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Barriers and facilitators for the uptake of tuberculosis diagnostic and treatment services by hard-to-reach populations in low and medium-incidence countries: A systematic review of qualitative literature

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ABSTRACT

Tuberculosis disproportionately affects hard-to-reach populations, such as people who are homeless, migrants, refugees, prisoners, or drug users. These people often face challenges in accessing quality healthcare services. We did a systematic review of the qualitative literature to identify barriers and facilitators to the uptake of tuberculosis diagnostic and treatment services by people from hard-to-reach populations in all EU, EEA, EU candidate, and OECD countries. The 12 studies included in this review mainly focused on migrants. Views on perceived susceptibility to and severity of TB varied widely and included many misconceptions. Stigma and challenges with accessing healthcare were identified as barriers for TB diagnosis and treatment uptake, whereas support from nurses, family, and friends was a facilitator for treatment adherence. Further studies are required to identify barriers and facilitators to the improved identification and management of tuberculosis cases in hard-to-reach populations to inform recommendations for more effective tuberculosis control programmes.

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Worldwide, tuberculosis (TB) causes the largest loss of disability-adjusted life-years worldwide due to an infectious disease, after malaria and human immunodeficiency virus (HIV).¹ An estimated 9.6 million incident cases of TB occurred in 2014, of which 5.4 million were men, 3.2 million women and 1.0 million children.² In the European Union (EU) and European Economic Area (EEA), a third of 65 000 notified TB cases were in 18 low-TB incidence countries (i.e. a notification rate of less than ten cases per 100 000 population).³ In these countries, TB cases are disproportionately concentrated in big cities, associated with an over-representation of TB among various hard-to-reach and susceptible populations, such as people who are homeless, migrants, refugees, prisoners, drug users, sex workers, and people living with HIV.^{4,5} Although not all people living with HIV can be called 'hard-to-reach', many hard-to-reach populations are more likely to acquire or carry an HIV infection.⁶⁻¹²

Few surveillance and survey data are available for TB in hard-to-reach populations.^{13,14} In the EU and EEA, 28% of new TB cases occur in individuals of foreign origin, with thirteen countries reporting more than 50% of their TB cases occur in individuals of foreign origin.³ With the exception of information about TB in individuals of different origins, ages, and sexes, limited information is available about TB in hard-to-reach groups. Moreover, information on other risk factors or social determinants is not readily available, which hampers policy and guideline development required to optimize TB control efforts. The global End TB Strategy and Towards TB elimination (a guideline for low-incidence countries) highlighted this scarcity of information and identified the most vulnerable and hard-to-reach populations, which are often underserved, as a priority for action.^{5,15,16}

Hard-to-reach populations often have specific risk factors which render them more exposed and vulnerable to infection with *Mycobacterium tuberculosis* and development of active TB disease.¹⁷ These risk factors include living in crowded and poorly ventilated areas, co-morbidities, substance abuse, HIV infection, and malnutrition. Additionally, hard-to-reach populations face major challenges in accessing health care and in adhering to TB treatment, which include reduced awareness and knowledge of the signs and symptoms of TB, unstable accommodation, and difficulties in transportation and access to healthcare, such as the restricted opening hours of testing centres, the cost of testing, and the lengthy duration of treatment.¹⁸⁻²⁷

The European Centre for Disease Prevention and Control (ECDC) initiated guidance for controlling TB in hard-to-reach and vulnerable populations.²⁸ To provide an up-to-date evidence base, we did a systematic review of qualitative literature focusing on the barriers and facilitators to the uptake of TB diagnostic and treatment services in hard-to-reach populations, covering all EU, EEA, EU candidate, and Organisation for Economic Co-operation and Development

(OECD) countries. Information on barriers and facilitators is often best assessed with qualitative research of the perspectives of patients or health care workers. Additionally, qualitative methods facilitate a more in-depth understanding of barriers and facilitators, compared with, and in addition to, quantitative research methods.²⁹ Synthesized qualitative research findings thus aid the development of new theories, interventions, and policies.

The primary review question of our systematic review was What factors help or hinder the uptake of TB diagnostic and treatment services by people from hard-to-reach populations in EU, EEA, EU candidate, and OECD countries, and how can those barriers be overcome? Secondary review questions were: How do views vary between different hard-to-reach populations? and What are the views of service providers? The findings served as the evidence base for the development of guidance for control of TB in hard-to-reach and susceptible groups.

METHODS

Selection of studies and data management

In 2010, the National Institute for Health and Clinical Excellence (NICE) commissioned a systematic review of barriers and facilitators to the uptake of TB diagnostic and treatment services by people from hard-to-reach populations in OECD countries.³⁰ We updated and extended this review, following standards described by the Cochrane Collaboration³¹ and NICE.³² The results are reported according to the PRISMA guidelines for systematic reviews.³³ We deemed people who were homeless, migrants, travellers (including Roma), refugees, prisoners, drug users, sex workers, and people with HIV as belonging to hard-to-reach populations.

Search strategy and selection criteria

Using the same search strategies as in O'Mara and colleagues' 2010 National Institute for Health and Care Excellence (NICE) review (which covered the period 1990 up to September 2010), we searched MEDLINE, MEDLINE In-Process, Embase, PsycINFO, the Centre for Reviews and Dissemination database (for the Database of Abstracts of Reviews of Effects, the National Health Service Economic Evaluation Database, and the Health Technology Assessment database), The Cochrane Library, Cumulative Index to Nursing and Allied Health Literature. We searched for studies in all European Union (EU), European Economic Area, and EU candidate countries published between January, 1990, and April 10, 2015, and for studies in Organisation for Economic Co-operation and Development countries published between June 5, 2010, and April 10, 2015. In addition to the hard-to-reach popula-

tions covered by the NICE review (migrants, homeless people, people who abuse substances, prisoners, sex workers, and people with HIV), we included children in hard-to-reach populations. Definitions of hard-to-reach groups were those defined by the respective papers. We limited the search to active tuberculosis, excluding latent tuberculosis infection. We included qualitative studies related to either the views of hard-to-reach people regarding perceptions of or attitudes towards tuberculosis services, qualitative descriptions of the variations in views between different hard-to-reach populations, or the views of service providers (appendix). Additionally, we checked all included studies for relevant references; all identified systematic reviews were also checked for relevant references, although they were not included (appendix).

Citations identified by the search were imported to an EndNote database (Endnote X7.1) and duplicate records removed. Three authors (SdV, CCH, BJV) screened the titles and abstracts of records independently and in parallel using pre-specified criteria (Panel 1). One author (CCH) screened 100% of the records; the other two authors (SGdV and BJV) screened 50% each. Disagreements were resolved by discussion. We retrieved the full texts of all articles identified in the initial screening, and contacted authors in cases of incomplete data or irretrievable articles. If the article was irretrievable (i.e. not accessible from any source, or from authors), the study was excluded. The full text of selected articles was screened by three independent authors (SDV 100%, CCH and ALC 50% each) with a full text assessment inclusion checklist, derived from the previous NICE review.³⁰ Inter-reviewer agreement and reliability were calculated according to standard methods.³¹

Panel 1. In- and exclusion criteria for this review

Studies were included if they:

- had a focus on TB services of any kind (any study examining TB or a TB service delivered to a hard-to-reach population)
- had been done in any of the EU/EEA countries, the candidate countries (Albania, Montenegro, Serbia, the former Yugoslav Republic of Macedonia and Turkey) and the other OECD countries (Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey,

United Kingdom, United States)

- Had been published in 2010 or later for the OECD countries
- Had been published in 1990 or later for the EU/EEA countries and EU candidate countries
- Presented data on the views of hard-to-reach people regarding perceptions of or attitudes to TB services
- Presented original qualitative data (no systematic reviews)
- Included data from any hard-to-reach population, including homeless people, people with alcohol or other drug addictions, sex workers, prisoners or people with a history of imprisonment, susceptible migrant populations (e.g. asylum seekers and refugees), but also recent migrants and travellers (including the Roma population), children within susceptible and hard-to-reach populations, and people living with HIV

Respondents do not necessarily have to be diagnosed with TB, studies should not exclusively focus on latent TB infection (LTBI), and there were no language restrictions.

Data extraction, data items and synthesis

We extracted data by use of the same forms as in the previous NICE review.³⁰ For a random 10% of included studies, data extraction was performed by two independent reviewers. For the remaining studies, one reviewer conducted data extraction that was checked by a second reviewer; any disagreement was resolved by discussion.

To structure the data synthesis, we used the Health Belief Model (HBM),³⁴ which explains and predicts health-related behaviours. Two independent reviewers did thematic and content analysis.³⁵ Data were coded and categorized into potential determinants of health behaviours within five themes of the HBM framework: (i) perceived susceptibility (risk); (ii) perceived severity (consequences, such as mortality and morbidity); (iii) perceived facilitators (predisposing factors); (iv) perceived barriers (factors that hinder); (v) cues to action (motivating or precipitating forces, such as contact with someone else who has TB).

Risk of bias in individual studies and the overall strength of the evidence

Studies were assessed for quality and risk of bias with the modified NICE Quality Assessment Tools for qualitative research.³⁰ Two reviewers (SDgV and CCH) assessed ten percent of included studies independently; the remaining 90% were assessed by one reviewer (SGdV) and corroborated by a second reviewer (ALC). Any disagreement was resolved by discussion. We assigned each study

rating based on the quality assessment: high quality [++], medium quality [+] or low quality [-]. We did not investigate publication bias. The evidence was graded and reported as described previously (Panel 2).³⁰

Panel 2. Grading of evidence

No evidence

No evidence or clear conclusions from any studies

Weak evidence

No clear or strong evidence/conclusions from high quality studies and only tentative evidence/conclusions from moderate quality studies or clear evidence/conclusions from low quality studies

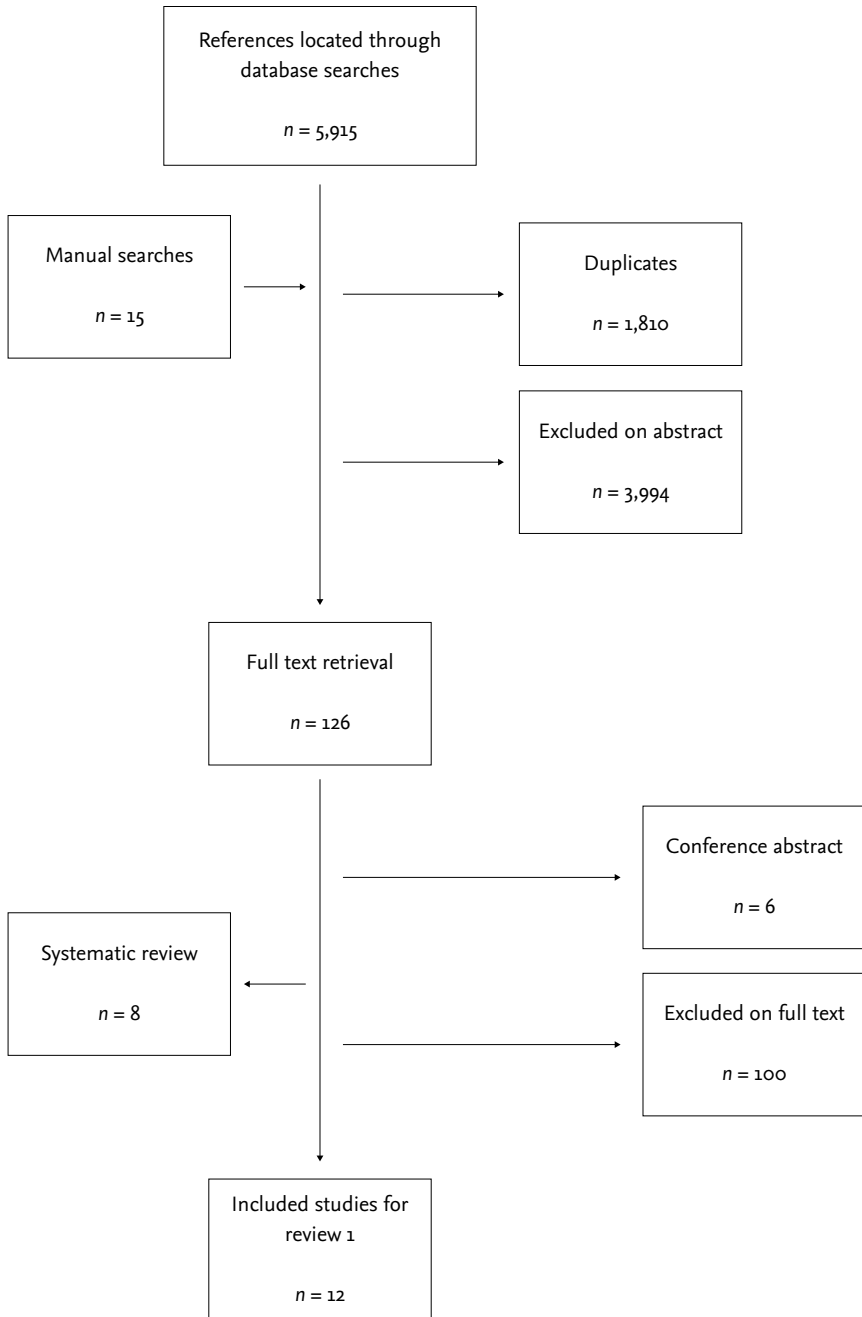
Moderate evidence

Tentative evidence/conclusions from multiple high quality studies, or clear evidence/conclusions from one high quality study or multiple medium quality studies, with minimal inconsistencies across all studies

Strong evidence

Clear conclusions from multiple high quality studies

Figure 1 Study selection process



RESULTS

The figure shows the study selection process. Database searches identified 5915 records. Citation searching of included studies and relevant (but excluded) reviews identified 15 records. Inter-reviewer agreement for the abstract screening was 98.1% before reconciliation; the inter-rater reliability (Cohen's k) was 0.627. Of the total 5930 abstracts, 1810 duplicate records were removed (Figure 1). In total, twelve studies were included in this review.^{19,36-46} The appendix and table 1 detail the characteristics of included studies. Of ten studies investigating the views of individuals belonging to hard-to-reach populations on TB and TB services, seven were of migrants,^{19,37,39,42,43,45,46} one of a mixed group of homeless people, migrants and drug users,³⁶ one was only of people who were homeless,⁴⁰ and one was of a Roma population.⁴⁴ We identified two studies focusing on views of healthcare providers on barriers or facilitators to the uptake of TB services by hard-to-reach populations.^{38,41} Studies were done in the United Kingdom (UK),^{36,38,39,42} the United States of America (USA),^{13,37,46} Sweden,⁴¹ Norway,⁴³ Serbia,⁴⁴ Canada⁴⁵ and Japan.⁴⁰ Table 2 shows the results of quality assessment. The appendix provides detailed evidence statements for all themes, combined with the findings of the previous NICE review.³⁰ Here, we present the findings of the update and extension of the NICE review.

Table 1 Characteristics of included studies

Year	First author	Aim(s)	Method
2010	Bender et al. ⁴⁵	To analyse how the experience of client displacement shapes the relational work of TB nurses.	Observations of the usual contacts between nurses and migrant clients. TB patients currently receiving direct observed treatment (DOT). Additionally, interviews with nurses and some of the observed clients were held.
2010	Coreil et al. ⁴⁶	To identify the components of stigma perceived as important within non-affected community samples in the two study populations (Haitians in Haiti and Haitian migrants in California); and second, to understand the contextual influences on these stigma components across sites (including affected members as well). For this review, only the views from participants in Florida are considered.	Interviews and observations at clinics with community members of Haitian origin.
2011	Vukovic and Nalgorni-Obradovic ⁴⁴	Exploring the knowledge and beliefs about TB transmission, symptoms and treatment, opinions on appropriate preventive measures, and attitudes towards people with TB among the Roma population.	Focus group discussions with the Roma population in Belgrade, living in selected Roma communities in different conditions (Living in the worst conditions (slums)/ living in conditions similar to the general population in Belgrade / living in conditions between the previous two).
2012	Gerrish et al. ⁴²	To ascertain the socio-cultural meaning and consequences of TB among people of Somalian origin living in the UK.	Interviews with community leaders from Somalian organizations and TB patients (in the Somalian community); interviews and focus groups with members of the wider Somalian community.
2012	Sagbakken et al. ⁴³	To explore experiences of being diagnosed with TB among migrants in Norway, with a view to identify factors associated with diagnostic delay.	Interviews with TB patients from Ethiopia and Somalia who had been diagnosed in a hospital and for whom TB treatment had been initiated.

Number of participants	Location	Study respondents	Quality score
N = 33 Nurses: 9 TB patients: 24	Toronto, Canada	Migrants and service providers	-
N = 81 CM: 24 HPs: 24 Patients: 33	Broward County and in Palm Beach County, California, USA	Migrants and service providers	+
N = 24	Belgrade, Serbia	Migrants	+
N = 104 CL: 10 CM: 80 Patients: 14	Sheffield, UK	Migrants	++
N = 42 Patients: 22 HPs: 20	Oslo, Norway	Migrants and service providers	++

Table 1 Characteristics of included studies

Year	First author	Aim(s)	Method
2012	Wieland et al. ³⁹	To understand the perceptions and misperceptions about TB among students and staff at an adult education centre. To understand how relationships and social structures influence the perceptions of TB. To understand what the perceived barriers and benefits to health seeking behaviour for TB are.	Separate focus groups at the adult education centre with students (from Somalia, Sudan, Vietnam, Cambodia, Laos, China, Pakistan, Ukraine, Russia, Turkey, Mexico, Colombia and Puerto Rico) and their teachers (from Somalia, Sudan, Asia, US).
2013	Croft et al. ³⁸	To understand the motivation and personal impact of being a peer educator on people with experience of anti-tuberculosis treatment, homelessness and addiction.	Interviews with peer educators who had had treatment for active TB and have experience with homelessness and/or drug/alcohol dependency, and have been a peer educator within the last 3 years of the project (Find & Treat)
2013	Gerrish et al. ³⁹	To explore experiences with the diagnosis and management of tuberculosis from the perspective of Somalian patients and healthcare professionals involved in their care.	Interviews with Somalian TB patients who had received treatment for TB in the UK and with healthcare practitioners with experience in caring for Somalian TB patients: general practitioners (GPs), TB specialists, nurses.
2013	Kawatsu et al. ⁴⁰	To explore the changes experienced by homeless TB patients, and to discuss the possible role of PHC-based DOT treatment in effecting these changes.	Interviews with homeless patients who had received and completed DOT at Shinjuku PHC.
2013	Wannheden et al. ⁴¹	To understand the challenges faced by nurses and physicians in the treatment of patients co-infected with the HIV and TB, with special focus on opportunities for information and communication technology.	Interviews with physicians and nurses of each speciality (HIV & TB), working with HIV/TB co-infected patients.
2014	Craig et al. ³⁶	To analyse patients' knowledge of TB, their experiences of symptoms, and their health care seeking behaviours.	Interviews with TB patients with health and social risk factors likely to complicate adherence to treatment (such as homelessness and drug use) attending a major TB centre.
2014	Zuñiga et al. ³⁷	Experiences of TB treatment among Mexican Americans living in the Lower Rio Grande Valley.	Interviews with Mexican American adults who were currently receiving DOT treatment.

Number of participants	Location	Study respondents	Quality score
N = 83 Students: 54 Teachers: 29	Rochester, USA	Migrants	++
N = 6	London, UK	Service care providers -Homeless and drug users	+
N= 32 Patients: 14 HPs: 18	Sheffield, UK	Migrants and service providers	+
N = 18	Shinjuku, Tokyo, Japan	Homeless	+
N = 9 Physicians: 4 Nurses: 5	Stockholm, Sweden	Service providers of HIV and TB co-infected patients, including migrants	+
N = 17	London, UK	Homeless, migrants, drug- and alcohol users, people living with HIV	++
N = 18	Lower Rio Grande Valley, Texas, USA	Migrants	+

Table 1 Characteristics of included studies

Year	First author	Aim(s)	Method
<i>Studies identified by the previous NICE review:³⁰</i>			
1994	Curtis et al. ⁴⁷	To examine the responses of injecting drug users to current TB management strategies and to explore the implications of these responses for the implementation of DOT.	Ethnographic interviews and observations in locations where drugs were sold and taken. Male and female injecting drug users were interviewed; Latino, black and white.
1995	Kitazawa ⁴⁸	To gather the knowledge and views of homeless people living in group shelters concerning tuberculosis, tuberculosis medical care and health education.	Interviews with men and women in homeless shelters who were English and/or Spanish speaking.
1996	Kelly-Rossini et al. ⁴⁹	To understand the experiences of respiratory isolation for HIV-infected patients with TB.	Interviews with males and females with a history of HIV infection or HIV risk behaviour, AFB positive sputum smears and confined to respiratory isolation; 30–51 years old.
1997	Jackson & Yuan ⁵⁰	To identify the non-clinical barriers family physicians may face in managing TB among patients and suggestions for overcoming these barriers.	Focus groups with primary care physicians, infectious disease specialists and respiratory physicians who work with TB patients.
1999	Ito ⁵¹	To investigate elements of ‘health culture’, which affect adherence with preventive treatment for inactive TB among Vietnamese refugees.	Individual interviews and observations with Vietnamese refugees; included individuals who were compliant with treatment and those who were non-compliant. Interviews conducted with clinic staff and various community members who were apparently not receiving TB services.
1999	Yamada et al. ⁵²	To understand what Filipino immigrants to the USA know about TB and examine their attitudes and practices concerning TB.	Focus groups with male and female Filipino immigrants in two locations.
2000	Fujiwara ⁵³	To explore the development of culturally appropriate marketing campaigns for TB awareness, testing and treatment for immigrants from China.	To explore the development of culturally appropriate marketing campaigns for TB awareness, testing and treatment for immigrants from China.

Number of participants	Location	Study respondents	Quality score
N = 68	Brooklyn, New York, USA	Drug users	-
N = 20	San Francisco, USA	Homeless	+
N = 18	New York, USA	People living with HIV	+
N = 15	Toronto, Canada	Service providers	+
N = 24 (individual who received treatment); others NR)	California, USA	Migrants	+
N = 36	Hawaii and California, USA	Migrants	++
N = 47	New York, USA	Chinese migrants	-

Table 1 Characteristics of included studies

Year	First author	Aim(s)	Method
2002	Houston et al. ⁵⁴	To identify the cultural health beliefs regarding TB and barriers to completion of TB prevention programmes among the Vietnamese population.	Individual interviews and observations with Vietnamese refugees; included individuals who were compliant with treatment and those who were non-compliant. Interviews conducted with clinic staff and various community members who were apparently not receiving TB services.
2003	Chemtob et al. ⁵⁵	To identify the barriers to diagnosis, prevention and treatment of TB among immigrants.	Interviews with immigrant Ethiopian families (ranging in size from 2 to 13 members); traditional healers and Israeli health and absorption professionals.
2004	Joseph et al. ⁵⁶	To identify the factors that influence healthcare workers' adherence to policies for routine tuberculin skin tests and treatment of latent TB infection.	Focus groups with healthcare workers from a range of occupations including clinical, janitorial, administrative, clerical and security staff; US and foreign-born.
2004	Swigart & Kolb ⁵⁷	To examine the factors that homeless people report as influencing their decisions to accept or reject TB screening.	Interviews with homeless men and women who either resided in or were visiting shelters.
2005	Gibson et al. ⁵⁸	To examine socio-cultural factors influencing behaviour related to TB prevention and treatment in high-risk cultural populations.	Interviews with immigrants from Hong Kong, China, Philippines, Vietnam, Punjab, Eastern Europe and Aboriginal populations; included those with active TB, those who had taken DOT, those who had been offered DOT and refused and those with past history of TB, or a relative with TB.
2005	Moro et al. ⁵⁹	To explore chest and infectious disease physicians' views of the barriers to effective tuberculosis control.	Focus groups with chest and infectious disease physicians offering TB care.
2005	Van der Oest et al. ⁶⁰	To explore the opinions of refugee and minority group representatives about the significance of TB for their community and perceptions of TB services.	Community representatives were interviewed from the largest community populations, including Maori and Pacific Island groups, as well as immigrants from China, The Philippines, Somalia, and Kampuchea (Cambodia).

Number of participants	Location	Study respondents	Quality score
N = 67 (53 in focus groups, 14 individual)	California, USA	Migrants	+
N = 36 (12 families, 3 traditional healers, 21 health professionals)	Israel	Ethiopian migrants and service providers	-
N = 106	USA	Service providers	+
N = 55	North-Western USA	Homeless	+
N = 133	Canada	Migrants	++
N = 49	Emilia Romagna region, Italy	Service providers	++
N = unclear ('several groups')	New Zealand	Migrants	-

Table 1 Characteristics of included studies

Year	First author	Aim(s)	Method
2006	Brewin et al. ⁶¹	To understand how acceptable tuberculosis screening is to immigrant populations and to explore immigrants' understandings of TB in relation to screening.	Interviews with adult immigrants from a variety of ethnicities who had been offered TB screening.
2006	Johnson ⁶²	To explore how specific cultural health beliefs regarding TB affect the awareness and understanding of the disease among at-risk communities.	Focus groups and interviews with members of the following at-risk populations: Chinese, Nigerian, women refugees, Vietnamese, substance misusers, HIV-positive people, homeless people and prisoners.
2006	Nnoaham et al. ⁶³	To describe the perceptions and experiences of African patients with TB, particularly relating to diagnosis, adherence and stigma.	Interviews with patients attending a TB clinic, either for preventive therapy or to receive a diagnosis; African-born; over 18 years.
2007	Brent Refugee Forum ⁶⁴	To examine the level of knowledge, attitudes and perceptions of TB among populations at high risk of social exclusion and deprivation. To identify barriers that different populations face in accessing treatment, and understand how the cultural context of TB affects their lives.	Focus groups with participants from different ethnicities including refugees and asylum seekers, people who are HIV positive, homeless, and prisoners; male and female. Focus groups with health-care professionals providing TB services to the same communities.
2007	Marais ⁶⁵	To identify the structural influences which operate across community and sector levels within the local context which may influence TB risk, healthcare access and outcome in migrant black African communities. To identify the resources to improve TB control which exist or could be strengthened within the sectors and within these migrant black African communities themselves.	Multi-method participatory research using questionnaires, in-depth interviews, community consultations and observations; migrant black Africans over 18 years old who had been in the UK for less than 10 years; key stakeholders including individuals and representatives of populations, organisations or institutions, which could significantly influence public health interventions for TB control.
2008	Belling et al. ⁶⁶	To conduct an audit of TB services in relation to the range of services and expertise required to control and treat TB in London.	Interviews with TB service users and TB service lead professionals. Focus groups with TB nurses and external respiratory physicians/epidemiology professionals.

Number of participants	Location	Study respondents	Quality score
N = 53	East London, UK	Migrants	+
N = 67	South East London, UK	Migrants, people living with-HIV, drug users, homeless, prisoners	
N = 16	London, UK	Migrants	++
N = 119 (104 migrants, 15 service providers)	Brent, UK	Migrants, PLHIV, homeless, ++ prisoners and healthcare professionals	
N = 329 (312 African migrants, 17 stakeholders)	London, UK	Migrants	++
N = 33	London, UK	Service providers	++

Table 1 Characteristics of included studies

Year	First author	Aim(s)	Method
2008	Craig et al. ⁶⁷	To explore how a social outreach model of care, including a TB link worker, can be best implemented for marginalised populations with TB.	To explore how a social outreach model of care, including a TB link worker, can be best implemented for marginalised populations with TB.
2008	West et al. ⁶⁸	To explore the knowledge, attitudes and beliefs about TB among homeless shelter residents and persons attending a drug/alcohol rehabilitation centre.	Focus groups of homeless participants at homeless shelters and people with drug/alcohol abuse problems attending a rehabilitation facility.
2008	Whoolery ⁶⁹	To explore what it means for homeless people to have TB and how this impacts their opportunities to complete treatment.	Semi-structured interviews with homeless persons, some of who were also drug users, commercial sex workers or HIV positive.
2010	Gerrish et al. ⁷⁰	To identify socio-cultural influences on the prevention, diagnosis, and treatment of TB within the Somalian community and to gain insight into healthcare practitioners' perceptions of and experiences with TB among the Somalian community. To identify ways in which culturally appropriate health promotion initiatives regarding TB can reach the Somalian community. To identify ways of supporting healthcare practitioners to provide culturally appropriate care in regard to the screening, diagnosis and management of TB within the Somalian community.	Interviews with Somalian community leaders. Interviews and focus groups with members of the Somalian community including those with personal experience of TB. Interviews with healthcare practitioners including GPs, consultants, TB nurses and Somalian nurses with experience of working with the Somalian community.
2010	Sagbakken et al. ⁷¹	To identify the factors associated with diagnostic delay for TB among immigrants in Norway	Interviews with male and female immigrants from Somalia and Ethiopia who had been diagnosed with TB.

- = low quality. + = medium quality. DOT = Directly observed therapy. GP = general practitioner. NICE = National Institute for Health and Care Excellence.

Number of participants	Location	Study respondents	Quality score
	UK	Service providers	-
11 focus groups of 52 participants	USA	Homeless and alcohol abusers	+
N = 16	UK	Homeless	++
N = 120 (N=56 for focus groups; N=64 for individual interview)	Sheffield, UK	Somalian Migrants	++
N = 22	Norway	Migrants	+

Seven studies analysed whether hard-to-reach groups viewed themselves as susceptible to TB and were therefore more inclined to undergo testing if they had symptoms of the disease. Five studies focused on migrant populations,^{19,37,39,42,46} one on a Roma population,⁴⁴ and one on a mixed population of homeless people, drug users and migrants.³⁶ Table 3 provides an overview of findings for views on susceptibility through reported concepts of causes and modes of transmission. The appendix provides an overview of illustrative quotations identified per theme.

A common misconception among migrant students and teachers at an adult education centre in the USA was that TB was not present in the USA.¹⁹ Mexican-American TB-patients living on the border between the USA and Mexico discussed being susceptible to TB because of the proximity to Mexico.³⁷ In a Somalian community in Sheffield, UK, community leaders generally showed accurate knowledge, but there was great variation among community members. Here, views were relatively accurate, with some people describing TB as '*an airborne disease whereby people became infected by "breathing in the germ" and once infected, they could pass it on to others*'.⁴² Conversely, in a mixed group of patients with TB who were homeless, drug users, or migrants in London, UK, knowledge of TB was generally poor and a wide variety of causes was mentioned.³⁶

The way in which communities perceive the severity of TB, including symptoms, health consequences, and treatability, affects people's health care seeking behaviour. Three studies on the views of migrant populations,^{19,37,42} one on a Roma population,⁴⁴ and one on a variety of urban risk populations in London³⁶ investigated the perceptions of TB severity.

Four studies reported on perceived TB severity in migrant and refugees in the USA,¹⁹ Mexican American migrants,³⁷ Somalian migrants in the UK.⁴² One was exclusively reporting on the views of TB patients,³⁷ one reported on views of non-TB patients,^{19,44} and one on both.⁴² Two studies reported good knowledge of the TB symptoms, persistent (bloody) cough, weight loss, fever and night sweats.^{37,42} Somalian TB patients had little knowledge of extra-pulmonary TB, but most were aware of the long duration of treatment with antibiotics and the prospect for good recovery. However, because of the belief that TB is hereditary, some thought that TB was incurable. Furthermore, people had various beliefs about the length of time a patient remained infectious.⁴² Similarly, a Roma population in Belgrade, Serbia, had accurate knowledge of symptoms, whereas their views on TB severity and the effectiveness of treatment varied, ranging from TB being a very serious and lethal disease to it being a long-lasting, but curable disease.⁴⁴ A mixed group of migrants in the USA reported fear of TB, which consisted mainly of fear of dying from an incurable disease.¹⁹

A mixed group of people who were mainly homeless, drug users, people living with HIV, and migrants, with (suspected) TB infection in London, UK, reported on common symptoms for TB; recognition of symptoms was not always accurate and miscellaneous explanations for common symptoms were

reported.³⁶ Symptoms were often attributed to other undiagnosed illnesses, poor diet, or to drug/alcohol abuse.

Eight studies elaborated on the barriers that affect the health care-seeking behaviour and treatment adherence of TB patients, which hinder effective implementation of TB prevention and control measures; seven studies reported on migrant populations,^{19,37,39,42,43,45,46} and one study reported on mixed urban risk groups in London, UK.³⁶

Various migrant populations in the USA reported difficulties with transport to the testing centre, the opening hours of testing centres, or the duration and cost of testing as barriers to the testing and treatment of TB.¹⁹ The challenges of TB symptoms combined with TB treatment side effects were described by Mexican American³⁷ and Somali¹⁹ migrants with TB in the USA. They experienced mental and physical conditions, which affected their treatment adherence. Two studies^{37,39} commented on stress and depression due to delay in diagnosis and treatment challenges. Somalian patients in the UK³⁹ reported feeling stressed, anxious, and powerless, especially if the diagnosis took a long time, and if they felt they were not being taken seriously. Moreover, these patients thought that the system had let them down and they did not trust their general practitioners (family doctors). Other patients felt relieved after TB was diagnosed.³⁹ Depression and feelings of sadness were described by Mexican Americans during TB treatment, often related to (self-chosen) social isolation at home and restricted daily activities to prevent transmission.³⁷

Two studies identified loss of privacy and breaches in confidentiality as important barriers to treatment adherence in two studies.^{43,46} The actions of TB health care services and outreach workers were perceived as revealing a patient's TB status to others, this was mentioned by Haitians in the USA⁴⁶ and by Ethiopian and Somalian migrants in Norway.⁴³ Patients were concerned that health workers in directly observed therapy (DOT) aggravated the stigma of TB and were unaware of the consequences of exposing their TB status to others. Three studies described negative attitudes or fear of DOT, which made people reluctant to undergo testing.^{37,43,46} Haitian Americans associated TB treatment with incarceration and feared loss of employment.⁴⁶ Some Somalian and Ethiopian patients in Norway questioned the necessity of DOT, feeling humiliated or discriminated by the frequent home visits. They felt unable to voice any criticism because of their migrant status, a scarcity of alternative TB services, and the threatening attitudes of nurses in cases of non-cooperation. Some patients did not understand why nurses suspected them of not being compliant with treatment; they argued that DOT should only be used where people needed assistance to be able to manage their treatment.⁴³ Furthermore, DOT was perceived as imprisoning, forcing the patient into a subservient and confined position hindering work responsibilities, and, consequently, complicating treatment adherence.^{37,43}

Somalian and Ethiopian migrants in Norway described the lack of continuity among health personnel as hindering the establishment of a secure and

trustful patient-nurse relationship during treatment. Some patients reported that some health workers tried to restrict patient contact as much as possible. Patients often did not know which health worker was attending and at what time, potentially causing feelings of stress and humiliation.⁴³

Economic hardship due to a TB diagnosis was mentioned by Somalian patients in the UK.^{39,42} A Somalian homeless patient described how inadequate accommodation, a lack of social support, and a poor diet complicated management of the disease.³⁹ Mexican American migrants reported economic hardship, losing their job or being unable to work as complicating factors.³⁷ Mixed migrant populations in the USA reported that knowledge about TB medication being free of charge reduced financial constraints to access of TB care.¹⁹

TB-related stigma was a barrier to seeking treatment and adhering to treatment.^{19,37,39,42,43,45,46} We identified five themes: face masks, stigma of association with HIV, self-stigma, consequences of stigma, and stigma due to poor knowledge. Mexican American TB patients associated wearing face masks with physical discomfort and stigma.³⁷ They were afraid the mask would reveal their TB status, and, therefore, most patients stayed at home or avoided crowded places out of fear of disclosing their TB status and experiencing discrimination. Similarly, migrants in Canada referred to the mask as an 'identifier of TB' and described the effect of face masks on losing friends, jobs, or being unable to find employment.⁴⁵

One study reported that many Haitian community members in Florida assumed that patients with TB were HIV positive, thus aggravating stigma.⁴⁶ In this study, the TB and HIV clinics were located together in one building, contributing to this assumption.

Four studies described TB self-stigmatisation.^{19,37,39,42} Mexican patients in the USA felt depressed and guilty about having TB; they were afraid of being a burden for family or friends. Negative feelings seemed to be intensified by non-disclosure and self-chosen social isolation. Five of 18 participants did not disclose their TB status, because of shame, not wanting to be a burden, protecting family from TB stigma, or protecting themselves from being stigmatized by family, friends or community members. Some patients only disclosed to their families and hid their TB status from friends, colleagues and community members.³⁷ Some Somalian patients in the UK disclosed their TB status, because they understood the importance of contact tracing, whereas others concealed their TB diagnosis to avoid distress and discrimination, and maintain isolation.⁴² Similarly, mixed migrant populations in the USA¹⁹ mentioned patients would shy away from their family members and other social contacts. Somalian migrants in the UK and Mexican American migrants perceived self-stigmatisation as a barrier to seeking TB care and support during treatment.^{37,39,42}

Four studies (on migrant populations in the USA,¹⁹ Somalian migrants in the UK,^{39,42} and Haitians in the USA⁴⁶) found that TB-related stigma was most likely to be caused by poor knowledge of the community. Haitians in the USA

reported being seen as a disadvantaged and socially marginalized group that brought TB and other diseases to the USA.⁴⁶ Many Mexican American patients felt they were stigmatized by family and friends who stayed away, did not want to share drinks or food, or slept separately. Consequently, most patients felt depressed, but accepted their situation; understanding that people wanted to protect themselves from TB.³⁷ Consequences of stigma in the Haitian community in Florida, USA, were discrimination, avoidance of TB patients by others, and negative effects on relationships with family members.⁴⁶ Many Somalian patients in Sheffield, UK, were supported by friends and family, but faced socio-cultural consequences in their wider social network.³⁹ In Somalia, TB is considered shameful for the whole family⁴² and, in some cases, the whole family is socially isolated and discriminated against. Some patients said community members still did not know that TB was curable. Moreover, the idea that TB is hereditary implies that the entire family will face stigma, which could affect employment and marriage prospects.⁴²

Perceived barriers to testing and treatment of TB were reported for other hard-to-reach populations. For drug using TB patients in the UK, the fear of opiate withdrawal symptoms resulted in most people seeking health care only when they had reached a crisis point.³⁶ Fear of hospital admission was also a barrier to seeking health care among drug users in the UK, especially if they were unaware of the availability of methadone to prevent withdrawal symptoms.³⁶

Seven studies reported on the facilitators that influence health care-seeking behaviour and treatment adherence of TB patients; five reported on migrant populations,^{37-39,43,45} one on homeless people in Japan⁴⁰ and one on mixed urban risk groups in London.³⁶

The importance of the nurse role in TB treatment was emphasised for mixed migrant and Somalian populations.^{39,45} For migrant TB patients in Canada nurses played an important role in supporting treatment adherence.^{37,39} Somalian patients in the UK appreciated support of Somalian health workers and TB specialist nurses.³⁹ Somalian TB patients in the UK were mostly supported by their family and friends.³⁹ Mexican American TB patients who disclosed their diagnosis of TB to their families received support and were accepted; however, those who did not disclose were not able to access this support.³⁷

A strong relationship of trust between care workers and patients, with care that goes beyond a single focus on drugs, was considered important by homeless patients in Tokyo, Japan. At the end of each successfully completed treatment course, the nurses organized a small ceremony, which was deemed important by patients.⁴⁰ These types of support, beyond normal TB care, made the patients generally feel more cared for and helped them adhere to treatment.

Two studies noted hospitalisation as a facilitator for health care seeking behaviour or adherence in migrants.^{37,43} Some female Somalian and Ethiopian TB patients in Norway described DO) as an expression of genuine care, which reduced their isolation.⁴³ In one study, most Mexican Americans with TB were

unable to work and limited other activities to prevent transmission of TB, making the hospital or nursing home visit *'the outing for the day'*.³⁷ Three studies noted hospital admission as a facilitator for health care seeking behaviour or adherence.^{36,38,40} A patient who was homeless and a drug user in the UK viewed hospital admission as *'a welcome break from the street'*. Some drug users turned to creative and strategic approaches to achieve hospital admission, thus avoiding opiate withdrawal symptoms.³⁶ Kawatsu and colleagues identified five subcategories of characteristics of homeless patients in Tokyo that improved after DOT: mental health, health behaviour, living environment, personal relationships, and attitudes towards society.⁴⁰ A peer educator in London with a history of TB noted the positive effects of DOT on treatment adherence.³⁸

Three studies mentioned cues to action for accessing TB care.^{36,39,44} Roma people in Belgrade, Serbia, indicated that Roma people often do not visit a doctor until the symptoms of the disease are so severe that they are unable to work.⁴⁴ Conversely, Somali TB patients in the UK were reported to have presented at the general practice shortly after initially feeling unwell.³⁹ Several participants in a mixed group (including homeless and migrants) in London, UK, delayed access to medical care, because they had been trying to self-manage and attributed symptoms to other factors, or sought help only after reaching a crisis point.³⁶

No studies directly comparing the views between hard-to-reach populations were identified. Five studies presented the views of TB health care/service providers, including those involved in the care of migrants in Canada,⁴⁵ Somali migrants in the UK,³⁹ Somali and Ethiopian migrants in Norway,⁴³ HIV infected patients in Sweden,⁴¹ and homeless and drug users in London.³⁸

As barriers to diagnosis and treatment adherence among migrant populations, service providers mentioned (fear of) stigma,^{39,45} the use of khat (resulting in late presentation of Somali migrant populations due to its escapist effects),³⁹ atypical presentation of the disease as a result of different cultural perspectives, language barriers (and the lack of professional translators), a paucity of TB cases seen each year,³⁹ negative psychological effects of wearing masks and experiencing isolation,⁴⁵ and an aversion to DOT.⁴³ Norwegian service providers acknowledged the existence of institutional barriers to treatment adherence.⁴³ Whilst DOT was generally seen as effective, most were aware of the implications of DOT on patients' lives, given their vulnerable socioeconomic position in society.⁴³ Service providers of Somali TB patients in the UK³⁹ and Norway⁴³ noted that most patients accepted and complied with treatment, non-adherence was sometimes due to the chaotic situation a patient was in, such as applying for asylum.

In Sweden, physicians and nurses specialised in HIV and TB were interviewed about the challenges in their work regarding TB-HIV co-infection,⁴¹ and reported a number of barriers to access to TB care and treatment adherence. These barriers included reduced continuity among physicians, staff shortages, difficulties in monitoring and managing the treatment process, insufficient networking between the HIV and TB specialties, a need for more collaboration,

uncertainty about division of tasks between HIV and TB clinics, and insufficient communication between team members.

Service providers additionally identified facilitators supporting treatment adherence, including the use of persuasion based on subtle threats,⁴³ assisting patients with needs beyond the administration of tablets,^{43,45} support by TB specialist nurses and Somalian service providers,³⁹ acknowledgement of the difficulties of being an immigrant,⁴⁵ and support from close family.³⁹

Peer educators in London, UK, who had received treatment for active TB and had been homeless or dependent on drugs or alcohol mentioned that their support could be motivational and have a personal effect on other TB patients in similar situations.³⁸

Table 2 Quality assessment of included studies

Year	Author	Quality score	1. Is a qualitative approach appropriate?	2. Is the study clear in what it seeks to do?	3. How defensible/rigorous is the research design / methodology?	4. How well was the data collection carried out?
2010	Bender et al. ⁴⁵	-	Y	Y	Y	NS
2010	Coreil et al. ⁴⁶	+	Y	Y	Y	Y
2011	Vukovic and Nagorni-Obradovic ⁴⁴	+	Y	Y	P	P
2012	Gerrish et al. ⁴²	++	Y	Y	Y	Y
2012	Sagbakken et al. ⁴³	++	Y	Y	Y	Y
2012	Wieland et al. ³⁹	++	Y	Y	Y	Y
2013	Croft et al. ³⁸	+	Y	Y	Y	Y
2013	Gerrish et al. ³⁹	+	Y	Y	Y	Y
2013	Kawatsu et al. ⁴⁰	+	Y	Y	Y	Y
2013	Wannheden et al. ⁴¹	+	Y	Y	Y	Y
2014	Craig et al. ³⁶	++	Y	Y	Y	Y
2014	Zuninga et al. ³⁷	+	Y	Y	Y	Y
1994	Curtis et al. ⁴⁷	-	Y	M	N	NS
1995	Kitazawa ⁴⁸	+	Y	Y	Y	Y
1996	Kelly-Rossini et al. ⁴⁹	+	Y	Y	Y	NS
1997	Jackson & Yuan ⁵⁰	+	Y	Y	Y	Y
1999	Ito ⁵¹	+	Y	Y	Y	Y
1999	Yamada et al. ⁵²	++	Y	Y	Y	Y
2000	Fujiwara ⁵³	-	Y	Y	Y	Y
2002	Houston et al. ⁵⁴	+	Y	Y	Y	Y
2003	Chemtob et al. ⁵⁵	-	Y	Y	N	N
2004	Joseph et al. ⁵⁶	+	Y	Y	Y	Y
2004	Swigart & Kolb ⁵⁷	+	Y	Y	Y	Y
2005	Gibson et al. ⁵⁸	++	Y	Y	Y	Y
2005	Moro et al. ⁵⁹	++	Y	Y	Y	Y
2005	Van der Oest et al. ⁶⁰	-	Y	Y	Y	Y
2006	Brewin et al. ⁶¹	+	Y	Y	Y	Y
2006	Johnson ⁶²	-	Y	N	N	N
2006	Nnoaham et al. ⁶³	++	Y	Y	Y	Y

5. Is the role of the researcher clearly described?	6. Is the context clearly described?	7. Were the methods reliable?	8. Is the data analysis sufficiently rigorous?	9. Is the data 'rich'?	10. Is the analysis reliable?	11. Are the findings convincing?	12. Are the findings relevant to the aims of the study?	13. Conclusions	14. How clear and coherent is the reporting of ethics?
NS	N	Y	Y	Y	NS	Y	Y	P	N
N	NS	Y	Y	Y	NS	Y	Y	Y	Y
Y	Y	N	Y	Y	Y	Y	Y	P	Y
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Y	P	Y	Y	Y	Y	Y	Y	Y	Y
NS	N	Y	Y	Y	Y	Y	Y	Y	Y
N	Y	N	Y	Y	Y	Y	Y	Y	Y
NS	NS	Y	Y	Y	NS	Y	Y	Y	Y
NS	NS	Y	Y	Y	Y	Y	Y	Y	Y
Y	Y	M	Y	Y	Y	Y	Y	Y	Y
N	Y	Y	Y	Y	NS	Y	Y	P	Y
N	NS	Y	N	NS	N	Y	Y	Y	N
N	Y	NS	N	N	N	Y	Y	Y	Y
N	NS	Y	Y	Y	Y	Y	Y	Y	Y
N	Y	Y	Y	N	Y	N	M	Y	Y
NS	Y	NS	NS	Y	NS	Y	Y	Y	NS
N	Y	Y	Y	Y	Y	Y	Y	Y	NS
N	N	N	N	N	N	N	P	N	N
Y	NS	Y	Y	N	NS	Y	M	Y	NS
N	N	N	N	N	N	N	N	N	N
NS	N	Y	Y	Y	Y	Y	Y	Y	Y
N	Y	Y	Y	NS	Y	Y	Y	Y	N
Y	Y	Y	Y	NS	Y	Y	Y	Y	Y
NS	Y	Y	Y	Y	Y	Y	Y	Y	NS
N	N	NS	N	Y	N	N	Y	Y	N
Y	Y	Y	Y	N	Y	Y	Y	Y	Y
N	Y	Y	N	N	N	N	Y	Y	NS
NS	NS	NS	Y	Y	NS	Y	Y	Y	Y

Table 2 Quality assessment of included studies

Year	Author	Quality score	1. Is a qualitative approach appropriate?	2. Is the study clear in what it seeks to do?	3. How defensible/rigorous is the research design / methodology?	4. How well was the data collection carried out?
2007	Brent Refugee Forum ⁶⁴	++	Y	Y	Y	Y
2007	Marais ⁶⁵	++	Y	Y	Y	Y
2008	Belling et al. ⁶⁶	++	Y	Y	Y	Y
2008	Craig et al. ⁶⁷	-	Y	Y	N	NS
2008	West et al. ⁶⁸	+	Y	Y	Y	NS
2008	Whoolery ⁶⁹	++	Y	Y	Y	Y
2010	Gerrish et al. ⁷⁰	++	Y	Y	Y	Y
2010	Sagbakken et al. ⁷¹	+	Y	Y	Y	Y

- = significant risk of bias. + = study might not have addressed all potential sources of bias.

++ = well-designed study, minimal risk of bias. N = no. Y = yes. NS = not sure (not reported or inadequately reported). M = mostly relevant. P = partially relevant. NICE = National Institute for Health and Care Excellence.

5. Is the role of the researcher clearly described?	6. Is the context clearly described?	7. Were the methods reliable?	8. Is the data analysis sufficiently rigorous?	9. Is the data 'rich'?	10. Is the analysis reliable?	11. Are the findings convincing?	12. Are the findings relevant to the aims of the study?	13. Conclusions	14. How clear and coherent is the reporting of ethics?
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	Y	Y	Y	Y	Y	Y	Y	Y	Y
NS	Y	Y	NS	M	Y	Y	Y	Y	Y
N	N	Y	N	N	N	N	Y	Y	Y
N	Y	Y	Y	N	Y	Y	M	N	N
Y	Y	Y	Y	Y	NS	NS	Y	Y	Y
Y	Y	Y	Y	Y	NS	Y	Y	Y	Y
N	Y	Y	Y	N	Y	Y	Y	Y	Y

Table 3 Views on susceptibility: reported concepts of causes and modes of transmission across 20 studies (this update and the previous NICE review).³⁰

Cause	Total Mentions	Mixed populations*	Homeless	Migrants – mixed
Smoking	10	1 ⁶⁴	2 ^{48,68}	3 ^{19,58,61}
Food-related	9	1 ³⁶	2 ^{48,68}	2 ^{19,61}
Heredity	9	1 ⁶²	1 ⁶²	2 ^{58,60}
Other illnesses	8	1 ³⁶ (HIV)	1 ⁶⁸ (AIDS)	
Environment (typically 'dirty' or weather)	8	1 ⁶⁴	1 ⁶⁸	1 ⁵⁸
Poverty	8	1 ³⁶	1 ⁶⁸	1 ⁶¹
Lack of self-care, health imbalance	7	1 ⁶⁴	1 ⁶⁸	2 ^{58,61}
Sharing (e.g., cigarettes, cutlery)	6	1 ⁶²	2 ^{48,68}	1 ⁶¹
Sexual contact / Saliva	4	1 ⁶²		2 ^{19,61}
Stress	4			
God	3	1 ³⁶		
Lifestyle factors	2	1 ³⁶		1 ¹⁹
Blood (type)	2			1 ¹⁹
Touch	2			1 ¹⁹
Geographical localisation	2			1 ¹⁹ (not in USA)
Airborne	1			
Vectors (rats)	1			

*Mixed groups differed by study, but could include any of people who use drugs, migrants, prisoners, people with HIV, and homeless people in the same study. For this updated review and the previous National Institute of health and Care Excellence review.

Migrants – African: Somali & Ethiopian	Migrants – Asian incl. Chinese, Vietnamese & Filipino	Migrants – Roma	Migrants – Mexican, Haitian
2 ^{70,71}	2 ^{53,62}		
2 ^{62,71}	1 ⁶²	1 ⁴⁴	
4 ^{39,42,63,70}		1 ⁴⁴	
3 influenza & pneumonia ⁴² asthma ⁷⁰ pneumonia ⁶¹	1 ⁶² (low immunity)	1 ⁴⁴ (influenza, pneumonia)	1 ⁴⁶ (HIV)
2 ^{62,70}	3 ^{52,53,62}		
2 ^{42,70,71}	1 ⁵⁴	1 ⁴⁴	
2 ^{70,71}	1 ⁵²		
1 ^{42,63}			
		1 ⁴⁴	
1 ^{42,70}	1 ⁵⁴	1 ⁴⁴	
2 ^{39,42}			
1 ⁴²			
		1 ⁴⁴	
		1 ⁴⁴	
			1 ³⁷ (proximity Mexico)
1 ⁴²			
		1 ⁴⁴	

Our review provides evidence-based qualitative information about several important barriers and facilitators to the uptake of TB diagnostic and treatment services by people from hard-to-reach populations in EU, EEA, EU-candidate, and OECD countries of low and medium TB incidence. We identified 12 studies, in addition to 25 studies⁴⁷⁻⁷¹ included in the previous NICE review.³⁰ In this review,³⁰ 12 studies reported on migrants,^{51-55, 58, 60, 61, 63, 65, 70, 71} four on homeless people,^{48, 57, 68, 69} two on a mixture of hard-to-reach populations (migrant, homeless, and prisoners),^{62, 64} one on drug users,⁴⁷ one on people living with HIV,⁴⁹ and five on the views of health-care professionals.^{50, 56, 59, 66, 67} Combining the findings of the current review with those of the previous review³⁰ provides a body of evidence that shows important gaps in the provision of TB care in countries of low and medium TB incidence.

Low perceived susceptibility can be a barrier, because individuals who do not consider themselves susceptible to TB might not access health care when they develop symptoms. We found strong evidence that many misconceptions exist regarding susceptibility to TB among all investigated hard-to-reach populations in our review and the previous review.^{19, 36, 37, 39, 42, 44, 46, 48, 52, 53, 58, 60-64, 68, 70, 71} For TB severity, migrants, prisoners, drugs users, and homeless populations were generally aware of untreated TB being potentially fatal.^{19, 62, 65, 68, 70} Previous studies have shown the importance of awareness about the variety of perceptions on illness and health care,^{72, 73} and many have emphasised the importance of cultural-sensitive programmes.^{74, 75} Thus, in specific settings, introduction of awareness-raising programmes that acknowledge and appropriately address the variety of local perceptions is relevant, with the aim of enhancing early case-finding and reducing delay in health care seeking.

We identified numerous barriers to treatment seeking and adherence for migrant populations.^{19, 37, 39, 42, 46, 48, 51-53, 57, 58, 60, 62-65, 70, 71} We found strong evidence that TB-related stigmatisation was perceived as a major barrier in almost all migrant populations and some homeless people.^{37, 39, 43, 45, 46, 52, 58, 60, 63, 64, 69, 70} Stigma can be described as a discrediting attribute negatively affecting social status and position and often leading to rejection and/or exclusion.⁷⁶ Self-stigmatisation can be defined as '*a reduction of an individual's self-esteem or self-worth caused by the individual self-labelling herself or himself as someone who is socially unacceptable*',⁷⁷ and can lead to denial of diagnosis, or hiding of TB status. Stigma and its social consequences is one of the major factors hindering TB diagnosis and treatment adherence.^{22, 78, 79} Various interventions exist to prevent stigma and its effects, including family and community sensitizations, treatment supporter programmes, and counselling. However, stigma is often embedded in a cultural context with deep-seated beliefs⁸⁰ and should therefore not solely be ascribed to a knowledge deficit as knowledgeable people might also stigmatize. Thus, it is necessary to organize interactive community sensitization programmes

that specifically target stigmatizing attitudes and actions. Notwithstanding the amount of literature on this topic,⁸¹ TB-related stigma remains prevalent and, therefore, a focus for international TB control efforts.^{79,82}

Institutional barriers, such as poor health infrastructure, unavailable diagnostic facilities, incorrect diagnosis, little health care provider training, and poor follow-up routines,²² were reported to delay TB diagnosis.^{19,36,43,62,63,65,70,71} Additionally, structural barriers were mentioned across studies.^{19,37,39,42,43,46,47,49,53,60,65,68,70} Hard-to-reach groups in countries of low and medium TB incidence often seek care or receive TB treatment under challenging circumstances, such as uncertain migrant status, undocumented immigration status, homelessness, addiction to alcohol or drugs, or vulnerable economic and social positions.^{78,83} Crucially, countries should reflect upon their immigration policies and how they might hamper TB control.⁸³ Evidence for the effect of incentives is conflicting.^{84–86}

We found no strong evidence for perceived facilitators of TB diagnosis or treatment adherence across hard-to-reach populations.^{36,37,40,43,45,46,49,51,63,65,69,70} Possible approaches to improve access to healthcare in general are support and social networks, multidisciplinary teams, care and transportation for free, use of outreach services, and trained care providers who are sensitive to gender and culture. A patient-centred approach plays a key role in improving treatment adherence.⁷⁸ For many migrants, interpreters and/or bilingual staff are needed.⁸⁷ In drug use and homelessness services, strong collaborations that integrate existing social services with TB care could be useful.⁸⁸ Furthermore, structural barriers need to be addressed.

No strong evidence for cues to action that motivate or precipitate health care seeking could be identified. Delay in health care seeking is often cited as a more complicated obstacle than treatment adherence among hard-to-reach populations, because people who delay care seeking are not yet in the health care system and, therefore, are difficult to reach. Discontinuity in primary care may also cause diagnostic delays.^{71,89–91} Such delays could be reduced by awareness training of health professionals about atypical TB symptoms, patients' history, and patients' interpretation of TB symptoms.⁷¹ Moreover, there is a need to improve the accessibility of TB services to hard-to-reach populations.⁹¹

The main challenges identified by service providers giving care to migrant TB patients were cultural and language barriers,^{39,41,43,45,59,65,70} and, with regard to TB care in general, a scarcity of specialist services and coordination of care,^{39,41,43,50,59,66,70} and complex social and clinical interactions.^{64,66,67} In settings with a low TB incidence, poor TB awareness and expertise among primary care providers is a problem, causing considerable treatment delays and distrust in the health system. Continuous training of health-care providers on TB and its diagnosis is needed; computer-based decision support has been suggested to improve clinical practice.^{41,92} Language and cultural barriers are considerable obstacles;^{87,93–98} care providers should have unlimited access to high-quality translation services, which are currently not readily available in many of the

studied countries.⁸⁷ Cross-cultural training of health care providers and the availability of bilingual, multidisciplinary teams have been associated with improved health outcomes.⁹⁶

Our systematic review highlights the small number of studies that have been of hard-to-reach populations in EU, EEA, EU-candidate), and OECD countries specifically, and in countries of medium and low TB incidence in general. A clear knowledge gap exists for drug- and alcohol users, homeless people, prisoners, and sex workers regarding the barriers and facilitators to TB services. Many studies focused on Somalian migrants; as such, most findings are specific to this migrant population and might not be transferrable to other hard-to-reach migrant populations. Children are not mentioned in the studies included in both our and the previous systematic review, and yet the World Health Organization (WHO) estimated 10% of the TB notifications worldwide to be in children.² Multidrug-resistant TB (MDR-TB) and HIV co-infection complicate TB care; HIV infection exacerbates mortality and facilitates the development of drug resistance.⁹⁹ MDR-TB was not cited in any of the identified studies, despite it being a growing problem in Europe.^{100,101} The lengthy duration of treatment with toxic drugs with potentially serious side effects complicates adherence to treatment.¹⁰² Only two studies about TB-HIV co-infection were identified; thus, more qualitative, large-scale, multi-country studies are needed to obtain evidence for operational factors that affect access and delivery of effective TB services, especially for MDR-TB and TB-HIV co-infected patients.

Our study had several limitations. One challenge was defining what groups are hard-to-reach;¹⁰³ this definition might vary between settings and in addition, not every individual within a so called hard-to-reach group is necessarily equally hard-to-reach. To be inclusive, we decided to include all people living with HIV and migrants in our analysis, because members of those groups are often hard-to-reach and face higher TB rates than other groups. Furthermore, we used wide inclusion criteria, which is common practice in qualitative literature synthesis,¹⁰⁴ but can affect reproducibility. Thematic analysis is, in view of its subjective nature, prone to bias; many views expressed in qualitative literature can be interpreted in different ways. We aimed to minimise this bias by following PRISMA guidelines, resulting in a critically appraised and structured analysis of the qualitative literature. The quality of the studies was generally moderate to high (for grading of qualitative research); there were shortcomings in the clarity of the role of the researcher, the description of the context, the reliability of the data collection methods, and reporting of the method of data-analysis. Our evidence is restricted because we identified relatively few studies, especially on non-migrant groups. Additionally, most studies focussed on Somalian migrant populations, hindering the formulation of generalized health care recommendations for other hard-to-reach populations.

Although countries of medium and low TB incidence might give lower priority to TB control and research activities than would high TB incidence

countries, TB has re-emerged as a significant problem.^{16,105} To ensure equitable access to TB care, increased investments are needed so that an evidence base for TB knowledge, stigma, DOT, and economic constraints is available to carefully tailor TB programmes to specific risk groups.¹⁰⁶ Such investment is of particular importance for progress towards TB elimination globally. The arrival of millions of refugees into Europe from high TB endemic regions of Asia, the Middle East, and Africa could increase the numbers of hard-to-reach populations with TB. The identified gaps in knowledge concerning drug- and alcohol users, homeless people, prisoners and sex-workers, and the new refugees, provide an opportunity to do future studies. A focus on patient autonomy, shared decision-making, and support systems, particularly for patients from hard-to-reach groups, might improve the uptake of diagnosis and adherence to treatment. The influence of poverty and gender on patients and their treatment adherence require further study.⁷⁸ Future research should cover the wide variety of hard-to-reach populations in EU, EEA, and OECD countries to make realistic recommendations to render TB control programmes maximally effective. Unfortunately, many countries, especially those where TB is concentrated in hard-to-reach populations, have limited resources at the national level and are not able to follow up such recommendations and take up the coordination.^{28,82}

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APPENDIX (AVAILABLE ONLINE)

Supplementary Material I: PICOS (Population-Intervention-ComparatorOutcome-Study design)

Supplementary Material II: Search strategy

Supplementary Material III: Evidence tables

Supplementary Material IV: Evidence statements

Supplementary Material V: Illustrative quotes per theme