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Araştırma Makalesi / Research Article

Beyond a Health-Related Issue: Socioeconomic Determinants of Patient Mobility in Turkey*

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Abstract

Detecting and explaining patient mobility patterns allows us to better understand linkages between socioeconomic facts. This research aims to reveal variables that affect the patient mobility among cities in Turkey. It considers not only the health–related factors but also socioeconomic, demographic, and geographic variables to analyze the patient mobility. The data covers 40 million external patient admission to health facilities between 2010 and 2013. The most common clinics (cardiology, pediatric, obstetric, and internal diseases) selected to focus on branch level differences. The random effects regression model was used due to the presence of time-invariant variables on the basis of gravity model. There are statistically significant positive relationships between migration and patient mobility for all the clinics studied. The distance between two provinces has a negative impact on patient movements. Statistically significant relationships in patient mobility are observed for all clinics when two provinces are contiguous. It is observed that patients are moving from the low-income provinces to those having higher income. As a result, apart from the health-related variables, socioeconomic, demographic and geographical factors also have a substantial effect on patient mobility. While generalizing the results, it should be kept in mind that a limited number of clinics are studied.

Keywords: *Patient mobility, health care, gravity model, socioeconomic characteristics.*

Bir Sağlık Sorununun Ötesinde: Türkiye'deki Hasta Hareketlerinin Sosyoekonomik Belirleyicileri

Öz

Hasta hareketlerinin yapısının anlaşılması, sosyoekonomik olaylar arasındaki ilişkilerin daha iyi anlaşılmasını sağlayacaktır. Bu çalışmanın amacı, Türkiye'de şehirler arasındaki hasta hareketlerini etkileyen değişkenlerin tespit edilmesidir. Hasta hareketleri analiz edilirken sadece sağlık ile ilgili değişkenler değil, aynı zamanda sosyoekonomik, demografik ve coğrafik değişkenler de dikkate alındı. Kullanılan veri seti, 2010- 2013 yılları arasında yaşanan yer dışındaki sağlık merkezlerine başvuru yapan 40 milyondan fazla hastanın bilgilerinden oluşmaktadır. 70'ten fazla klinik arasından en çok başvuru yapılan kardiyoloji, çocuk hastalıkları, kadın doğum ve iç hastalıkları incelenmiştir. Zaman içerisinde değişmeyen değişkenlerin varlığından dolayı, Çekim Modeli temelinde Rassal Etkiler Regresyon Modeli kullanılarak tahminler yapılmıştır. Bütün kliniklerde, göç değişkeni ile hasta hareketleri arasında pozitif yönlü ve istatistiksel olarak anlamlı ilişki tespit edilmiştir. Şehirler arasındaki mesafe ile hasta hareketleri arasında negatif yönlü ilişki görülürken; komşu şehirlerde, bütün klinikler için, pozitif yönlü istatistiksel olarak anlamlı hasta hareketleri gözlemlenmiştir. Düşük gelirli illerden yüksek gelirli illere doğru bir hasta hareketi tespit edilmiştir. Sonuç olarak hasta hareketleri, sağlık ile ilgili değişkenlerin dışında, sosyoekonomik, demografik ve coğrafik değişkenlerden de etkilenmektedir. Çalışmadan elde edilen sonuçlar değerlendirilirken, sınırlı sayıda klinik değişkenlerinin dikkate alındığı da unutulmamalıdır.

Anahtar Sözcükler: *Hasta hareketleri, sağlık hizmetleri, çekim modeli, sosyoekonomik özellikler.*

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INTRODUCTION

One of the most important indicators of spatial disparities in healthcare is the distribution of hospitals/specialists among provinces of a country. A significant tool for a government to increase public support is setting similar standards in the accessibility to healthcare services in all parts of the country. However, it is very difficult for policy makers to provide a balance between the efficiency of healthcare and access to the services. Although all patients should receive the same quality of health services in an ideal world, it is a fact that health resources (e.g., hospitals, equipment, specialists) are limited (Bruni *et al*., 2008).

In the short term, it is not easy to increase the efficiency of healthcare on the supply side. It takes time to build new hospitals or to train new specialists. However, several arrangements like a pay-for-performance system for healthcare workers (Casalino *et al*., 2007) or making the accessibility to private health centers easier (Swan and Zwi, 1997) can provide more efficient healthcare.

Moreover, to improve access to health services, some arrangements can be made on the demand side. For example, granting patients the right to choose hospitals or specialists regardless of their insurance companies and residences will cause increased accessibility to health services (Vrangbaek *et al*., 2007). On the one hand, health disparity decreases with provision of free access to health centers different from primary healthcare providers (Zuvekas and Taliaferro, 2003); on the other hand, deficiencies of health services can be detected by looking at patient movements (Cantarero, 2006).

If the assumptions of traditional health economics are taken to be valid, it is expected that patients will prefer to be treated in their own cities without taking diseases types or health services into account. Yet, patients who are able get more information about healthcare opportunities via new communication technologies can decide on hospitals or specialists to receive the best healthcare services in regional and even national or international levels (Levaggi and Zanola, 2004).

Reasons for intra-regional, extra-regional or international patient mobility can be grouped under four main headings (Paolella, 2012):

(a) Programmed admission: Patients can receive higher quality healthcare from specialized extra-regional or international health centers in the context of health tourism.

(b) Random component: Patients can visit health centers when they are abroad for other reasons (e.g., study, work, or vacation).

(c) Border mobility: It occurs if neighbor regions or provinces are large or advanced.

(d) Suffered component: Due to a lack of specialized care (e.g., equipment or specialists).

Because of the uncertainty regarding the need for health services as well as bureaucratic barriers, regional and national migration of patients is limited. Especially, doctor expertise (e.g., in the plastic surgery) (Glinos *et al*., 2010) and healthcare provides' packages (Lunt, 2015) stands out in the regional, national, and international patient mobility.

In the studies on regional or national patient movements, following health-related variables the reasons emphasized for the applications to health centers outside of home city are: waiting time (Dawson *et al*., 2004; Ringard and Hagen, 2011), doctor's expertise, previous negative experience, quality healthcare (Cantarero, 2006), the number of hospitals/specialists, the number of beds, advanced health technology, lack of specialized centers, mistrust, comfort, and cleaning of health centers (Paolella, 2012).

In this study, the patient mobility will be discussed in the case of Turkey. In the 1990s, the main problems in healthcare in Turkey were the inadequacies of hospitals and healthcare workers (especially specialists), difficulties in getting appointments, long waiting times for medical examinations, and the inequalities to access the health services (Tatar *et al*., 2011). In the early 2000s, the new Turkish government made two important arrangements to increase public satisfaction in health services. First, patients who were covered by public health insurance became able to receive healthcare from any kind of health center without following any hierarchical referral chain among health centers. Second, patients who were covered by the public health insurance gained the right to receive healthcare from any kind of public/private health center with little extra payments even from those outside of the residential area (Akdağ, 2011). The latter can be expected to have two different effects on patient mobility: Either patients choose to go to other provinces to get better health services from the health center, or they prefer to go to their own provinces' private hospitals. In both cases, the novelties increase getting healthcare in both types of cities (either origins or destinations).

This paper focuses on regional and national patient movements, examining the determinants of patient mobility across the provinces in Turkey. The aim of the paper is to address an important issue on patient mobility in Turkey: What kind of variables affects patient mobility? Patient mobility can be considered as a proxy to assess the health disparity among Turkish provinces. In this paper, not only the health-related variables; but also socioeconomic, demographic, and geographic parameters will be taken into account to analyze patient mobility. The most common clinics—cardiology, pediatric, obstetric, and internal diseases—selected to focus on branch level differences. For each clinic's data, the random effects regression model was used due to the presence of time-invariant variables on the basis of gravity model. Unlike other studies in the literature, it allows us to evaluate the joint effect of health and socioeconomic disparities on patient mobility.

The remainder of the study as follows. In the first section, the data set and econometric method used in the study are introduced. In the second section, the results obtained are presented. In the last section, the results were discussed in the context of the literature and the aim of the study.

1. DATA AND METHODS

1.1. Data

The number of patients who apply for the healthcare providers outside of their residents among Turkish provinces between 2010 and 2013 was selected from the clinics such as cardiology, pediatrics, obstetrics, and internal diseases. After the new government came to power in 2003, it implemented a series of reforms called as the Health Transformation Program. Changes (e.g., the removal of the referral chain, being able to get private healthcare with a low fee, the right to choose a hospital or specialist) made under this program has facilitated patient mobility among provinces. In this article, the post-2010 period was chosen for analysis in order to better detect the impact of the program on the patient mobility. Table 1 shows the total number of admissions to health centers and patient movements in the years studied. Data on health center admissions and patient mobility were obtained from the Turkish Social Security Institute (TSSI).

Table 1: The Number of Admissions to Health Centers and Patient Movements

Period	Overall Admissions*	Patient Movements**	Patient Mobility Ratio (%)***
Dec. 2009 – Nov. 2010	251 630 100	32 843 706	13.05
Dec. 2010 – Nov. 2011	292 626 833	36 407 051	12.44
Dec. 2011 – Nov. 2012	355 843 020	41 755 845	11.73
Dec. 2012 – Nov. 2013	372 586 211	43 772 750	11.74

* The number of admissions to all kind of health center across Turkey.
** The number of patients who applied to a health center outside of her/his residential province.
*** The percentage of admissions to outside of residential provinces in overall admissions.

Despite the Turkish Ministry of Health (MoH) defines more than 70 clinics, four of them (cardiology, pediatrics, obstetrics, and internal disease) were selected. These are the most commonly applied clinics which can represent the visits of different divisions of the society. Table 2 shows the share of selected clinics in total patient mobility, and the number of specialists in each clinic across Turkey.

Table 2: Information on the Selected Clinics

	Cardiology		Pediatrics		Obstetrics		Internal disease	
Period	Share* (%)	# of Specialist	Share* (%)	# of Specialist	Share* (%)	# of Specialist	Share* (%)	# of Specialist
Dec. 2009 – Nov. 2010	14.4%	1644	9.0%	4060	10.8%	4782	10.8%	4352
Dec. 2010 – Nov. 2011	13.7%	1847	8.3%	4500	10.0%	4847	10.2%	4653
Dec. 2011 – Nov. 2012	13.0%	2027	7.0%	4557	8.8%	4885	9.7%	4792
Dec. 2012 – Nov. 2013	12.9%	2196	6.5%	4444	9.8%	5046	9.9%	4548

* The percentage of the number of patients visited a health center outside of their residence to the total number of patients in each clinic.

Data set for analysis of four clinics at the provincial level were created by matching the patient mobility information (from the TSSI); the number of specialists and health centers (from the MoH); and provinces' information on population, migration, distance, and income per capita (from the Turkish Statistical Institute (TSI)). Table 3 involves the variables used in the analysis and their definitions.

Continuous random variables are used in logarithmic form. Thus, the distributions of the variables are aimed to converge to the normal distribution. The distance variable is used in level since its distribution is close to normal. In the study, the logarithm of the net balance of patient mobility between province *i* and province *j* is used as the dependent variable. When a province pairs mutually compares, it is possible to determine which one is the net patient attractive.

The patient mobility between provinces is driven by attractive forces like the number of specialists between origins and destinations or hampered by the costs of movements like the distance between two provinces (Lewer and Van den Berg, 2008). The health model of immigration suggests that the differences in the number of specialists, nurses, and health centers between origins and destinations are incentives to patient mobility. In the same context, another factor that positively affects the patient movements is population; the large population in the origins is likely to cause the patient movement. In this study, these two variables are combined under one variable, which defined the net balance of the number of patients per specialists ($\ln specialist_{ij}$) between an origin province (i) and a destination province (j). When patient density increases in a certain province, it becomes a good option for patients to receive medical examination in an accessible province. On the other hand, if the number of patients per specialists and that of coming from other provinces are increasing at the same time, there may be a renowned specialist effect (Laugesen and Vargas-Bustamante, 2010).

Besides the human resources of the provinces in the health sector, the health equipment of the provinces is an essential factor in patient movements. As compared to primary health centers, it is thought that the number of public and private hospitals is more important for patient movements; thus only the number of hospitals in cities is preferred in this study. Although the number of beds in hospitals is used as an additional explanatory variable in some studies (Levaggi and Zanola, 2004; Cantarero, 2006), it is not used in this study because of the perfect multicollinearity issue.

Table 3: Definition of Variables

Variables	Definitions	Types of Variables	Sources
lnm_{ij}	The logarithm of the net balance of patient mobility between province *i* and province *j* ($i \neq j$).	Continuous	Turkish Social Security Institution
ln$specialist_{ij}$	The logarithm of the net balance of the number of patients per specialists between *i* and *j* ($i \neq j$).	Continuous	The Republic of Turkey Ministry of Health
ln$hospital_{ij}$	The logarithm of the net balance of the number of hospitals between *i* and *j* ($i \neq j$).	Continuous	The Republic of Turkey Ministry of Health
ln$migration_{ij}$	The logarithm of the net balance of the number of people between *i* and *j* (difference in the number of people who was born in *i*, and are living in *j*; and that of people who were born in *j* and are living in *i*) ($i \neq j$).	Continuous	Turkish Statistical Institute
ln$income_{ij}$	The logarithm of the net balance of real income per capita between *i* and *j* ($i \neq j$).	Continuous	Own calculation based on TSI's data
$distance_{ij}$	The distance in kilometers between *i* and *j* ($i \neq j$).	Continuous	Turkish Statistical Institute
neighbor_{ij}	It takes "1" if the two provinces are contiguous; otherwise, it takes "0".	Discrete (Binary) Variable	Turkish Statistical Institute

Past migration (i.e., kinship/family effect) and presence of contact people at the destination increases patient mobility (Legido-Quigley *et al*., 2007; Akarca and Tansel, 2015). People may want to take advantage of better healthcare when they visit relatives who migrated to other provinces. Moreover, when people go to their hometown especially in the summer holidays, they can benefit from health services.

The difference in income level is another variable that can affect patient mobility between provinces. In relatively developed (and large) cities there are more health opportunities than the others. Thus, they will attract more patients from other provinces. The national income per capita for each province was derived from Gross Domestic Product (GDP) and the share of economic contributions of provinces. Because GDP is not calculated on the basis of provinces. The calculation for each year studied is as follows:

$$income_i = \frac{\left(\frac{GDP}{100}\right) \times Province's\ share}{Province\ Population} \tag{1}$$

While GDP and population are taken into account separately for each year in Equation (1), the economic contributions of provinces calculated by TSI in 2001 are used. *lnmigration* and *lnincome* variables are included in the model as socioeconomic factors affecting patient mobility at the province level. The macro variables in Table 4 are recalculated at the provincial level and used to predict the model.

One of the geographic variables that can affect patient mobility is the distance between provinces. As the distance between provinces increases, it is expected that patient mobility will decrease. Another geographic variable is neighbor relationship. Patient mobility is also expected to be high between two adjacent provinces.

Table 4: Summary statistics of selected variables for period of 2010 – 2013

	Years			
Variables	**2010**	**2011**	**2012**	**2013**
Internal Migration	2.360.079	2.420.181	2.317.814	2.534.279
Population	73.722.988	74.724.269	75.627.384	76.667.864
Income*	771,9	832,5	874,0	950,6

* billion US Dollar

1.2. Methodology

The factors that determine the net patient mobility among the provinces are categorized under three headings: socioeconomic, geographical, and health–related variables. These considerations suggest the gravity model equation:

$$m_{ij} = f(O_i, T_j, D_{ij}) \tag{2}$$

In equation (2), m_{ij} is the net balance of patient mobility between province *i* and province *j*; $O_i$is the health-related attributes of the origin; T_j is the health-related attributes of the destination; and D_{ij} is the distance between the origin and the destination (Levaggi and Zanola, 2004). In terms of healthcare gravity models, estimations using health-related variables (e.g., the number of hospitals and specialists) and distance might give relatively better results. However, it should be developed as a model that considers other variables that affect patient mobility. The linear form of the panel-specific model that include health-related, geographic, demographic, and socioeconomic variables is as follows:

$$lnm_{ij,t} = \beta_0 + \beta_1 lnspecialists_{ij,t} + \beta_2 lnhospital_{ij,t} + \beta_3 lnmigration_{ij,t} + \beta_4 lnincome_{ij,t} + \beta_5 distance_{ij,t} + \beta_6 neighbor_{ij} + \alpha_i + u_{ij,t} \tag{3}$$

where lnm_{ijt} is the log of the net balance of patient movements between province *i* and province *j* in year *t*. Equation (3) is a modified gravity model that includes more specific variable such as kinship/family effect (*lnmigration*) than the conventional healthcare gravity models.

An important advantage of the equation (3) is that all variables in the equation are bilateral at the provinces level through taking the net balance of the variables (the number of patients per specialists and hospitals, population, and income) except for the contiguous and the distance variables. In other words, both origins' and destinations' characteristics that are related to patient mobility are taken into account in one equation. If data belonging only to one of the two provinces (the origin or the destination) were used for the analysis in each observation, the estimators would be biased (Ramos, 2016).

Although ratio values of variables such as the income of provinces were used in some studies (Levaggi and Zanola, 2004; Cantarero, 2006) we choose using the difference in the number of patients per specialists and hospitals, and incomes between provinces. Another reason we didn't use the ratio of variables in the equation, substantial values of number of specialists would be indefinite or zero due to the lack of specialists in some provinces. Because of omitting indefinite observations, the estimates of regression coefficients might be biased (Lewer and Van den Berg, 2008).

The data used in this paper consists of a sample of longitudinal data set which includes both time-variant and time-invariant variables at provincial level over the period 2010-2013. Thus, the Random-effects (RE) model of panel-data models was used due to the presence of time-invariant variables (e.g., distance and contiguous) which make it impossible to use the Fixed-Effects (FE) model in equation (3).

Based on the assumption of the selected estimation model, the province-specific effects (α_i) are uncorrelated with the explanatory variables ($x_{ij,t}$). This can be formulated as follows;

$$cov(\alpha_i, x_{ij,t}) = 0 \tag{4}$$

As a consequence of this assumption, the new form of the error term ($v_{ij,t}$), called the composite error, is as in equation (5).

$$v_{ij,t} = \alpha_i + u_{ij,t} \tag{5}$$

While α_i in equation represents variables that cause patient movements but cannot be included in the model for each province, $u_{ij,t}$ represents the error term that occurs for each section and time.

Before deciding which of the Pooled Ordinary Least Squares (Pooled OLS) or RE methods to use, the Breusch-Pagan Lagrange multiplier (*LM Statistic*) test runs for the null hypothesis in equation (6) that is the variance across entities (provinces) is zero.

$$H_0: \quad Var[u_i] = 0 \tag{6}$$

According to the test results displayed in Table 5, the null hypotheses for four different clinics were rejected. In other words, there is a significant difference among provinces (i.e., presence of the panel effect), and the RE model chosen as the estimation method.

2. RESULTS

In the results, a statistically significant relationship is observed between the dependent variable and many explanatory variables used for four clinics. In table 5, the economic interpretations of the results are discussed in terms of patient mobility.

After running the RE model, the Wald test can be used to test the null hypothesis that coefficients of interest are simultaneously equal to zero:

$$H_0: \beta_1 = \beta_2 = \cdots = \beta_k = 0, \quad i = 1,2,\dots,k \tag{7}$$

As seen in Table 5, the probability values of the Wald test statistic are less than 0.05. This indicates that the null hypothesis shown in equation (7) for each model can be rejected.

Patient mobility is positively affected by the difference in the number of specialists in all clinics with statistically significant effect at the 5% level except internal medicine. Although magnitudes of the coefficients are somewhat different for four clinics, the positive coefficients mean that the intra-provincial patient mobility increases, while enhancing the difference in the number of patients per specialists between provinces. Despite the increase in the number of patients per specialist, the increase in patient mobility indicates that patients deliberately choose famed doctors. In other words, the positive coefficients can be interpreted as a renowned specialist effect. When the difference in the number of patients per specialist increases by 10%, patient movements increase by 0.42% in cardiology, and 0.33% in obstetrics. Although the coefficients of pediatrics and internal medicine are positive, these coefficients are statistically insignificant.

Table 5: Random Effects PAnel Model With Four Clinics in Turkey (2010 – 2013)

Dependent variable: $\ln m_{ij,t}$	Clinics			
	Cardiology[a]	Pediatrics[a]	Obstetrics[a]	Internal Medicine[a]
ln*specialist*$_{ij,t}$	.042	.007	.033	.015
	(.012)*	(.007)	(.010)*	(.011)
ln*hospital*$_{ij,t}$	.062	.062	.075	.017
	(.019)*	(.014)*	(.015)*	(.016)
ln*migration*$_{ij,t}$	.255	.234	.243	.270
	(.015)*	(.010)*	(.010)*	(.010)*
ln*income*$_{ij,t}$	.040	.010	.028	.053
	(.027)	(.001)*	(.018)	(.019)*
distance$_{ij}$	-.0004	-.0001	-.0001	-.0001
	(.0001)*	(.00001)*	(.00001)*	(.00001)*
neighbor$_{ij}$	1.685	1.475	1.701	1.760
	(.1830)*	(.1180)*	(.1288)*	(.1240)*
Wald statistics (χ^2)	487.53	863.24	876.55	1082.99
	$(p-value=.00)$	$(p-value=.00)$	$(p-value=.00)$	$(p-value=.00)$
LM statistic (χ^2)	2312.0	2831.6	2749.3	2883.1
	$(p-value=.00)$	$(p-value=.00)$	$(p-value=.00)$	$(p-value=.00)$
number of observations	12625	12776	12776	12497

[a] In the estimation, four different population types were used for four clinics. In cardiology estimation, only 50+ ages ratio of provinces were used. For pediatrics, the numbers of patients aged between 0 and 14 were run as the population variable in the estimation for each province. While the numbers of women in provinces were used for obstetrics, the overall populations of provinces in each year studied were used for internal medicine.

$* p < 0.05$

The difference in hospital numbers between provinces is considered a good indicator of healthcare quality. More hospitals mean that patients can have more options for medical examination by various specialists in diverse hospital types. Also, higher number of hospitals is expected to reduce the waiting time. Thus, patients who live in a province which has less number of hospitals are more likely to move to other provinces which have more hospitals. As seen in Table 5, when the difference in the number of hospitals increases by 10%, patient movements increase by 0.62% - 0.75% in three clinics except for internal medicine (the coefficient of *lnhospital* is statistically insignificant for internal medicine).

Despite the family/relative relationship is not important in developed countries; it is essential for people in developing countries like Turkey. People seek help of their relatives who live in central provinces to reach better health services. When the net balances of the number of people who were born in *i* and is living in *j* changes by 1000 units, patient mobility change in the range of by 2.3% to 2.7% for all clinics. Coefficients for $lnmigration_{ij,t}$ are statistically significant for all clinics.

In terms of income, patient mobility is expected to occur from low-income provinces to high-income provinces. Income level of a province is thought as a proxy for the healthcare endowment of a province. As expected for all clinics, when the difference in income between provinces increases, the patient movement increases as well. When the difference in income between provinces increases by 10%, the patient movements in pediatrics and internal medicine increase respectively, 0.1% and 0.5%. Coefficients of income differences in cardiology and obstetrics are statistically insignificant.

Unsurprisingly, the distance between *i* and *j* has a negative impact on patient movements. When the distance increases by 100 kilometers, patient movements decrease by 4% in cardiology, and 1% in other clinics (the coefficients of distance in all clinics are statistically significant).

Geographically, Turkey is divided into seven regions. Each geographic region has its own central province(s). Thus, being adjacent to the central cities is a key factor for both intra and extra regional patient movements. As shown in Table 5, patient movements increase in the range from 1.47% to 1.76% when the two provinces are contiguous. All coefficients of neighbor for four clinics are statistically significant.

3. DISCUSSION AND CONCLUSION

The direction and signs of most coefficients obtained from the model are consistent with the expectations of the model and past literature. Although the micro level analysis of health data has not been made due to the high privacy concerns, the findings support adequate evidence that there is evidence on quality-driven movement at the meso-level (provinces). The statistically significant differences in the number of patients per specialist/hospital and income between provinces are the most important supporters of these suggestions.

However, based on the findings of the paper, it would be wrong to draw a conclusion that patient mobility could be reduced by increasing the number of specialists or hospitals in the low-income provinces. First, at the meso-level data, it is very hard to detect the causes of patient mobility thoroughly. In the other words, at the meso-level data, the effects of socioeconomic (e.g., kinship/family variable) and geographic variables (e.g., distance or contiguous) on the patient mobility cannot be decomposed completely.

Second, although the coefficients of $lnspecialist_{ij}$ were interpreted as the renowned specialist effect; there is no information on the motivation behind the specialist choices of patients. Because of the lack of additional cost of receiving healthcare from the outside of the residential provinces, patients might have preferred the movement to get better healthcare. However, one of the evidence supporting the renowned specialist effect proposition is that the coefficients of the variables are quite different for four clinics; but the data used in the study is not sufficient to detect the pure renowned specialist effect.

As another result of this study, it should be emphasized that just increasing the number of specialists or hospitals in low-income provinces may not suffice to reduce patient mobility among provinces. In other words, health-related investments could fail to reduce health disparity unless patients and clinic-specific patients' characteristics are taken into account by policymakers.

The study shows that socioeconomic variables are significant factors when patients make decisions on treatments. Although the coefficients of other variables change over four different clinics in the regression models, the coefficient of migration is stable for four clinics. When examining the patient rationality, in addition to variables such as treatment costs, the number of specialists or hospitals, socioeconomic factors such as kinship could also be taken into consideration. This finding counts as one of the major contributions of the paper to the literature on patient mobility, and it is also called *the kinship/family effect* on patient mobility.

As discussed in the methodology section, since the data set contains both time-variant and time-invariant variables, the model was run by the RE model. Yet the reason for using longitudinal data in researches is to find individual-specific effects. The fixed-effects model is the best one to estimate such effects. It is obvious that the features of provinces (large or small, developed or undeveloped) and specialists (famous or not) have important effects on patient mobility. The micro-level data set containing information on characteristics of patients, clinics, specialists, and provinces should be constructed to analyze the effects of such individual-specific effects on patient mobility. Moreover, using such data, the effects of health-related and socioeconomic variables can be separated. In this study, although the health-related, socioeconomic and geographical characteristics of patient mobility were determined at meso-level, micro level data would be useful to develop location-specific health policies which may contribute reduction of health disparities among provinces or regions of a country.

AUTHOR STATEMENT

Research and Publication Ethics Statement

This study has been prepared in accordance with the ethical principles of scientific research and publication.

Approval of Ethics Board

This study does not involve any human subject participation.

Author Contribution

The authors have contributed the study equally.

Conflict of Interest

There is no conflict of interest arising from the study for the authors or third parties.

Declaration of Support

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