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Medical deserts in Finland

Medical deserts in the Wellbeing Services County of Pirkanmaa

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ABSTRACT:
Demographic changes, such as the decline in birth rates, ageing population and the shrinking proportion of the working population, are already challenging public healthcare services in Europe. The ever-increasing need for healthcare services at the same time as the resources to provide them are increasingly scarce, are forcing to consider how the current service systems can be maintained. There is no sign of a change in this in the coming decades. On the contrary, these challenges are seen as permanent phenomena throughout Europe.

These challenges are particularly acute in remote areas. Remote areas can be defined geographically or, for example, by population density. It is typical for such areas that the service network does not fully cover their residents, and the availability of health workforce is more challenging than in urban areas. These areas are called medical deserts. It is necessary to be able to identify such areas so that, based on the identified characteristics, measures can be targeted to ensure equal services.

The topic of the master's thesis is the factors causing medical deserts and thus, the identification of medical deserts. Medical desert refers to the limited access of the population or its group to health services in a certain area. Access is affected by certain factors, which can be both demand-driven and supply-driven. The factors are interconnected in many ways.

In this study, medical deserts are examined through a literature review and a case study. The theoretical part maps the definitions of medical deserts, causes for them to occur and policy solutions that have been made trying to mitigate them based on the existing literature. The region examined in the empirical part is Pirkanmaa, one of the wellbeing services counties of Finland, and the municipalities located in its area. The research questions are used to determine whether there are medical deserts in the Pirkanmaa region and, if so, what types of medical deserts can be identified there.

The data collected in the case study is applied to a taxonomy defined in the literature. Based on the taxonomy, it is possible to identify those municipalities that potentially meet the definition of medical deserts and to which types of medical deserts they belong. Based on the collected data, several municipalities can be considered as medical deserts in Pirkanmaa. The municipalities are located on the edges of the region, relatively far from the center of the it. In addition, their population structure differs from other municipalities in the region. These medical deserts contain almost all types of medical deserts. Pirkanmaa itself cannot be considered as medical desert, even if it also has some characteristics of it.

KEYWORDS: medical desert, healthcare, healthcare center, public healthcare, wellbeing services county, health workforce

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TIIVISTELMÄ:
Väestörakenteen muutokset, kuten syntyvyyden lasku, väestön ikääntyminen ja työikäisen väestön osuuden väheneminen haastavat jo nyt julkista terveydenhuoltoa Euroopassa. Samaan aikaan, kun terveyspalveluiden tarve kasvaa, niiden tarjoamiseen tarvittavat resurssit ovat yhä niukemmat. Tämä pakottaa miettimään, miten nykyisiä palveluita voidaan ylläpitää nyt ja tulevaisuudessa. Nämä haasteet nähdään pysyvinä ilmiöinä kaikkialla Euroopassa.

Erityisen akuutteja nämä haasteet ovat syrjäseuduilla. Syrjäiset alueet voidaan määritellä maantieteellisesti tai esimerkiksi väestötiheyden perusteella. Tällaisille alueille on tyypillistä, että palveluverkosto ei kata täysin niiden asukkaita, ja terveydenhuollon työvoiman saatavuus on haastavampaa kuin kaupunkialueilla. Tällaisia alueita kutsutaan lääketieteellisiksi aavikoiksi. On välttämätöntä pystyä tunnistamaan tällaiset alueet, jotta tunnistettujen ominaisuuksien perusteella voidaan kohdentaa toimenpiteitä yhdenvertaisten palvelujen varmistamiseksi.

Tämän pro gradu -tutkielman aiheena ovat lääketieteellisten aavikoiden syntyyn vaikuttavat tekijät ja lääketieteellisten aavikoiden tunnistaminen. Lääketieteellinen aavikko viittaa tietyn alueen väestön rajalliseen pääsyyn terveydenhuollon palveluihin. Saatavuuteen vaikuttavat tietyt tekijät, jotka voivat olla sekä kysyntä- että tarjontalähtöisiä. Nämä tekijät ovat monin tavoin yhteydessä toisiinsa.

Tässä tutkielmassa lääketieteellisiä aavikoita tarkastellaan kirjallisuuskatsauksen ja tapaustutkimuksen avulla. Teoreettinen osa kartoittaa lääketieteellisten aavikoiden määritelmiä, niiden syntymisen syitä ja niiden lieventämiseksi tehtyjä poliittisia ratkaisuja olemassa olevan kirjallisuuden perusteella. Empiirisessä osassa tarkasteltava alue on Pirkanmaan hyvinvointialue ja sen alueella sijaitsevat kunnat. Tutkimuskysymysten avulla selvitetään, onko Pirkanmaan alueella lääketieteellisiä aavikoita ja jos on, minkä tyyppisiä lääketieteellisiä aavikoita siellä voidaan tunnistaa.

Tapaustutkimuksessa kerättyä dataa sovelletaan kirjallisuudessa määriteltyyn taksonomiaan. Sen avulla voidaan tunnistaa ne kunnat, jotka mahdollisesti täyttävät lääketieteellisten aavikoiden määritelmän ja mihin lääketieteellisten aavikoiden tyyppeihin ne kuuluvat. Kerättyjen tietojen perusteella useita Pirkanmaan kuntia voidaan pitää lääketieteellisinä aavikoina. Nämä kunnat sijaitsevat alueen reunamilla, suhteellisen kaukana alueen keskuksesta. Lisäksi niiden väestörakenne poikkeaa muista alueen kunnista. Lähes jokaista lääketieteellisen aavikon tyyppiä on tunnistettavissa Pirkanmaalla. Pirkanmaata itseään ei voida pitää lääketieteellisenä aavikkona, vaikka joitain lääketieteellisen aavikon piirteitä onkin tunnistettavissa.

AVAINSANAT: lääketieteellinen aavikko, terveydenhuolto, julkinen terveydenhuolto, terveyskeskus, hyvinvointialue

Contents

1 Introduction

Ensuring that healthcare is both accessible and tailored to individual needs stands as a fundamental goal of health policies across numerous countries. In European Union (EU), equitable health services and good coverage are objectives of its health policy (Ozegowski, 2013, p. 151; Kivimäki, 2017). Ensuring accessibility poses a significant challenge in low- and middle-income nations where healthcare personnel are in short supply. Nonetheless, the matter of access to primary care has become a focal point even in high-income countries (Gautier et al., 2024, p. 1; Ozegowski, 2013, p. 151–152).

Rural and remote areas face the most significant obstacles to ensuring access to services. In every EU country, there is an ongoing discourse concerning the sufficiency of the healthcare workforce and how to cover the services chain within every part of the country. In these countries, and in many others such as the United States and Canada as well, healthcare workforce shortages and challenges to maintain the healthcare service network are driven by complicated reasons such as aging population and changing healthcare needs that cannot be easily resolved (Gautier et al., 2024, p. 1; Ozegowski, 2013, p. 151–152).

Primary care serves as a cornerstone in achieving this goal, serving as the initial point of contact for healthcare services within local communities. Consequently, there is widespread acknowledgment that access to primary care providers must be assured for all individuals, with particular emphasis on those with the greatest need. In essence, equity in access to primary care services is imperative (Ozegowski, 2013, p. 151–152). Especially in countries where public healthcare is mainly publicly funded, it can be justified to demand that health services be guaranteed to all residents in every part of the country. In addition, the responsibility for providing equal healthcare services to residents is often a legal obligation (Leppänen et al., 2024, p. 115; Manderbacka et al., p. 207–208).

Ensuring equality in access to and use of health services is important for two key reasons. First, the targeting of health services measures how effectively the goal of equality in healthcare has been achieved. From an equality perspective, it is crucial to examine the availability and quality of services. Second, the appropriate targeting of health services has a clear impact on health inequalities in the population. According to need, it has been found to have an increasing impact on health inequalities. (Manderbacka et al., p. 208).

As for the EU, also for Finnish health policy achieving equality among different population groups has been a longstanding primary goal. According to both the Finnish Constitution and the Health Care Act, the fundamental principle has been to ensure that all residents receive equal, high-quality, and sufficient healthcare services, irrespective of socio-economic status, financial circumstances, place of residence, or any other factors that might impede access to services. Additionally, the aim has been to diminish health disparities between various segments of the population (Manderbacka et al., 2017, p. 207–208).

Since the beginning of the year 2023 primary and specialized healthcare services, social services, and rescue services has been organized by 21 wellbeing services counties and the City of Helsinki. It is the result of a major structural reform which was in the making for almost two decades. The aim has been into centralization and the establishment of counties as units that are now responsible for providing these services that were organized by over 200 municipalities before (OECD, 2023, p. 9).

Centralizing services is one of the responses to the challenges facing Finland's healthcare system. The main challenges have been welfare and health inequalities, problems of access to services and, regional disparities in the implementation of healthcare services. Also, the consequences of ageing on the growth in demand for health services challenged (and still does) the healthcare system. This means that the number of people who need services is growing because of the ageing and therefore, the costs of

healthcare and social services increase while the number of people of working age is decreasing (Leppänen et al., 2024, p. 3). As will be discussed later in this study, this restructuring has sought to address similar challenges that are typical of medical deserts.

As in the many countries, also in Finland the healthcare centers and general practitioners working there play a crucial role in primary healthcare. In many countries all over Europe, the lack of these professionals exists (Ozegowski, 2013, p. 152). That challenges to provide the essential primary care services to everyone. It is obvious that this professional group is not the only one that are in the center of medical deserts when talking about accessibility to the services. However, some framing in this study is necessary to set. Therefore, it is justified to keep focus on the public primary healthcare and its workforce in this study.

Often, the challenges related to providing public healthcare services and health workforce are addressed at country level. The fundamental goal of EU, the freedom of movement, has caused dynamic and complex healthcare workers mobility flows which means that healthcare professionals move to countries and regions where the working conditions are more favorable (AHEAD, 2022b, p. 6). As it will be seen later in this study, those mobility flows are part of the reasons that causes medical deserts. The resulting inequalities run counter to the EU's objectives, which include responsibility for the common prosperity of all in the EU, the pursuit of solidarity and the reduction of health and social inequalities. Therefore, the member states and EU institutions are responsible of looking for ways to achieve these ambitions (AHEAD, 2022b, p. 6). This shows that even if the countries play a crucial role to tackle medical deserts, the actions by EU level are also needed.

The purpose of this study is to determine whether medical deserts can be identified in Finland. Considering the scope of the study, the area of study is limited to one wellbeing services county. Therefore, the first research question of the study is: are medical deserts existing in the Wellbeing Services County of Pirkanmaa? The taxonomy of medical

deserts developed by the ROUTE-HWF Project allows us to delve deeper into the municipalities of the Pirkanmaa region (The ROUTE-HWF Project, 2023, p. 16). The indicators named by the project are applied in this study, and the data required by the indicators have been sought to be collected for all municipalities in Pirkanmaa. The second research question is therefore closely related to the first: what types of medical deserts can be identified in the Wellbeing Services County of Pirkanmaa?

This thesis is structured in two parts: a literature review and a case study. The literature review in Chapter 2 compiles the findings of the most important international research literature on medical deserts for the topic of this thesis. First, the definitions of medical deserts are presented, what kind of definitions have been used in literature and what dimensions are associated with the concept. At the same time, the taxonomy of types of medical deserts to be utilized in the case study is initially presented. After the definitions, the main causes of medical deserts that have appeared in the literature are presented. After this, the policy solutions that have been used to mitigate medical deserts according to the literature are reviewed. The level of review for the definitions, causes and policy solutions of medical deserts is Europe.

After the theoretical part of the thesis, the case study follows. For the case study, Finland and one of its wellbeing services counties, Pirkanmaa, have been selected for review. This section of the study first presents a brief country description of Finland and its healthcare system. This is followed by a more detailed analysis of the selected wellbeing services county, its geographical features, service network and other basic information as an organization. The section presents the taxonomy used to identify medical deserts and types of them and the key indicators required for it. The data collected for the method in the Wellbeing Services County of Pirkanmaa is also described in this chapter.

Finally, an analysis of the results obtained through the case study and its relationship to the theoretical part of the study is presented. The section answers the research questions here. The relevance of the study and the conclusions to be drawn from the

results are also reviewed here. In addition, the chapter assesses the reliability of the study and possible further research suggestions.

Research questions:

1. **Are there medical deserts in the Wellbeing Services County of Pirkanmaa?**
2. **What types of medical deserts can be identified in the Wellbeing Services County of Pirkanmaa?**

2 Literature review on medical deserts in Europe

Before medical deserts can be examined in a national context, it is necessary to define what they mean as a concept and phenomenon in general. This section of the thesis examines what findings have been made in the literature about medical deserts. The level of observation is Europe.

The first sub-chapter discusses how medical deserts are defined as a term. Other terms that will be defined are rural and remote areas in their geographical meaning. The following chapters define how the medical deserts are classified and what causes them in Europe and examines what policy solutions have been and should be done to mitigate medical deserts in Europe.

2.1 Definitions

When trying to define medical deserts as a term, it is important to note that there is no generally accepted definition for it. More specifically, there is not a formal and globally accepted definition for the phenomenon of medical deserts (Brînzac et al., 2023, p. 785; Domagała et al., 2026, p. 2; Flinterman et al., 2023, p. 1). However, different definitions have been used in the literature which, despite their differences, refer usually to the same phenomenon. Before delving deeper into these different definitions, it is necessary to first understand why the concept should be defined as precisely as possible.

Living in an area where the access to the healthcare services is limited has significant medical and economic implications for both individuals and society. Research has shown that delaying access to healthcare has a negative impact on morbidity and mortality rates. Moreover, living in an area that has significant limitations of the services, strains the healthcare system, as individuals often require more intricate and expensive services compared to those in urban areas where people usually have better access to the healthcare services. This places additional burdens on both the healthcare system and

individuals. Additionally, in many countries, the emigration of healthcare professionals exacerbates the problem of access to services (Brînzac et al., 2023, p. 785; Domagała et al., 2026, p. 2).

Without a precise definition and categorization, it is not possible to study the phenomenon with sufficient precision. This can cause confusion in research and policy debate. Confusion leads easily to incorrect conclusions and, consequently, to decisions that ultimately do not have the desired effect in preventing or mitigating medical deserts, instead, they can have negative impact (Brînzac et al., 2023, p. 785–786; Domagała et al., 2026, p. 2; Flinterman et al., 2023, p. 1). Therefore, it is necessary to take a deeper look into medical deserts as a term and phenomenon.

The term “medical desert” has its roots in the expression “food deserts”. That term is originated in the United Kingdom in 1995 and is much used in the United States and Canada to describe a geographical area where people have limited access to healthy, affordable, and fresh food from shops (Brînzac et al., 2023, p. 785). Even though the medical deserts are not directly comparable to the food deserts, knowing the definition of food deserts can help to understand medical deserts.

Medical deserts is a relatively new term in Europe. It is mainly used in France to describe geographical areas where the citizens have limited access to healthcare services. The reasons for insufficient access are usually a shortage of healthcare service providers, a long distance to the closest healthcare service point and a length of waiting times to see a health professional such as a nurse or a doctor. It is noticeable that the term "deserts" refers to various medical specialties or services, such as maternity care or surgical services, and primary care or advanced medical care. Overall, medical deserts can be seen as a question of coverage, whether the service network covers the residents of the area or whether part of the population remains in a kind of shadow area (AHEAD, 2022b, p. 8–10; 10; Brînzac et al., 2023, p. 785; Marcec et al., 2023, p. 1).

Alternative terms used in the literature include “medically underserved areas”, which refers to areas with a low number of health professionals, and “medically underserved populations”, which refers to groups that do not have sufficient healthcare personnel to meet their needs in each area. These definitions are united by a perspective that focuses on health workforce. However, it is noteworthy that these definitions do not cover economic, social, or cultural barriers as factors contributing to limited access to healthcare (Brînzac et al., 2023, p. 785).

The World Health Organization (WHO) as well recognizes the phenomenon of medical deserts. It has defined them as underserved areas, which means the remote and rural areas where the access to the quality healthcare is lacking for certain reasons, such as a shortage of qualified healthcare providers. Insufficient number of qualified health workforce in these areas impacts negatively for a significant part of the population in a national and international level. It also slows down the progress of achieving the development goals and it calls into question the goal of health for all (WHO, 2010, p. 7; Flinterman et al., 2023, p. 1–2).

As it can be seen above, medical deserts include a geographical meaning. The geographical meaning of the concept poses challenges for its use in all countries since the geographical characteristics can be very different in each of them. In some places, the remote and rural areas (which are also underserved areas) are made up of mountains, while in others they are made up of islands. Sometimes the actual geographical features do not isolate an area, but for one reason or another, the population density is low, in which case the area is also called a remote area (WHO, 2010, p. 9; Flinterman et al., 2023, p. 1–9).

Also, the distances are very different in the countries, and the desired distance to health services varies between them. For example, the distances in Belgium are relatively shorter than in larger countries such as Norway or Finland. Thus, when referring to rural areas, it does not automatically imply that these are poorly served or disadvantaged

areas. However, rural areas are comparatively often underserved and personnel shortages are often the first to be noticed (AHEAD, 2022b, p. 9; Bes et al., 2023, p. 8).

It is also noticeable that the geographical meaning does not only mean the distances and the geographical characteristics. In many countries, such in Italy, the geographical aspects reflect the economic and social imbalance between the different geographical locations. For instance, in Italy, there is a markable imbalance between the south and north in almost all demographic and health indicators. Italy has 20 administrative regions, which are remarkably different from each other when considering their size, population, economy and geographical features (AHEAD, 2022a, p. 6). This example aims to highlight the fact that rural and remote areas are often not only far from other parts of the country but also lack resources and other desirable characteristics.

Although medical deserts are often associated with certain geographical features described above, the literature notes that medical deserts can also exist in areas with high population density and central geographic location. For example, in Paris, certain areas meet the characteristics of medical deserts when considering the number of general practitioners per 1,000 inhabitants (Gautier et al., 2024, p. 1).

The ROUTE-HWF Project (2023, p. 16) has defined and measure medical deserts by approaching them with four factors. Two of the factors deal with the demand for healthcare, and two deal with the supply of healthcare in each area. All four factors are defined on the list below.

- Factor 1: Percentage of the population aged 65 and over, which describes the proportion of inhabitants aged 65 and over living in the area. The value is compared to the national average. This factor is related to demand.
- Factor 2: Economic resources of the population, which describes the proportion of inhabitants of the area that is living under the poverty line. The value is compared to the national level. This factor is related to demand.

- Factor 3: Travel time to health facilities, which describes the percentage of the population of the area living within 15 minutes from the hospital. This value is also compared to the national average. This factor is related to supply.
- Factor 4: Population-provider ratio, which describes the proportion of health workforce working in the area. This value is compared to the national average. This factor is related to supply.

The factors presented above allow the area to be examined using the taxonomy developed by the project. The taxonomy includes five different types of medical desert. If at least three of the four factors apply to an area, the area can be classified as a medical desert. Depends on which factors can be seen in the area, the type of the medical desert can be defined. Even if only one target is identified in an area, it cannot yet be determined that the area is a medical desert (ROUTE-HWF Project, 2023, p. 16; ROUTE-HWF Project, 2024, p. 1–9).

To understand desertification as a process, it is important to understand their drivers. The taxonomy presented by the project approaches medical deserts through these drivers, determining whether they are on the demand or supply side of the healthcare system. Based on the taxonomy, it is known that these demand and supply side factors always interact with each other. By identifying the types of medical deserts with the help of the taxonomy, appropriate measures can be targeted to the area (ROUTE-HWF Project, 2024, p. 8–9).

Later in this paper in chapter 3, the selected area in Finland will be mirrored to these four objects and assessed through them to see if the area has the characteristics of medical deserts. If yes, through taxonomy, it can be analyzed which types of medical deserts there can be seen.

As it can be seen above, there is not a specific definition for the term medical deserts. Still, to understand what is meant by the term “medical desert” when reading this study, it must be defined as precisely as possible. This study follows the definition of medical

deserts developed by AHEAD (2022b, p. 6). Their definition combines most of the aspects that were described above. Based on that definition, medical deserts refer to the limited access to health services for given the population or a group of it. Access is affected by certain quantitative and qualitative barriers that are interconnected in many ways. These barriers can be physical accessibility, social and political.

Overall, this study focuses on a characteristic feature of medical deserts: the lack of health services and health workforce in remote and rural areas. It should be noted that medical deserts are often a combination of several causes. Age structure, economic resources, distances to access health services, and regional differences in healthcare providers are all factors that contribute to geographical regional disparities. The study recognizes the broad meanings of the concepts. Since the research literature most often includes medical personnel when referring to healthcare personnel, the focus in this study is mainly on physicians.

2.2 Causes

As it is said before, there is a limited access to the healthcare services in rural and remote areas compared to urban areas. Often, the limitation is caused by the lack of the healthcare services and healthcare professionals in those areas. Beside the poor access to healthcare, this leads easily also to reduced health outcomes and health inequalities (AHEAD, 2022b, p. 8–10; Bes et al., 2023, p. 1–2; Marcec et al., 2023, p. 1).

There are several factors that have been noticed to cause the problems with healthcare service availability in medical deserts. One is the challenge to recruit and engage personnel to the rural and remote areas. In this paper, the factors that cause these challenges are divided as following: work-related factors, lifestyle-related factors, socio-demographic factors and migration as Flinterman et al have presented (2023, p. 5–6). Even if this division is not widely used in studies, the factors that are mentioned in other

literature follows it often. Considering the literature related to this topic, this division can be seen as justified**.**

The main factors causing medical deserts

1. Work-related factors
2. Lifestyle-related factors
3. Migration
4. Socio-demographic factors
5. Other factors

Research has identified various work-related factors that can impact medical deserts and issues related to healthcare workforce availability in negative ways. One of these factors is increased workload. Increased workload is frequently cited in rural areas and is seen as a concerning issue. This has been seen potentially discouraging individuals from working in these locations (Bes et al., 2023, p. 2; Flinterman et al., 2023, p. 5; Gautier et al., 2024, p. 2).

Working conditions are other factors that can have negative effects on decision to work in rural areas, depending on the personal preferences of the healthcare workforce. Among other things, whether you work alone or in a team, or whether you choose to work full-time or part-time, will affect how you perceive your working conditions. However, it should be noted that these aspects can contribute both positively and negatively the willingness of finding employment in a rural and remote areas (Flinterman et al., 2023, p. 5).

Other considerations include job availability, turnover rates, lack of intellectual stimulation, such as opportunities for research or specialized care, expectations for professional specialization, and personal traits, all of which can negatively influence the decision to work in rural locations (Bes et al., 2023, p. 2; Flinterman et al., 2023, p. 5).

Furthermore, the studies have highlighted the financial concerns, such as inadequate financial compensation, job security, and financial incentives as negative factors that can cause career decisions that do not lead working in rural areas. Additionally, limited career advancement opportunities, insufficient support for professional and educational development, professional isolation, and inadequate access to healthcare resources have been identified as negative factors associated with working in rural settings (Bes et al., 2023, p. 2; Flinterman et al., 2023, p. 5).

The literature has also identified other than work-related factors that negatively influence the recruitment and retention of health professionals in medical deserts. Studies have explored lifestyle-related factors that could impact this phenomenon. These factors are often related to the family considerations, such as the ability to find employment for a spouse and access to quality education for children, and have emerged as significant factors in several studies, reducing the inclination to work in rural areas. However, it is important to note that family considerations may also have a positive impact on the phenomenon of health workforce availability (Bes et al., 2023, p. 2; Flinterman et al., 2023, p. 6).

Social disconnection, limited access to amenities like recreational activities have also been identified as pertinent lifestyle-related factors that adversely affect the willingness to work in rural settings. Beside these factors, the anonymity has also mentioned in studies as a relevant lifestyle-related factor that decreases willingness of working in rural areas (Bes et al., 2023, p. 2; Flinterman et al., 2023, p. 6).

The third group of factors mentioned in literature is migration. International migration among the health workforce is an ever-growing phenomenon, driven by various labor market factors, the most significant of which are education, working conditions and salary. The assessment of its impact depends on the perspective, as increasing international recruitment from low- and middle-income countries to fill domestic shortages in high-income countries certainly helps the destination country, but at the

same time it can exacerbate personnel shortages and weakens the healthcare services in the country of origin. If international mobility and migration of the health workforce is not adequately managed, it can weaken national health systems in countries of origin and thus, increase inequalities around the world (Bes et al., 2023, p. 8; Joshi et al., 2023, p. 960–961; WHO, 2024).

Often, the main motive for leaving from the country origin is education or the acquisition of new skills in the destination country, even though other reasons have recognized in the studies as well. Together, these factors undermine access to healthcare for citizens of low- and middle-income countries, which usually are the country of origins for migrating healthcare workforce, even though these countries often have a higher burden of disease. Also, the transfer of wealth is twisted, with destination countries saving on education costs while the country of origin loses the investment made in providing education to these professionals (Joshi et al., 2023, p. 960–961).

In Europe, migration has been seen as a factor that causes medical deserts. Paradoxically, it is also a way to mitigate them, as presented in the following subsection. As a cause for medical deserts, it has mainly been observed in Eastern Europe, such as Romania. However, this factor has not emerged significantly in the studies. The finding is probably specific to Romania or a country with same special features, which are known as a typical country of origin for cross-border mobility of health workforce (Bes et al., 2023, p. 8; Flinterman et al., 2023, p. 6).

In countries like Finland, where the population will decrease heavily, already struggles with workforce, especially in rural areas. The same trend can be seen all over Europe. This is more about migration towards growth centers and cities. The challenges facing rural areas are largely due to demographic changes that are not favorable for rural areas, unlike urban areas. The migration of young people to cities, the stagnation of the working-age population and the ageing population pose major challenges for remote

areas (Kestilä & Karvonen, 2022, p. 23; Tikka & Moisio, 2021, p. 41). The literature identifies both domestic and international migration as causing medical deserts.

Finally, some studies have indicated that socio-demographic factors and other characteristics of healthcare workforce may also play a role in career decisions, thereby influencing workforce issues in medical deserts. Age is one of the factors that is affecting healthcare workforce turnover in rural areas. Some studies have shown that the retirement of older healthcare workforce members in rural settings has not been offset by the influx of younger healthcare workers, as they tend to prefer growth centers (Flinterman et al., 2023, p. 6).

The existence of medical deserts is partly influenced by the attitudes of healthcare professionals toward working in such areas. Research has indicated that medical students' perspectives on working in medical deserts are impacted by factors such as their personal attributes, socioeconomic status, possible minority status and educational background (Marcec et al., 2023, p. 1). Attitudes can be considered as a separate factor in why certain more remote areas suffer from workforce shortages. However, attitudes are linked to the background of individuals and to sociodemographic factors.

The literature has shown that, regardless of gender, a significant proportion of medical students were willing to work in areas with a shortage of doctors, but only for a limited period. Parents' occupation, upbringing and growth environment are factors that have been found to influence students' attitudes toward working in medical deserts. For example, students whose parents were working in other fields than in healthcare sector showed more willingness to work in rural settings. Students who grew up in rural areas are also more likely to seek employment in areas with a shortage of health professionals than students from urban areas (Flinterman et al., 2023, p. 6; Marcec et al., 2023, p. 1).

As seen above, the reasons for inadequate health services in certain areas are often related to challenges in the availability and retention of health workforce. These

challenges are driven by a diverse set of factors. They need to be approached from a slightly different perspective, as measures such as reducing workload and emigration require the actions of different institutions and actors. The next sub-chapter reviews interventions to mitigate medical deserts.

2.3 Policy solutions

Most European countries have sought to ensure the coverage of health services throughout the country to ensure healthcare for all citizens. The most common priority is to ensure the capacity of general practitioners in primary healthcare, as they often act as gatekeepers to specialized medical services. In addition, general practitioners are typically the first point of contact in primary healthcare services, such as healthcare centers. However, countries have not managed to tackle medical deserts completely (Bes et al., 2023, p. 2). Next, the interventions that have been most frequently reported to alleviate the shortage of healthcare professionals in medical deserts will be reviewed.

Measures to mitigate medical deserts are typically related to professional and personal support and education. This is observed despite insufficient evidence supporting their effects. Studies have found that instead, financial and regulatory measures have had an impact on mitigating medical deserts. Among other things, financial bonuses, mandatory placement laws and capitation payments have improved the more even geographical distribution. It should be noted, however, that identifying best practices has so far been challenging, as studies have rarely considered or assessed the combined effects of measures or other confounding factors (Bes et al., 2023, p. 7).

The most reported interventions to mitigate medical deserts:

1. Education
2. Working conditions
3. Financial interventions
4. Regulatory interventions

Several countries have reported on the introduction of a rural-specific component in the curriculum, which is expected to alleviate the shortage of health professionals in rural areas. In the literature, this approach has been linked to the WHO and the European Commission, which have highlighted *rural curriculum*. Furthermore, changes to the curriculum have been seen as less demanding in terms of resources, especially when compared to the idea of establishing rural medical faculties. In practice, a rural curriculum would mean including a rural course in medical studies. During this period, medical students would be introduced to the specificities of rural healthcare (Bes et al., 2023, p. 2–8; Flinterman et al., 2023, p. 6; WHO, 2010, p. 7–9).

Other educational solutions mentioned in the studies include rural clinical rotations included in bachelor's degrees, rural student recruitment programs, and assessing personal interest of the students in rural medicine, as it has been found that those who grew up in rural areas or, for example, due to the studies spent their time there for longer time are more likely to work in rural areas. The measures focus on recruiting students interested in rural healthcare and providing training in rural departments, with the aim of encouraging these students to apply for jobs in rural healthcare in the future (Bes et al., 2023, p. 8; Flinterman et al., 2023, p. 7; Marcec et al., 2023, p. 1).

Continuing education also comes up in the studies. Maintaining professional skills after graduation is important, but in rural areas this should be focused on the specific characteristics of rural working life. Postgraduate training, mentoring programs and continuing medical education strategies are needed, and it should be adapted to the scope of rural practice (Flinterman et al., 2023, p. 7; Gautier et al., 2024, p. 1–2).

In literature, it has also been identified numerous personal and professional support interventions aimed at enhancing working conditions. Various factors indirectly influence job satisfaction in rural settings, such as manageable workloads, professional support systems, and the perception of a respected profession. Addressing these issues could potentially extend physicians’ careers or postpone their retirement. This will

simultaneously pave the way for future work for the benefit of younger generations, as future generations of doctors will emphasize the importance of a healthy work-life balance more than previous generations (Bes et al., 2023, p. 8; Flinterman et al., 2023, p. 8).

When considering solutions to improve the working conditions of personnel in rural and remote areas, the term telemedicine comes up in the literature. Telemedicine involves providing healthcare services remotely through the utilization of information and communication technologies. This facilitates the exchange of accurate information among healthcare professionals for purposes including related to patient care and personnel education. Research suggests that telemedicine holds promise as a strategy to alleviate workload burdens and improve general practitioners' retention both generally and in rural and remote areas (Bes et al., 2023, p. 8; Flinterman et al., 2023, p.8–9; Khemapech et al., 2019, p. 247).

Providing digital services is a way in which the professional can work physically somewhere else, but the customer can still get the service that they need. It has been seen that especially remote consultations with physicians have had a high demand in the recent years (Butcher & Hussein, 2022, p. 114–115). It is important to notice that the digital services cannot replace the physical ones completely, instead they are an alternative alongside them, complementing the service network.

Financial interventions have also been used to alleviate the challenges of staff availability in regions. The evaluation of the effectiveness of financial incentives has found limited and partly contradictory research results. They are mainly effective for trainees from rural areas, and even then, in combination with other interventions, such as flexible career opportunities and longer mandatory service periods. This suggests that financial incentives alone are not sufficient to encourage physicians to move to remote areas (Bes et al., 2023, p. 7–8; Ozegowski, 2013, p. 151–158).

Capitation compensation refers to compensation paid for a client. The payment received by the service provider is based on the client's characteristics. When the client's expected need for services is high, the capitation fee is also higher. The amount of the payment is therefore not necessarily the same for every client. The scope of services, for example, whether all primary health care and specialized medical care services are covered also affects the amount of the payment (Häkkinen et al., 2019, p. 8).

In the literature, capitation fees are considered an effective way to combat oversupply, especially for general practitioners, because in a capitation fee system they are rewarded specifically according to the number of clients they are responsible for. The population of the area therefore limits the earning potential of general practitioners. In addition, capitation fees can prevent the geographical concentration of general practitioners, which supports a more even and therefore fairer distribution of medical resources (Ozegowski, 2013, p. 153).

However, the literature has identified certain conditions as prerequisites for the effectiveness of capitation fees. First, capitation fees are more effective in healthcare systems where the general practitioner acts as a gatekeeper for services, so the client must first seek care from a general practitioner in order to receive services. Capitation fees can also be more effective in systems with a high doctor density, where oversupply limits the income potential (Ozegowski, 2013, p. 153).

A factor found in studies that is also loosely related to financial interventions is international recruitment. It has been addressed to some extent in studies outside Europe. In general, higher wages in neighboring countries have an impact to that. It has been noticed that the migration of medical students or general practitioners to rural areas is mainly due to the more prosperous countries of Western Europe, where it is possible to earn higher salaries than in their home countries. The literature has stated that bilateral or multilateral agreements in international recruitment may be a solution mitigate the health workforce shortage in the host country, but cause problems in the country of origin (Bes et al., 2023, p. 8; Joshi et al., 2023, p. 960–961).

By taking advantage of this migration, health workforce shortages can be partly filled in receiving countries. However, solutions have been seen in the literature as effective mainly in the short term. It is unclear how such measures to retain talent (in this case physicians) will affect cost-effectiveness (Bes et al., 2023, p. 8).

Regulatory interventions are not as often reported in the literature as other interventions that were mentioned below. Some of them can also be considered as educational or financial interventions. Also, the effectiveness of them is not shown clearly. However, a few countries such as France, Norway and Turkey have tried some, and the possibility to regulatory interventions is discussed every now and then in European countries (Bes et al., 2023, p. 4–8). Therefore, regulatory interventions have been chosen to be brought up here.

Increasing the number of medical student places is one reported way to increase the number of doctors. However, it has been found that this has little effect on the geographical distribution of physicians. For example, in Portugal, despite an annual increase in the number of doctors per capita, increasing quotas did not lead to an improvement in the regional distribution (Bes et al., 2023, p. 4–8).

In addition to increasing training quotas, the literature has also identified measures that limit the number of healthcare personnel. Reducing the number of licensed general practitioners in remote areas is one measure that aims to influence the geographical location of doctors. Additionally, regulations have limited the number of customers per doctor to keep the workload manageable (Bes et al., 2023, p. 4).

A few examples of countries that have used regulatory measures to reduce medical deserts have been mentioned. The governments in France and Norway decided to introduce co-financing of the costs of setting up primary healthcare teams to promote primary healthcare. Portugal, on the other hand, has bilateral agreements in place that

allow foreign general practitioners to work in its primary healthcare centers in rural areas (Bes et al., 2023, p. 4).

So far, very few countries in Europe have regulations related to compulsory placement, but it has been explored as an option. In Turkey, the mandatory placement law was introduced in 1980, which requires general practitioners to complete a two-year service in a certain area determined by the authority. This has led to a brisk improvement in the distribution of general practitioners in Turkey (Bes et al., 2023, p. 4–8). However, literature does not recognize other similar regulation in Europe.

When looking at the different types of interventions in the literature, financial and regulatory interventions (such as capitation fees and mandatory placement law) can be seen as the most effective means, but the applicability of the findings to broader contexts is uncertain, as there have been relatively few studies on the topic. The results of many studies are also very country and context dependent. In addition, medical deserts are defined differently in Europe, which affects the interpretation of the results (Bes et al., 2023, p. 7–8; Flinterman et al., 2023, p. 10; Ozegowski, 2013, p. 158).

Overall, it has been found that the methods presented above alone do not necessarily lead to better coverage of the healthcare services. Decisionmakers should be aware of the factors that support the development of an effective interventions but also understand that many of them are not effective on their own (Bes et al., 2023, p. 8; Flinterman et al., 2023, p. 6–10). Overall, these methods that have emerged from the literature can be useful, but they need to be supported by other measures.

3 Case study

The country that is chosen for the case study for the closer observation is Finland. Since the national level would have been too broad considering the scope of this study, the observed area is narrowed. In Finland, the next administrational level is regional. Therefore, the chosen area here is the Wellbeing Services County of Pirkanmaa. Regionally, when talking about the Wellbeing Services County of Pirkanmaa, the region of Pirkanmaa is also meant.

In this chapter, first, the geographical and socio-demographic characteristics of Finland are examined. Also, the public healthcare system is presented before deepening to the regional observation. Before presenting the collected data, Pirkanmaa is presented as an area and as an organization. The collected data as well as the analysis based on that is presented here.

3.1 Geography and socio-demographic of Finland

Finland is one of the largest European countries in terms of area with its 338,424 square kilometers (Statista, 2026). Considering the size, population density and a northern location of it, it is quite clear that the geographical distribution of residents varies greatly within the country. Finland is more densely populated in the southern and western parts, while the sparsely populated areas are located in the north and east (Statistics Finland, 2026).

According to statistics, population migration has been concentrated in certain urban areas over the past decade, and the trend is expected to continue in the same direction in Finland. Migrants are mainly young and educated. Growth centers will therefore continue to enjoy favorable demographic trends, while municipalities suffer from decreasing birth rate and working-age population, aging population and migration losses. Shortly, the population movement in Finland therefore strengthens already strong areas

and weakens already weak areas (Kestilä & Karvonen, 2022, p. 29; Tikka & Moisio, 2021, p. 41).

As it is mentioned above, in Finland, the biggest growth centers are in the southern and western parts of it. Although individual examples show that a northern or eastern location does not automatically make an area vulnerable to migration, these locations are less densely populated, and people leave them more often than they move into them. Demographic changes are not seen to ease the situation: in recent decades, net migration of young adults has occurred from rural areas to cities, while net migration of working-age people has remained at zero (Tikka & Moisio, 2021, p. 41).

In Finland, demographic developments are challenging the healthcare system in many areas. Low birth rates and an ageing population are putting pressure on the healthcare services. An ageing population requires labor-intensive care, which means a high need for health workforce. As the number of working-age population does not increase, it is appropriate to consider where the workforce will be obtained. On the one hand, the need for workforce in the healthcare sector poses its own challenges, as workforce is diverted to healthcare, availability in other sectors will weaken. In addition, the projected growth in income transfers and the decline in tax revenues are challenging public finances (Honkatukia & Vaittinen, 2022, p. 333; Kestilä et al., 2023, p. 51; Kestilä & Karvonen, 2022, p. 27–29).

These phenomena create pressure to improve the efficiency of healthcare services and at the same time to reduce them. The literature recognizes that the current population forecast does not necessarily provide enough working-age population, which is why the service structure needs to be reviewed. Forecasts show that the population's need for health services and, additionally, the need for the sector's workforce will grow significantly in the current and coming decades. The phenomenon is therefore not just in the future, but already a reality of our time (Honkatukia & Vaittinen, 2022, p. 333; Kestilä et al., 2023, p. 51; Kestilä & Karvonen, 2022, p. 27–29).

Immigration has been seen as a key factor to equalize the dependency ratio. In Finland, there are significant regional differences in the proportion of the population with a foreign background. The largest number of people with a foreign background is found in the southern parts of Finland, while the smallest number is found in the northern and eastern parts (Honkatukia & Vaittinen, 2022, p. 335; Kestilä & Karvonen, 2022, p. 26). The benefits of immigration do not therefore apply to all of Finland.

3.2 Healthcare services in Finland

In Finland, public primary and specialized healthcare is provided by 21 wellbeing services counties (WBSCs) and the City of Helsinki. The responsibility for organizing social, healthcare and rescue services transferred to them in January 2023 due to a major structural reform. Before, these services were organized by over 200 municipalities and the joint municipality authorities. The division of WBSCs is based on the division of regions in Finland. The exception is the region of Uusimaa, which is divided into four wellbeing services counties. In addition, the City of Helsinki is responsible for organizing social and health services and rescue services in its area. HUS Group is responsible for separately regulated demanding specialist medical care services (Leppänen et al., 2024, p. 26–27; OECD, 2023, p. 9).

The WBSCs has the autonomy in their areas as they are separated from both the municipalities and the state. The highest decision-making authority in the WBSCs is a county council which controls activities and finances of the organization. Councilors are selected in county elections every four years. Unlike municipalities, the WBSCs do not have the right to levy taxes. Their funding is therefore based on the state budget. The WBSCs can decide for themselves how to allocate the funding they receive to their activities. In addition, they have the right to charge customer fees. Compared to municipalities, the finances of WBSCs are under stricter control due to their funding

system (Leppänen et al., 2024, p. 27–508; Ministry of Social Affairs and Health, 2026a; Pirha, 2025; OECD, 2023, p. 9).

The aim of the reform was to centralize responsibility for organization so that the service structure would be harmonized and inequalities in health and wellbeing would be narrowed. In addition, cost growth needed to be contained (Leppänen et al., 2024, p. 26–27; Ministry of Social Affairs and Health, 2026a; OECD, 2023, p. 9).

The general conditions for the planning and implementation of social and health services in WBSCs are laid down in law. According to it, social and health services must be organized in such a way that the content, scope and quality of the services take into account the needs of the clients, the services must be equal, the service packages must be coordinated, the needs of the population in the area close to them are taken into account and the accessibility of the services is ensured (Leppänen et al., 2024, p. 117).

The service package must be functional for customers. Cooperation between different service providers must be smooth and the transition from one service to another must take place without unjustified delays or interruptions. In addition, the WBSCs must secure local services, which mean services that customers use often and that at least some of them use repeatedly. Often, from the customer's perspective, local services are basically close to the everyday environment (Leppänen et al., 2024, p. 117–119).

However, local services can also be provided in other ways, for example as services provided at home, electronic services or moving services. The literature notes that no kilometric or time series have been set for the accessibility of services, even if consideration must also be given to factors such as distances and customer fees in the region. This is due to the different conditions in the WBSCs. Local services must therefore be defined according to the needs and circumstances of the residents of each WBSC (Leppänen et al., 2024, p. 117–119).

In Finland, all residents are covered by the public healthcare system. In addition, those in employment are covered by occupational healthcare. Employers are obliged to arrange occupational healthcare for their personnel. In addition to statutory preventive services, employers can arrange medical care and other health services if they wish. The majority (over 85%) of employees therefore receive primary healthcare services through occupational healthcare in addition to the public system. Statutory, preventive occupational healthcare is free of charge for its user (employee), and it often offers rapid access to services (Ministry of Social Affairs and Health, 2026b; OECD, 2023, p. 9).

For employees, occupational healthcare is primarily funded with mandatory earned income insurance contributions collected from employers as well as with employer client fees. However, the earned income insurance contributions are partly collected from employees as well. The Social Insurance Institution of Finland (KELA) partially reimburses the employer for the necessary and reasonable costs of occupational health care under certain conditions (Occupational Safety and Health Department at the Finnish Supervisory Agency, 2026; Turunen, 2020).

3.3 The Wellbeing Services County of Pirkanmaa

The Wellbeing Services County of Pirkanmaa (later Pirha) is located in the southwestern part of Finland. The geographical borders of Pirha correspond to the borders of the Pirkanmaa region. In 2025, the population of the region was nearly 549 000 which makes it the largest WBSC by population in Finland. As a region, Pirkanmaa covers 23 municipalities and Tampere, the largest city in the region, is one of growth centers in Finland (Pirha, 2025b; Statistics Finland, 2026).

The area no significant elevation differences in Pirkanmaa region, and its central location in the southern half of Finland ensures reasonable distances to other growth centers (Tikkanen, 1994, p. 182–183). It is therefore not an isolated area in terms of geographical features. However, differences in population density are shown by more rural

municipalities within the region. In the picture below (**Figure 1**) can be seen all the municipalities of Pirkanmaa and how they are located on the map. The picture also shows where Pirkanmaa is located on the map of Finland.

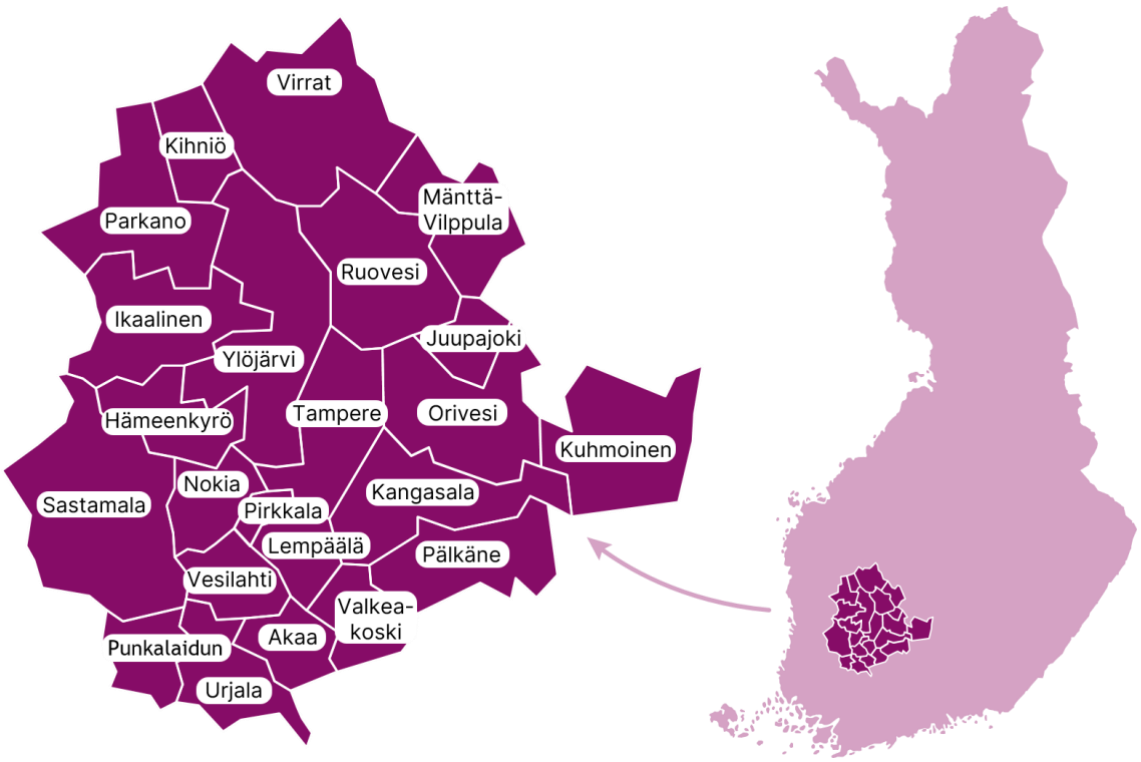

Figure 1 Municipalities of the Wellbeing Services County of Pirkanmaa (Pirha, 2025b).

As it can be seen in the chart below (**Figure 2**), population density (inhabitants per square kilometer) varies significantly within the region. The absolute highest population density is in Tampere (500,5) and some of its surrounding municipalities such as Pirkkala, Nokia, and Lempäälä which locate on the southern Pirkanmaa. The lowest population density is in the municipalities such as Kuhmoinen and Kihniö that locate in the edge of the region in the north and east (Statistics Finland, 2026).

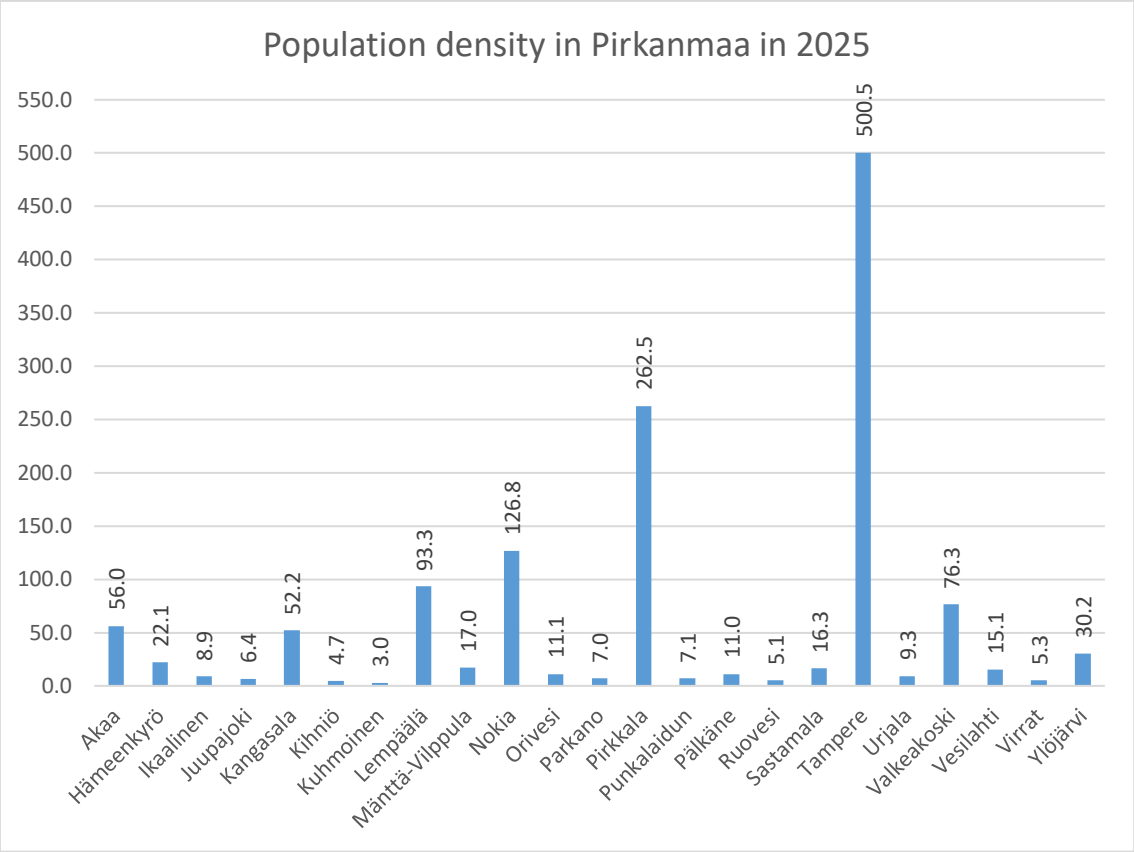

Figure 2 Population density per municipalities in 2025 (Statistics Finland, 2026).

As on organization, Pirha is one of the largest employers in Finland with approximately 21,000 employees (Pirha, 2025b). As mentioned above, in Pirkanmaa region there are approximately 549,000 inhabitants which means that Pirha provides social, healthcare and rescue services for all of them. In addition, as explained later in the text, it offers specialized healthcare services to an even wider customer base. The budget of Pirha for 2026 is nearly 3 billion euros, of which 2,6 billion is the government's share and the rest comes from customer fees and other operating expenses collected by the WBSC (Pirha, 2025b; Pirha, n.d.).

As a result of the WBSC reform, one of Finland's five university hospitals, Tays, became part of Pirha. It provides specialized healthcare to a wider population than just the residents of the area. Tays offers treatment, research and expertise in almost all medical specialties. In total, Pirha has four hospitals, Tays Central Hospital, Tays Hatanpää

Hospital that locates in a district of Tampere, Tays Sastamala Hospital and Tays Valkeakoski Hospital (Pirha, n.d.).

Pirkanmaa's service points are divided into three different types: social and health centers, local service center and local service points. Each municipality in Pirkanmaa has one of these service point types (Pirha, 2026a). Pirha has 20 social and health centers. Social and health centers offer basic health services, such as doctor and nurse appointments, physiotherapy, mental health and substance abuse services, as well as dental care and social services. Those stations located in hospital areas also offer special expertise and equipment to a wider group of Pirkanmaa residents (Pirha, 2026a).

A local service center refers to a service point that offers basic social and healthcare services. The range of services is therefore narrower than at social and health centers. The services and their scope vary according to the needs of the area. The services that a customer cannot get from a local service center are available from a social and health center (Pirha, 2026a).

In addition to the service points mentioned above, Pirha also has local service points. These offer services for non-urgent care. Service hours are shorter than those of social services and local service centers, for example on certain days of the week or month. The services of local service points are aimed at those residents of the area who find it more challenging to travel to other service points or use digital services (Pirha, 2026a).

In addition to physical service points, Pirha has extensive digital services. The Digital Clinic offers a remote access to the health services. Currently, it offers access to treatment needs assessments and remote consultations with doctors and nurses. The Digital Clinic acts as a messaging service, which also allows customers to send pictures. If necessary, a professional can also open a video connection. If the matter cannot be handled at the Digital Clinic, the customer will be directed to professionals at their own health center (Pirha, 2026a).

Urgent care is divided into different locations in Pirha. Social and health centers treat symptoms and injuries that require treatment either immediately or within a few days. Urgent care is available on weekdays from the customer's own social and health center, and on weekends and holidays from centralized emergency services. The centralized emergency services are located in Nokia, Sastamala, Hatanpää in Tampere, Virrat and Ylöjärvi (Pirha, 2025a).

Pirha has one 24-hour emergency department. Tays Acuta locates in Tampere, in Tays Central Hospital. It treats those patients whose examination or treatment cannot wait until the next working day, whose delay in treatment could cause permanent harm to the patient's health and patients with life-threatening conditions (Pirha, 2025a).

Like other WBSCs, Pirha's operating environment also faces challenges that stem not only from the structural reform but also from national decisions. The 2024 annual report states that the financial situation and operational changes have required several change negotiation processes. In 2024 alone, four extensive change negotiation processes were held in Pirha (2024, p. 7). The tightened financial conditions will inevitably affect the service structure, although not only in a weakening way.

3.4 Key indicators for identifying medical deserts in Pirkanmaa

This sub-chapter presents the key indicators for identifying a medical desert in Pirkanmaa. In this context, the area of Pirkanmaa also geographically covers the Wellbeing Services County of Pirkanmaa. The indicators used here follow the ones that the ROUTE-HWF Project (2023, p. 16; 2024, p. 1–9) has used to aim to identify medical deserts and the type of them. On the figure below (**Figure 3**), the indicators and the taxonomy defining five types of medical deserts are presented.

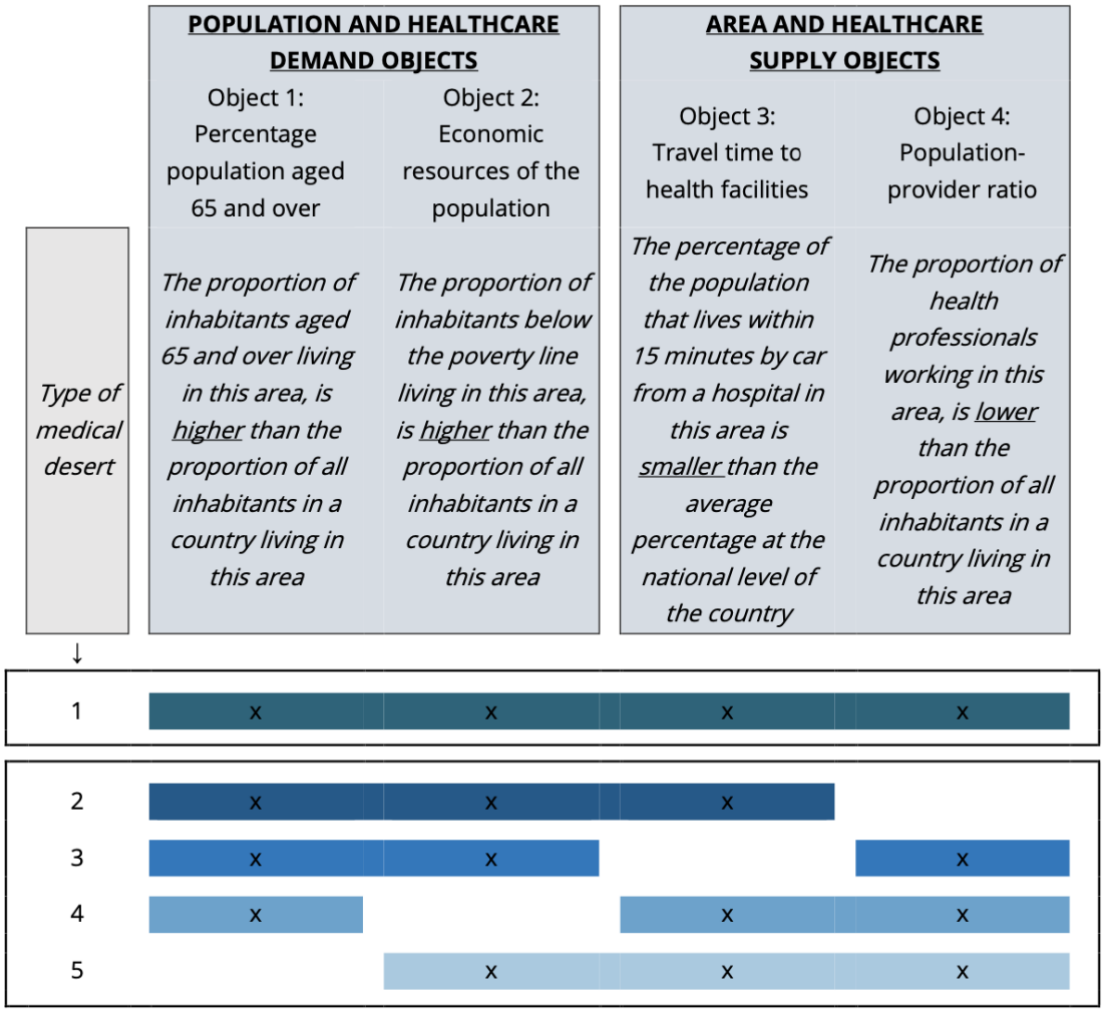

Figure 3 Taxonomy of five types of medical deserts by the ROUTE-HWF Project (2023, p. 16).

The ROUTE-HWF Project recommends four indicators: the proportion of the population aged 65 and over in the area, the financial resources of the population, the travel time to healthcare facilities and the ratio of service providers to the population. The indicators are mirrored to the corresponding figures at the national level. In this study, these indicators have been used, adapted according to the available data. The four indicators used in this study are: the proportion of the population aged 65 and over in the area, the general poverty risk rate, the average travel time to the nearest health center, and number or physicians per 1,000 inhabitants.

The data has been collected form the public databases at three levels: nationally (Finland), by wellbeing services county (Pirkanmaa) and by municipality (municipalities in the Pirkanmaa region). Since not all the indicator and its data was able to be collected from the same database, a few different databases have been utilized. Missing data has been supplemented with other data and material. The most recent data available in databases has been selected for this study.

Factor 1: Percentage of population aged 65 and over

In the chart below (**Figure 4**), the proportion of inhabitants aged 65 and over in the total inhabitants of the area is presented for Pirkanmaa and its municipalities and for Finland. The inhabitants here refer to those persons who, according to the population information system, had a residence in Finland and in region at the end of 2025. Age refers to the person's age in whole years at the end of 2025 (Statistics Finland, 2026).

As it is shown, the proportion of inhabitants aged 65 and over is higher than the average in Finland (23,8 %) in 16 out of 23 municipalities in Pirkanmaa region. The highest percentages are in Kuhmoinen (47,2), Ruovesi (40,8), Kihniö (39,3), Punkalaidun (39,1) and Mänttä-Vilppula (39,1). The average of whole Pirkanmaa (22,6 %) is a bit lower than the national average.

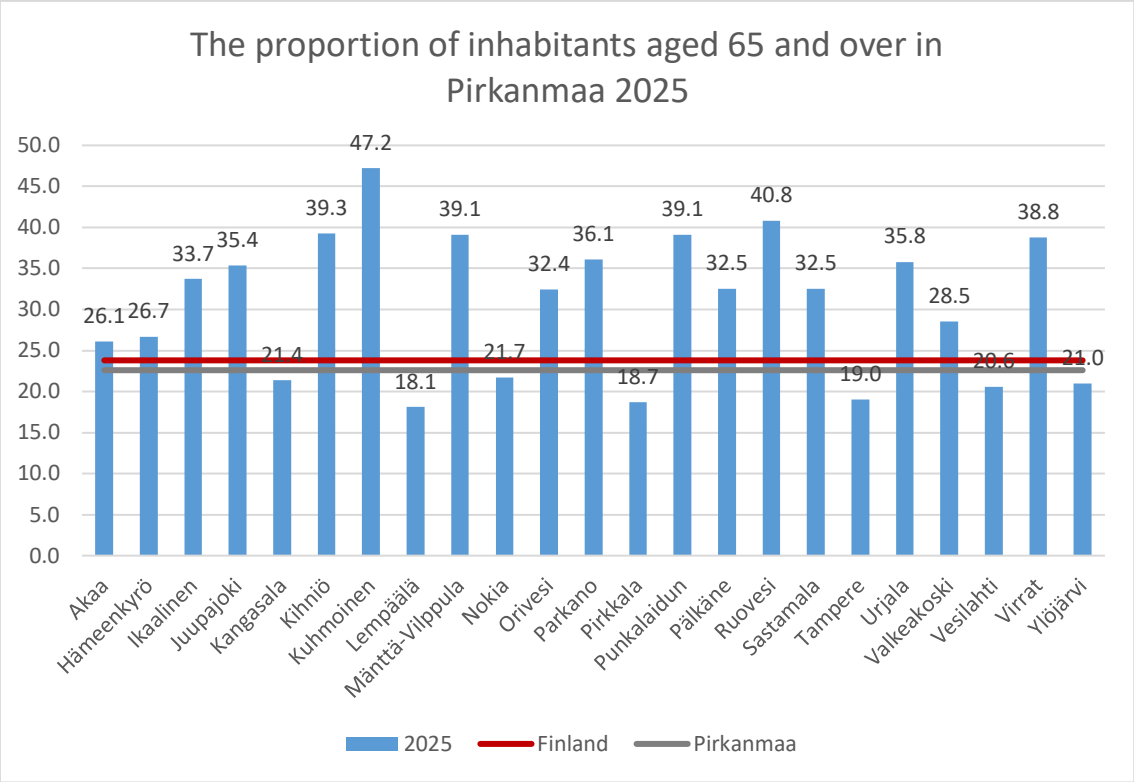

Figure 4 The proportion of inhabitants aged 65 and over living in Pirkanmaa in 2025 (Statistics Finland, 2026).

Factor 2: Economic resources of the population

The indicator examined here for the municipalities of Pirkanmaa is the general at-risk-of-poverty rate. It describes the percentage of persons in the geographical area living in households with incomes below the poverty rate (Sotkanet Indicator Bank, n.d.). The data was collected for Pirkanmaa and its municipalities and for Finland, so that the result is comparable both regionally and nationally.

The at-risk-of-poverty threshold is based on the national income distribution of the entire population and is recalculated annually. This nationally calculated threshold is used in each geographical area. The indicator therefore describes the proportion of low-income people in the area's total population according to the national standard. The income distribution of an area may differ from the national standard, and thus, the

position of a particular population group in relation to the area's own income distribution may also differ from the national standard (Sotkanet Indicator Bank, n.d.).

As it can be seen in the chart below (**Figure 5**), ten out of 23 municipalities have clearly higher at-risk-of-poverty rate compared to the national level (14,2). One of the municipalities, Sastamala, is on the same level with the national value. Additionally, Pirkanmaa is slightly above the national average with the value of 14,6. Rest of the municipalities are above the national average quite clearly.

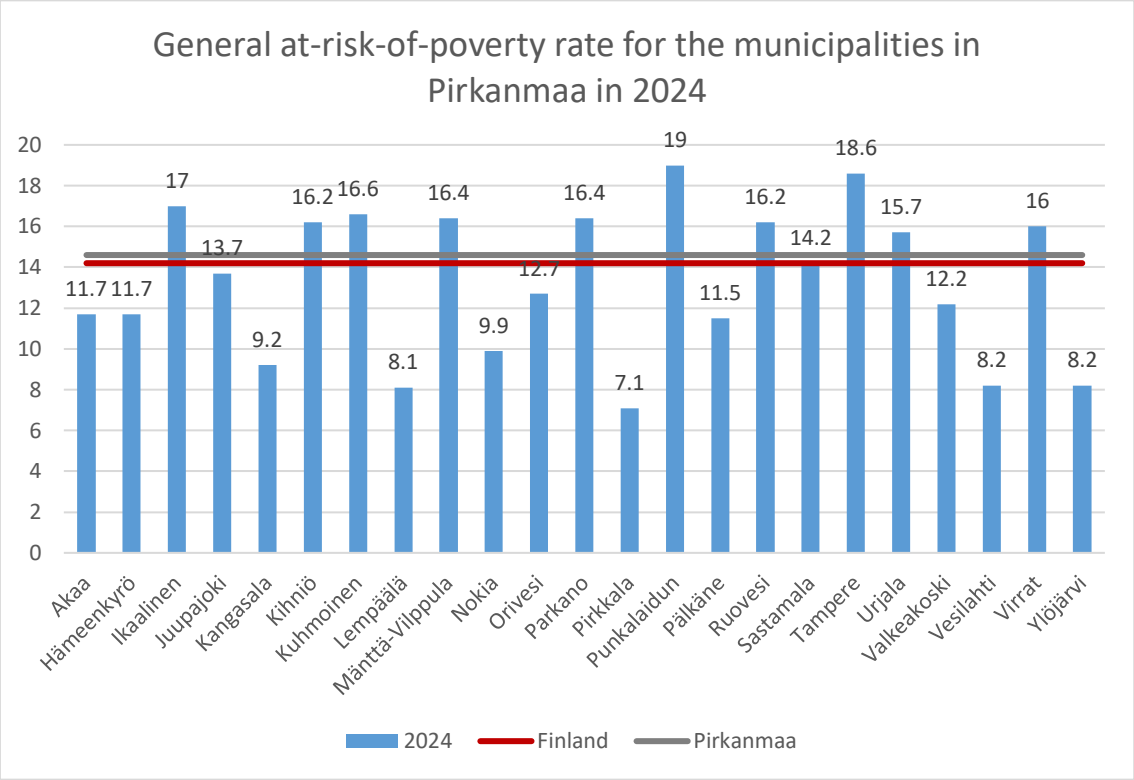

Figure 5 General at-risk-of-poverty rate in Pirkanmaa (Sotkanet Indicator Bank, n.d.).

Factor 3: Travel time to health facilities

The data for this indicator was collected from two services: Eurostat and SoteDatalab. Neither service provided data by municipality. Instead, data was collected by region and WBSCs. Information was collected from the Eurostat service on the proportion of the

population living within a 15-minute drive of a hospital by region. SoteDataLab instead offered data on the average travel time to the closest health center by WBSCs.

In the table below (**Figure 6**), Pirha is among the ten WBSCs with the longest average travel time *to the nearest health center*, with an average of 18,2 minutes. The average in Finland is not available in SoteDataLab service, but the median for WBSCs is 17,5 which is slightly lower than in Pirkanmaa (SoteDataLab, 2025).

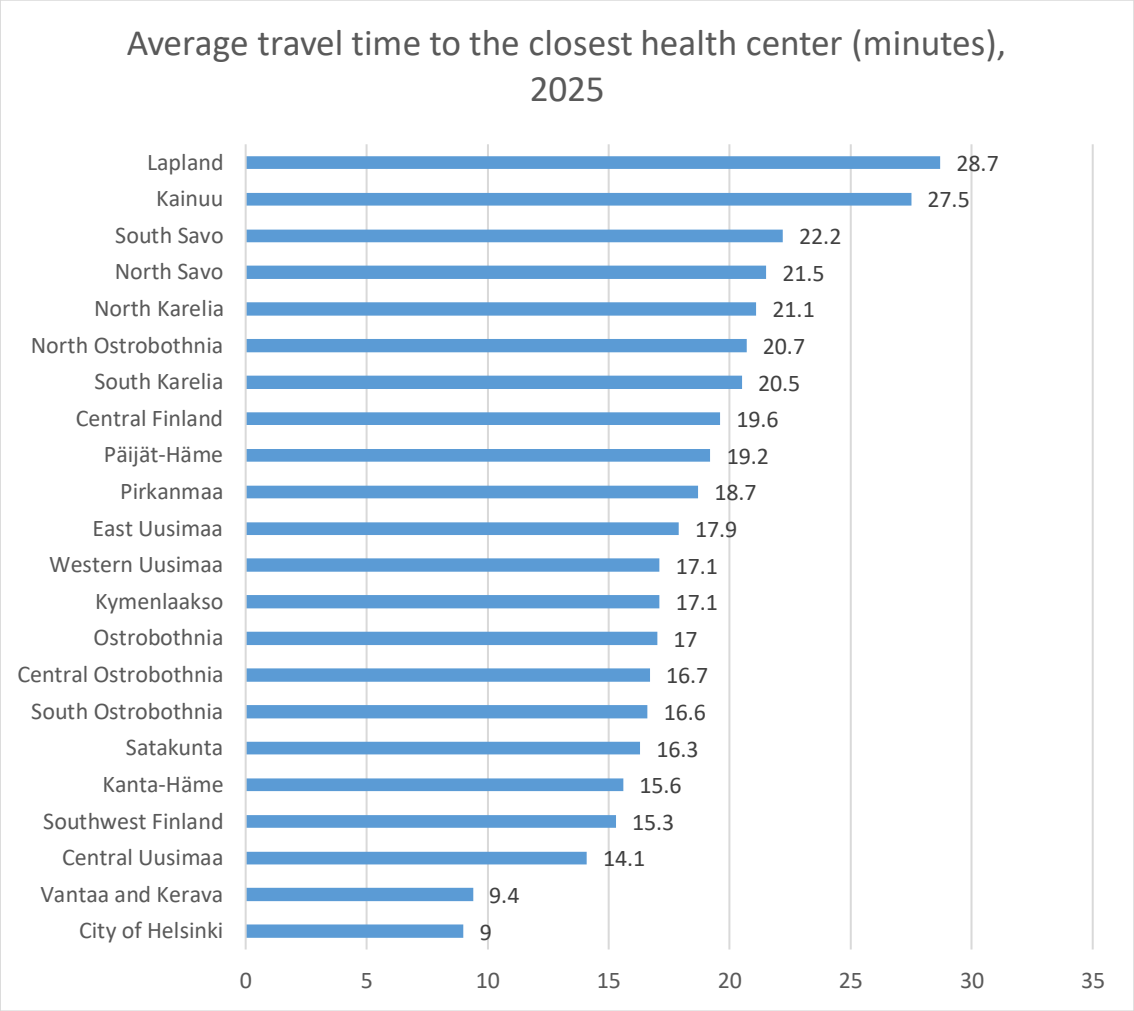

Figure 6 Average travel time to a health center, minutes (SoteDataLab, 2025).

Pirkanmaa has is slightly better ranking in Eurostat statistics (**Figure 7**), which describe the proportion of the population living less than a 15-minute drive away *from the hospital*. Pirkanmaa region has higher percentage (89,7 %) than the average in EU

(83,2 %). It should be noted that the regional division of Eurostat data follows regions, not the WBSCs. However, this does not apply to Pirkanmaa since its boarder follow the boarder of the region. This is visible in Uusimaa instead, since it is divided into several WBSCs in the WBSC division (Eurostat, 2025).

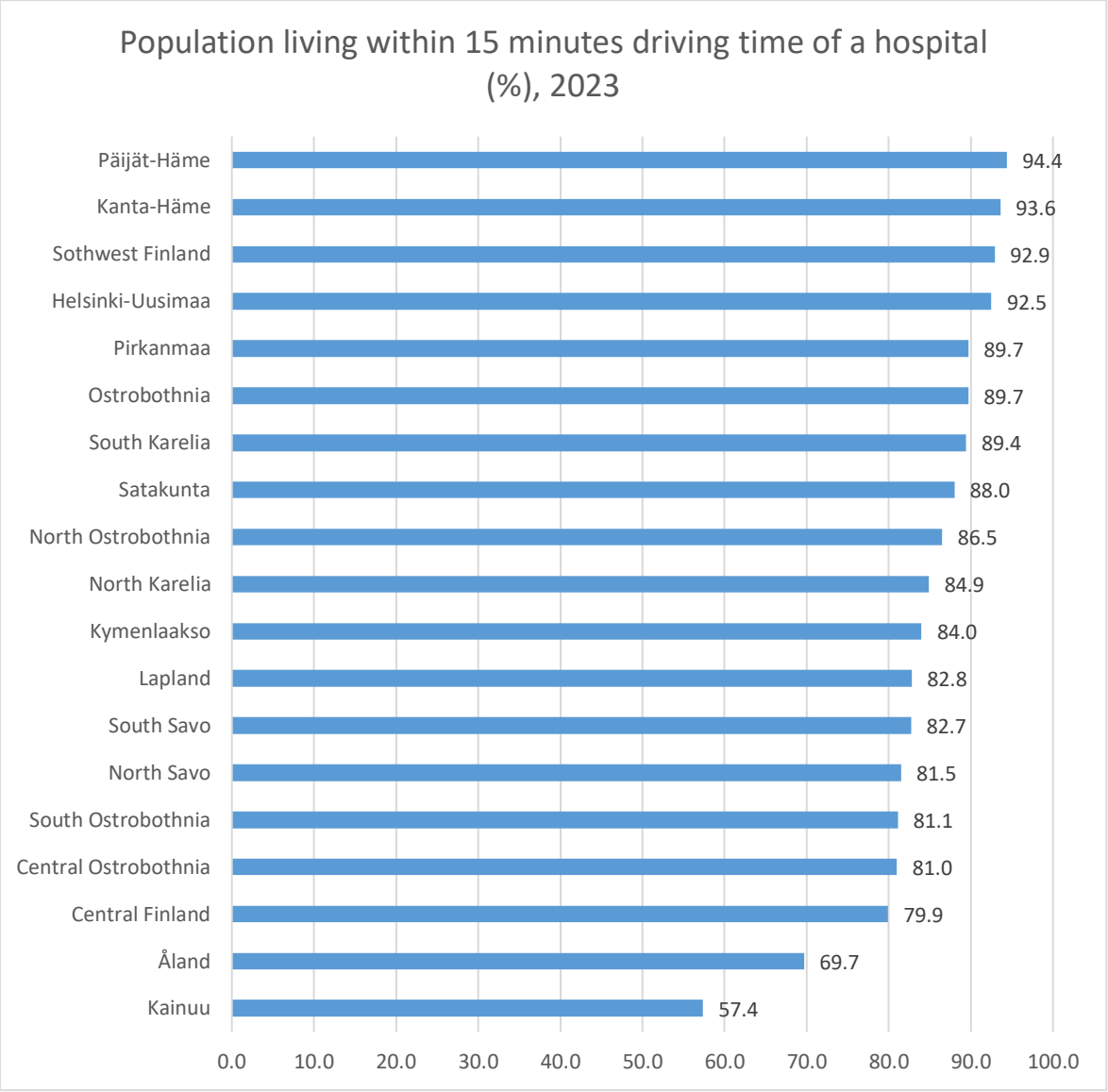

Figure 7 Population living within 15 minutes driving time of a hospital in 2023 (Eurostat, 2026).

Since the municipality specific data is not available, the data at the WBSC level has been supplemented here with a description of the service network of Pirha. This allows us to highlight where in Pirkanmaa there is a social and health center and where there is a

local service center or a local service point which can be less frequently used because of their opening hours and selection of services. In the table below (**Table 1**), the service points of Pirha are listed by the type and municipality.

Municipality	Hospital	Social and healthcare center	Local service center	Local service point	Total
Akaa	0	1	0	0	1
Hämeenkyrö	0	1	0	0	1
Ikaalinen	0	0	1	0	1
Juupajoki	0	0	0	1	1
Kangasala	0	1	2	1	4
Kihniö	0	0	0	1	1
Kuhmoinen	0	0	1	0	1
Lempäälä	0	1	0	0	1
Mänttä-Vilppula	0	1	0	0	1
Nokia	0	1	0	0	1
Orivesi	0	1	0	0	1
Parkano	0	1	0	0	1
Pirkkala	0	1	0	0	1
Punkalaidun	0	0	0	1	1
Pälkäne	0	0	1	1	2
Ruovesi	0	0	0	1	1
Sastamala	1	1	0	1	3
Tampere	2	7	3	1	12
Urjala	0	0	1	0	1
Valkeakoski	1	1	0	0	2
Vesilahti	0	0	1	0	1
Virrat	0	1	0	0	1
Ylöjärvi	0	1	0	2	3

Table 1 Number of service points in Pirkanmaa (Pirha, 2026a).

Factor 4: Population-provider ratio

The municipality specific data for this indicator is collected from Sotkanet Indicator Bank provided by the Finnish Institute for Health and Welfare. Missing data (EU level

information) has been supplemented from other sources. The indicator that Sotkanet Indicator Bank has used in its statistics is the number of physicians per 10,000 inhabitants. Here, the indicator has been changed to physicians per 1,000 inhabitants to make the data comparable with the international equivalent that has been used, for example, in the 2023 Finnish Health Profile prepared by the OECD (OECD, 2023, p. 10-15).

It should be noted that the data collected from Sotkanet Indicator Bank includes the number of physicians in both private and public sector. The doctors' sector is defined according to the employment in the last two weeks of the year under review. The OECD's EU level figures include all licensed physicians. OECD has mentioned that this can cause large overestimation of the number of practicing doctors (OECD, 2025; Sotkanet Indicator Bank, n.d.). Therefore, differences in calculations may challenge the comparability between national and EU levels.

As it can be seen in the chart below (**Figure 8**), there is some variation in numbers of physicians per 1,000 inhabitants between municipalities. Tampere is an exception with the highest value of 7,5 which is significantly higher than in other municipalities and the national average (3,7). The second highest values are between 2,0 and 3,0 in Pirkkala, Valkeakoski, Nokia, Kangasala, Sastamala and Lempäälä. However, the values of these municipalities are still lower that the national average. The rest of the values fall between 0,0 and 1,8. The data was not available for Juupajoki, Kuhmoinen, Orivesi, Parkano, Punkalaidun and Urjala.

Pirkanmaa has the fourth highest number among all the WBSCs with 4,5 doctors per 1,000 inhabitants. It is higher than the national average 3,7 and, clearly higher than the average in EU, 3,8 (OECD, 2025; Sotkanet Indicator Bank, n.d.). However, the indicators on national and international level are not fully comparable due to measurement differences that were mentioned above.

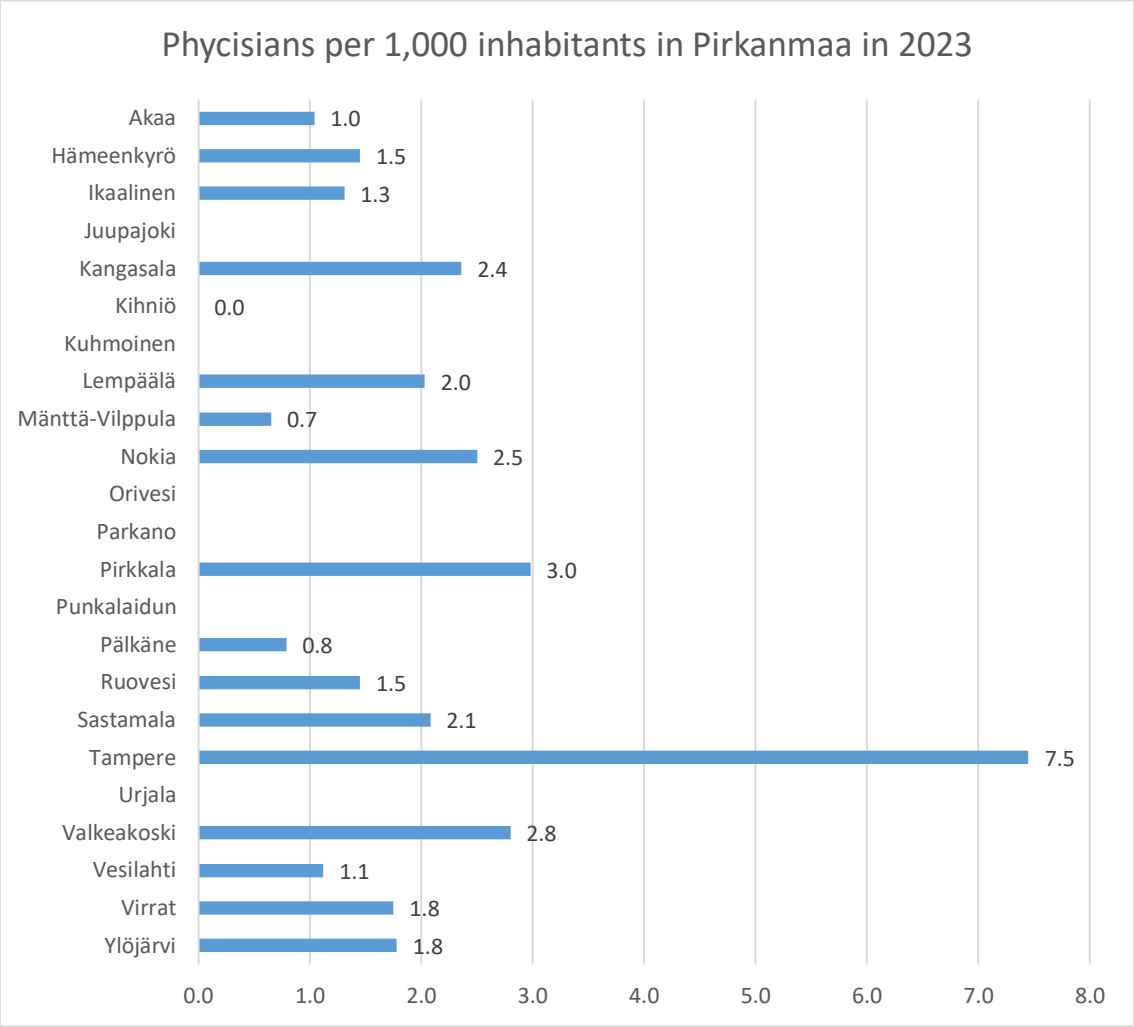

Figure 8 Physicians per 1,000 inhabitants in Pirkanmaa in 2023 (Sotkanet Indicator Bank, n.d.).

3.5 Applying the taxonomy to detect medical deserts

The taxonomy of the ROUTE-HWF Project has been applied below to identify medical deserts in Pirkanmaa and, as it has been mentioned earlier, in the Wellbeing Services County of Pirkanmaa. The data was collected from public databases, selecting the most recent and most accurate data possible. If data was not obtained at the most accurate possible level, in this case, at the municipal level, data at the WBSC level has been utilized and a comparison has been made between the counties. If the indicator has not been

able to be collected as such from the public data sources, the closest equivalent indicator has been selected.

The results are presented in the table below (**Table 2**). Values marked in red indicate that the municipality specific value is below or above the national average, suggesting that it is in line with the indicator of the taxonomy of medical deserts. Regarding the third indicator, average travel time to the nearest health center, the value of Finland is presented as the median.

Region	Proportion of population aged 65 and over (2025)	The general at-risk-of poverty rate (2024)	Average travel time to the nearest health center (2025)	Physicians per 1,000 inhabitants (2023)
Finland	23,8	14,2	17,5	3,7
Pirkanmaa	22,6	14,6	18,7	4,5
Akaa	26,1	11,7	-	1,0
Hämeenkyrö	26,7	11,7	-	1,5
Ikaalinen	33,7	17	-	1,3
Juupajoki	35,4	13,7	-	-
Kangasala	21,4	9,2	-	2,4
Kihniö	39,3	16,2	-	0,0
Kuhmoinen	47,2	16,6	-	-
Lempäälä	18,1	8,1	-	2,0
Mänttä-Vilppula	39,1	16,4	-	0,7
Nokia	21,7	9,9	-	2,5
Orivesi	32,4	12,7	-	-
Parkano	36,1	16,4	-	-
Pirkkala	18,7	7,1	-	3,0
Punkalaidun	39,1	19	-	-
Pälkäne	32,5	11,5	-	0,8
Ruovesi	40,8	16,2	-	1,5
Sastamala	32,5	14,2	-	2,1
Tampere	19	18,6	-	7,5
Urjala	35,8	15,7	-	-
Valkeakoski	28,5	12,2	-	2,8
Vesilahti	20,6	8,2	-	1,1
Virrat	38,8	16	-	1,8
Ylöjärvi	21	8,2	-	1,1

Table 2 Key indicators to measure and identify medical deserts.

There are several municipalities in Pirkanmaa for which some of indicators are directly met, but for which some of them are incomplete due to lack of data. Those municipalities where at least two indicators are already met have been selected for closer examination. These municipalities are Akaa, Hämeenkyrö, Ikaalinen, Juupajoki, Kihniö, Kuhmoinen, Mänttä-Vilppula, Orivesi, Parkano, Punkalaidun, Pälkäne, Ruovesi, Sastamala, Urjala, Valkeakoski and Virrat. For them, other information supplementing the indicator was needed.

As it was presented in the table earlier (**Table 1**), some of these municipalities have social and healthcare centers (Virrat) or hospitals (Sastamala, Valkeakoski) with extended opening hours and services. In some municipalities, the social and health center only serve during office hours on weekdays (Akaa, Hämeenkyrö, Mänttä-Vilppula, Orivesi, Parkano), while in some there are local service centers and service points with very limited services and opening hours (Ikaalinen, Juupajoki, Kihniö, Kuhmoinen, Punkalaidun, Pälkäne, Ruovesi, Urjala) (Pirha, 2026a). In Urjala, the local service point offers services during office hours on weekdays but the available services there are more limited than in social and healthcare services.

In Ikaalinen, Juupajoki, Kihniö, Kuhmoinen, Punkalaidun, Pälkäne, Ruovesi and Urjala the inhabitants are informed to get to the nearest social and healthcare center outside of their own service point's opening hours and with the needs that cannot be treated at the closest service point. Depending on the municipality, the distance between the primary option and the secondary option varies between an hour and 20 minutes if traveling by car. It can be assumed that in these municipalities the journey to this second option is longer than to a local service point located within the municipality.

Using data from public databases and supplementing it with other information leads to the identification of nine municipalities as medical deserts. These municipalities are Ikaalinen, Kihniö, Kuhmoinen, Mänttä-Vilppula, Punkalaidun, Pälkäne, Ruovesi, Urjala and Virrat. Urjala can be considered as a medical desert, however, the indicators are not that clear with it. Two municipalities, Juupajoki and Parkano, could not be fully analyzed with the incomplete data. Other municipalities (Akaa, Hämeenkyrö, Kangasala, Lempäälä, Nokia, Orivesi, Pirkkala, Sastamala, Tampere, Valkeakoski, Vesilahti and Ylöjärvi) do not meet the definition of medical deserts in the light of the taxonomy, although some factors can be detected also in them in the light of certain indicators. However, Sastamala reach the critical point in two indicators and in one it is exactly on

the national level. According to the taxonomy that was used here, Sastamala is not a medical desert, but in light of the results, it must be suggested that it is at a critical point.

According to the ROUTE-HWF Project's taxonomy, there are two type 1 medical deserts, Kihniö and Ruovesi. Kuhmoinen, Punkalaidun and Urjala are at least type 2 medical deserts but since the indicator of the number of physicians could not be defined with the available data, it cannot be stated whether they would be type 1 instead. Mänttä-Vilppula and Virrat are medical deserts type 3. Two type 4 one was identified, Ikaalinen and Pälkäne. No type 5 medical deserts could not be detected in the light of the results. In the case of Sastamala, if the result for the poverty line indicator increases, it would be classified as a medical desert type 3.

As it can be seen from the table that was examined before (**Figure 3**), all types of medical deserts involve both demand and supply factors and are emphasized differently. Type 1 medical deserts show all factors from both the demand and supply sides. This can be seen as the most challenging type as it contains the most diverse set of drivers. In type 2, the factors are more demand-side but include the location aspect of services as a supply factor. In type 3, in addition to the demand-side factors, service providers are also visible. In type 4, two supply factors are emphasized, and the demand factors are economic conditions. In type 5, two supply factors and a factor related to the age structure of the population as a demand factor would be emphasized, but as previously stated, no type 5 medical deserts were identified in this study (ROUTE-HWF Project, 2023, p. 16).

In Pirkanmaa, the factor of the proportion of the population aged 65 and over is present in all types of medical desert in the region. Also, the number of physicians per 1,000 inhabitants is below the national average in all of them. Municipalities that are identified as type 1 medical deserts are both locating in North Pirkanmaa. The type 2 and 3 medical deserts are locating in the edge of the region. In these municipalities, demand factors are more strongly present, which means that demographic factors are the drivers of

medical deserts there. The difference between these types is which supply factors are present there. On the other hand, when examining the results, it must be noted that the deserts now identified as type 2 could, considering more accurate data, be type 1 deserts. However, due to incomplete data, this study must state that they are at least type 2. Two municipalities were identified as type 4 deserts. In Ikaalinen and Pälkäne, the economic resources of the population in the area are the factors causing medical deserts, along with supply factors.

Pirha itself cannot be identified as a medical desert. However, the result is not clear, as Pirkanmaa meets the definition of a medical desert for two indicators, general at-risk-of-poverty rate and average travel time to the nearest health center, when comparing to the national level.

4 Conclusions

This final chapter of the study discusses the results of the case study in relation to the literature review. In addition, factors challenging the conclusions of the study are critically discussed. The research questions set will be also answered. Finally, possible further research topics are highlighted.

4.1 Discussion

Two research questions were defined for this study. The first one was if there are medical deserts in the Wellbeing Services County of Pirkanmaa. Based on the findings of this study, it can be stated that medical deserts occur there. Pirkanmaa region itself cannot be defined as medical desert but some of the municipalities located in its area meet this definition. These municipalities are Ikaalinen, Kihniö, Kuhmoinen, Mänttä-Vilppula, Punkalaidun, Pälkäne, Ruovesi, Virrat and Urjala.

The second research question was which types of medical deserts can be identified in the Wellbeing Services County of Pirkanmaa. There are medical deserts of types 1, 2, 3 and 4 in Pirkanmaa according to the ROUTE-HWF project taxonomy. This means that almost every type of medical desert is identified in Pirkanmaa, and every driver of medical deserts can be seen there.

Considering the literature review of the study, the results of the case study are quite expected. The municipalities that can be considered as medical deserts (Ikaalinen, Kihniö, Kuhmoinen, Mänttä-Vilppula, Punkalaidun, Pälkäne, Ruovesi, Virrat and Urjala) are located in the edge of the Pirkanmaa region. Instead, the municipalities closer to Tampere, which is a center of the region and has a university hospital, are closer to the denser service network.

Population density of the municipalities in Pirkanmaa classified as medical deserts follows the trend that can be seen all over Finland: it is higher in southern part and around growth centers, and significantly lower on the other parts (Kestilä & Karvonen, 2022, p. 29). Pirkanmaa itself does not meet the most typical geographical features of medical deserts, being centrally located in the southern part of Finland and being a plain area (Pirha, 2025; Tikkanen, 1994, p. 182–183). However, as mentioned in the literature review, a medical desert does not automatically include specific geographical features. Instead, underserved areas can even be found within a city (Gautier et al., 2024, p. 1).

A typical demographic feature of rural areas, a high proportion of elderly people, is seen in every municipality that can be considered as medical deserts in Pirkanmaa. Combined with this the predicted trend in the migration of the young population and low birth rate, the demographic future of these rural municipalities is quite bleak (Kestilä & Karvonen, 2022, p. 23; Tikka & Moisio, 2021, p. 41).

Rural municipalities typically have a higher proportion of lower-income residents. This can be explained at least by the large proportion of elderly people, people aged 65 and over in the area. On the other hand, as can be seen from the results, Tampere also has a high proportion of people living below the poverty line, although the proportion of elderly people there is not comparatively high. The number of low-income residents is probably partly explained by the large number of students, as in Tampere there are a university and a university of applied sciences (Kestilä & Karvonen, 2022, p. 25–31).

The number of physicians per 1,000 inhabitants is remarkably low in almost all municipalities, except Tampere. In Nokia and Valkeakoski the result is slightly higher compared to other municipalities, although still below the national level. According to the Finnish Medical Association, the geographical area where most doctors work is in the regions where a university hospital is located. These regions are the Pirkanmaa, Uusimaa, Southwest Finland, Northern Savo and Northern Ostrobothnia (2025).

This significantly higher value in Tampere is probably explained by the university hospital located there. In Tampere, a services network is denser there since there are also many other healthcare service points, such as social and health centers, where medical personnel work. The density of services is understandable, considering that Tampere is the largest city by population in the region. One of the Tays hospitals is located in Valkeakoski, which probably also partly explains a reasonable result of Valkeakoski. On the other hand, there is no clear explanation for Nokia's relatively high value, as Pirha's services located in its area are not much different from many other surrounding municipalities.

Pirha’s service network partly explains the values also in the other parts of Pirkanmaa. Smaller municipalities on the edges of the region, the service network is sparser, and the physical location of medical personnel is therefore less frequent in these locations. When talking about the service network, digital services must also be considered since they cover at least partly the services and may play more significant role in rural areas where the distances to the services points are longer (Butcher & Hussein, 2022, p. 114–115).

Even if the data of the physicians was not available for all the municipalities, it is reasonable to assume that the values would be low in the municipalities in question. In Finland, it has been challenging to recruit doctors in remote areas, which is especially the case for the municipalities of North Pirkanmaa due to their geographical features. Furthermore, when examining the whole of Finland, it has been stated in the literature that the number of physicians per 1,000 inhabitants is the lowest in the EU (OECD, 2023, p. 10–15).

In addition to quantitative indicators, it is worth considering the points raised in the literature review regarding the willingness of doctors to work in remote areas. Although no data on the subject was collected for this study, it is reasonable to take these factors into account. The desire to work in a medical desert is greatly influenced by a person's background. People from remote areas have a more positive attitude towards working

in rural areas than those who grew up in urban areas (Flinterman et al., 2023, p. 6; Marcec et al., 2023, p. 1).

The literature has found that working conditions, life-style factors and images of working in rural areas influence the willingness of healthcare personnel to seek employment and move into such locations. The effects can be both negative and positive. It can therefore be cautiously stated that some of these factors that cause medical deserts also have the potential to combat them (Bes et al., 2023, p. 2; Flinterman et al., 2023, p. 5; Gautier et al., 2024, p. 2).

Comparability between municipalities for the indicator of average travel time to the nearest healthcare centers is challenging, because due to the nature of Pirha's service network, each municipality is not intended to have its own healthcare center. The background information of the tool created by SoteDataLab (2025) shows that the measurement also considers other locations for Pirha than social and health centers. Therefore, the indicator does not consider the limited opening hours of local service centers and local service points. For example, if a customer needs services outside of office hours, they will most likely have to seek services further away than at their nearest location.

It should also be noted that thinning out the service network may be a conscious choice. Due to tight financial conditions, services may not necessarily be provided on the scale that would be desired. In addition, one of the goals of the WBSC reform was to centralize certain services (Leppänen et al., 2024, p. 26–27; Ministry of Social Affairs and Health, 2026a; OECD, 2023, p. 9). In the old system, when municipalities provided social services, the same services may have been available in several neighboring municipalities, relatively close to each other. Combined with this, the ever-growing need for services and challenges in the availability of health workforce, centralizing services can be seen as justified. In addition, with the increase in digital services, it may no longer be modern to require that each municipality has its own laboratory or emergency room. Many

conditions that previously required a visit to a health center can now be diagnosed remotely.

Country-specific studies and reports on medical deserts have been conducted in a few European countries. Since medical deserts have not been studied much in Finland, this current study can be considered necessary. In general, this study can be seen as complementary to the previous research field.

However, this study has some limitations that affect the results. The use of taxonomy was challenged by the line chosen for the study in using public data. The indicator on the location of the nearest health center could not be shelved, as the data in question was not available at the desired level of accuracy. Also, data on the number of doctors per 1,000 inhabitants was not available from public databases for each municipality selected for the study. Therefore, two municipalities could not be analyzed. These factors limited the possibility of identifying and analyzing the characteristics of medical deserts. Therefore, it must be noted in the results of the study that the results contain some uncertainties.

The research also considers the relatively short period of operation of the wellbeing services counties. With the structural reform, the WBSCs have only been in operation as organizations for just over three years. The organization is still in its early stages, and many of their functions are still trying to stabilize. Pirha is no exception to this. This is especially important in terms of the data used, as some of the data was collected from 2023 due to the lack of more recent data. More recent data on the number of physicians per 1,000 inhabitants might provide a more accurate picture of the current state of the Pirkanmaa, and thus, the indicator in question could be compared more accurately to other indicators for which data was available more recently.

4.2 Future study suggestions

Especially considering the limitations of this study, future research topics need to be considered. Both more specific and broader perspectives can be recommended as further research topics. In the future, it could be examined whether medical deserts can be identified elsewhere in Finland and in its wellbeing services counties. This would enable comparisons, for example, between the wellbeing services counties. Based on this study, it can be assumed that medical deserts also exist elsewhere in Finland, and it could be necessary to examine how the drivers of medical deserts in different regions differ from each other.

This study only dealt with the identification of medical deserts in the selected area. In the future, it is possible to deepen the examination by considering in more depth the factors that cause medical deserts and their future scenarios. In addition, the literature review of this study provides grounds for examining how medical deserts have been attempted to be mitigated so far.

As there are only a few country-specific studies and reports on medical deserts in Europe, it could be useful in the future to conduct more country-specific reviews from across Europe. This would broaden the view of the situation of medical deserts at the European level and allow for comparisons between countries.

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