Pulmonol. 2019;25(1):32–39

PULMONOLOGY

www.journalpulmonology.org

ORIGINAL ARTICLE

Immigrants' access to health care: Problems identified in a high-risk tuberculosis population

R. Linhas[a,*], O. Oliveira[b], P. Meireles[b], P. Oliveira[b], M.B. de Melo[c], J. Lourenço[d], F. Ferreira[e], R. Gaio[e,f], R. Duarte[a,b,g,*]

[a] *Serviço de Pneumologia, Centro Hospitalar de Vila Nova de Gaia/Espinho, Vila Nova de Gaia, Portugal*
[b] *EPIUnit – Instituto de Saúde Pública, Universidade do Porto, Porto, Portugal*
[c] *Faculdade de Ciências da Saúde, Universidade da Beira Interior, Covilhã, Portugal*
[d] *Faculdade de Ciências, Universidade do Porto, Porto, Portugal*
[e] *Departamento de Matemática, Faculdade de Ciências, Porto, Portugal*
[f] *Centro de Matemática, Universidade do Porto, Porto, Portugal*
[g] *Departamento de Ciências de Saúde Pública, Ciências Forenses e Educação Médica, Universidade do Porto, Porto, Portugal*

Received 13 October 2017; accepted 15 April 2018
Available online 1 August 2018

KEYWORDS
Tuberculosis;
Immigration;
Health services;
Barriers

Abstract
Introduction: Immigrants may utilize health care services differently than other residents and may also have a greater risk for tuberculosis (TB).
Objective: Identify barriers to healthcare access by immigrants, factors associated with these barriers, and discuss strategies that may reduce these barriers.
Material and methods: Anonymous questionnaires were given to immigrants at National Immigrant Support Centres between 2015 and 2016. Barriers to healthcare were identified using logistic regression.
Results: One-hundred and nineteen questionnaires were administered to immigrants, 9 of whom (8%) presented with TB while in Portugal. Twenty-one percent of immigrants reported barriers to healthcare access, and 69% had general practitioners (GPs). The presence of barriers to healthcare access was negatively associated with having a GP and with being married or in a *de facto* union.
Conclusions: A considerable proportion of immigrants reported having difficulties accessing healthcare services in Portugal where legally these barriers are nonexistent. Certain factors were associated with these difficulties.

* Corresponding authors.
E-mail addresses: ana.linhas@chvng.min-saude.pt (R. Linhas), raquel.duarte@chvng.min-saude.pt (R. Duarte).

https://doi.org/10.1016/j.pulmoe.2018.04.002

Introduction

Over one-billion people worldwide are immigrants, and this number continues to increase, especially in developed countries.[1] In 2015, there were 388,731 immigrants in Portugal, mainly in Lisbon and Porto, the two largest metropolitan areas (50.7% of all immigrants).[2] National Immigrant Support Centres (CNAIs) provide immigration support and hosting services.

Management of immigrant healthcare is a significant challenge. The World Health Organization considers the right to healthcare as a fundamental human right,[3] although utilization and access to healthcare differs for immigrants and non-immigrants.[4] The needs and access to healthcare of immigrants may be affected by their adverse living and working conditions,[5,6] discrimination,[7] and diminished socio-economic opportunities.[7]

In addition, immigrants are exposed to multiple health risks and may also have different disease profiles than residents of the host population.[4] For example, the proportion of tuberculosis (TB) cases among immigrants in several European countries has increased to more than 50%.[8] Data for Portugal in 2014 indicated that 15.9% of TB cases were immigrants, much greater than in the general population.[9]

Portugal has free access to healthcare for all immigrants with residence permits and those presenting a document proving residence in Portugal for more than 90 days. Immigrants in the country illegally also have the right to healthcare, although they are directed toward CNAIs to obtain legal status. As for residents of the native population they only have to pay a small tax.[10] However, these conditions do not apply to TB patients, who are diagnosed and treated free-of-charge, regardless of the country of origin and legal status.[10]

The main objective of the present study was to determine if immigrants perceive barriers to healthcare access and to identify factors associated that limit their access to healthcare. We also discuss potential strategies to improve the healthcare of immigrants, such as screening programs for TB.

Material and methods

This cross-sectional study was conducted from September 1, 2015 to August 31, 2016 at CNAIs in Porto and Lisbon.

Population definition

Based on the different definitions and categorizations of immigrants across European Union,[11–13] we included participants older than 18 years-old who had moved to Portugal (which was neither their usual residence nor country of birth) permanently or for more than six months, except for holidays, visits to friends and relatives, business, medical assistance, or religious pilgrimage.

Questionnaire and procedure

The questionnaire was based on relevant literature and previous validated questionnaires.[14,15] A draft version was given to a pilot group of immigrants at a TB outpatient care center. The revised version collected information about three general topics: socio-demographic characteristics, tuberculosis risk, and healthcare access. The questionnaire was in the Portuguese language, and included closed- and open-ended questions using simple and objective language. The questionnaire was limited in scope, and designed to be completed in 5–10 min. Anonymity was maintained for all participants.

The interviewers were members of our team with field-survey experience. The questionnaires were performed on 10 randomly chosen week days (4 days in Lisbon and 6 days in Porto). Immigrants searching for services at a CNAI were asked to participate in the study, and a face-to-face interview was conducted. To overcome language and literacy barriers, collaboration of friends and family was allowed.

Ethics and consent

The research proposal was approved by the ethical board of the ISPUP (Institute of Public Health of the University of Porto), the Health Regional Administration of Lisbon and Tagus Valley, and the Portuguese Data Protection Authority. Permission to perform the study was obtained from the coordinators of the CNAIs of Porto and Lisbon. All ethical principles of the Helsinki Declaration were followed, and all participants provided informed consent directly in the questionnaire.

Statistical analysis

Descriptive statistics consisted of absolute and relative frequencies for each collected (categorical) variable. Evaluation of the independence between two categorical variables used the χ^2-test or the Fisher test, according to the expected frequencies. Exact Logistic Regression[16] was used to test the potential association [Odds Ratios (OR) with 95% confidence intervals (CI)] between some of the collected variables and the process of facing or not difficulties whenever accessing the Portuguese health-care services. Only the marginally significant variables from the univariate analysis were considered as independent variables and the forward algorithm was followed. This statistical methodology was chosen due to a small number of people in some of the contingency tables created from the categories of the independent variables and the response. A similar situation was observed for the binary variable coding the attribution, or not, of a GP in Portugal. However, as exact logistic regression did not converge, the importance of the significant variables flagged by the univariate analysis was investigated by a random forest algorithm.[17] In particular, no adjusted effects were estimated.

The statistical analyses were performed with the R language and software environment for statistical computation, version 2.3.3.[18] The significance level was set at 0.05.

Table 1 Socio-demographic variables and tuberculosis risk among surveyed immigrants in Portugal ($n = 119$).

Socio-demographic variable	*n* (relative frequency)
City	
Porto	96 (81)
Lisbon	23 (19)
Age (years-old)	
<40	78 (68)
≥40	37 (32)
Sex	
Female	52 (47)
Male	58 (53)
Region of origin	
Africa	40 (35)
South America	40 (35)
Eastern Europe	20 (18)
Arab states and Asia	13 (12)
Time living in Portugal	
<2 years	32 (29)
≥2 years	80 (71)
Tuberculosis risk	
Previous TB diagnosis	
Yes	9 (8)
No	101 (92)
Country where TB was diagnosed	
Brazil	1 (11)
Portugal	7 (78)
Ukraine	1 (11)
Screening for TB in Portugal	
Yes	29 (26)
No	82 (74)

Table 2 Healthcare use among surveyed immigrants in Portugal ($n = 119$).

Previous use of healthcare services in Portugal	*n* (%)
Hospitalization	
Yes	26 (24)
No	82 (76)
Emergency service	
Yes	65 (60)
No	43 (40)
Consultation in a medical speciality	
Yes	54 (51)
No	52 (49)
Primary Healthcare Centre	
Yes	89 (81)
No	21 (19)
Assigned GP	
Yes	73 (69)
No	33 (31)
Barriers to healthcare access	
Yes	23 (21)
No	84 (79)
Main difficulties in accessing to healthcare services	
It is hard to understand how I can be assigned a doctor	15 (68)
I am still unsure of my rights to access medical care	13 (65)
There are long waiting times for an appointment	11 (58)
Clinic opening hours are inconvenient	8 (42)
It is difficult to pay for an appointment due to a lack of money	7 (37)
Healthcare services are far from my house	6 (32)
I am afraid of losing my job because of going to the hospital	5 (25)
I do not trust the health services to keep my data confidential	5 (28)
I feel discriminated against by health professionals	5 (28)
I feel difficulties in communicating with health service professionals because of language problems	4 (21)
I feel discriminated against by other patients	2 (11)

Results

The interviewers initially recruited 136 immigrants, but 17 refused to participate or dropped out before completion, resulting in a sample size of 119 (96 from Porto and 23 from Lisbon) (Table 1). Most participants were from Africa or South America (70%), most were younger than 40 years-old (68%), and there were similar numbers of males and females. Most immigrants had been living in Portugal for more than two years (71%). Nine individuals (8%) had previous diagnosis of TB, and seven of them were diagnosed in Portugal.

The use of healthcare services while in Portugal and the barriers to health care reported by the participants are presented in Table 2. Twenty-three immigrants (21%) reported encountering barriers to healthcare access. These barriers were more prevalent in those who were single, divorced, or widowed (78% vs. 22%, $p = 0.054$), and in those without GPs (76% vs. 24%, $p = 0.003$) (Table 3).

A multivariate analysis (Table 4) indicated that immigrants who were married or in *de facto* unions were less likely to report barriers to access than those who were single, divorced, or widowed (adjusted odds ratio [aOR] 0.35, 95% CI 0.08–1.28, $p = 0.087$; marginally significant). Immigrants without GPs were also more likely to report barriers to access than those with GPs (aOR 0.31, 95% CI 0.07–0.93, $p = 0.032$) (Table 4).

Thirty-three immigrants (31%) reported not having an assigned GP (Table 2), and this status was more common for those who had lived in Portugal for fewer than two years (77% vs. 13%, $p < 0.001$), who lived for more than one month in a different country during the past five years (52% vs. 23%, $p = 0.006$) and who were single, divorced, or widowed (42% vs. 16%, $p = 0.011$). Additionally, respondents who had GPs were more likely to have their legal status regularized, to use health services as emergency services (82% vs.

Table 3 Description of the sample concerning the perceived barriers to healthcare access and the assignment of a general practitioner among surveyed immigrants in Portugal.

Variable	Barriers to healthcare access			Assigned GP		
	Yes ($n=23$) *n* (%)	No ($n=84$) *n* (%)	*p*-value	Yes ($n=73$) *n* (%)	No ($n=33$) *n* (%)	*p*-value
City where the questionnaire was administered						
Porto	17 (19)	71 (81)	0.235	59 (69)	27 (31)	1.000
Lisbon	6 (32)	13 (68)		14 (70)	6 (30)	
Age (years)						
<40	13 (19)	57 (81)	0.444	47 (67)	23 (33)	0.754
≥40	10 (27)	27 (73)		26 (72)	10 (28)	
Sex						
Female	11 (22)	38 (78)	1.000	30 (64)	17 (36)	0.417
Male	12 (22)	43 (78)		41 (73)	15 (27)	
Place of origin						
Africa	7 (31)	33 (37)		26 (36)	14 (35)	
South America	10 (43)	30 (33)	0.844	23 (32)	17 (42)	0.600
Eastern Europe	4 (17)	16 (18)		15 (20)	5 (13)	
Arab states and Asia	2 (9)	11 (12)		9 (12)	4 (10)	
Time living in Portugal						
<2 years	8 (27)	22 (73)	0.582	7 (23)	23 (77)	**<0.001**
≥2 years	15 (19)	62 (81)		66 (87)	10 (13)	
Lived for more than 1 month in a different country during the past 5 years						
Yes	6 (19)	25 (81)	0.854	16 (48)	17 (52)	**0.006**
No	17 (23)	56 (77)		55 (77)	16 (23)	
Number of years of education						
<6	2 (20)	8 (80)	0.895	5 (55)	4 (45)	0.216
6–12	12 (21)	45 (79)		42 (75)	14 (25)	
>12	9 (24)	29 (76)		23 (60)	15 (40)	
Employment status						
Unemployed	6 (20)	24 (80)	1.000	24 (83)	5 (17)	0.114
Others[a]	16 (21)	60 (79)		49 (64)	27 (36)	
Marital status						
Single/divorced/widow	17 (28)	43 (72)	0.064	35 (58)	25 (42)	**0.011**
Married/De facto union	5 (11)	39 (89)		36 (84)	7 (16)	
Average monthly income in the last year (compared with minimum wage in Portugal)						
≤Than minimum wage	17 (26)	48 (74)	0.155	43 (68)	21 (32)	0.531
>Than minimum wage	5 (13)	35 (87)		30 (75)	10 (25)	
Legal status						
European citizen or permanent residence permit	8 (15)	47 (85)	0.202	44 (83)	9 (17)	**0.007**
Others[b]	13 (27)	36 (73)		29 (57)	22 (43)	
Previous TB diagnosis						
Yes	1 (13)	7 (87)	1.000	6 (75)	2 (25)	1.000
No	22 (22)	76 (78)		67 (69)	30 (31)	
Screening for TB in Portugal						
Yes	6 (21)	22 (79)	1.000	20 (74)	7 (26)	0.632
No	17 (22)	62 (78)		53 (67)	26 (33)	
Previous use of health services						
Hospitalization						
Yes	5 (19)	21 (81)	1.000	21 (81)	5 (19)	0.220
No	17 (22)	62 (78)		51 (65)	27 (35)	

Table 3 (*Continued*)

Variable	Barriers to healthcare access			Assigned GP		
	Yes ($n = 23$) *n* (%)	No ($n = 84$) *n* (%)	*p*-value	Yes ($n = 73$) *n* (%)	No ($n = 33$) *n* (%)	*p*-value
Emergency service						
Yes	11 (17)	53 (83)	0.348	50 (82)	11 (18)	**0.002**
No	11 (27)	30 (73)		22 (51)	21 (49)	
Consultation in a medical specialty						
Yes	13 (24)	41 (76)	0.834	41 (79)	11 (21)	**0.024**
No	10 (20)	39 (80)		28 (56)	22 (44)	
Primary Healthcare Centre						
Yes	16 (18)	71 (82)	0.132	69 (81)	16 (19)	**<0.001**
No	7 (35)	13 (65)		4 (19)	17 (81)	
Assigned GP						
Yes	9 (13)	62 (87)	**0.003**	–	–	–
No	13 (41)	19 (59)		–	–	–
Barriers to healthcare access						
Yes	–	–	–	9 (41)	13 (59)	**0.003**
No	–	–	–	62 (77)	19 (23)	
Discrimination because of ethnicity or country of origin						
Yes	12 (30)	28 (70)	0.158	29 (71)	12 (29)	0.909
No	11 (16)	56 (84)		44 (68)	21 (32)	

[a] Student, student worker, full-time employment, part-time employment, receiving unemployment benefits, undeclared worker, sexual worker, unauthorized to work (for immigration purposes), voluntary worker, domestic, retired.
[b] Temporary residence permit, temporary residence permission, residence request submitted, in the country with visa, application for asylum, refugee status, student visa.

Table 4 Estimates from the exact logistic regression model identifying the factors associated with barriers to healthcare access and assignment of a general practitioner among surveyed immigrants in Portugal.

Barriers to healthcare access		
Variable	aOR (95% CI)	*p*-value
Marital status (married/de facto union vs. single/divorced/widow)	0.35 (0.08, 1.28)	0.087
GP in Portugal (yes vs. no)	0.31 (0.07, 0.93)	**0.032**

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval.

51%; $p = 0.002$), consultations in medical specialties (79% vs. 56%, p 0.024) and primary healthcare centers (81% vs. 19%; $p < 0.001$).

The small numbers in the contingency table concerning the potential independent variables and the response ''Having a GP in Portugal'' failed to be accounted for by an exact logistic regression model. Among all marginally significant factors identified in the univariate analysis, a random forest algorithm for classification returned the variables' importance measures and only ''Time living in Portugal ($\geq$2 years vs. <2 years)'' and ''Previous use of a Primary Healthcare Centre (yes vs. no)'' stood out from the others.

None of the variables examined were significantly different between immigrants in Porto and Lisbon, except ''having previous contact with a TB patient'', which was more common among immigrants in Lisbon (50% vs 8%, $p < 0.001$).

Discussion

We evaluated the presence of barriers to healthcare access in immigrants and identified specific factors that act as barriers. Although most of the surveyed population did not face barriers to healthcare, we found that those who were single, divorced, or widowed, and those without an assigned GP were potentially vulnerable. In addition, immigrants living in Portugal for fewer than two years and those who were single, divorced, or widowed were less likely to have an assigned GP. Those who had a GP were more likely to use health services.

It is possible that immigrants have poor access to health services because of their inability to navigate the healthcare system. Thus, immigrants may have greater social support if they are married or in a *de facto* union and if they already

have a GP, and this may lead to improved access to healthcare.

Although most immigrants in our sample had assigned GPs, about one-third did not, much greater than for Portuguese natives (7.9%).[19] We found that living in Portugal for a longer period was associated with having a regular healthcare provider which is consistent with previous research showing that immigrants adopt regular sources of care over time.[20] This could be because it takes immigrants a long time to become integrated and become familiar with the healthcare system. We also found that respondents who had GPs were more likely to use health services. Similarly, a Dutch study reported that a higher contact between GPs and immigrants was unrelated to less specialized care or lower use of specialist care.[21] Additionally, we also found that immigrants who previously used a primary healthcare center were more likely to have a regular healthcare provider than those who never sought these services. This may be because immigrants can more easily integrate into a healthcare network after an initial contact with primary healthcare professional, because this provides them with greater knowledge about the types of services available.

Our analysis of the legal status indicated this was significantly associated with the attribution of a GP. These results are in line with previous data, which suggested that immigrants' capacity to obtain formal employment may have a strong impact on their access to healthcare services.[22]

Some immigrants reported barriers to receipt of healthcare services; lack of knowledge about available services and healthcare rights and long waiting times for a medical appointment were the most frequent reported barriers. A previous systematic review showed that lack of information about services and difficulties in making appointments with GPs may lead to ''informal'' barriers that reduce immigrants' use of these services.[4] Likewise, previous data reported that organizational barriers, lack of referral among government agencies, and long waiting times for medical appointments reduced access to healthcare for immigrants.[22,23] Inconvenient schedules and a long distance to available healthcare services were also barriers. For instance, many immigrants live far from healthcare centers, or have difficulty reaching them due to their work schedules (e.g. shift work), which may conflict with hours when the healthcare center is open.[24]

Despite awareness of inequities in healthcare quality, there are only limited strategies that improve the quality of healthcare for ethnic minority populations. In the US, community health workers (CHWs) provide educational programs for issues such as cancer, diabetes, hypertension, asthma, nutrition, and tobacco addiction.[25] If they share the same ethnic background, speak the same language, and understand the health beliefs and barriers of their patients, they can act as intermediaries between patients and healthcare providers.[26,27] Previous studies of the efficacy of CHW interventions demonstrated that they can increase health knowledge, improve health-related behaviors, and increase access to healthcare in targeted groups.[28,29] A previous systematic review evaluated interventions that targeted healthcare providers in the primary care setting in an effort to improve care and reduce disparities in care for ethnic minorities. There was evidence that provider tracking/reminder systems, provider education interventions, and interventions that bypass the physician and provide direct screening services can improve quality-of-care for these individuals.[30]

It is very important to increase the participation of immigrants in the healthcare system of Portugal, and support from medical professionals and communities may be particularly helpful.[31] To overcome the difficulties immigrants have with communication and cultural differences, it may help to provide basic health education to the immigrants and to improve the communication skills of healthcare professionals.[32] The structure and organization of public and private healthcare systems, as well as the professionals themselves, affect access to healthcare. Thus, development of social and institutional changes that improve access to healthcare services is essential to ensure healthcare for all.[33]

The use of screening programs to assess potential public health risks may improve immigrants' access to healthcare. For example, Canadian legislation requires each immigrant to receive a medical examination as part of the application process, to allow testing for contagious diseases, such as HIV and TB.[34] TB screening provides an excellent illustration of the complexity of healthcare issues related to immigration. In immigrants, the late diagnosis or failure to detect TB, and inadequate follow-up treatments reflect underlying educational, cultural, economic, and social barriers.[15] Different countries have notable differences in their TB screening programs for immigrants, in terms of screening location, administrative and financial autonomy, and medical procedures. In general, because of the ease with which at-risk groups can be tested, immigrants are screened upon arrival or during the processing of temporary residence applications in the host country, although there is still debate about the public health impact of this strategy.[35] In our study, some respondents presented with histories of TB, and most of these individuals were diagnosed in Portugal soon after arrival.

We recognize some limitations in our study. First, the sample size ($n = 119$) was rather small for the number of studied variables, limiting the statistical power to detect significant differences and to quantify effects; although the question of small numbers was circumvented for the analysis of the factors influencing the existence of barriers to the Portuguese health-care services, the same did not happen in the analysis of the factors influencing the existence of a GP. Here, only a qualitative answer was possible to obtain. Second, we recruited participants only from selected institutions, and this could have led to selection bias. Immigrants use CNAIs in Portugal to resolve problems related to their integration and daily living in Portugal, and generally after they have lived in Portugal for a while; this could explain why our sample had many immigrants who have lived in Portugal for long periods (79% had lived in Portugal for 2 or more years), and the complete absence of undocumented immigrants in our study population. However, there was concordance of the socio-demographic profile of our sample with the immigrant population in Portugal.[8,36] Lastly, our face-to-face interviews could have led to respondents to under-report certain key areas of concern. Additionally, our questionnaire was only available in the Portuguese language, and this could have favored the selection of immigrants from Portuguese-speaking countries. However, very few

participants refused to answer the questionnaire because of language problems.

The major strengths of our study were its survey of individuals from multiple CNAIs, our use of trained interviewers and anonymous questionnaires, and our analysis of multiple risk factors.

Conclusions

There has been substantial debate about immigration and the best strategies for addressing its challenges, especially in regard to healthcare. In this work, we studied the barriers to healthcare access that are experienced by immigrants living in Portugal. Our data show that certain socio-demographic factors are significantly associated with barriers to healthcare access and primary care. Taking into consideration its limitations, the main contribution of this paper is to lead to discussion of the problems related to health care access in a population which is particularly susceptible to TB and possible strategies to overcome them. This study supports the need for further research.

Conflicts of interest

None declared.

Acknowledgements

The authors thank Ana Domingues and Carolina Rocha (University of Porto) for collaborating on this project. This work was supported by contributions from the Unidade de Investigação em Epidemiologia – Instituto de Saúde Pública da Universidade do Porto (EPIUnit) (POCI-01-0145-FEDER-006862; Ref. UID/DTP/04750/2013). Rita Gaio was partially supported by CMUP (UID/MAT/00144/2013), which is funded by FCT (Portugal) with national (MEC) and European structural funds (FEDER), under the partnership agreement PT2020. PhD Grant SFRH/BD/112867/2015 (Paula Meireles) co-funded by the FCT and the POCH/FSE Program.

References

1. United Nations Department of Economic and Social Affairs. Trends in International Migrant Stock, 2015 Revision.
2. Relatório de Imigração, Fronteiras e Asilo. Serviço de Estrangeiros e Fronteiras; 2015 [Portuguese].
3. World Health Organisation (WHO). WHO Constitution. Geneva: WHO; 1946.
4. Norredam M, Nielsen SS, Krasnik A. Migrants' utilization of somatic healthcare services in Europe – a systematic review. Eur J Public Health. 2010;20(5):555–63.
5. Harding S, Teyhan A, Rosato M, Santana P. All cause and cardiovascular mortality in African migrants living in Portugal: evidence of large social inequalities. Eur J Prev Cardiol. 2008;15:670–6.
6. Agudelo-Suárez A, Gil-González D, Ronda-Pérez E, Porthé V, Paramio-Pérez G, García AM, et al. Discrimination work and health in immigrant populations in Spain. Soc Sci Med. 2009;68:1866–74.
7. Williams R, Mohammed S. Discrimination and racial disparities in health: evidence and needed research. J Behav Med. 2009;32:20–47.
8. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis surveillance and monitoring in Europe 2016. Stockholm: European Centre for Disease Prevention and Control; 2016.
9. Portugal, Infeção por VIH, SIDA e Tuberculose em números – 2015. Direção-Geral da Saúde, Lisboa, Novembro de 2015 [Portuguese].
10. Acesso aos cuidados de saúde pelos imigrantes. DGS, 2016 [Portuguese].
11. United Nations. Glossary. www.unesco.org/shs/migration/glossary [accessed on 21st July].
12. Eurostat. Glossary. http://ec.europa.eu/eurostat/statisticsexplained/index.php?title=Glossary:Migrant&redirect=no [accessed on 21st July].
13. International Migration Law Nu25. Glossary on migration. 2nd ed. Geneva: International Organization for Migration; 2011.
14. R Development Core Team. R: a language and environment for statistical computing. Vienna: R Foundation for Statistical Computing; 2012.
15. https://www.sns.gov.pt/noticias/2017/02/20/acss-revela-dados-de-2016/ [accessed on 21st July].
16. Zamar D, McNeney B, Graham J. elrm: software implementing exact-like inference for logistic regression models. J Stat Softw. 2007;21(3).
17. Breiman L. Random forests. Mach Learn. 2001;45(1):5–32.
18. Newbold B. Health status and health care of immigrants in Canada: a longitudinal analysis. J Health Serv Res Policy. 2005;10:77–83.
19. Uiters E, Deville W, Foets M, Groenewegen P. Use of health care services by ethnic minorities in The Netherlands: do patterns differ? Eur J Public Health. 2006;16:388–93.
20. Nandi A, Galea S, Lopez G, Nandi V, Strongarone S, Ompad DC. Access to and use of Health Services among Undocumented Mexican Immigrants in a US Urban Area. Am J Public Health. 2008;98:2011–20.
21. Burns FM, Imrie JY, Nazroo J, Johnson AM, Fenton KA. Why the(y) wait? Key informant understandings of factors contributing to late presentation and poor utilization of HIV health and social care services by African migrants in Britain. AIDS Care. 2007;19:102–8.
22. de Graaff F, Francke A. Home care for terminally ill Turks and Moroccans and their families in the Netherlands: carers' experiences and factors influencing ease of access and use of services. Int J Nurs Stud. 2003;40:797–805.
23. Magalhaes L, Carrasco C, Gastaldo D. Undocumented migrants in Canada: a scope literature review on health, access to services, and working conditions. J Immigr Minor Health. 2010;12(1):132–51.
24. Witmer A, Seifer SD, Finocchio L, Leslie J, O'Neil EH. Community health workers: integral members of the health care work force. Am J Public Health. 1995;85(8):1055–8.
25. Giblin PT. Effective utilization and evaluation of indigenous health care workers. Public Health Rep. 1989;104(4):361–8.
26. Love MB, Gardner K, Legion V. Community health workers: who they are and what they do. Health Educ Behav. 1997;24(4):510–22.
27. Andrews JO, Felton G, Wewers ME, Heath J. Use of community health workers in research with ethnic minority women. J Nurs Scholarsh. 2004;36(4):358–65.
28. Verhagen I, Steunenberg B, de Wit NJ, Ros WJ. Community health worker interventions to improve access to health care services for older adults from ethnic minorities: a systematic review. BMC Health Serv Res. 2014;13(14):497.
29. Beach MC, Gary TL, Price EG, Robinson K, Gozu A, Palacio A, et al. Improving health care quality for racial/ethnic minorities: a systematic review of the best evidence regarding provider and organization interventions. BMC Public Health. 2006;6(1):104.

30. Laroche M. Health status and health services utilization of Canada's immigrant and non-immigrant populations. Can Public Policy/Anal Polit. 2000;26:51–73.
31. Hjern A, Haglund B, Person G, Rosén M. Is there equity in access to health services for ethnic minorities in Sweden? Eur J Public Health. 2001;1:147–52.
32. Gil-González D, Carrasco-Portiño M, Vives-Cases C, Agudelo-Suárez A, Bolea RC, Elena Ronda-Pérez E. Is health a right for all? An umbrella review of the barriers to health care access faced by migrants. Ethn Health. 2015;20(5):523–41.
33. Gushulak BD, Pottie K, Hatcher Roberts J, Torres S, DesMeules M, Canadian Collaboration for Immigrant and Refugee Health. Migration and health in Canada: health in the global village. CMAJ. 2011;183(12):E952–8.
34. Stoesslé P, González-Salazar F, Santos-Guzmán J, Sánchez-González N. Risk factors and current health-seeking patterns of migrants in northeastern Mexico: healthcare needs for a socially vulnerable population. Front Public Health. 2015;3:191.
35. Pell C, Bueno-Cavanillas A, Guillen-Solvas J, Pool R, Roura M. Tuberculosis in migrant populations. A systematic review of the qualitative literature. PLOS ONE. 2013;8(12):e82440.
36. Labour market situation of migrants and their immediate descendants – 2nd quarter of 2014. INE; 2015.