Original Article

Determinants of medical tourism considering a geographical model: a case study of Iran

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Abstract

Background: Medical Tourism has received significant attention worldwide as the most remarkable phenomenon in the tourism industry. Medical Tourism was considered a medical tourist's behavior concerning the push/pull factors and three fundamental flows to assess the BTD model (Birthplace-Transportation-Destination). The present study aimed to unearth determinable factors of medical tourism based on a geographical model named BTD in Iran.

Methods: Firstly, with 301 respondents and 11 expert judges, after literature review, item building, and some assessments, the primary checklist leads to 49 items. Two next steps, some processes were common, including sample-to-item ratio (10.12, 10.24), the Cronbach's alpha (over 0.81, 0.85-0.96), Bartlett's Test (both were significant), and KMO (0.896, 0.915). Finally, EFA in the first study and PCA in the second study were assessed and reported. In the third study, to check multicollinearity, the VIF (1.809-2.917), AVE (0.50-0.55), and CR (0.59-0.68) were calculated. Then, AVE was compared with SIC. Ultimately, SEM was conducted that the 3-factor model, especially without the Mahalanobis distance, indicates better results. The study is developed in five cities called Khorasan, Tabriz, Tehran, Fars, and Isfahan.

Results: Regardless of cost, other significant factors were recognized, including birthplace-related factors, transportation-related factors, and destination-related factors.

Conclusion: As can be seen, the construction and the push/pull factors surveyed to assess the BTD model covering all main flows were well defined. Meaningful statistical relationships support the internal and external validity of the multidimensional construct. Therefore, present results are functional for interested sectors, and researchers must not disregard the market.

Keywords: Medical Tourism; Health Care Economics and Organization; Quality of Health Care; Iran.

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Introduction

Medical tourism does not constitute a novel phenomenon in the world as Connell (1), and Gray and Poland (2) highlighted. Unfortunately, statistics for Medical Tourism are inadequate or unreliable (1, 3, 4) or sometimes no governmental statistics exist (1), and the studies performed are not enough. However, some organizations estimate that the medical tourism industry is worth virtually $100 billion worldwide. As reported by the World Tourism

Organization, by 2005, virtually 617 million citizens earned a living in medical tourism, growing at a rate of 3.9% each year from 2000 to 2005 (5, 6).

Iran, such as other countries, tends to plan to increase its share of the market, and according to the claim of authorities, Iran serves about % 0.5 of medical tourists in the world. Iran and some other countries were referred to (1, 7) as nations with a notable proportion of medical tourists, particularly diasporic tourists. Han and Hyun (8) categorized international medical tourists and stated that global medical tourists leave their countries for a lower cost. According to economic factors, it is evident that three rudimentary flows of Medical Tourism prevail: 1- frontier flow: this border-based flow constitutes the base of inexpensive medical tourism, and frontier zones enjoy this type of flow. In general, this flow does not have considerable benefits for border towns or states. 2- South flow: In this flow, people travel from developing to developed countries. These people are usually rich in birthplace or home. They have been seeking high-quality and effective treatment in the destination. 3- North flow: In this flow, people travel from developed to developing countries. They have been seeking low-cost services with high quality in a shorter time. The study is developed in the most important Medical Tourism destinations in five cities. In this study that took three years, all main flows in these five cities were covered.

Determinable geographical factors in attracting this type of tourist are the backbone of 'medical tourism development' and carry enormous significance for great discernment and discrimination, logical assessment, and appropriate decision-making to minimize error and increase efficiency. A limited number of scientific studies have been performed in Iran, including research by Momeni, Janati (9), Moghimehfar and Nasr-Esfahani (10), Connell (1), Jafari, Gh (11), Mahdavi, Mardani (12), Goodarzi, Taghvaei (13), Karami, Bayati Khatibi (14), Mohammadi and Khaldi (15), etc.; however, a myriad of investigations is required regionally, nationally, and internationally. Accordingly, in this regard, we aim to unearth these factors.

After the introduction, the contribution is divided into three distinct phases. Initially, items were extracted based on available sources, and they were surveyed. It is hypothesized that three geographical factors named Birthplace, transportation, and Destination are recognized as the Leiper model or the BTD model and their expanded details influence medical tourists. Subsequently, items need to be filtered, purified and confirmed. Finally, they assessed a total of 1270 inbound medical tourists to Iran. The result assists experienced researchers to find a clear and deep insight, reaching more universal factors by reviewing them in the final.

1.1. Medical Tourism

Most Medical Tourism accounts assume a definition, but some definitions are minimalist and undeveloped (1). The definition of health tourism by Carrera and Bridges (5) and Pourkhaghan, Ebraimipour (16) may be a good instance in this field. Before providing a clear definition, we have to identify and perceive what this phenomenon is. We can categorize Medical Tourism considering various dimensions. For example, Yu, and Lee (17) asserted that Medical Tourism could be classified according to the relative amount of time spent on medical services and tourism on the trip. Other terms exist, including Medical Tourism, Health Tourism, Curative Tourism, Treatment Tourism, Wellness Tourism, Medical Migrants (18), Health Care Tourism, and so on. As Fetscherin and Stephano (19) claim, these are some of the terms used very loosely and unsystematically. Although a part of the authors has pursued the application of the phrase 'health tourism' to accept it as an umbrella term for a variety of different health-related tourism (20), it is useful to differentiate 'Medical Tourism' as special medical measures (21).' De la Hoz-Correa

and Muñoz-Leiva (22) considered medical tourism as a subset of health tourism and, on a large scale, a subcategory of tourism studies.

According to Runnels and Carrera (23), the hierarchy of medical needs is divided into four segments; moreover, these needs generally concentrate on the upper parts of this pyramid.

Apart from the health segment, Medical Tourism requires non-medical services too (16), such as accommodation, transportation, purchase, and so forth. In other words, Medical Tourism covers a wide range of income sources.

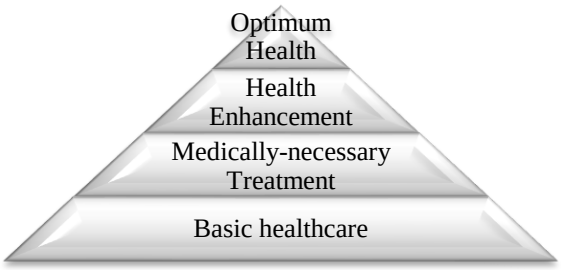

Fig.1 Pyramid of Health Needs (23)

Research by Seow and Choong (24) regarding visiting Malaysia as a Medical Tourism Destination by applying the antecedents of The Theory of Planned Behavior has introduced Medical Tourism as behavior. In this study, a new definition was developed using experts' opinions. Accordingly, Medical Tourism was defined as the behavior of medical tourists, opting for appropriate medical services in a suitable place considering the push/pull factors. It means that the push/pull factors change the behavior of medical tourists considering Birthplace, Transportation, and Destination (BTD model).

1.2. Theoretical Framework

Push factors or the pushers and pull factors or the pullers in tourism are theoretical concepts proposed by Dann (25). Generally, a further examination of the former studies in tourism revealed that the apparent contrast between push and pull factors is approved (25). Fetscherin and Stephano (19) also adopted and developed these concepts along with their index. The authors tend to the economic resources in which these factors are predominantly classified into demand or the pushers along with supply or the pullers illustrating the economic circumstances (19).

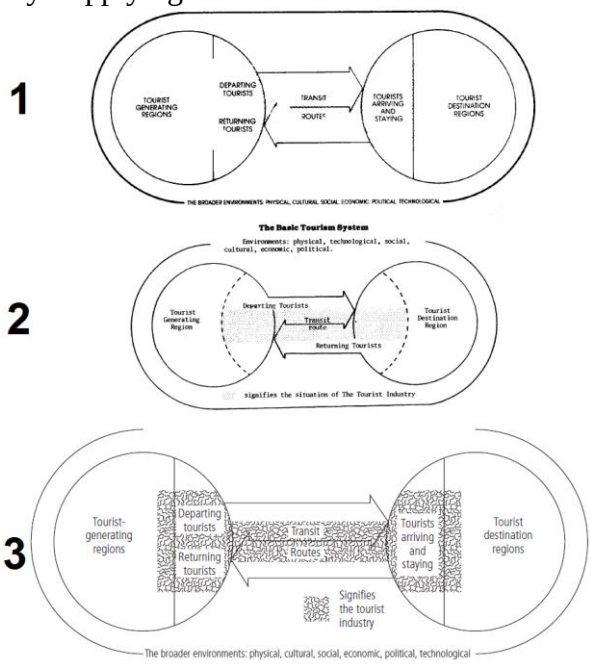

Fig.2**:** The tourism system (1: Leiper (27); 2: Leiper (28); 3: Boniface, Cooper (26))

Medical Tourism has three geographical aspects. Boniface, Cooper (26), Leiper (27), and Leiper (28) asserted that a geographical attitude of tourism has three main components, including the place of origin of tourists or their birthplace,

destinations or receiving areas; and the routes taken between these two locations, or transportation. Accordingly, the birthplace or marketplace is the origin of tourists, the destination is the tourists' target, and transportation includes facilities and equipment which link the birthplace and the destination.

Fig.3: BTD model.

These models have endorsed three rudimentary components from the geographical perspective. These three factors are developed in the BTD model too.

In this BTD, three geographical units and many factors for each of them exist that consider push/pull factors whose factors are different in each unit and at different times. According to the model, we extract Iran's pull/push factors as a destination.

Methods

The research according to the purpose is categorized as applied research, and this quantitative research is experimental methodically. The study followed the way of scale development based on formative measures following Rossiter (29). The study of Fetscherin and Stephano (19) is one of the best instances in this regard. Rossiter (29) offered the C-OAR-SE method for scale development in marketing. Regardless of C (Construct definition), we did just study the OAR stages because we did not aim to build a new structure or index. Here statistical population included all inbound medical tourists in Iran from 2016-2018. Three samples in three diverse phases in five different cities called Khorasan, Tabriz, Tehran, Fars, and Isfahan with 1270 respondents (First study: 301, Second study: 496, Third study 473) were accidentally selected by cluster sampling method. Further details are provided below. The data was analyzed by IBM SPSS 19.

In the first study, we had 301 respondents and 11 expert judges from private and public segments engaged in the Medical Tourism industry. After the literature review and item-building process to assess the primary checklist of items, the study results in some items as pull/push factors for Medical Tourism. The first study here with a 5-point Likert scale was assessed. To assess content validity, the mean values were answered for each item. Moreover, to check the face validity, the items were graded by respondents; finally, some items remained, and some of them were eliminated according to the expert judges.

In the second study, items were filtered for external validity via some respondents across five demographic dimensions. After the rate of sample-to-item; to assess the reliability of statistics, the Cronbach's alpha; and to assess sample and construct validity sufficiency, the KMO and Bartlett's Test checked whether they were appropriate for factor analysis. Then, to check the appropriate extraction method, each of them for normality was tested. Accordingly, the PCA with Direct Oblimin rotation was applied on account of significant results for both tests of normality. Then, the Eigenvalues (Kaiser's criterion), and the average communality were reported. Some items according to the factor loading standard rule must be removed; if the expert judges approve. All reported items provide internal consistency of the method. Finally, the Exploratory Factor Analysis (EFA) and the correlation matrix between the factors were reported.

In the third study, items were checked with more respondents or inbound medical tourists to ensure that it works without malfunctions, and purify and confirm the three-dimensional structure of the factors attracting medical tourists. An accurate scientific structure is an early stage of forming composite indicators that must manifestly delineate the fact to be assessed and its subcomponents (30). Here another sample was assessed. First, the rate of sample-to-item is calculated. To test the

reliability of statistics and the internal consistency of the research scale, Cronbach's alpha, Bartlett's Test, and KMO were checked if it is acceptable for factor analysis. Then, the 'test of normality of the details for Kolmogorov-Smirnov and Shapiro–Wilk was assessed. Accordingly, PCA was used. Subsequently, the CFA was conducted to approve the determinable factor attracting medical tourists. The Direct Oblimin rotation was used due to the factors were expected to be correlated. To check multicollinearity, the VIF was calculated if the values are the cut-off values. Then, the validity test was carried out. Convergent validity was tested by assessing the AVE[1] and also CR[2].

Subsequently, for the discriminate validity test, the AVE was compared with the squared inter-construct correlation estimates (SIC). If all of the AVE values are more than SIC, it can be said that the assessed items are more similar to the construct than to alternative constructs. Here, the correlations of Kendall's tau-b used and the AVE and SIC values to compare reported. Finally, SEM is a statistical tool to detect relationships among underlying constructs. The SEM was conducted by SPSS (AMOS). A 3-factor model was calculated, after which it was compared with a 1-factor model; and the details were reported. Of course, we can remove some extreme outliers or Mahalanobis distance and rerun without them. The results of the two models without the Mahalanobis distance are presented and can be compared. Ultimately, nomological validity was examined by the structural equation model whether it supports the nomological validity of Determinable Factors of Medical Tourism.

2.1. CASE STUDY

The increasing requisition for health care from some people provides a chance for some societies in Asia and Central Europe. These nations have determinedly cultivated Medical Tourism to increase GDP (31). In the world, the leading part of Medical Tourism remains Asia (21). There are many popular destinations in Asia, including Iran, Turkey, India, Thailand, Jordan, the Philippines, UAE, Malaysia, Colombia, Malta, Taiwan, Lebanon, and elsewhere (1, 7). There is a huge potential in several Iran provinces; for instance, the advantage of having skilled professionals and practitioners with international skills in ophthalmology in Shiraz may bring about the improvement of Medical Tourism in the ophthalmic field (32).

Medical activities in Iran have an ancient history. “Medical History of Persia” and “Persian Medicine” are the best-recognized works of Cyril Elgood that can be beneficial in this field. Negligible expenditure and high-quality medical treatment (involving treatment for cancer (specialized treatment of all kinds of cancer, bone marrow transplantation, chemotherapy, gynecological oncology, etc.) cosmetic (rhinoplasty, liposuction, Botox, etc.) dental, dermatology, fertility, heart, ophthalmology (Lasik & laser surgery, cataract surgery, corneal diseases, intraocular lens, medical retina, etc.), neurosurgery, gynecology, podiatric, podiatry-Chiropody, and so on) make Iran a rewarding and appealing destination.

Han and Hyun (8) categorized international medical tourists and stated that global medical tourists leave their countries for a lower cost. According to economic factors, it is evident that three

[1] Average Variance Extracted

[2] Construct Reliability

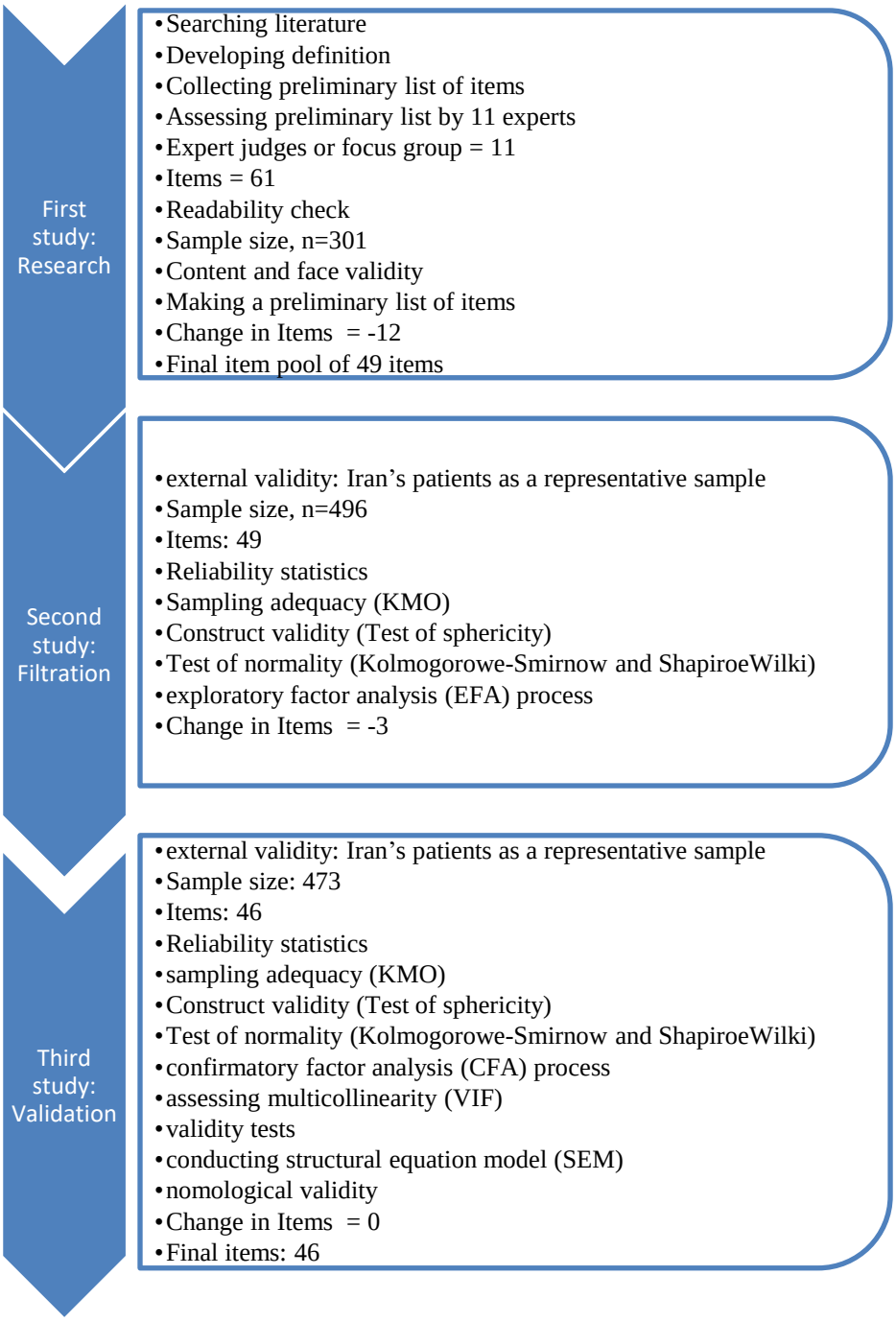

Fig 4: Flow chart of the scale development

rudimentary flows of Medical Tourism prevail: 1- frontier flow: this border-based flow constitutes the base of inexpensive medical tourism, and frontier zones enjoy this type of flow. In general, this flow does not have considerable benefits for border towns or states. 2- South flow: In this flow, people travel from developing to developed countries. These people are usually rich in birthplace or home. They have been seeking high-quality and effective treatment in the destination. 3- North flow: In this flow, people travel from developed to developing countries. They have been seeking low-cost services with high quality in a shorter time.

As shown in Fig. 5, the study is developed in the most important Medical Tourism destinations in five provinces. In this study that took three years, all main flows in these

five provinces were covered. Many medical tourists are arriving from the First Flow in Khorasan and Tabriz. In addition, many medical tourists are arriving from South and North flows throughout the five provinces under study; however, Tehran mainly enjoys medical tourists from the North flow. It is believed that Iran will have a positive role in this field in the future.

Results

In this section, three studies were developed in the three phases below.

3.1. The first study: Preliminary search (the process of search and review of literature and items building)

We had to search and discover pull/push factors, which create a behavior called Medical Tourism. Churchill Jr (33) states that the resources must provide the method of the defined variable clearly in advance and the number of items or aspects. Sound research should use a multi-source approach; therefore, many theses, dissertations, articles, books, and magazines were searched and reviewed in the first study to build items as outlined previously. After that, the opinions of a group of expert judges in this field consisting of 11 experts were asked. They assessed the primary checklist of items and added or removed a part of them, leading to 61 items as pull/push factors for Medical Tourism.

In survey 1, 301 expert judges from private and public segments participated in this study. Expert judges are engaged or familiar with the Medical Tourism industry. Descriptive statistics of the respondents or inbound medical tourists can be found in the Appendix. The 5-point Likert scale at a range of strongly unimportant, unimportant, neutral, important, and strongly important was used.

To assess content validity, the mean values answered by respondents or inbound medical tourists for each item were the amount of three or more (34). Also, to check the face validity, some items whose values were graded by inbound medical tourists or respondents providing the amount of about two or below were eliminated. In this section, twelve items got

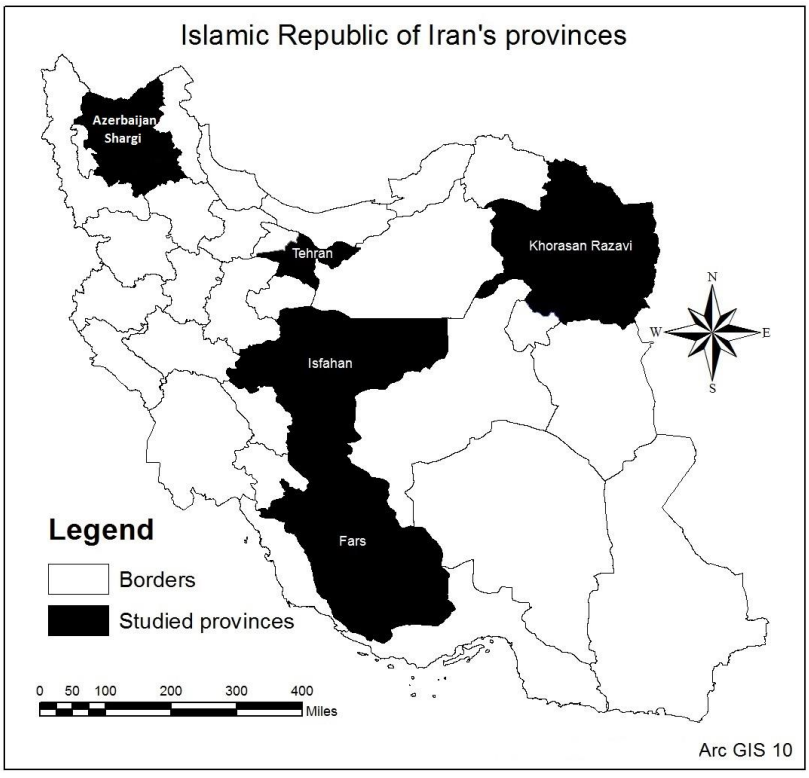

Fig. 5 Location of studied provinces in the I.R. of Iran

the amount of two or below, and the remains got the amount of three or more (minimum: 1.94; maximum: 4.93); thus, 49 items remained from the preliminary list, and twelve items were eliminated according to the opinions of the expert judges.

The experts were also requested to comment further about additional items. Accordingly, 43 suggestions were received, all of which had been previously identified.

3.2. The second study: Filtration

The reports of the sample size and analyses of the second study are summarized below. The external validity was gained by applying Iran's Patients as representative samples. In this survey, a representative Iran Patients population sample was studied considering five demographic dimensions (gender, marital status, age, educational attainment, and geographical location). A total of 496 respondents or inbound medical tourists was obtained, consisting of 53% male, 47% female, 36% single, 58% married, and 6% divorced or widows. More details are provided in the Appendix.

Respondents or inbound medical tourists were inquired how necessary they felt each of the 49 items was to move. In other words, the following question was raised: "Which items do you think are necessary to move here for medical services?" On the Likert scale, each of them was appraised. Also, the rate of sample-to-item was calculated, whose outcome was 10.12. This result is higher than the appropriate range of Nunnally (35), indicating the adequate sample size of the study.

The Cronbach's alpha values were over 0.81; therefore, it can be said that the reliability of statistics was satisfied. The Kaiser Meyer Olkin (KMO) and Bartlett's Test for Sphericity were calculated to assess sample and construct validity sufficiency. Bartlett's Test for Sphericity was significant at 0.000, and the KMO was 0.896, indicating that the data for factor analysis was appropriate. Then to check the appropriate extraction method, each of them for normality was tested. As the results show, the principal component analysis (PCA) was applied because of significant results in each item for both Kolmogorov-Smirnov and Shapiro–Wilk tests of normality.

The reports on factor analysis of the second study are summarized below. For this study, SPSS was used by applying the principal component analysis (PCA) with Direct Oblimin rotation for factor analysis. The Direct Oblimin was used for factor analysis because this study was a kind of psychological research, and the factors were expected to be correlated.

All factors were kept with Eigenvalues above 1 (Kaiser's criterion) because the sample size was over 300 respondents or inbound medical tourists (496 Iran Patients representatives), and the average communality was more than 0.57. In this factor analysis, three factors with Eigenvalues of higher one were identified, explaining 74.71% of the variance in the data.

According to the factor loading standard rule, items with 0.30 or more are significant, while 0.40 and 0.50 are considerable as Hair, and Anderson (36) have suggested; however, as Nunnally (35) suggests, the items that load below 0.5 can be removed. Three items (after-care services to return, a nice and beautiful way to travel, and food options) had low item loadings. Given that the items that load below 0.5 are not added to assess purification, the present study followed Nunnally (35). The expert judges surveyed the items and concluded that they could be eliminated. All items had a Cronbach's alpha ranging from 0.81 to 0.96, proving the internal consistency of the method of development. The three new factors were labeled as Birthplace, Transportation, and Destination. Table 1 reports the Exploratory Factor Analysis (EFA).

Finally, the correlation matrix between the factors was calculated. As shown in Table 2, the lowest correlation was 0.537; therefore, Direct Oblimin met the

Table 1 Exploratory Factor Analysis Results for the Second Study

	n: 496
First factor: Birthplace	a: 0.87
Expensive treatment and healthcare	0.882
Disreputable hospitals and doctors	0.869
low healthcare and treatment quality	0.855
Financial assistance or attractive payment plans for a destination	0.851
The positive image of the destination to travel	0.780
lack of treatment service	0.764
Perceived satisfaction and trust in the staff and clinic to return	0.723
Lack of capacity and long waiting lists	0.694
Perceived quality in the staff and clinic to return	0.687
Facilitators of destination	0.658
system corruption	0.649
Attractive medical packages and effective advertisement of destination	0.633
Ineffective treatment	0.633
Legal or ethical limitations in treatment	0.632
Absence of health insurance	0.627
Easy access to medical packages of destination (Internet, etc.)	0.615
Invalid and old medical equipment and facilities	0.603
Unprofessional staff and doctors	0.548
Second factor: Transportation	a:0.81
Quick and various transportation	0.679
Easily obtainable visa system and lack of travel limitation	0.675
Availability and accessibility of transportation*	0.672
Cheap fare And High-quality traveling*	0.662
Security in traveling*	0.658
Cheap fare And High-quality air traveling	0.643
Cheap fare And High-quality sea traveling	0.639
Infrastructure of Transportation	0.601
Cheap fare And High quality in special transportation and disability access	0.587
Third factor: Destination	a:0.97
Low treatment and healthcare cost	0.928
Lack of or short waiting lists	0.885
Reputable and popular hospitals and doctors	0.832
High-quality and effective treatment	0.817
Well-known and state-of-the-art medical technologies and equipment	0.793
International accreditation of standards (ISO, TAS, NCQA, ESQA)	0.789
Well banking and financial services (exchanging rate, Visa or Master card, etc.)	0.783
Low accommodation cost	0.778
Religious and ethnic similarity	0.762
Professional and friendly behavior of staff and doctors	0.759
Accreditation of medical facilities (ACI, JCI, ISQUA)	0.735
high healthcare quality indicators	0.689
Nice weather	0.688
Attractive and popular tourism destination	0.676
Abundant cultural and natural attractions	0.674
Popular and effective alternative treatment	0.665
Security of destination	0.647
Language similarity	0.628
Less corruption	0.613

Extraction method: Principal Component Analysis Rotation Method: Direct Oblimin

requirements of this study and was the appropriate rotation method.

Validation is discussed in the third study.

3.3. The third study: Validation

The study aims to purify and confirm the three-dimensional structure of the determinable factor in the attraction of medical tourists. The report of the third

Table 2 Component correlation matrix

	1	2	3
1	1		
2	0.537	1	
3	0.727	0.673	1

Extraction method: Principal Component Analysis Rotation Method: Direct Oblimin.

study sample size and analysis is summarized below.Another sample with 473 respondents or inbound medical tourists was used in this study. Column three in the Appendix provides details. The rate of sample-to-item was 10.28, recording greater than the suitable rate of 10:1, as reported by Nunnally (35). To show the internal consistency of the research scale, it should be said that each factor had a Cronbach's alpha with values between 0.85 and 0.96, which is acceptable. The Cronbach's alpha values were over 0.85; therefore, it could be said that the reliability of statistics was also satisfied. Bartlett's Test for Sphericity was significant at 0.000, and the KMO was 0.915, which is acceptable for factor analysis. The 'test of normality of the details for Kolmogorov-Smirnov and Shapiro–Wilk was significant. Therefore, the principal component analysis was used.

The reports on the factor analysis of the third study are summarized below. A confirmatory factor analysis (CFA) was conducted to approve the determinable factor in the attraction of medical tourists. The Direct Oblimin rotation was used because the factors were expected to be correlated. Of the 46 items, there was no items in low item loading (<.50). These 46 items load on three factors defining 80.35% of the variance. The results of the confirmatory factor analysis (CFA) are reported in Table 4.

According to Table 3, the lowest and

Table 3 Component correlation matrix

	1	2	3
1	1		
2	0.622	1	
3	0.680	0.668	1

Extraction method: Principal Component Analysis and Rotation Method: Direct Oblimin.

highest correlations were 0.622 and 0.68, respectively; therefore, it can be said that Direct Oblimin met the requirements of the study and was the correct rotation method.Tables 2 and 5 compare the results of the last two studies, covering the significant items for the confirmatory factor analysis or CFA and Cronbach's alpha. As shown in Table 5, each of the items had significant loadings of 0.50 or more, ranging from 0.50 to 0.86, showing the convergent validity of the constructs. To check multicollinearity, the variance inflation factor (VIF) was calculated, which is acceptable in a range of 1 to 5. The VIF values were between 1.809 and 2.917, and the tolerance test was between 0.347 and 0.612. As Fetscherin and Stephano (19) state, many regards a VIF less than three and a tolerance test more than 0.33 as cut-off values for multicollinearity; therefore, the values obtained in this study were below the cut-off values.

Then, the validity test was carried out. Convergent validity was tested by assessing the Average Variance Extracted (AVE) and also the construct reliability (CR). According to Fornell and Larcker (37), the AVE has to be more than 0.50, and based on Bagozzi and Yi (38), the CR has to be more than 0.60.

The AVE values were in a range of 0.50 to 0.55, and the CR values were recorded between 0.59 and 0.68. Therefore, regarding the value of 0.597 (Birthplace's CR), it can be said that this number was close to 0.6 and could be acceptable for this study.

As can be seen, all of the CR values were more than the AVE. However, the discriminate validity test should be assessed. For this purpose, the AVE was compared with the squared inter-construct correlation estimates (SIC). If all of the AVE values are more than SIC, it can be said that the assessed items are more similar to the construct than to alternative constructs. Here the correlations of

Table 4: Confirmatory Factor Analysis Results for the Third Study

	(n:473)
First factor: Birthplace	a: 0.85
Expensive treatment and healthcare	0.809
low healthcare and treatment quality	0.791
Disreputable hospitals and doctors	0.743
Financial assistance or attractive payment plans for a destination	0.715
Lack of capacity and long waiting lists	0.702
Ineffective treatment	0.683
Perceived satisfaction and trust in the staff and clinic to return	0.663
The positive image of the destination to travel	0.661
Perceived quality in the staff and clinic to return	0.659
lack of treatment service	0.646
Legal or ethical limitations in treatment	0.638
Absence of health insurance	0.635
Facilitators of destination	0.627
Invalid and old medical equipment and facilities	0.619
system corruption	0.623
Attractive medical packages and effective advertisement of destination	0.583
Easy access to medical packages of destination (Internet, etc.)	0.561
Unprofessional staff and doctors	0.508
Second factor: Transportation	a:0.86
Quick and various transportation	0.736
Availability and accessibility of transportation	0.729
Security in travel	0.706
Easily obtainable visa system and lack of travel limitation	0.698
Cheap fare And High-quality traveling	0.688
Cheap fare And High-quality air traveling	0.673
Cheap fare And High-quality sea traveling	0.672
Cheap fare And High quality in special transportation and disability access	0.659
Infrastructure of Transportation	0.574
Third factor: Destination	a: 0.96
Low treatment and healthcare cost	0.861
Reputable and popular hospitals and doctors	0.847
Lack of or short waiting lists	0.837
High-quality and effective treatment	0.819
Well-known and state-of-the-art medical technologies and equipment	0.793
International accreditation of standards (ISO, TAS, NCQA, ESQA)	0.781
Accreditation of medical facilities (ACI, JCI, ISQUA)	0.764
Low accommodation cost	0.763
Religious and ethnic similarity	0.762
high healthcare quality indicators	0.759
Professional and friendly behavior of staff and doctors	0.718
Well banking and financial services (exchanging rate, Visa or Master card, etc.)	0.681
Nice weather	0.654
Popular and effective alternative treatment	0.649
Abundant cultural and natural attractions	0.637
Attractive and popular tourism destination	0.618
Security of destination	0.573
Less corruption	0.571
Language similarity	0.533

Kendall's tau-b were used. Table 5 compares the AVE and SIC values.

SEM or Structural Equation Modelling is a statistical tool to detect relationships among underlying constructs. The structural equation model (SEM) was conducted by SPSS (AMOS). A 3-factor model was calculated, after which it was compared with a 1-factor model. As Table 6 shows, the 3-factor model had better model fit indices.

As can be seen, the construct was well defined, indicating that every index for Medical Tourism has been a multidimensional construct. When the multi-normality analysis was studied, there were several extreme outliers or Mahalanobis distance. Therefore, the data were identified, and then both models were rerun without them.

Table 5 AVE, CR, and SIC[3]

	CR	AVE	SIC (F1)	SIC (F2)	SIC (F3)
Factor 1	0.597	0.50	1	0.41	0.38
Factor 2	0.638	0.53	0.41	1	0.46
Factor 3	0.681	0.55	0.38	0.46	1

Table 6 model fit indices with Mahalanobis distance

	3-factor model	1-factor model	Threshold
CMIN/DF	6.816	11.453	>3.0
NFI	0.861	0.754	>0.9
IFI	0.875	0.767	>0.9
TLI	0.858	0.734	>0.9
CFI	0.877	0.759	>0.9
RMSEA	0.08	0.15	<0.7

Table 7 Model fit indexes after removing the Mahalanobis distance

	3-factor model	1-factor model	Threshold
CMIN/DF	5.994	13.073	>3.0
NFI	0.938	0.760	>0.9
IFI	0.947	0.771	>0.9
TLI	0.932	0.736	>0.9
CFI	0.957	0.763	>0.9
RMSEA	0.07	0.15	<0.7

The results of the two models without the Mahalanobis distance are presented in Table 7 and can be compared with the previous Table. Fig. 6 reveals the standardized regression coefficients for the 3-factor model have not focused on the destination. Other geographical factors should be considered because it is possible to generate a great destination for travel, but the other factors do not push people as Medical Tourists to travel to other countries following a special behavior.

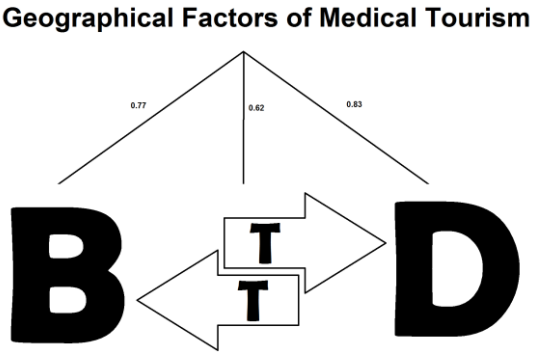

Fig.6 Path model or Structural Equation Model (SEM) of Determinable Geographical Factors of Medical Tourism.

Ultimately, nomological validity was examined by the structural equation model in Fig.6 following Cronbach and Meehl (39). According to Fig. 6, the statistical relationships were meaningful in the hypothesized direction, supporting the nomological validity of Determinable Geographical Factors of Medical Tourism

Discussion

Push/pull factors were surveyed to assess the BTD model covering all main flows of Medical Tourism, including the frontier, South, and North flows. As you may see, the statistical relationships were meaningful, supporting the internal and external validity of the multidimensional construct of determinable geographical factors of Medical Tourism; and the results of the study are in line with many studies throughout the world conducted by Fetscherin and Stephano (19), Cham, Lim (40), Jotikasthira (41), Maboodi and Hakimi (42), Kyritsis Froelich (43), Datta (44), Singh (45), Singh and Gill (46), Henson, Guy (47), Sultana, Haque (48), Aydin and Karamehmet (49)Henson et al. (2015), Sultana et al. (2014), Aydin and Karamehmet (2017), Al Adwan (50), Yin (51), Kanittinsuttitong (52), Fisher and Sood (53), Kumar and Hussian (54), Nilashi, Samad (55), etc.

[3] Kendall's tau-b correlations coefficient in the square.

The Birthplace underlies the initiation of Medical Tourism; for instance, persuading advertisements may enhance Medical Tourism for a destination. The quality of medical and non-medical services at the birthplace can be a potential factor to encourage medical tourists to travel. Expensive treatment and healthcare, lack of capacity and long waiting lists (21), legal or ethical limitations in treatment (21, 56), lack of treatment services, perceived satisfaction and trust (16) along with the level of quality, the image of the destination (19, 40), system corruption, disreputable doctors and hospitals, ineffective treatment, invalid and old medical equipment and facilities, absence of health insurance, low healthcare and treatment quality, unprofessional staff and doctors in the birthplace, against easy access to medical packages, facilitators (57), financial assistance and attractive payment plans (21), attractive medical packages, and effective advertisement of the destination in the birthplace can stimulate behavior of Medical Tourists.

Transportation, which is one of the main factors of the BTD model, plays a crucial role in Iran. There are many limitations in transportation in Iran, influenced by many factors such as financial problems and international sanctions (21). However, cheap fares, high-quality vehicles, special transportation services for emergency conditions and disability access, availability and accessibility of transportation, security in traveling, quick and various transportation (21), easily obtainable visa system, and lack of travel limitations, and more importantly, infrastructures of transportation (Public roads and necessary highways, etc.) are the most critical pull factors in transportation.

The most critical factors attracting medical tourists are those factors that will influence the medical tourists to choose certain destinations. These factors include cost-effectiveness, cultural similarity (1, 10, 58), security, nice weather, less corruption, attractive and popular tourism destinations, abundant cultural and natural attractions, lack or short waiting lists, reputable and popular hospitals and doctors, professional and friendly behavior of staff and doctors, well-known and state-of-the-art medical equipment and technologies, international accreditation of standards, accreditation of medical facilities, popular and effective alternative treatments, etc.

As can be seen from the facts and figures, some of them are general but a few of them are unique to Iran. The present results build up a picture of the pushers and the pullers of medical tourism in Iran. The results and previously published works may use for other similar countries; however, further research is required. To suggest some points for future research, fundamentally, researchers must not ignore the market or birthplace and all main flows. Whilst some works disregard it, one of the most important advantages of this study is that it has considered the birthplace as a vital factor. It is not logical to study a city that mainly enjoys the North flow, for example, and generalize it to Medical Tourism.

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Author's contribution

The first step including developing the study concept and design was done and revised by AFM, KZ, MR, and JE. Next step i.e. the data gathering was surveyed by AFM. Moreover, the last stages encompassing analyzing and interpreting the data, and writing the first draft of the manuscript were done, revised and edited by AFM, MK, and ZT; and finally, all the authors approved the final manuscript.

Ethical considerations

The Ethical Considerations are provided for this paper. Our participants are free to opt-in or out of the study at any point in time,

and Participants know the purpose, benefits, and possible risks of the study before they agree or decline to join. We don't know the identities of the participants, and personally identifiable data is not collected. There are no potential physical, social, psychological, or all other types of harm. Moreover, we ensure our work is free of plagiarism or research misconduct, and we accurately represent our results.

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Conflict of interest

There are no relevant financial or non-financial competing interests to report.

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Appendix

Descriptive statistics sample

	1st study (n: 301) Convenience expert sample		2nd study (n: 496) Representative Iran's Patients sample		3rd study (n: 473) Representative Iran's Patients sample	
Gender	amount	%	amount	%	amount	%
Male	175	58	263	53	255	54
Female	126	42	233	47	218	46
total	301	100	496	100	473	100
Marital Status						
Single	105	35	178	36	151	32
Married	169	56	287	58	289	61
Divorced or Widow	27	9	30	6	33	7
total	301	100	495	100	473	100
Highest Educational Level						
Associate Degree or less	18	6	69	14	52	11
Bachelor Degree	72	24	188	38	189	40
Master's Degree	130	43	178	36	170	36
Doctorate Degree	81	27	60	12	62	13
total	301	100	495	100	473	100
Age						
<20	12	4	54	11	43	9
20-30	45	15	94	19	66	14
30-40	54	18	134	27	128	27
40-50	79	26	119	24	118	25
50-60	69	23	64	13	76	16
>60	42	14	30	6	42	9
total	301	100	495	100	473	100
Residence						
Afghanistan	n/a		39	8	28	6
Armenia	n/a		10	2	14	3
Azerbaijan	n/a		35	7	38	8
Bahrain	n/a		10	2	0	0
Canada	n/a		5	1	9	2
France	n/a		5	1	0	0
Germany	n/a		10	2	9	2
India	n/a		20	4	24	5
Iraq	n/a		69	14	76	16
Kuwait	n/a		30	6	42	9
Lebanon	n/a		10	2	19	4
Malaysia	n/a		10	2	14	3
Oman	n/a		54	11	61	13
Pakistan	n/a		44	9	38	8
Qatar	n/a		39	8	43	9
Syria	n/a		35	7	24	5
Turkey	n/a		30	6	19	4
U.A.E.	n/a		15	3	5	1
U.S.A.	n/a		0	0	5	1
U.K.	n/a		5	1	5	1
Yemen	n/a		20	4	0	0
total	n/a		495	100	473	100