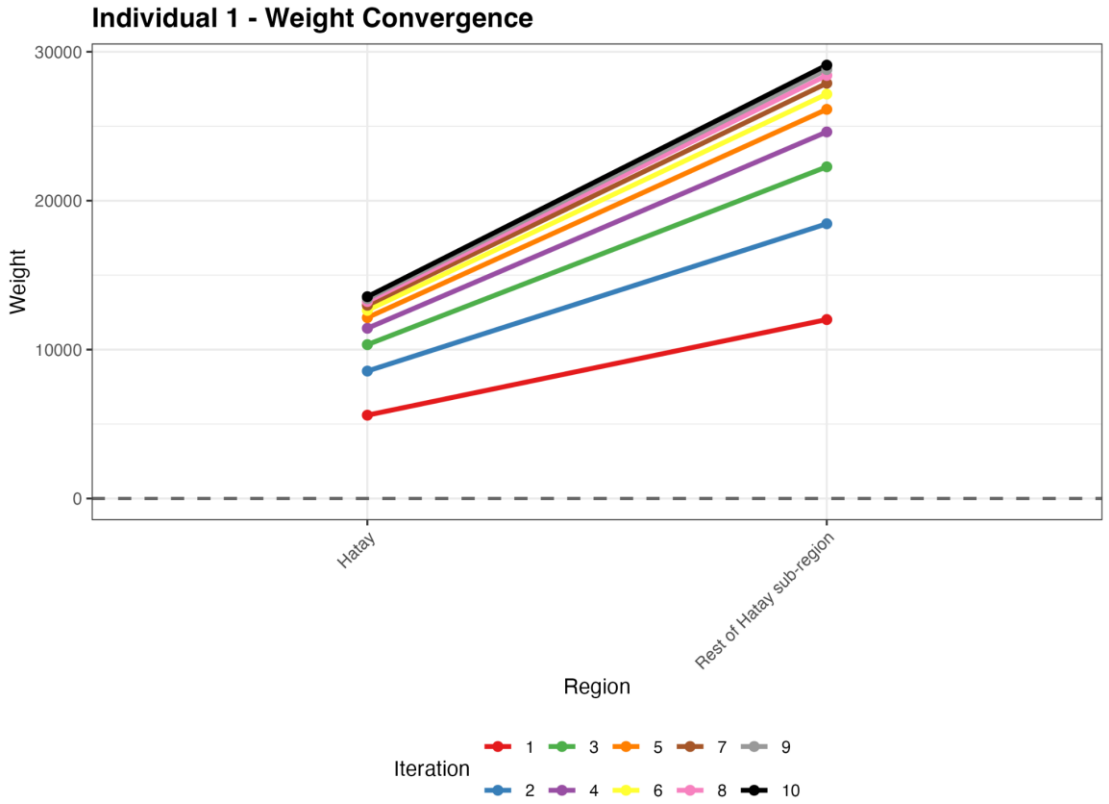


Figure A3: Convergence graphs of spatial microsimulation weights for Rouen and other neighbouring communes.



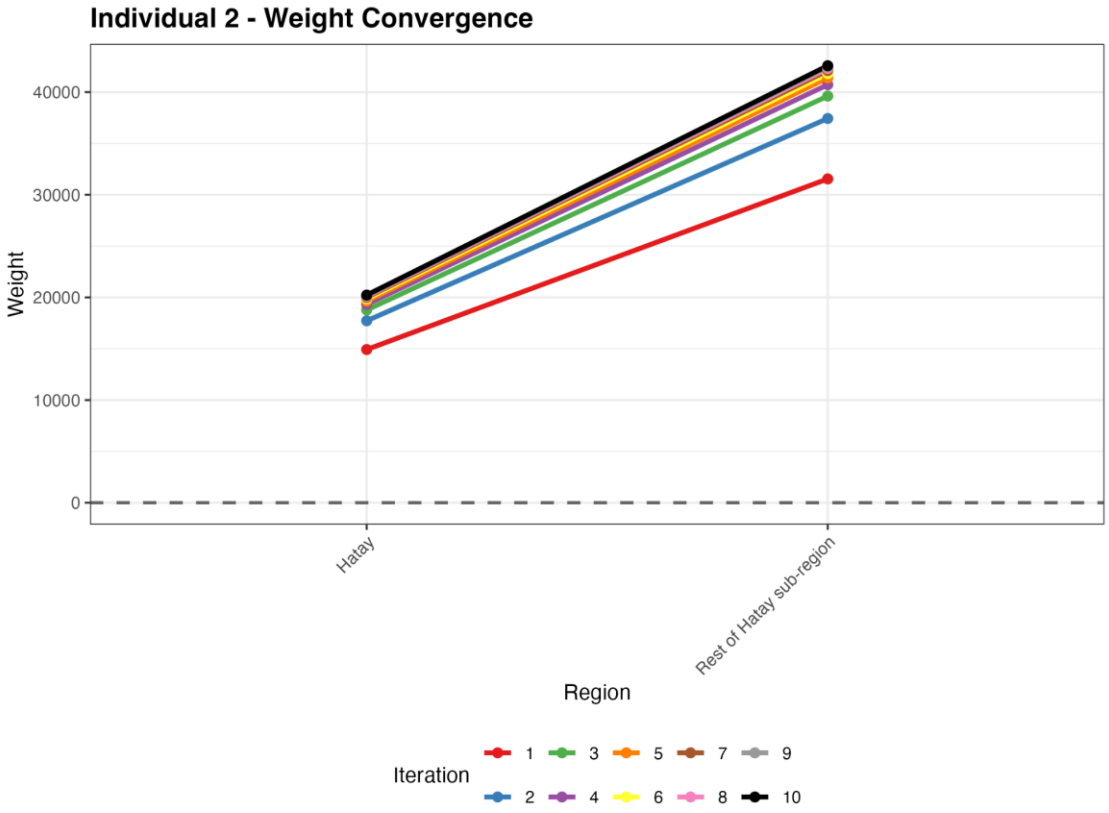
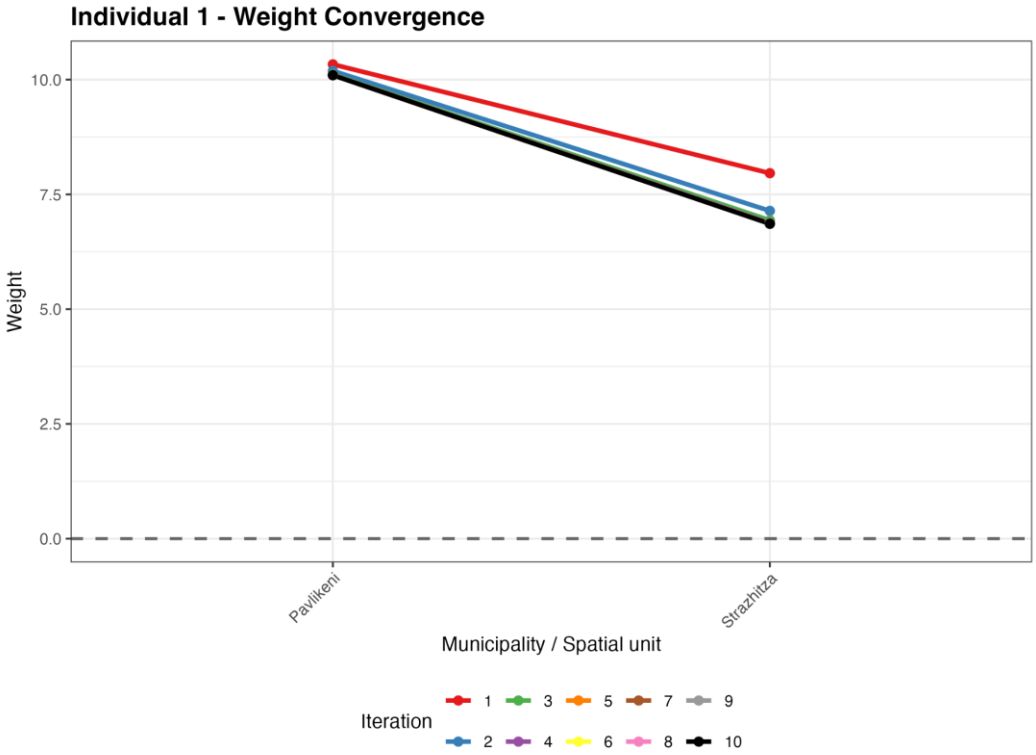


Figure A4: Convergence graphs of spatial microsimulation weights for Hatay NUTS3 region.



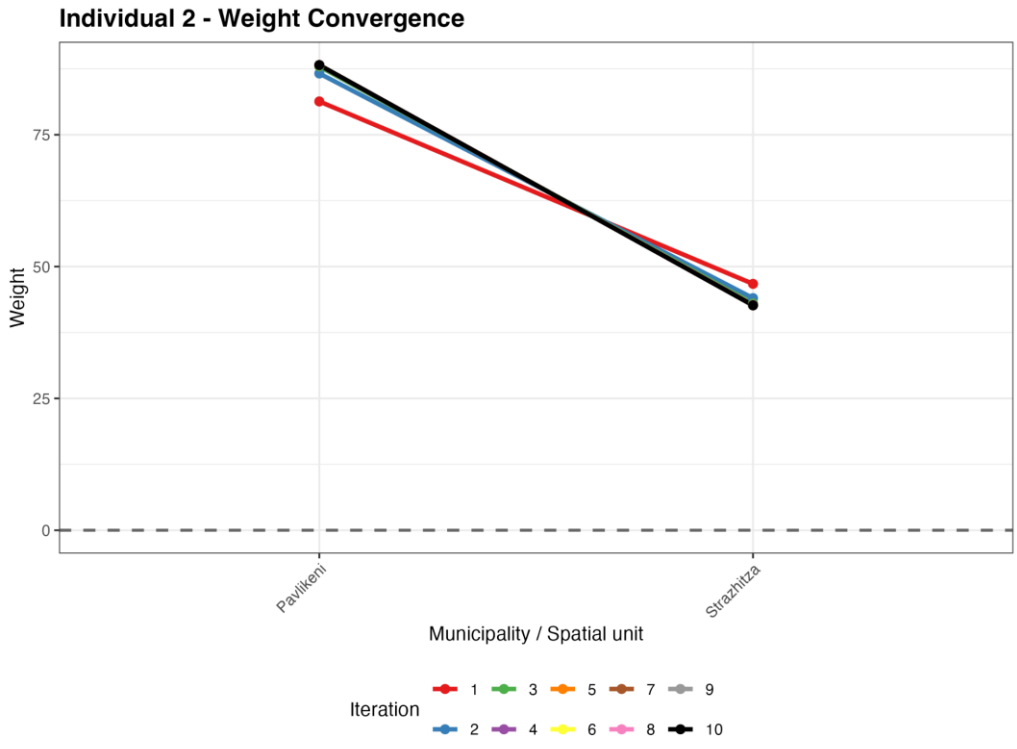


Figure A5: Convergence graphs of spatial microsimulation weights for Pavlikeni and Strazhitsa.

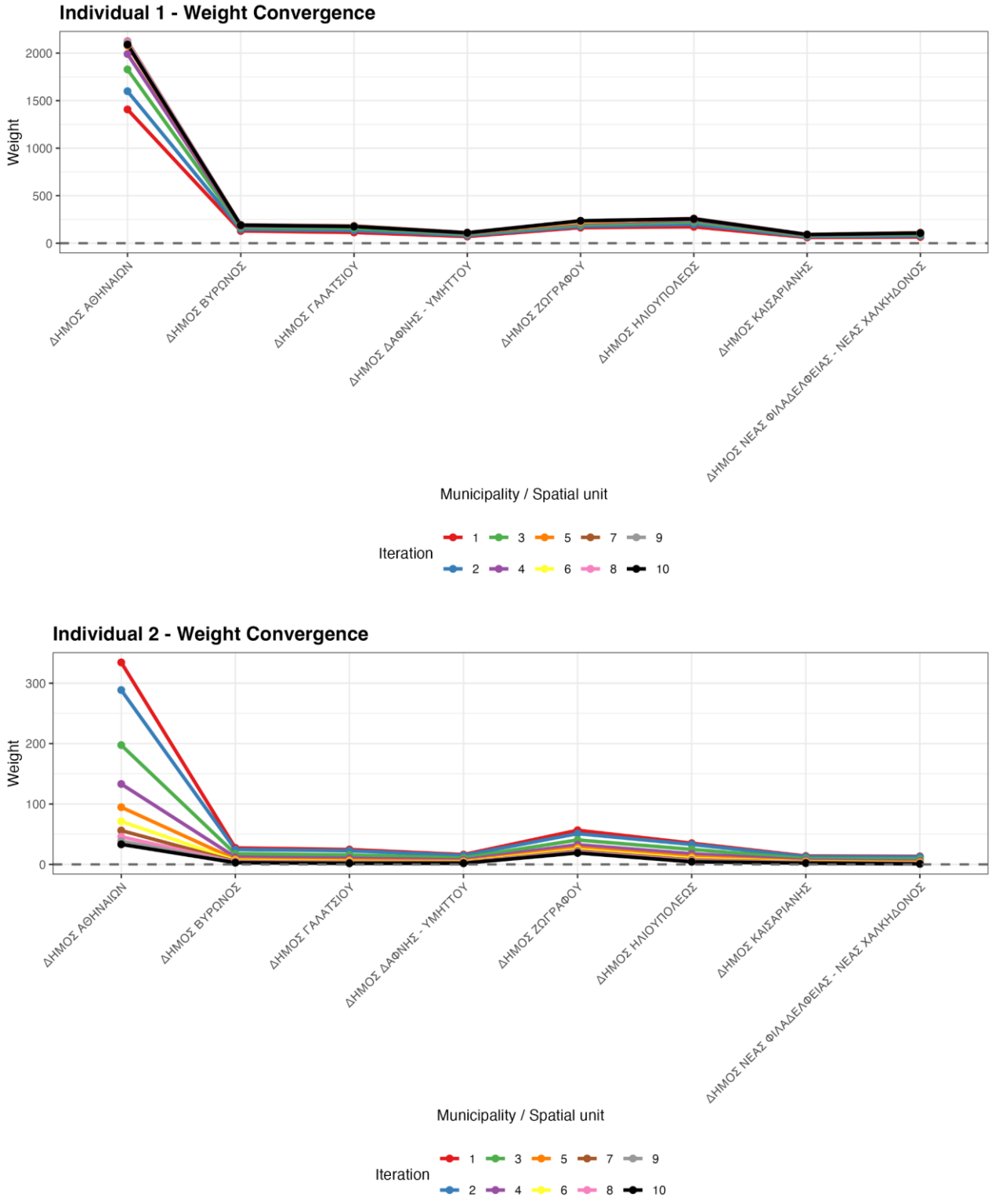


Figure A6: Convergence graphs of spatial microsimulation weights for the municipalities of Athens.

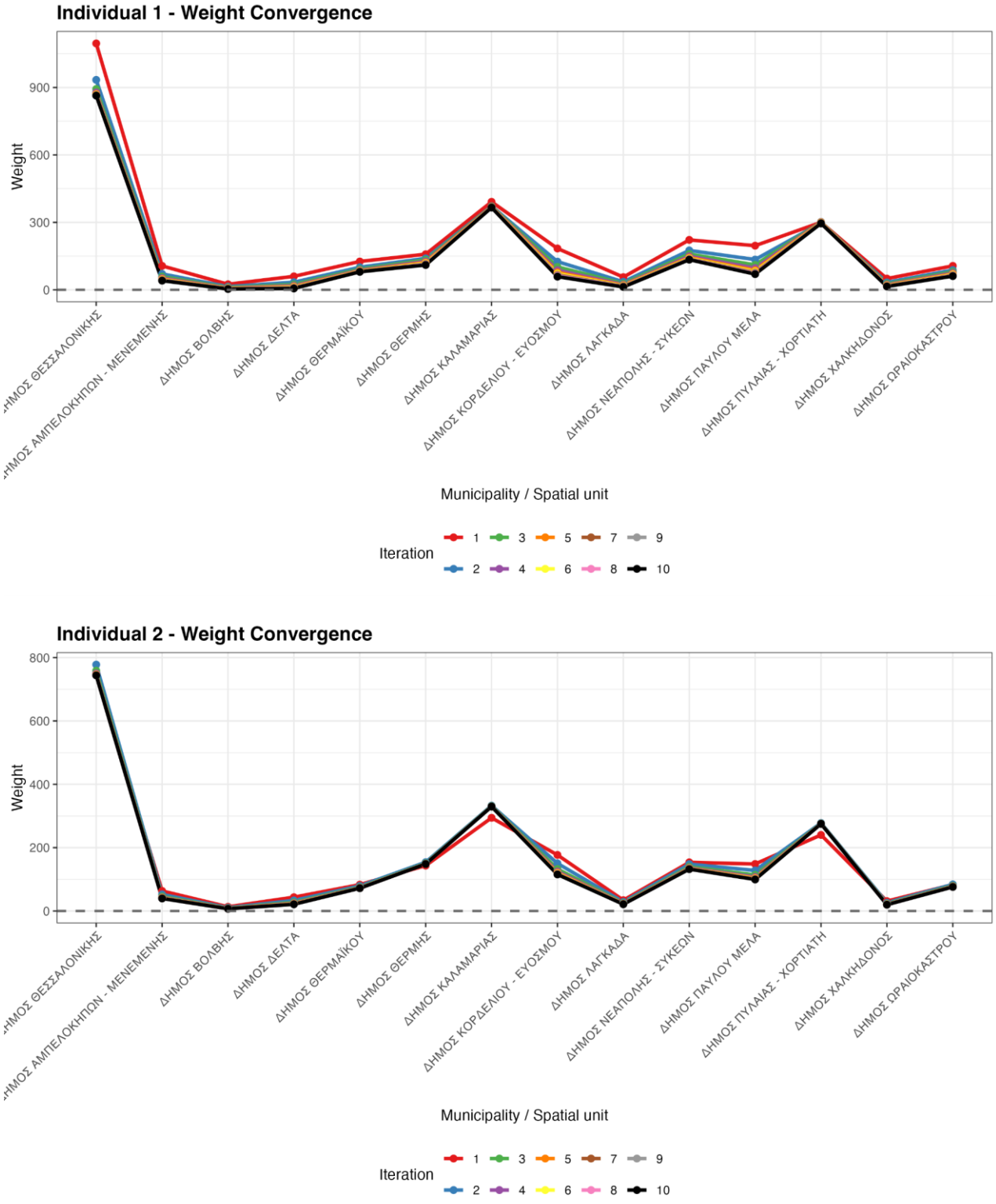


Figure A7: Convergence graphs of spatial microsimulation weights for the municipalities of Thessaloniki.

Table A1: Questions used in the construction of the indices

Number	Question
Q17	Extent of having little interest or pleasure in doing things over the last 2 weeks
Q18	Extent of feeling down, depressed or hopeless over the last 2 weeks
Q19	Extent of trouble sleeping or sleeping too much over the last 2 weeks
Q20	Extent of feeling tired or low energy over the last 2 weeks
Q21	Extent of feeling bad about yourself or like a failure over the last 2 weeks
Q22	Extent of having trouble concentrating over the last 2 weeks
Q37	Is there a mental health service location that you know of?
Q38	Is there a mental health service location that you know of?
Q40	Last time you needed mental health care, how long did you have to wait to get an appointment?
Q41	Do you know where to go for immediate help in a mental health crisis?
Q42	Have you come across any information that explain where and how to get mental health support in your area?
Q43	How easy is it to understand the information about the mental health services (spoken or written)?
Q44	How easy is it for you to find reliable information about mental health services?
Q54	In general, do you think the mental health services are trusthworthy or not?
Q56	Do you have health insurance that covers mental health services?
Q58	Have you delayed or avoided mental health care due to cost in the past 12 months?
Q	How often did mental health professionals treat you with courtesy and respect while receiving mental health services?
Q66	To what extent your mental health service was helpful or relevant?
Q72	Have you been able to see the same doctor or therapist consistently during your mental health treatment?

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SEERC SOUTH-EAST EUROPEAN RESEARCH CENTRE

GIVMED Share medicine Share life

AMALIPE Center For Interethnic Dialogue and Tolerance

LADAPT

LGBT IRELAND For Inclusion For Equality For Everyone

FISEVI Fundación para la Gestión de la Investigación en Salud de Sevilla

Zentralinstitut für Seelische Gesundheit

Q-PLAN INTERNATIONAL

JIGSAW Young people's health in mind

EHTEL Collaborating for Digital Health and Care in Europe

diesis network

EUCOMS The European Community based Mental Health Service Providers Network www.eucoms.net

EASPD European Association of Service providers for Persons with Disabilities

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