

Spatial Disparities and Inequitable Access to Health Care among Farmers with Musculoskeletal Disorders

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Abstract. Access to healthcare is a critical issue for global health systems. The objective of this study was to explore the determinants affecting access to health services and the disparities within a specific geographic context in Greece, focusing on rural populations. Factors affecting people's propensity to use health services, factors that facilitate use, and the need for health care were identified. Data analysis used both inferential and descriptive statistics. Geographical Information System is used to analyze, and present information related to spatially evolving phenomena. Disparities in access to health services were observed. The results indicate that socioeconomic factors are stronger predictors of health service use than need and demographic characteristics. This suggests socioeconomic inequalities and inequitable access to healthcare.

Keywords: health care access, health services use, spatial disparities, geographical information system

Introduction

Access to health care is a crucial issue in the responsiveness of health systems around the world (Levesque et al., 2013). Nevertheless, access to health care remains a complex concept (Cu et al., 2021) that has not yet been sufficiently defined (Khakh et al., 2019). Furthermore, there is no yet been a consensus in the literature (Baier et al., 2020; Bihin et al., 2022) on standards for measuring access.

According to Khan & Bhardwaj (1994) access is divided into '*potential*' and '*realized*' access. The assessment of potential access focuses on the availability of resources while realized access is concerned with the actual use of health services (Andersen, 2008; Schultheis & Glasmeier, 2015).

One of the most widely used theoretical models to assess access to and use of health services is Andersen's Behavioral Model of Health Services Use (BMH) (Andersen, 1995, 2008). Given that the use of health services is not only related to health status but is also a multidimensional phenomenon (Kim & Lee, 2016), Andersen's model provides a conceptual framework for understanding the issue of health services use (Alkhawaldeh et al., 2023). BMH defines three components that are associated with the use of healthcare services: predisposing factors (socio-demographic factors), enabling factors (socioeconomic factors) and need for health care. According to the BMH, equitable and inequitable access are defined according to the main determinants of health care use. Equitable access occurs when demographic factors and health needs account for most of the variations in use. By contrast, inequitable access happens when socioeconomic factors enable the use of health services (Andersen, 2008).

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The Greek National Health System (Greek: ESY) was first established by Law 1397/1983. It is financed by both taxation (mainly hospital care) and social health insurance funds (Kampouraki et al., 2023). The Greek health system is characterized as mixed, where the National Health Service model (Beveridge system) coexists with the Social Health Insurance model (Bismarck system), while at the same time, increasing private sector involvement in the provision of health services is also taking place (Economou et al., 2017).

The Greek health care system guarantees equitable access to health care services. However, significant regional variations in the distribution of health resources have occurred (Gogos et al., 2022), indicating the inefficiency of the health system to address the issues of decentralization and equitable access to health services adequately.

The aim of the present study is to investigate the spatial disparities in access to health care, which is equated with the actual use of health services, among the municipalities of the Regional Unit of Imathia.

Methodology & Materials

Regional Context

The present study focused on the Regional Unit of Imathia in Greece, NUTS 3 level, in accordance with the Nomenclature of Territorial Units for Statistics of the European Commission (Eurostat, 2023) which is located in Macedonia, the largest geographical region of Greece (Figure 1).

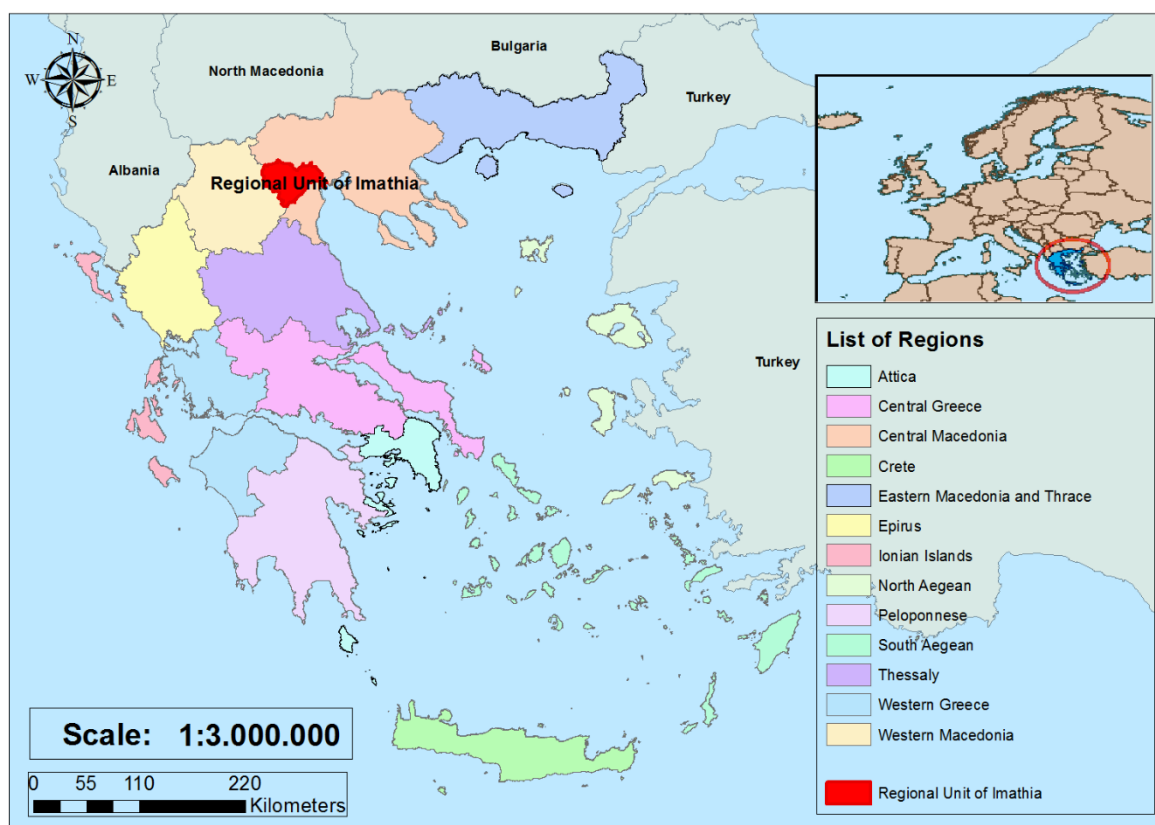


Figure 1. Map of the study area

Imathia is divided into three municipalities: Alexandria, Naousa, and Veria, which is the seat of the region. With regard to health structures, there are two secondary interconnected hospitals in the towns of Veria and Naousa, three Health Centers (HC) in the seats of the three

municipalities, and two Local Health Units (Greek: TOMYs) in Veria (3rd YPE, 2023) (Figure 2).

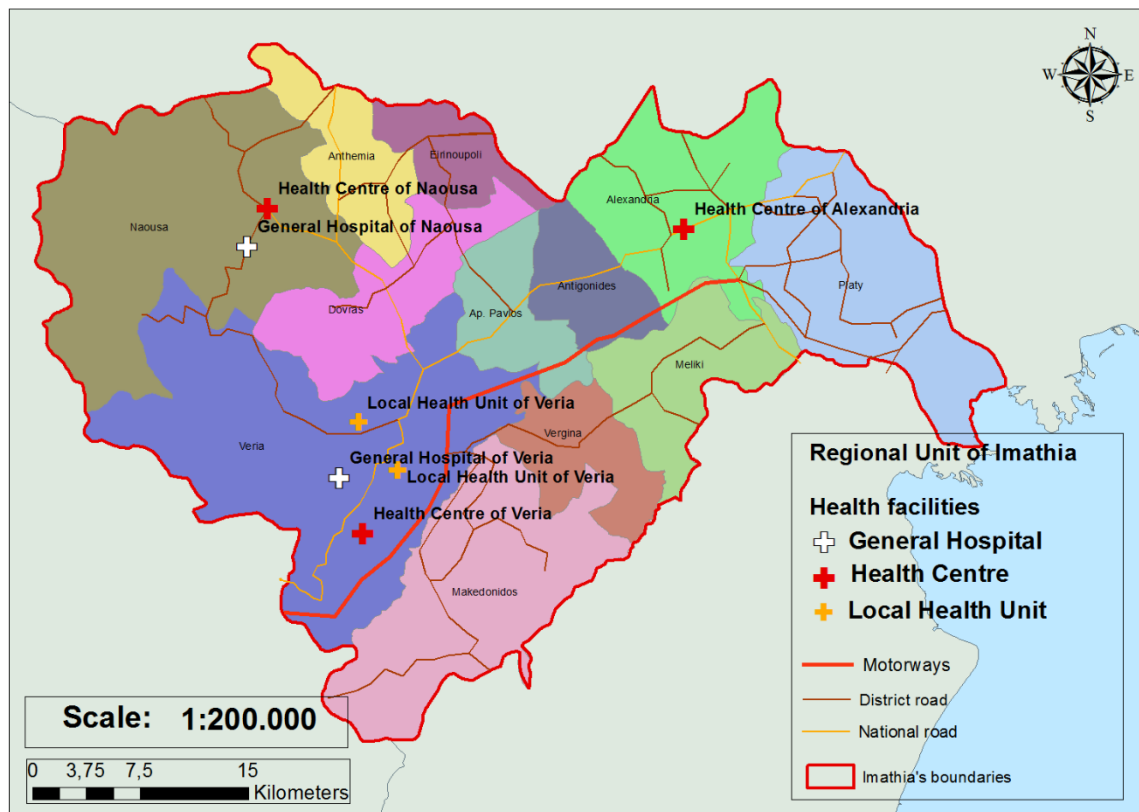


Figure 2. Regional Unit of Imathia Health Facilities

Spatial data transformation was conducted in the Hellenic Geodetic Reference System, 87 (Greek: EGSA,87) and was based on the creation of Digital Elevation Models of Greece (DEM), especially for the aforementioned region. Spatial data mapping was conducted using the Geographical Information System ArcMap 10.5 (GIS software package). GIS are integrated information systems for collecting, managing, analyzing, and presenting information related to (mainly) spatially evolving phenomena (Doukas, 2023). The increasing use of GIS techniques is related to the public health sector solving specific health issues, such as the structure of healthcare facilities and access to health services (Fradelos et al., 2014).

This study explored the spatial disparities in access to and use of health services among the Municipal Units of the Regional Unit of Imathia, identifying the determinants associated with the use of health services in the rural population with diagnosed musculoskeletal disorders (MSDs) within a specific geographical area.

Three main determinants were explored as independent variables, according to Andersen's BMH components: *Predisposing factors* (age, gender, marital status, educational status), *Enabling factors* (income, health insurance, region, distance, car ownership, and public transportation), *Need* (self-rated health status).

The use of health services in the past 12 months was explored as a dependent variable. Different domains of health are explored: primary care, secondary care, home care, medicines use, and unmet health needs due to COVID-19. Previous studies in Greece focused primarily on migrant populations (Galanis et al., 2013; Kaitelidou et al., 2020) or studied health care use at the nationwide level (Beletsioti & Niakas, 2022; Kyriopoulos et al., 2014).

This study has the major advantage of exploring inequalities in access to health care at a small-scale, geographical level, as research in this area is inadequate. Using Andersen's theoretical model, it examines the determinants from a spatial perspective, studying determinants related to distance from healthcare providers and place of residence.

In order to explore the factors that influence realized access to health care, specific research hypotheses are examined:

1. There are inequalities in the use of health services among the municipal units of the regional unit of Imathia.
2. Health need is not the main factor in the use of health services.
3. The use of health services is primarily affected by socioeconomic factors.
4. The use of health services is primarily affected by geographical factors.

A cross-sectional study was conducted among farmers with MSDs. The registry of patients who received rehabilitation services between 2015 and 2020 was retrospectively studied, and a census of this population was conducted. The inclusion criteria were limited to adult farmers over the age of 18 years who are permanent residents of Imathia. Chronic diseases (autoimmune or neurological diseases) and non-work-related MSDs were excluded. The survey was conducted between May and October 2022. A total of 1,100 questionnaires were distributed, with a response rate of 81% ($n = 891$). Questionnaires were collected through enrolment methods: self-completion through distribution and collection and face-to-face interviews.

Questionnaire

The questionnaire included information on demographic characteristics, social structure factors and economic determinants associated with the use of health services (gender, age, marital status, place of residence, education level, health insurance, reported annual income, distance to healthcare providers, and available transportation). The questions were classified according to the health care domain in order to ascertain the use of various service forms. The sum of the responses was calculated and the highest score was associated with the highest level of use. Overall health service use scores were also calculated.

Health needs were examined through self-reported health status using the SF-36 Health Survey (V 1.0) (RAND, 2023). Eight sub-scales, multi-item, representing frequently assessed parameters: Physical Functioning (PF), Role – Physical (RP), Bodily Pain (BP), General Health (GH), Role – Emotional (RE), Vitality (VT), Mental Health (MH), Social Functioning (SF). Two summary scales are formed by these scales: Physical Component Summary (PCS), Mental Component Summary – MCS.

Each item's response is coded from 0 to 100 based on the number of possible responses. The lowest and highest possible scores are 0 and 100, respectively. The highest value defines a more favorable health status, indicating a better quality of life. The items on the same scale are then averaged together to generate the scores on each scale. Missing questions are not used in score calculations. Instead, the values of these questions are averaged with the values of the other questions on the same scale.

The Greek SF-36 Health Survey questionnaire has been validated in a Greek population sample (Pappa et al., 2006). A preliminary small-scale pilot survey was conducted to assess the comprehension of the questions and face validity.

Data Analysis

This study used both inferential and descriptive statistics. The response frequencies and percentages were determined. Monte Carlo significance test procedures and Pearson's chi-square test of independence were used. Multiple hierarchical regression was performed to create a predictive model of health services usage. Additionally, nonparametric Kruskal-Wallis

and Mann-Whitney U tests were performed. All data analyses were performed using SPSS version 23.0, with a significance level of 0.05.

Ethical Issues

All participants were informed in writing about the purpose and procedure of the survey, as well as about the anonymity and confidentiality of the data and their voluntary participation. The research protocol was approved by the Directorate for Human Resources Development of the 3rd Health Region of Macedonia (date of approval: 21/06/2022, number of approval: D3b/27039).

Results

Table 1 provides a description of the study population. An uneven distribution was observed between men and women (31.8% and 68.2%, respectively). The majority of participants were aged 40–59 years (84.7%), married (98.4%), and secondary school graduates (86.5%), with an income of 10,001–20,000 euros (84.0%). All participants had public health insurance. The percentages of use of different kinds of health services are shown in Table 2.

Table 1. Characteristics of Participants (n=891).

Characteristics	N	%
Gender		
male	283	31.8
female	608	68.2
Age		
20-39	26	2.9
40-59	755	84.7
60-79	106	11.9
80 +	4	0.4
Marital status		
unmarried	5	0.6
married	877	98.4
widowed	9	1.0
Education		
primary school	85	9.5
lower secondary school	309	34.7
high secondary school	461	51.7
vocational training	5	0.6
tertiary	30	3.4
Income, €		
< 10,000	65	7.3
10,001 – 20,000	748	84.0
20,001 – 30,000	65	7.3
30,001 – 40,000	13	1.5
Public health insurance		
yes	891	100.0
Private health insurance		
yes	2	0.2
no	889	99.8

Table 2. Use of health services by the healthcare domain

Health care domain	Service forms	Response	n	%
Secondary care	Inpatient	none	888	99.7
		once	3	0.3
		more than once	0	0
	Day-care treatment	none	763	85.6
		once	112	12.6
		more than once	16	1.8
	Outpatient	none	576	64.6
		once	236	26.5
		more than once	79	8.9
Primary care	Health Center visit	none	876	98.3
		once	15	1.7
		more than once	0	0
	Private health practitioners	none	712	79.9
		once	155	17.4
		more than once	24	2.7
Home care		none	832	93.4
		once	59	6.6
		more than once	0	0
Medicines use	with prescription	non use	539	60.5
		less than a month	220	24.7
		more than a month	132	14.8
	without prescription	non use	662	74.3
		less than a month	156	17.5
		more than a month	73	8.2
Unmet health needs due to COVID-19		none	815	91.6
		once	75	8.4
		more than once	0	0

Table 3 shows the mean SF-36 scale scores for all participants. Participants showed low scores on most subscales. In summary, the physical health of participants was categorized as poor to moderate. PCS scores ranged from 4.52 to 59.05. Regarding MCS, there was great variation in prices (28.57 to 75.71).

Table 3. SF-36 scale scores

SF-36 scale	Range	Mean±SD	$Q_1 - Q_2 - Q_3$	Mode value
Physical Functioning (N=877)	0 - 50	12.55±16.25	0 - 5 - 10	5
Role – Physical (N=891)	0 – 100	7.88±26.37	0 – 0 – 0	0
Bodily Pain (N=882)	10 – 45	35.49±11.12	22.5 – 45 – 45	45

General Health (N=884)	10 – 50	20.63±12.40	15 – 15 – 20	15
Physical Component Summary – PCS (N=863)	4.52 – 59.05	15.90±14.61	7.86 – 10.24 – 13.81	4.52
Role – Emotional (N=891)	0 – 100	17.63±37.06	0 – 0 – 0	0
Vitality (N=877)	20 – 60	36.73±10.66	25 – 40 – 45	40
Mental Health (N=889)	44 – 84	60.43±10.17	52 – 56 – 64	56
Social Functioning (N=891)	50 – 62.5	50.01±0.42	50 – 50 – 50	50
Mental Component Summary – MCS (N=875)	28.57 – 75.71	43.05±10.28	35.71 – 40 – 50	37.14

Use of Health Services and Demographic Variables (Predisposing Factors)

According to the results, these specific characteristics did not affect the level of use of health services. The only exception is medicines use, where age has an effect ($H = 7.091$, $p = 0.029$) (Table 4).

Table 4. Demographic variables and health services use

Health care domain	Demographic variables		Mean±SD	U/H	<i>p</i>
Secondary care	Gender	male	3.57±0.89	81989.000	0.198
		female	3.62±0.86		
	Age	20-39	3.58±0.76	5.021	0.081
		40-59	3.64±0.89		
		60-79	3.43±0.73		
Primary care	Marital status	unmarried	3.60±0.89	3.428	0.180
		married	3.61±0.87		
		widowed	3.11±0.33		
	Gender	male	2.24±0.51	85234.500	0.755
		female	2.25±0.48		
	Age	20-39	2.35±0.56	2.971	0.226
		40-59	2.25±0.50		
		60-79	2.17±0.38		
	Marital status	unmarried	2.00±0.00	3.902	0.142
		married	2.25±0.49		
		widowed	2.00±0.00		
Medicines use	Gender	male	2.87±0.75	84891.000	0.732
		female	2.89±0.75		
	Age	20-39	3.04±0.72	7.091	0.029
		40-59	2.85±0.76		
		60-79	3.04±0.72		
	Marital status	unmarried	2.60±0.55	3.851	0.146
		married	2.88±0.75		
		widowed	3.33±0.71		

Overall health use	Gender	male	12.67±1.49	82996.500	0.406
		female	12.74±1.49		
	Age	20-39	13.00±1.58	0.875	0.646
		40-59	12.72±1.53		
		60-79	12.64±1.23		
	Marital status	unmarried	12.00±1.23	2.057	0.357
		married	12.73±1.50		
		widowed	12.22±0.67		

Use of Health Services and Socioeconomic Variables (Enabling Factors)

Level of education ($\chi^2(4)=61.765$, $p<0.001$) and income ($\chi^2(3)=256.367$, $p<0.001$) influenced the frequency of use of both individual domains of health services and overall use (Table 5).

Table 5. Socioeconomic variables and health services use

Health care domain	Socioeconomic variables		Mean±SD	U/H	p
Secondary care	Education	primary school	3.40±0.73	7.865	0.097
		lower secondary school	3.60±0.82		
		high secondary school	3.65±0.92		
		vocational training	3.20±0.45		
		tertiary	3.70±0.95		
		<10,000	3.22±0.55		
		10,001-20,000	3.65±0.89		
Primary care	Income, €	20,001-30,000	3.57±0.83	24.702	<0.001
		30,001-40,000	3.08±0.28		
	Education	primary school	2.15±0.36		
		lower secondary school	2.17±0.39		
		high secondary school	2.27±0.52		
		vocational training	3.00±0.71		
		tertiary	2.77±0.77		
Medicines use	Income, €	< 10,000	2.08±0.27	161.729	<0.001
		10,001-20,000	2.18±0.42		
		20,001-30,000	2.94±0.66		
		30,001- 40,000	3.08±0.76		
	Education	primary school	3.12±0.73		
		lower secondary school	2.88±0.75		
		high secondary school	2.82±0.76		
Medicines use	Income, €	vocational training	3.20±0.45	14.305	0.006
		tertiary	3.07±0.69		
		< 10,000	3.25±0.64		
		10,001-20,000	2.18±0.42		
		20,001-30,000	2.94±0.66		
		30,001- 40,000	3.08±0.76		
		primary school	3.12±0.73		

Overall health use	Education	10,001-20,000	2.83±0.75	15.568	0.004
		20,001-30,000	3.08±0.71		
		30,001-40,000	3.08±0.76		
		primary school	12.65±1.18		
		lower secondary school	12.60±1.39		
		high secondary school	12.73±1.57		
		vocational training	13.60±0.89		
	Income, €	tertiary	13.77±1.79	46.445	<0.001
		< 10,000	12.48±0.97		
		10,001-20,000	12.61±1.45		
		20,001-30,000	13.95±1.68		
		30,001-40,000	13.85±1.86		

Use of Health Services and Geographic Variables (Enabling Factors)

Participants from the three municipalities differ significantly in terms of their use of primary ($H=68.354$, $p<0.001$) and secondary health services ($H=6.482$, $p=0.039$), as well as their overall score ($H=27.960$, $p<0.001$) in the use of health services. People in Alexandria have the lowest score, and people in Veria have the highest score (Table 6).

Table 6. Health services use in the Municipalities of Imathia

Health care domain	Alexandria (Mean±SD)	Naousa (Mean±SD)	Veria (Mean±SD)	H	p
Secondary care	3.26±0.55	3.51±0.86	3.77±0.93	68.354	<0.001
Primary care	2.19±0.44	2.21±0.51	2.27±0.51	6.482	0.039
Medicines use	2.88±0.73	2.85±0.73	2.87±0.77	0.871	0.647
Overall health use	12.26±1.27	12.59±1.51	12.92±1.56	27.960	<0.001

As regards the Municipal Unit of permanent residence, Veria has the highest number of people receiving health services (41.3%), followed by Ap. Pavlos (12.2%), and the lowest is in the municipal unit of Makedonidos (2.0%) (Figure 3).

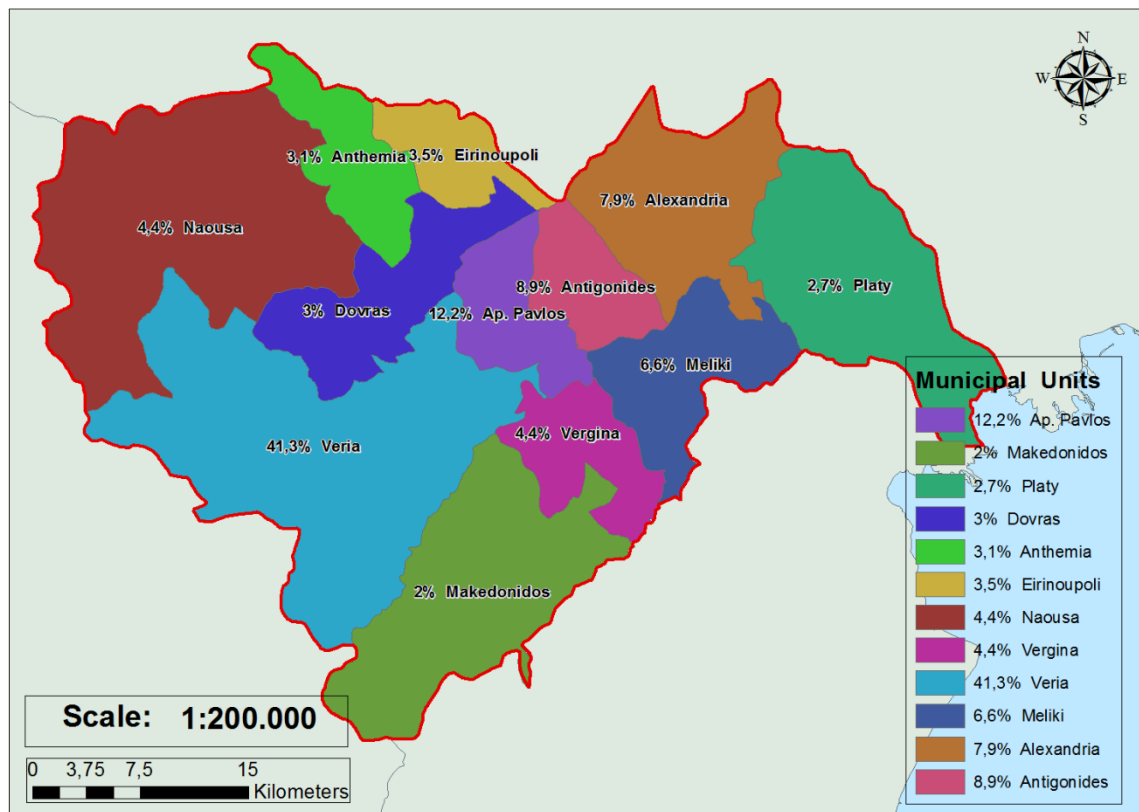


Figure 3. Percentage distribution of health services use by Municipal Unit

Three usage scales were derived from the score: low overall use (total score of 10–12), moderate overall use (13–15), and high overall use (16–18). As shown in figure 4, percentage of 5% of individuals had high use, 50% had low use, and 45% had moderate use.

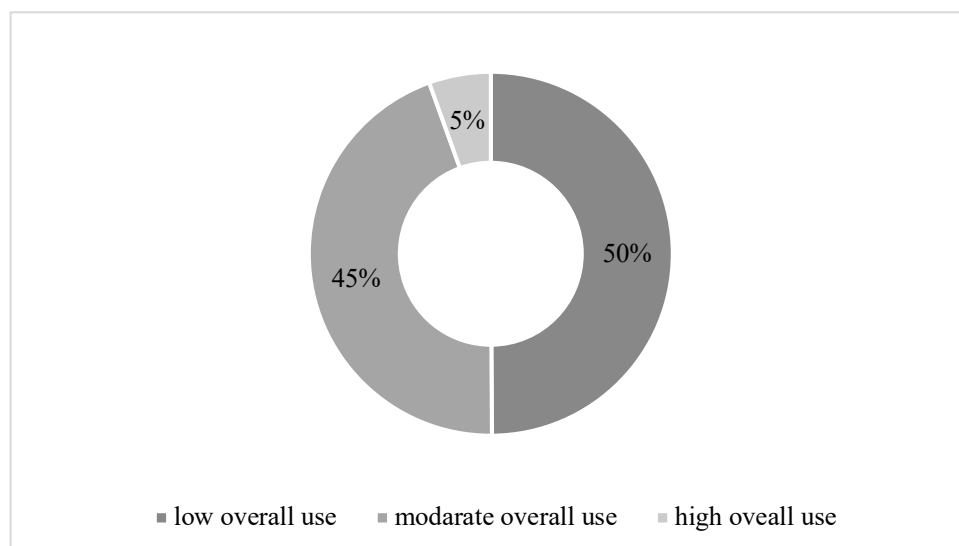


Figure 4. Percentage distribution of overall health services use

Low use of health services was associated with greater distance from health providers, whereas high use was linked to shorter distance from the health provider. The shortest distance of 5 km from a health provider corresponds to 67.3%–69.4% of high use and 30.4%–34.9% of low use. In contrast, 31.3%–32.2% of participants with low use had to travel a distance of 10–

20 km. Percentage 24.5%–25.4% of participants with moderate use of health services had to travel the same distance, while only 10.2%–12.2% with high use crossed the above-mentioned distance. All participants with high use traveled a distance of less than or equal to 20 km to receive health care (Table 7).

Table 7. Usage scales and distance from healthcare providers

Usage scales	Healthcare providers				χ^2	p
	Hospital					
	<5 Km	5-10 Km	10-20 Km	>20 Km		
Low use	135 (30.4%)	63 (14.2%)	140 (31.5%)	106 (23.9%)	47.357	<0.001
Moderate use	172 (43.3%)	64 (16.1%)	100 (25.2%)	61 (15.4%)		
High use	33 (67.3%)	10 (20.4%)	6 (12.2%)	0 (0%)		
	Health Centre					
	<5 Km	5-10 Km	10-20 Km	>20 Km		
Low use	155 (34.9%)	88 (19.8%)	139 (31.3%)	62 (14%)	33.789	<0.001
Moderate use	184 (46.5%)	75 (18.9%)	97 (24.5%)	40 (10.1%)		
High use	34 (69.4%)	10 (20.4%)	5 (10.2%)	0 (0%)		
	Private health practitioner					
	<5 Km	5-10 Km	10-20 Km	>20 Km		
Low use	137 (30.9%)	61 (13.7%)	143 (32.2%)	103 (23.2%)	46.613	<0.001
Moderate use	173 (43.6%)	63 (15.9%)	101 (25.4%)	60 (15.1%)		
High use	33 (67.3%)	10 (20.4%)	6 (12.2%)	0 (0%)		

Use of Health Services and Health Related Quality of Life (Need Factors)

The use of secondary health care had a significant negative correlation with almost all dimensions of quality of life. The use of primary care services and medicines was significantly associated only with certain dimensions of health related quality of lie (Table 8).

Table 8. Use of health services and health related quality of life

	Secondary care	Primary care	Medicines use	Overall use
PF	-0.177 (<0.001)	-0.117 (0.001)	-0.483 (<0.001)	-0.419 (<0.001)
RP	-0.160 (<0.001)	-0.092 (0.006)	-0.220 (<0.001)	-0.253 (<0.001)
RE	-0.027 (0.428)	-0.002 (0.947)	-0.002 (0.950)	-0.019 (0.574)
VT	-0.139 (<0.001)	-0.023 (0.487)	-0.264 (<0.001)	-0.238 (<0.001)
MH	-0.120 (<0.001)	-0.011 (0.487)	-0.281 (<0.001)	-0.230 (<0.001)
SF	-0.027 (0.425)	-0.011 (0.745)	0.048 (0.153)	-0.017 (0.623)
BP	-0.165 (<0.001)	-0.018 (0.601)	-0.410 (<0.001)	-0.318 (<0.001)
GH	-0.203 (<0.001)	-0.014 (0.679)	-0.521 (<0.001)	-0.454 (<0.001)
PCS	-0.195 (<0.001)	-0.109 (0.001)	-0.531 (<0.001)	-0.448 (<0.001)
MCS	-0.109 (0.001)	-0.111 (0.001)	-0.193 (<0.001)	-0.173 (<0.001)

Municipal Units of Alexandria

Based on the results, farmers had roughly the same score for the use of primary and secondary health care and the overall use of health services. A significant difference was observed in medicines use ($H = 11.292$, $p = 0.010$). Table 9. There were no differences in home care and unmet health needs.

Municipal Units of Veria

In the municipal units of Veria, a significant difference was observed ($H = 35.310$, $p < 0.001$). In the use of secondary health care, in particular, the inhabitants of the Municipal Unit of Veria scored the highest average score, and the participants from the Municipal Unit of Makedonidos scored the lowest (Table 10). There were no differences in the use of health services among the Municipal Units in Naousa.

Table 9. Health care use in the Municipal Units of Alexandria

Health care domain	Antigonides (Mean±SD)	Meliki (Mean±SD)	Platy (Mean±SD)	Alexandria (Mean±SD)	H	<i>p</i>
Secondary care	3.21±0.51	3.33±0.58	3.13±0.34	3.30±0.63	2.211	0.530
Primary care	2.24±0.52	2.11±0.37	2.17±0.39	2.21±0.41	4.000	0.261
Medicines use	2.96±0.76	2.87±0.73	3.22±0.60	2.70±0.68	11.292	0.010
Overall use	12.27±1.23	12.17±1.37	12.48±1.16	12.24±1.29	1.584	0.663

Table 10. Health care use in the Municipal Units of Veria

Health care domain	Veria (Mean±SD)	Ap. Pavlos (Mean±SD)	Vergina (Mean±SD)	Dovras (Mean±SD)	Makedonidos (Mean±SD)	H	<i>p</i>
Secondary care	3.90±1.02	3.70±0.73	3.27±0.56	3.37±0.69	3.18±0.39	35.310	<0.001
Primary care	2.28±0.50	2.27±0.52	2.24±0.60	2.33±0.56	2.06±0.24	4.949	0.293
Medicines use	2.86±0.77	2.81±0.77	3.05±0.74	2.93±0.73	3.18±0.81	5.861	0.210
Overall use	13.04±1.67	12.77±1.35	12.54±1.22	12.70±1.35	12.41±0.80	5.872	0.209

Health Services Use Predictive Model

A hierarchical regression procedure was applied, in which the independent variables were entered into four steps. First, demographic variables (predisposing factors) were included. Then, socioeconomic variables (enabling factors) were entered. In the third step, the variable distance (enabling factor) was added. In the fourth, final step, perceived health (Sf-36 subscale scores- health need) was added. Finally, the predictive model for the overall use of health services was recalculated, retaining only the factors considered significant in the last step. The predictive model was able to predict health service use ($F(6.865) = 57.653$, $p < 0.001$). As shown in table 11, the most important factors for predicting the use of health services were income ($t(871) = 4.168$, $p < 0.001$), distance from healthcare providers ($t(871) = -6.913$, $p < 0.001$), and the dimension of SF-36, General Health ($t(871) = 7.582$, $p < 0.001$).

Table 11. Predictive model for the overall health services use

Independent variables	β	S.E.	B	t	p
Constant	14.105	0.372		37.925	<0.001
Income, € 20,001 – 30,000	1.099	0.168	0.190	6.539	<0.001
Income, € 30,001 – 40,000	1.546	0.371	0.120	4.168	<0.001
Distance from health providers	-0.092	0.013	-0.201	-6.913	<0.001
RE	0.013	0.007	0.092	1.947	0.052
BP	-0.021	0.004	-0.157	-4.863	<0.001
GH	-0.046	0.006	-0.382	-7.582	<0.001

Discussion

In the current survey, Andersen's model was used as a theoretical background to obtain information on the overall influences on access to health care, especially in a specific spatial context.

According to the survey results, the frequency of use of different types of health services ranged from moderate to low, with the majority of participants having used health services only once. Most farmers did not require hospitalization for the reported NCDs, visited mainly the Outpatient Departments of the hospital and private health care practitioners and preferred to use medicines. The results of the present study are consistent with other studies (MacKay et al., 2010; Power et al., 2022) where the majority of patients with NCDs chose ambulatory care.

In relation to the use of primary care, visits to the Health Centre were extremely low and private providers were preferred. This could perhaps be attributed to the lack of confidence in the population due to the staff of these units by General Practitioners, who are lagging behind in the management of musculoskeletal disorders (Antonopoulou, 2008), the lack of medical specialties and low-quality services (Frengidou & Galanis, 2020), and the lack of organization of primary care services. The Greek health care system is mainly hospital-based (Petrelis & Domeyer, 2016). The primary care reforms during the 2008–2018 period of the economic crisis and three successive economic adjustment programs (Emmanouilidou, 2021), failed to substantially improve overall healthcare coverage in this sector. The COVID-19 pandemic did not affect the seeking and use of health care due to NCDs, although it is responsible for high levels of subjective unmet health care needs in European countries (Quintal et al., 2023).

Health-related quality of life was assessed to determine the need for health care. Based on their responses, farmers showed low to moderate physical health and moderate to good mental health. However, it is noteworthy that in all individual dimensions of quality of life, lower values were recorded compared to the corresponding values of the general population in an earlier survey in Greece (Pappa et al., 2006).

Demographic characteristics did not appear to influence the use of health services. This finding contrasts with previous research studies, both Greek (Geitona et al., 2007; Lahana, 2011; Pappa, 2007) and international (Dey & Mishra, 2014; Felix, 2020; Kim & Lee, 2016; Paul & Chouhan, 2020), where demographic characteristics affect the level of health service use.

By exploring the effect of individual socioeconomic factors on health care use, higher levels of primary health care use were found among farmers with higher educational and income levels. In contrast, higher levels of secondary care use were observed among those with lower incomes.

People with lower education levels have lower health literacy skills than those with higher levels of education (Shahid et al., 2022). They have better information about their treatment alternatives and know more about promoting their health and preventing the onset or worsening of the disease (Cutler & Lleras-Muney, 2008).

It is likely that participants with a lower level of education were less likely to follow up regularly in primary care, which led to worsening of the disease and the need for hospital treatment. Ensuring access to primary health care is essential to address the inequalities that characterize rural and remote areas (Franco et al., 2021) and is a critical element in achieving SDG3 "Good health and well-being" for Sustainable Development (United Nations, 2015).

The results of the correlation tests between the Sf-36 scales and health service use indicated a significant effect of health-related quality of life on health service use by the survey participants. These findings are in agreement with those of other studies, where a high number of health problems is associated with a high rate of health care service use among farmers (Nguyen et al., 2019).

With respect to the distance variable, the difference-in-difference tests showed that as distance increased, usage rates tended to range from moderate to low, while as distance decreased, usage rates increased. Specifically, the majority of those with low health service use reported the greatest distance from their respective health providers, while those with high use reported the least distance from health providers.

Differences in access to health services were observed not only between but also within the municipalities of the Regional Unit of Imathia. People from Veria municipality had the highest average usage rates for all health services and overall usage. This was followed by the municipality of Naousa, while those from the municipality of Alexandria recorded the lowest overall use. The vast majority of private health practitioners are active in the towns of Veria and Naousa. Veria is Imathia's main town and commercial center (Hellenic Statistical Authority, 2021). The hospital of Veria is located within the town of Veria. Proximity of Veria town and municipal units to the general hospital positively impacts population's access. Naousa is the second-largest town in Imathia and has a secondary hospital in the town center. In contrast, Alexandria only has a Health Centre.

Access to health care is not equal, and access problems are particularly pronounced in mountainous and remote areas where distance from health facilities has been identified as a reason for the limited access of the population to specific health services in the Imathia region. (Gogos et al., 2018). Specifically, as far as the municipality of Veria is concerned, respondents from the municipal unit of Veria showed the highest levels of access, while those from the municipal unit of Makedonidos showed the lowest. The municipal unit of Makedonidos, at an altitude of 650-800 m, has communities classified as disadvantaged mountain areas (Council of the European Union, 1975, 1985). Distance to health facilities is around 40 km on average. Transportation in this area is still a problem because public transport is very limited and the road network, while it has improved, is not good enough because of the geographical relief. Geographical distances combined with limited transport services pose additional challenges for access to health care.

The distance between where people live and healthcare facilities is a key factor in accessing healthcare in rural and remote areas. Distance affects population groups from various locations, creating limitations and possibilities for accessing health care. (Amoah-Nuamah et al., 2023). It is also a determinant of how long patients delay before seeking care (Rojjananukulpong et al., 2021). However, even a short distance from a healthcare facility, unaffordable transport can be a barrier (Barber et al., 2016), particularly in the case of the above-mentioned regions (Limwattananon et al., 2015). Travel expenses and costs not only decrease the demand for local healthcare but also weaken the effectiveness of the public health system due to limited access (Liu et al., 2019).

The European Commission's 'Health QUEST' project (European Commission, 2008), aims to understand barriers to healthcare access in Europe. One important aspect is transportation and geographic differences, as they affect patients' ability to access healthcare.

In Greece, only a few initiatives have been taken regarding this issue, as there has never been a national policy on it (Altanis, et al., 2008).

According to the predictive model developed, the most important predictors of health care use were distance, income and the dimension of general health. In contrast to the findings of previous studies in Greece, where the dominant factor emerged as the health need (Geitona et al., 2007), the effect of health-related quality of life as an indicator of health status appeared to be limited to the dimensions of general health and physical pain. However, not as much as income and distance.

Conclusions

This research aimed to explore the factors influencing access to health services and shed light on the disparities in accessing such services within a particular geographic context.

According to the findings, enabling factors emerge as stronger predictors of health service use compared to need and demographic characteristics. Findings that lead to the conclusion of the occurrence of socioeconomic inequalities and inequitable access to health care in this particular regional context.

Based on the current state of literature and the results of this research, future research should focus on several topics, such as the exploration of populations' attitudes towards health service use, including health system responsiveness and individuals' attitudes and behaviors towards health, illness, and health services. Furthermore, as the effect of distance on facility use is complex (Panciera et al., 2016), it would be interesting to study the effect of geographical distance on the use of health services by studying different types of health facilities.

Competing interests

None declared.

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