



Migration and medical screening for tuberculosis

Denise Rossato Silva¹, Fernanda Carvalho de Queiroz Mello²,
Fernanda Dockhorn Costa Johansen³, Rosella Centis⁴, Lia D'Ambrosio⁵,
Giovanni Battista Migliori⁴

1. Faculdade de Medicina, Universidade Federal do Rio Grande do Sul – UFRGS – Porto Alegre (RS) Brasil.
2. Instituto de Doenças do Tórax – IDT – Faculdade de Medicina, Universidade Federal do Rio de Janeiro – UFRJ – Rio de Janeiro (RJ) Brasil.
3. Brasil. Ministério da Saúde, Secretaria em Vigilância em Saúde e Ambiente, Coordenação-Geral de Vigilância da Tuberculose, Micoses Endêmicas e Micobactérias não Tuberculosas, Brasília (DF) Brasil.
4. Servizio di Epidemiologia Clinica delle Malattie Respiratorie, Istituti Clinici Scientifici Maugeri – IRCCS – Tradate, Italia.
5. Public Health Consulting Group, Lugano, Switzerland.

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INTRODUCTION

Tuberculosis is a major public health concern in many countries, and remains a top killer worldwide.⁽¹⁾ Vulnerable population, such as migrants and refugees, have an increased risk of developing tuberculosis, especially in the first years after arrival in the host country.⁽²⁻⁵⁾ The tuberculosis incidence rate in the country of origin usually influences the risk of tuberculosis infection (TBI) and tuberculosis disease (TBD), although tuberculosis may be equally or more prevalent in the destination country.⁽⁶⁻⁸⁾ However, social and behavioral determinants on arrival, such as discrimination and economic adversity, can contribute to the increase in the risk of tuberculosis during the migration process.^(3,9) Ensuring prevention, diagnosis, and treatment for TBI and TBD in migrant populations is an important aspect of tuberculosis control and elimination.^(10,11) In this review article, we address epidemiological aspects and access to health care for migrants in Brazil. In addition, the migration medical screening for tuberculosis was reviewed.

EPIDEMIOLOGY

The presence of migrants and refugees exponentially grew over the period between 2011 and 2020 in Brazil. In that decade, there was the arrival of new migratory flows

ABSTRACT

Vulnerable populations, such as migrants and refugees, have an increased risk of tuberculosis disease, especially in the first years after arrival in the host country. The presence of migrants and refugees in Brazil exponentially grew over the period between 2011 and 2020, and approximately 1.3 million migrants from the Global South were estimated to be residing in Brazil, most of whom from Venezuela and Haiti. Tuberculosis control programs for migrants can be divided into pre- and post-migration screening strategies. Pre-migration screening aims to identify cases of tuberculosis infection (TBI) and can be carried out in the country of origin (pre-entry) or in the destination country (at entry). Pre-migration screening can also detect migrants at an increased risk of developing tuberculosis in the future. High-risk migrants are then followed up in post-migration screening. In Brazil, migrants are considered a priority group for the active search for tuberculosis cases. However, there is no recommendation or plan regarding screening for TBI in migrants and refugees. Ensuring prevention, diagnosis, and treatment for TBI and tuberculosis disease in migrant populations is an important aspect of tuberculosis control and elimination. In this review article, we address epidemiological aspects and access to health care for migrants in Brazil. In addition, the migration medical screening for tuberculosis was reviewed.

Keywords: Tuberculosis/diagnosis; Tuberculosis/therapy; Tuberculosis/prevention & control; Transients and migrants.

coming from different regions of the Global South, and, in recent years, there has been the consolidation of Latin American immigrants, mostly Haitians and Venezuelans, who made up the main nationalities in the country.⁽¹²⁾

The consolidation of Brazil as an emerging power, member of the BRICS (Brazil, Russia, India, China, and South Africa) and organizer of major world events (2014 World Cup and 2016 Olympics), as well as the appreciation of the national currency against the dollar and low unemployment rates, were determining factors for the international image of the country as a place of opportunities and made the migratory networks of the Global South begin to strengthen towards Brazil. Thus, migrants from different origins from the Global South, such as Haitians, Senegalese, Congolese, Guineans, Bengalis, Ghanaians, Pakistanis, among others, began to arrive at Brazilian borders.⁽¹³⁾

Some events have accelerated migration flows to Brazil, as is the case of the two main nationalities in the country today, Haitians and Venezuelans. The flow of Haitian immigration to Brazil began after the earthquake in Haiti on January 12, 2010, and the consequent humanitarian crises. Also, in 2012, hurricanes Isaac and Sandy hit the country, destroying its agricultural production. On the other hand, the economic and social crisis in Venezuela,

Correspondence to:

Denise Rossato Silva. Rua Ramiro Barcelos, 2350, sala 2050. Santa Cecília, CEP 90035-903, Porto Alegre, RS, Brasil.
Tel.: 55 55 3359-8241. E-mail: denise.rossato@terra.com.br
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starting in the middle of that decade, intensified the Venezuelan flow to Brazil, especially after 2016.⁽¹²⁾

According to data from the Brazilian demographic census, there were 592,570 migrants residing in Brazil on July 31, 2010, and the two main nationalities were Portuguese and Japanese. Among the twenty most important nationalities, there were eight other nationalities from countries in the northern hemisphere (Italy, Spain, the USA, Germany, France, South Korea, Scotland, and Poland). Between 2011 and 2020, it was estimated that approximately 1.3 million migrants were residing in Brazil, most of whom were Venezuelans and Haitians. In that period, among the top ten countries of birth of migrants, only the USA and France are located in the Global North.⁽¹²⁾

With regard to refugees, at the end of 2020, 4.6 million people having a refugee status were living in the Americas. Venezuelans (73.7%), Haitians (18.6%), and Cubans (5.6%) together represented 97.9% of the total requests over the last decade.⁽¹²⁾

The number of new cases of tuberculosis in migrants in Brazil in the years 2018, 2019, 2020, 2021, and 2022 was 568, 543, 477, 452, and 422, respectively. Of the total number of tuberculosis cases, 0.6% occurred in migrants; higher rates were found in Roraima (19.83%), the Federal District (3.87%), Santa Catarina (1.30%), and São Paulo (1.12%). Most migrants with tuberculosis were men older than > 15 years of age. About 4-5% of cases occurred in the 0-14 age group. The most common form was pulmonary tuberculosis (in 81.2%), followed by extrapulmonary tuberculosis (in 13.3%) and pulmonary plus extrapulmonary tuberculosis (in 5.5%).⁽¹⁴⁾

ACCESS TO HEALTH

Migrants/refugees have intrinsic vulnerabilities that can lead to inequalities in access to health. Some of the main barriers to migrants' access to health are: cultural differences, socioeconomic status, language difficulties, lack of documentation, lack of medical history, social isolation, lack of information about access to health care, racism, and xenophobia.^(15,16) In addition, they may encounter restrictions on the care of foreigners in the local public health care system.⁽¹⁶⁾

Brazilian legislation is in line with the recommendations of international agencies regarding access to health of migrants and refugees. Law 8,666/1990 regulates the *Sistema Único de Saúde* (SUS, Brazilian Unified Health System), and Law 13,445/2018 regulates migration in the country guaranteeing the right to health for migrants in Brazilian territory regardless of their migratory status. In fact, because Brazil is the only country in South America with a free, universal public health system, and various migrants enter the country for health treatments. However, there is no specific public policy for migrants, with the exception of the municipal law 16,478/2016, which establishes a health policy for the migrant population in the city of São Paulo.⁽¹⁷⁾ Even so, due to family health care programs, community agent programs, and the universal

nature of the SUS, migrants end up receiving medical assistance in some cases such as tuberculosis.⁽¹²⁾

A study with Haitian migrants in Brazil showed that the main difficulties encountered in accessing health care were the language barrier, cultural issues (conflicts with traditional Haitian medicine), problems with schedules (need to miss work to seek care), and delay in care.⁽¹⁵⁾ Other obstacles encountered by migrants were episodes of non-attendance at emergency services, lack of medication, or lack of information on how to obtain them.⁽¹⁸⁾ On the other hand, health care teams also face challenges in caring for migrants, such as difficulties with the migrant language and location of patients due to their frequent change of residence or fear of revealing their address in the case of refugees.^(15,19)

MIGRATION MEDICAL SCREENING FOR TUBERCULOSIS

The WHO recommends the use of chest X-ray (CXR) for tuberculosis screening among migrants from countries with a high tuberculosis incidence and the use of tuberculin skin test (TST) or IFN- γ release assays (IGRA) for TBI screening.⁽²⁰⁻²²⁾ Systematic screening of migrants using CXR at arrival in the destination country and that of migrants from settings with a tuberculosis high burden using TST and/or IGRA have been suggested by the European Centre for Disease Prevention and Control.⁽²³⁾ In Brazil, since 2015, data on tuberculosis in migrants have been inserted into the *Sistema de Informação de Agravos de Notificação* (Brazilian Case Registry Database). According to the Brazilian Ministry of Health, migrants are considered a priority group for the active search for tuberculosis cases, and tuberculosis should be investigated in migrants with a cough of any duration.⁽²⁴⁾ However, there is no recommendation or plan regarding screening for TBI in migrants and refugees.

Tuberculosis control programs for migrants can be divided into pre-migration and post-migration screening strategies.^(25,26) Pre-migration screening aims to identify cases of TBI and can be carried out in the country of origin (pre-entry) or in the destination country (at entry). This screening usually includes symptom assessment, CXR, and sputum smear and/or culture.^(6,27-29) Pre-migration screening can also detect migrants at an increased risk of developing tuberculosis in the future. Pre-entry or at-entry TBI screening is important since between 3% and 30% have already been infected before entry.⁽³⁰⁾ One study in the Netherlands showed a prevalence of TBI of 20% among migrants.⁽³¹⁾ In Brazil, the proportion of TBI among migrants varies between 23.5% and 46.1%, depending on the study location.⁽³²⁾ In fact, the first 2-5 years after arrival in the destination country is the period with the highest risk of developing TBD, which justifies pre-entry or at-entry tuberculosis preventive treatment in many cases.^(6,23,33,34)

Migrants with CXR abnormalities, history of tuberculosis (treated or not), or history of a close contact

with a patient with TBI identified during pre-migration screening are considered to be high-risk migrants and are then followed up in post-migration screening.⁽²⁵⁾

Systematic screening for tuberculosis is recommended in several countries; however, procedures vary from country to country. In a study conducted in 2016,⁽³⁵⁾ 36 national tuberculosis programs, representative of European countries with low and intermediate tuberculosis incidence, completed a questionnaire about screening and management practices among refugees. Among these, 31 (86.1%) and 19 (52.8%) reported screening for TBD and TBI, respectively. In another recent study,⁽²⁷⁾ a survey was conducted involving 1,055 respondents from 80 countries and territories. The participants agreed with regard to tuberculosis surveillance and infection control practices. However, they disagreed about diagnosis and management of TBD and TBI, especially with regard to which TBI regimens and indications for hospitalization should be adopted.

TUBERCULOSIS SCREENING PLAN FOR MIGRANTS/REFUGEES SUGGESTED FOR USE IN BRAZIL

Chart 1 lists the main items to be observed for the development of a TBD/TBI screening plan for migrants, adapted for use in Brazil. This list is based on recommendations from the European Respiratory Society and the European Region of the International Union Against Tuberculosis and Lung Disease.⁽¹⁰⁾ Figure 1 shows a flow chart suggesting how to evaluate TBD/TBI in migrants/refugees.

There is a consensus that ensuring access to health care services and health education, as well as providing culturally appropriate tuberculosis services, are key components of TBD and TBI screening programs for migrants and refugees.^(23,33,36) In this sense, a group of researchers in Brazil developed an educational booklet as a tool to support prevention and treatment of tuberculosis for migrants and refugees, under the auspices of the Pan American Health Organization. The purpose of the booklet is to facilitate knowledge about ways to prevent and treat tuberculosis using simple language and being accessible to adults and children. The material was prepared in three languages: Portuguese, Spanish, and Warao (language of an indigenous people in Venezuela) and was distributed in four Brazilian cities.⁽³⁷⁾

RESEARCH QUESTIONS

In addition to implementing a screening plan for tuberculosis for migrants, it is important to promote research on migration-related issues.⁽⁹⁾ Chart 2 shows suggestions for research questions regarding TBD and TBI in migrants/refugees.

FINAL CONSIDERATIONS

The increasing population of migrants and refugees in Brazil has required effective prevention, diagnosis, and treatment of TBI and TBD, particularly during the COVID-19 pandemic and in the post-pandemic phase.⁽³⁸⁾ The WHO recommends systematic screening of migrants originated from settings with a high burden

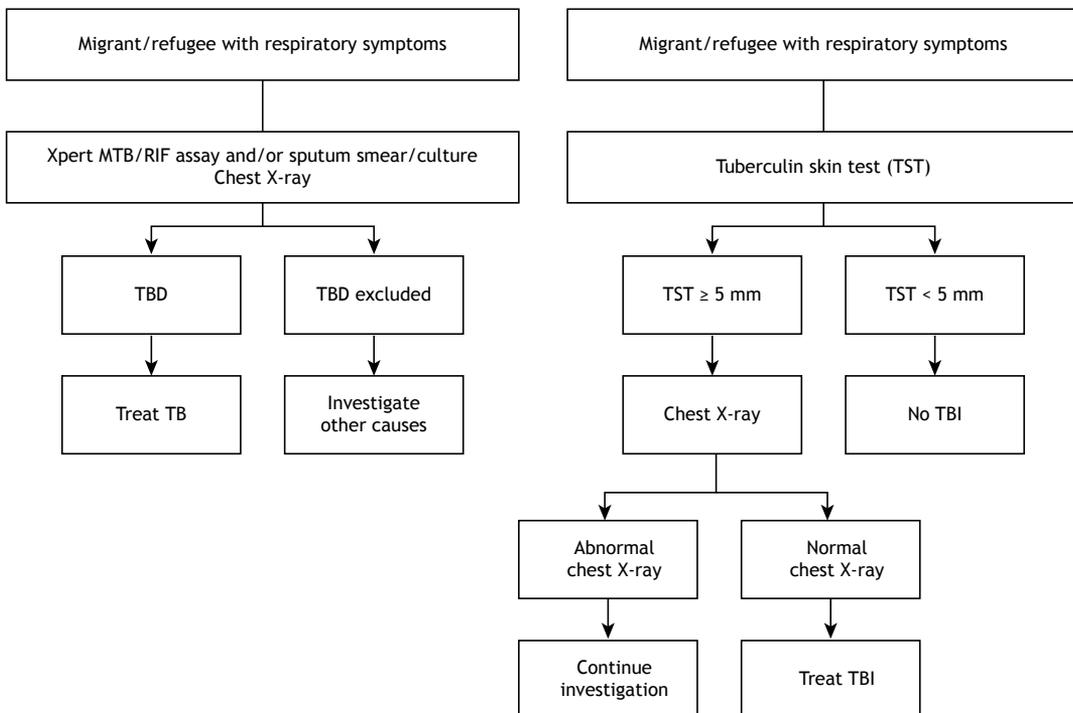


Figure 1. Flow chart suggesting how to evaluate tuberculosis infection and tuberculosis disease in migrants/refugees. TB: tuberculosis; TBD: tuberculosis disease; and TBI: tuberculosis infection.

Chart 1. Tuberculosis screening plan for migrants/refugees, adapted for use in Brazil.

- Adapt the guidelines of the “Manual of Recommendations for Control of Tuberculosis in Brazil”⁽²⁴⁾ for migrants/refugees to ensure adequate tuberculosis prevention, diagnosis, and treatment
- Ensure screening for TBD among migrants/refugees coming from countries with middle or high tuberculosis incidence
- Ensure post-migration screening for high-risk migrants
- Promote universal access to TBD/TBI services
- Provide culturally appropriate TBD/TBI services
- Provide surveillance, monitoring, and evaluation of TBD/TBI services for migrants/refugees
- Ensure health education in TBD/TBI
- Provide operational research in prevention, diagnosis, and treatment for TBD/TBI

TBD: tuberculosis disease; and TBI: tuberculosis infection.

Chart 2. Suggestions of research questions regarding tuberculosis disease and tuberculosis infection in migrants/refugees.

- TBI prevalence in different migrant risk groups
- Comparison between TBI and TBD registry data to determine reactivation rates
- Risk factors for TBD and TBI
- Transmission dynamics (migrant-to-migrant and migrant-to-native population)
- Risk factors for poor outcomes
- Barriers to accessing health care services
- Reasons for non-adherence to treatment
- Identification of socioeconomic vulnerabilities
- Feasibility of TBI testing and treatment (pre- and post-migration)

TBD: tuberculosis disease; and TBI: tuberculosis infection.

of tuberculosis. Pre-migration screening must be integrated into post-migration follow-up of high-risk migrants to ensure adequate tuberculosis control.

AUTHOR CONTRIBUTIONS

DRS: conceptualization, methodology, project administration, and drafting of the manuscript. FCQM, FDCJ, RC, and LD: conceptualization, methodology,

and drafting and revision of the manuscript. GBM: conceptualization, methodology, and drafting of the manuscript. All authors read and approved the final version of the manuscript.

CONFLICTS OF INTEREST

None declared.

REFERENCES

1. World Health Organization [homepage on the Internet]. Geneva: WHO; c2022 [cited 2023 Feb 1]. Global Tuberculosis Report 2022. Available from: <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022>
2. Aldridge RW, Zenner D, White PJ, Williamson EJ, Muzyamba MC, Dhavan P, et al. Tuberculosis in migrants moving from high-incidence to low-incidence countries: a population-based cohort study of 519 955 migrants screened before entry to England, Wales, and Northern Ireland. *Lancet*. 2016;388(10059):2510-2518. [https://doi.org/10.1016/S0140-6736\(16\)31008-X](https://doi.org/10.1016/S0140-6736(16)31008-X)
3. Pareek M, Greenaway C, Noori T, Munoz J, Zenner D. The impact of migration on tuberculosis epidemiology and control in high-income countries: a review. *BMC Med*. 2016;14:48. <https://doi.org/10.1186/s12916-016-0595-5>
4. Menezes D, Zenner D, Aldridge R, Anderson SR, de Vries G, Erkens C, et al. Country differences and determinants of yield in programmatic migrant TB screening in four European countries. *Int J Tuberc Lung Dis*. 2022;26(10):942-948. <https://doi.org/10.5588/ijtld.22.0186>
5. Spruijt I, Erkens C, Greenaway C, Mulder C, Raviglione M, Villa S, Zenner D, et al. Reducing the burden of TB among migrants to low TB incidence countries. *Int J Tuberc Lung Dis*. 2023;27(3):182-188. <https://doi.org/10.5588/ijtld.22.0662>
6. Dara M, Gushulak BD, Posey DL, Zellweger JP, Migliori GB. The history and evolution of immigration medical screening for tuberculosis. *Expert Rev Anti Infect Ther*. 2013;11(2):137-146. <https://doi.org/10.1586/eri.12.168>
7. Lönnroth K, Mor Z, Erkens C, Bruchfeld J, Nathavitharana RR, van der Werf MJ, et al. Tuberculosis in migrants in low-incidence countries: epidemiology and intervention entry points. *Int J Tuberc Lung Dis*. 2017;21(6):624-637. <https://doi.org/10.5588/ijtld.16.0845>
8. Willemstein IJM, de Vries G, Essink DR, Slump E, van Gageldonk-Lafeber AB, van den Hof S, et al. TB in migrants residing in the Netherlands for at least 5 years at diagnosis, 2003-2018. *Int J Tuberc Lung Dis*. 2022;26(11):1050-1057. <https://doi.org/10.5588/ijtld.22.0082>
9. Shete PB, Boccia D, Dhavan P, Gebreselassie N, Lönnroth K, Marks S, et al. Defining a migrant-inclusive tuberculosis research agenda to end TB [published correction appears in *Int J Tuberc Lung Dis*. 2018 Oct 1;22(10):1244]. *Int J Tuberc Lung Dis*. 2018;22(8):835-843. <https://doi.org/10.5588/ijtld.17.0503>
10. Dara M, Solovic I, Sotgiu G, D'ambrosio L, Centis R, Goletti D, et al. Call for urgent actions to ensure access to early diagnosis and care of tuberculosis among refugees: Statement of the European Respiratory Society and the European Region of the International Union Against Tuberculosis and Lung Disease. *Eur Respir J*. 2016;47(5):1345-1347. <https://doi.org/10.1183/13993003.00377-2016>
11. Yaacoub H, Farhat AM, Najjar-Pellet J, Zgheib J, Jradi F, van den Boom M, et al. Planning for TB elimination in Lebanon. *Int J Tuberc Lung Dis*. 2023;27(3):171-174. <https://doi.org/10.5588/ijtld.22.0673>
12. Brasil. Ministério da Justiça e Segurança Pública. Portal de Imigração [homepage on the Internet]. Brasília: Observatório das Migrações Internacionais [cited 2022 Feb 1]. Relatório Anual 2021. 2011-2020: Uma década de desafios para a imigração e refúgio no Brasil. [Adobe

- Acrobat document, 321p.]. Available from: https://portaldeimigracao.mj.gov.br/imagens/Obmigra_2020/Relatório_Anual/Relatório_Anual_-_Completo.pdf
13. Cavalcanti L, Oliveira AT. A caminho da conclusão. Meia década de novos fluxos migratórios no Brasil. In: Cavalcante L, Oliveira AT, Araujo D, organizers. A imersão dos imigrantes no mercado de trabalho brasileiro. Relatório Anual 2016. - Brasília: Observatório das Migrações Internacionais; Ministério do Trabalho/Conselho Nacional de Imigração e Coordenação Geral de Imigração; 2016. p.142-146. Available from: <http://obmigra.mte.gov.br/index.php/relatorio-anual>
 14. Brasil. Ministério da Saúde. Sistema de Informação de Agravos de Notificação [homepage on the Internet]. Brasília: Ministério da Saúde. Available from: <https://portalsinan.saude.gov.br/>
 15. Rocha ASPS, Cunha TR, Guiotoku S, Moysés ST. Acesso de migrantes haitianos à saúde pública: uma questão bioética. *Rev Bioética*. 2020;28(2):384-389. <https://doi.org/10.1590/1983-80422020282400>
 16. Granada D, Carreno I, Ramos MCP. Debating health and migrations in a context of intense human mobility [Article in Portuguese]. *Interface*. 2017;21(61):285-296. <https://doi.org/10.1590/1807-57622016.0626>
 17. Costa NBN, Gurgel H, Matos KFR. Migração e saúde: inter-relações, legislação e acesso. *Tempus*. 2020;14(3):99-114. <https://doi.org/10.18569/tempus.v14i3.2866>
 18. Guerra K, Ventura M. Bioethics, immigration and health care: tensions and convergences on the human right to health in Brazil in the regional integration of the countries [Article in Portuguese]. *Cad Saude Colet*. 2017;25(1):123-129. <https://doi.org/10.1590/1414-462X201700010185>
 19. Maia AC, Azize RL. Health on the fringes: dilemmas of the territoriality of Primary Health Care for refugees in the city of Rio de Janeiro, Brazil [Article in Portuguese]. *Cien Saude Colet*. 2021;25(5):1789-1798. <https://doi.org/10.1590/1413-81232020255.34972019>
 20. Migliori GB, Ong CWM, Petrone L, D'Ambrosio L, Centis R, Goletti D. The definition of tuberculosis infection based on the spectrum of tuberculosis disease. *Breathe (Sheff)*. 2021;17(3):210079. <https://doi.org/10.1183/20734735.0079-2021>
 21. World Health Organization [homepage on the Internet]. Geneva: WHO; c2022 [updated 2021 Mar 22; cited 2022 Feb 1]. WHO consolidated guidelines on tuberculosis: module 2: screening: systematic screening for tuberculosis disease. Available from: <https://www.who.int/publications/i/item/9789240022676>
 22. World Health Organization [homepage on the Internet]. Geneva: WHO; c2022 [updated 2021 Mar 22; cited 2022 Feb 1]. WHO consolidated guidelines on tuberculosis: module 1: prevention: tuberculosis preventive treatment. Available from: <https://www.who.int/publications/i/item/9789240001503>
 23. European Centre for Disease Prevention and Control [homepage on the Internet]. Solna, Sweden: ECDC. [updated 2018 Nov; cited 2022 Feb 1]. Public Health Guidance on Screening and Vaccination for Infectious Diseases in Newly Arrived Migrants within the EU/EEA. [Adobe Acrobat document, 85p.]. Available from: <https://www.ecdc.europa.eu/sites/default/files/documents/Public%20health%20guidance%20on%20screening%20and%20vaccination%20of%20migrants%20in%20the%20EU%20EEA.pdf>
 24. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis [homepage on the Internet]. Brasília: Ministério da Saúde [cited 2023 Feb 1]. Manual de Recomendações para o Controle da Tuberculose no Brasil 2019. [Adobe Acrobat document, 364p.]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil_2_ed.pdf
 25. Kaushik N, Lowbridge C, Scandurra G, Dobler CC. Post-migration follow-up programme for migrants at increased risk of developing tuberculosis: a cohort study. *ERJ Open Res*. 2018;4(3):00008-2018. <https://doi.org/10.1183/23120541.00008-2018>
 26. Chan IHY, Kaushik N, Dobler CC. Post-migration follow-up of migrants identified to be at increased risk of developing tuberculosis at pre-migration screening: a systematic review and meta-analysis [published correction appears in *Lancet Infect Dis*. 2017 Jun;17(6):576]. *Lancet Infect Dis*. 2017;17(7):770-779. [https://doi.org/10.1016/S1473-3099\(17\)30194-9](https://doi.org/10.1016/S1473-3099(17)30194-9)
 27. D'Ambrosio L, Centis R, Dobler CC, Tiberi S, Matteelli A, Denholm J, et al. Screening for Tuberculosis in Migrants: A Survey by the Global Tuberculosis Network. *Antibiotics (Basel)*. 2021;10(11):1355. <https://doi.org/10.3390/antibiotics10111355>
 28. Luan L, Fraise P, Cordel H, Charlois C, Méchai F, Ibanez G, et al. Screening for active and latent TB among migrants in France. *Int J Tuberc Lung Dis*. 2021;25(11):903-910. <https://doi.org/10.5588/ijtld.21.0231>
 29. Naufal F, Chaisson LH, Robsky KO, Delgado-Barroso P, Alvarez-Manzo HS, Miller CR, et al. Number needed to screen for TB in clinical, structural or occupational risk groups. *Int J Tuberc Lung Dis*. 2022;26(6):500-508. <https://doi.org/10.5588/ijtld.21.0749>
 30. Sarivalasis A, Zellweger JP, Faouzi M, Daher O, Deslarzes C, Bodenmann P. Factors associated with latent tuberculosis among asylum seekers in Switzerland: a cross-sectional study in Vaud County. *BMC Infect Dis*. 2012;12:285. <https://doi.org/10.1186/1471-2334-12-285>
 31. Mulder C, van Deutekom H, Huisman EM, Toumanian S, Koster BF, Meijer-Veldman W, et al. Role of the QuantiFERON(R)-TB Gold In-Tube assay in screening new immigrants for tuberculosis infection. *Eur Respir J*. 2012;40(6):1443-1449. <https://doi.org/10.1183/09031936.00010612>
 32. de Jezus SV, do Prado TN, Arcêncio RA, Mascarello KC, Sales CMM, Fauth MM, et al. Correction to: Factors associated with latent tuberculosis among international migrants in Brazil: a cross-sectional study (2020). *BMC Infect Dis*. 2021;21(1):591. <https://doi.org/10.1186/s12879-021-06305-2>
 33. Dobler CC, Fox GJ, Douglas P, Viney KA, Khan FA, Temesgen Z, et al. Screening for tuberculosis in migrants and visitors from high-incidence settings: present and future perspectives. *Eur Respir J*. 2018;52(1):1800591. <https://doi.org/10.1183/13993003.00591-2018>
 34. Dara M, Sulis G, Centis R, D'Ambrosio L, De Vries G, Douglas P, et al. Cross-border collaboration for improved tuberculosis prevention and care: policies, tools and experiences. *Int J Tuberc Lung Dis*. 2017;21(7):727-736. <https://doi.org/10.5588/ijtld.16.0940>
 35. Dara M, Solovic I, Sotgiu G, D'Ambrosio L, Centis R, Tran R, et al. Tuberculosis care among refugees arriving in Europe: a ERS/WHO Europe Region survey of current practices. *Eur Respir J*. 2016;48(3):808-817. <https://doi.org/10.1183/13993003.00840-2016>
 36. Scandurra G, Degeling C, Douglas P, Dobler CC, Marais B. Tuberculosis in migrants - screening, surveillance and ethics. *Pneumonia (Nathan)*. 2020;12:9. <https://doi.org/10.1186/s41479-020-00072-5>
 37. Masochini RG, Jezus SV, Sales CMM, Prado TN, Maciel ELN. De olho na tuberculose. Sinop, MT: Oiticica Ed; 2020. Available from: <https://documentcloud.adobe.com/link/track?uri=urn:aaid:scds:US:c68805d7-d46e-4e5a-82a7-0e619283af14>
 38. Margineanu I, Mor Z, Garcia D, Gilpin C, Dhawan S, Ritz N, et al. TB and COVID-19 in migrants - the need to focus on both conditions. *Int J Tuberc Lung Dis*. 2021;25(5):333-335. <https://doi.org/10.5588/ijtld.21.0067>