

SOCIO-ECONOMIC AND DEMOGRAPHIC FACTORS AFFECTING ACCESS TO HEALTHCARE SERVICES IN TÜRKİYE: A PROBIT MODEL ANALYSIS

Banu Beyaz Sipahi

Faculty of Applied Sciences, University of Tarsus, Mersin, Türkiye

Correspondence: banubeyazsipahi@tarsus.edu.tr

ABSTRACT

BACKGROUND:

Healthcare services aim to meet preventive and therapeutic needs and ensure equal access for all. Despite reforms like the Health Transformation Program in Türkiye, socio-economic and demographic inequalities in healthcare access persist. This study, based on the Grossman model, examines the factors affecting healthcare access in Türkiye.

METHOD:

Data from the Turkish Statistical Institute's Health Survey (2014, 2016, 2019, 2022) covering 76,196 individuals aged 15 and above were used. Access to healthcare was measured using an index created from observed variables in the survey. The probit model was used to analyze the impact of socio-economic and demographic factors.

RESULTS:

Gender, age, income, education, and employment status significantly influence healthcare access. Women have better access than men, and older individuals face more challenges despite growing healthcare needs. Income positively impacts access, while higher education shows an unexpected negative effect, suggesting reliance on alternative healthcare services. Employment status and good health improve access, while obesity and poor health are barriers.

CONCLUSION:

To reduce healthcare inequalities, policies expanding insurance coverage and reducing costs for low-income groups are crucial. Interventions such as awareness programs targeting education and elderly individuals can help mitigate barriers. These findings highlight the role of socio-economic factors in healthcare access and inform the development of sustainable health policies.

KEYWORDS

healthcare access, socio-economic factors, probit models, Türkiye

INTRODUCTION

Healthcare services aim to protect health, treat illnesses, and promote healthy living, ensuring equal and quality care for all. The Basic Health Services Law of 1987 mandates equal, high-quality, and efficient services [1]. Healthcare services are divided into public health and personal healthcare, with public health focusing on broad issues like infectious diseases

and vaccinations, and personal healthcare addressing individual needs [2]. This study focuses on access to personal healthcare.

Inequalities in healthcare access are a global issue, particularly in low- and middle-income countries. In Türkiye, the Health Transformation Program (HTP) since 2003 has improved access, but socio-economic inequalities persist [3]. Micro-level studies on healthcare access in Türkiye are limited. [4] found that rural individuals still face significant challenges, with income level being a major factor. [5] highlighted that women, those with no education, and individuals with low income face greater unmet healthcare needs, while improvements in education and income enhance access. [3] examined inequalities during the transition to Universal Health Insurance, and [6] analyzed income-related inequalities after the Health Transformation Program.

This study contributes to the literature by merging healthcare access categories into a single variable, using recent TurkStat data [7] from 2014, 2016, 2019, and 2022, to analyze socio-economic and demographic factors affecting access through a probit model.

This study offers policy recommendations and examines how age, education, and income influence access to healthcare, based on Grossman's health capital model (1972) [8]. The model emphasizes how socio-economic factors affect investments in health capital, with age identified as a key determinant [8]. Access to healthcare services reflects inequities stemming from income, education, and socio-demographic differences among social groups. These inequalities impact individuals globally and vary according to countries' cultural contexts, while also adversely affecting overall societal welfare [9,10]. Grossman's health capital model (1972) is a widely used theoretical framework for explaining these disparities. According to this model, individuals invest in their health based on resources such as income and education. Lower socioeconomic status diminishes individuals' capacity to maintain health and restricts their access to healthcare services. Consequently, the model provides a theoretical foundation for understanding how demographic and economic inequalities generate disparities in healthcare access [11,12].

This study aims to conduct a comprehensive analysis of access to healthcare services in Türkiye, with the goal of contributing to the development of sustainable and equitable health policies. The central research question is: "What factors influence individuals' access to healthcare services?" The study specifically investigates the role of socio-economic and demographic determinants in shaping healthcare access. By employing robust analytical methods and utilizing recent nationally representative data, the research seeks to fill existing gaps in the literature regarding the unique cultural and economic challenges faced by middle-income countries. Ultimately, the findings aim to inform policymakers and relevant stakeholders in designing targeted interventions to reduce inequalities in healthcare access in Türkiye and other countries with similar socio-economic conditions.

DATA AND METHOD

The Türkiye Health Survey (THS), conducted biennially by Turkstat since 2008, collects data on health status, behaviors, age, marital status, education, income, and employment. It includes forms for ages 0-6, 7-14, and 15+. The survey has limitations, such as excluding homeless or temporarily housed individuals by focusing on registered households. This study uses THS data from 2014, 2016, 2019, and 2022 for individuals aged 15 and above, totaling 76,196 observations: 41,053 females and 35,143 males.

The dependent variable in the study is the level of access to healthcare services, which is not directly available in the dataset. Instead, the dataset includes questions grouped into five categories:

- **Inpatient/Outpatient Care:** Variables include receiving inpatient or outpatient services in the last 12 months, reasons for choosing the last healthcare institution, and timing of the last dental or family doctor visit.
- **Ambulatory/Home Care/Emergency Services:** Variables reflect access to specialists, physiotherapists, psychologists, psychotherapists, psychiatrists, and home care services in the last year.

- **Medication Use:** Variables include using prescription or over-the-counter medication and supplements in the last two weeks.
- **Preventive Services:** Variables measure access to flu vaccinations, blood pressure and cholesterol checks, cancer screenings, stool tests, colonoscopies, mammograms, and smear tests.
- **Unmet Healthcare Needs:** Variables capture delays in healthcare access in the past year due to distance, travel difficulties, long wait times, or affordability issues, including unmet needs for medical care, prescriptions, or mental health treatment.

An index for access to healthcare services was created based on these five groups and their questions. As access is a latent variable without direct data, it was calculated using observed (indicator) variables [13]. Factor analysis, which combines variables with different factor loadings, was used for measurement. Confirmatory Factor Analysis (CFA) facilitated the development of the measurement model.

$$h_i = \Lambda_b + H_i + \varepsilon_i^h \quad (1)$$

Equation (1) defines the measurement model, where H represents the latent healthcare access variable. The variable h_i , or its detailed form $h_i=(h_{i1}, \dots, h_{iq})'$ is a q-dimensional vector of observable variables representing individual health levels, with $n \leq q$. The error term has a dimension of $q \times 1$. The latent variable H is an index, where higher values indicate better access to healthcare and lower values indicate poor access. The median value of the healthcare access index, the dependent variable, was used as the threshold: values above it is coded as 1 (access), and those below as 0 (no access). Descriptive statistics for the independent variables are in Table 1.

TABLE 1: SUMMARY STATISTICS FOR VARIABLES

Categorical Variables					
Access to healthcare services	Yes	No			
Gender	75.19	24.81			
	Female	Male			
Marital Status	46.12	53.88			
Single	Single	Married	Divorced	Widowed	
	11.97	83.35	1.38	3.31	
Education Level	Primary or below	Secondary	High school	University	Graduate
	77.15	4.51	3.6	10.71	4.03
Household Income Group (20%)	Low Income	Low-Middle Income	Middle Income	Upper-Middle Income	High Income
	14.01	26.22	39.35	12.17	8.25
Employment Status	Yes	No			
	70.8	29.2			
BMI	Underweight	Normal Weight	Overweight	Obese	
	3.57	39.16	35.69	21.57	
General Health Status	Very Good	Good	Fair	Poor	Very Poor
	8.89	50.99	29.45	9.4	1.27
Continuous Variables					
	Mean	Std. Dev.	Min	Max	
Age	43.4136	17.63923	15	120	

Note: Created by researchers from the TÜİK Health Survey data for 2014, 2016, 2019, and 2022.

Although the healthcare access rate is high (75.19%), a significant portion (24.81%) still lacks access. The gender distribution is nearly balanced, with men slightly more represented (53.88%). A large majority of participants are married (83.35%), reflecting the societal demographic. The education level is generally low, with 77.15% having primary school education or less. Regarding income, 39.35% belong to the middle-income group, while 14.01% are in the low-income group, suggesting a segment that may face difficulties accessing healthcare. BMI values show that most participants (39.16%) are of normal weight, but a significant portion (35.69%) is overweight, and 21.57% are obese, posing potential health risks. More than half of the participants (50.99%) rate their health as good, while 9.4% assess it as poor.

This study aims to analyze the socio-economic, demographic, and health-related determinants that influence individuals' access to healthcare services. Within this framework, the central research question is defined as follows: "Which factors significantly affect individuals' access to healthcare?" To address this question, and based on the existing literature and Grossman's health capital model (1972), the following hypotheses have been formulated:

- H1:** Gender is significantly associated with access to healthcare services.
- H2:** Age is significantly associated with access to healthcare services.
- H3:** Household income level is significantly associated with access to healthcare services.
- H4:** Education level is significantly associated with access to healthcare services.
- H5:** Employment status is significantly associated with access to healthcare services.
- H6:** Marital status is significantly associated with access to healthcare services.
- H7:** General health status is significantly associated with access to healthcare services.
- H8:** Body mass index (BMI) category is significantly associated with access to healthcare services.

Since the dependent variable is binary, the choice between the probit and logit models depends on prediction performance and fit metrics. The model with lower AIC and BIC values is preferred, and the probit model showed lower values than the logit model¹. Thus, the probit model was used to analyze factors affecting healthcare access. This model assumes the dependent variable follows a normal probability distribution and examines how independent variables influence this probability [14].

$$Y_i^* = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} \dots \dots \dots + \beta_k X_{ki} + \epsilon_i \quad (2)$$

The dependent variable Y_i is defined as follows, with X_1, \dots, X_k representing the explanatory variables and ϵ_i the error term. The model, based on the cumulative normal distribution, is the probit model. After applying the probit model, marginal effects are calculated to better illustrate the impact of independent variables, especially in nonlinear models like probit. The marginal effects are defined as follows.

$$ME = \frac{\partial \Phi(X\beta)}{\partial X} \quad (3)$$

Here, Φ is the cumulative distribution function of the standard normal distribution, X is the vector of independent variables, and β is the coefficient vector. In the probit model, the marginal effect represents the impact of a one-unit change in the independent variables on the probability of the dependent variable.

RESULTS:

The findings in Table 2 identify factors significantly affecting healthcare access. All variables were statistically significant.

¹ Logit Models: Probit Models:
 • AIC: 53995.18 AIC: 52778.42
 • BIC: 54226.21 BIC: 53009.44

TABLE 2: PROBIT MODEL RESULTS

Variable	Coef.	Robust Std. Err.	z
Constant	3.008	0.060	49.71***
Gender (if male=1, female=0)	-0.291	0.012	-23.06***
Age	-0.082	0.002	-36.44***
Age Square	0.0007	0.000	34.03***
Household Income Group (Basic Category: Low Income)			
Low-Middle Income	-0.023	0.017	-1.30
Middle Income	0.426	0.0182	23.39***
Upper-Middle Income	0.319	0.022	14.45***
High Income	0.174	0.025	6.88***
Education (Basic Category:Primary or Below)			
Secondary	-0.730	0.028	-25.83***
High school	-0.806	0.035	-22.61***
University	-1.0721	0.0204	-52.33***
Master's degree	-1.4963	0.0301	-49.70***
Doctorate	-1.763	0.179	-9.80***
Employment Status (if working = 1, otherwise = 0)	1.125	0.0148	40.24***
Marital Status (Basic Category:Single)			
Married	-0.396	0.025	-15.64***
Divorced	-0.773	0.054	-14.10***
Widowed	-0.898	0.039	-22.80***
General Health Status (Basic Category:Very Good)			
Good	-0.134	0.025	-5.27***
Fair	-0.484	0.027	-17.85***
Poor	-0.612	0.031	-19.92***
Very Poor	-0.643	0.051	-12.56***
BMI (Basic Category:Underweight)			
Normal Weight	-0.084	0.038	-2.17**
Overweight	-0.184	0.039	-4.66***
Obese	-0.255	0.040	-6.35***
			Wald chi2(23) =
Number of Observations	76196		17967.75
Pseudo R ²	0.4130		prob:0.00

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Instead of directly interpreting the probit model results, the probabilistic effects of socio-economic and demographic variables on access to healthcare services were analyzed through the marginal effects presented in Table 3.

TABLE 3: MARGINAL EFFECTS OF INDEPENDENT VARIABLES ON ACCESS TO HEALTHCARE SERVICES

Variable	Dy/dx	Delta-method std. Error	Z
Gender (if male=1, female=0)	-0.063	0.0027	-23.20***
Age	-0.018	0.000	-36.79***
Age Square	0.001	0.004	34.27***

Household Income Group (Basic Category: Lowe Income)			
Low-Middle Income	-0.006	0.0044	-1.30
Middle Income	0.096	0.0043	22.09***
Upper-Middle Income	0.074	0.0051	14.50***
High Income	0.0418	0.0060	6.95***
Education (Basic Category:Primary or Below)			
Secondary	-0.175	0.0077	-22.60***
High school	-0.197	0.0099	-19.72***
University	-0.2758	0.0058	-47.28***
Master's degree	-0.4059	0.0087	-46.34***
Doctorate	-0.485	0.0.051	-9.40***
Employment Status (if working = 1, otherwise = 0)	0.245	0.0028	42.91***
Marital Status (Basic Category:Single)			
Married	-0.080	0.0046	-17.32***
Divorced	-0.172	0.0136	-12.63***
Widowed	-0.205	0.0096	-21.39***
General Health Status (Basic Category:Very Good)			
Good	-0.026	0.0048	-5.45***
Fair	-0.105	0.0053	-19.55***
Poor	-0.137	0.0065	-20.87***
Very Poor	-0.145	0.0124	-11.57***
BMI (Basic Category:Underweight)			
Normal Weight	-0.0172	0.0078	-2.21**
Overweight	-0.0388	0.0079	-4.86***
Obese	-0.055	0.0082	-6.69***

Note: Standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1

According to Table 3, male individuals have a lower probability of accessing healthcare services compared to females. Another key finding is that age negatively affects healthcare access, but the square of age has a positive effect, suggesting that access decreases up to a certain age and then increases as age progresses. There is a strong positive relationship between income level and healthcare access, with middle and high-income individuals having better access than those with the lowest income.

Higher education levels negatively affect access to healthcare. Compared to individuals with primary or lower education, high school graduates have a 19.7% lower probability of accessing healthcare, and university graduates have a 27.58% lower probability. This decline is even greater for postgraduate education. Single individuals have better access to healthcare than married ones. Health status also impacts healthcare access, as individuals in poor health face more challenges (e.g., transportation, cost) in accessing services. Employed individuals have better access than unemployed individuals. Overweight and obese individuals are less likely to access healthcare compared to those with normal weight, as obesity can limit mobility and healthcare access.

These findings underscore the significant impact of socio-economic and demographic factors, such as income, education, age, and gender, on healthcare access. Addressing these factors could help reduce healthcare access inequalities.

CONCLUSIONS

This study aims to analyze the factors affecting access to healthcare using the probit model with data from the TurkStat Health Survey for the years 2014, 2016, 2019, and 2022. The results of the analysis reveal the impacts of factors such as income level, education level, age, employment status, general health status, and BMI on access to healthcare services. Based on the findings, the primary objective is to provide policy recommendations.

According to the study findings, male individuals are less likely to access healthcare services compared to females. This suggests that women may have an advantage in accessing healthcare. A study by [15] in the United Kingdom found that men seek healthcare services less frequently than women, which is consistent with the current study. It can be inferred that women are more likely to seek healthcare services or are more encouraged to utilize them. This may be due to men's lower interest in healthcare and lower awareness compared to women. Information campaigns on common health issues faced by men, such as heart diseases, diabetes, and types of cancer, could help address this gap. Men's lower access to healthcare suggests that awareness campaigns can encourage regular health check-ups for them.

The analysis indicates that age negatively affects access to healthcare, with older individuals being less likely to utilize healthcare services. This can be attributed to several interrelated factors, including reduced mobility due to aging, chronic illnesses or disabilities, financial constraints stemming from fixed or low incomes that make it difficult to afford treatment and medications, limited digital literacy that hinders the use of online appointment systems or telemedicine, and a lack of family support, which further complicates access to care. To address these challenges, policy measures such as age-friendly healthcare initiatives, expanded mobile health services, enhanced home care options, and increased financial assistance for older adults can play a critical role in improving access.

Higher-income groups have better access to healthcare services than lower-income groups, indicating that financial resources are a key determinant. [6] found that wealthier individuals benefit from greater access based on their income levels. [3] observed improvements after the Health Transformation Program, though income-based inequalities increased. [16] highlighted significant challenges for low-income individuals in accessing healthcare, an issue faced globally. These findings align with the current study. To reduce income-based healthcare inequalities, health insurance coverage should be expanded, and subsidies introduced to reduce costs for low-income groups. Increasing publicly funded healthcare services can also improve access for these groups.

Interestingly, a higher education level negatively affects healthcare access, possibly because more educated individuals use healthcare services less or prefer alternatives (e.g., private healthcare). As education level rises, access to healthcare decreases. Simplifying healthcare services can help more educated individuals better understand their health needs and utilize services. Personalized health plans and guidance could also improve access to accurate information for this group. Employment status positively affects access to healthcare, suggesting that comprehensive health packages could be offered to employees. Incentives like flexible working hours or health leave could help employees allocate time for health check-ups. These findings provide valuable insights for developing health policies and improving access for low-income and low-education groups, which is critical for improving overall health.

Reducing healthcare access inequalities is essential for the general health of the population. Health policies must be evaluated carefully, with steps taken to ensure fairer, more accessible healthcare services. The analysis highlights the importance of addressing factors such as income, education, and age in healthcare access and integrating these into health policies.

This study shows that inequalities in access to healthcare in Türkiye stem from structural factors such as income, education, and regional disparities, and that these issues are also widespread in many low- and middle-income countries (LMICs) with similar socioeconomic structures. Research conducted in countries like India, Brazil, and South Africa reveals that high out-of-pocket health expenditures and insufficient health insurance cause difficulties for low-income groups in accessing

healthcare services [17,18,19]. Türkiye's social health insurance system and Health Transformation Program serve as examples for other developing countries by reducing out-of-pocket expenses and increasing access. However, problems with healthcare access among low-income groups persist. Therefore, the Turkish experience provides an important reference and analytical framework for LMICs to understand and develop solutions for health inequalities.

Furthermore, this study offers significant insights not only for LMICs but also for developed countries. Although health systems in developed countries are generally more comprehensive and resource-rich, disparities in access related to socioeconomic factors such as income, education, age, and gender still persist. The analysis of access barriers and solutions in transitional health systems like Türkiye's can provide different perspectives for policies aimed at reducing health inequalities in developed countries. Considering the growing immigrant populations and vulnerable groups in developed countries, experiences from LMICs can serve as valuable references in developing strategies targeting these populations.

A limitation of the study is the lack of regional data for Türkiye, which prevented an assessment of regional effects on healthcare access. This limits the development of policies to improve healthcare access in rural areas. More healthcare facilities should be established in rural areas, and existing infrastructure should be improved. Future research should explore the differences in healthcare access between rural and urban areas in more depth and develop policies to address the specific barriers in these areas.

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