ANALYSE AND EXPLORE CONTEMPORARY RESEARCH LITERATURE TO IDENTIFY AREAS FOR SERVICE IMPROVEMENT
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1 INTRODUCTION

1.1 BACKGROUND

Tuberculosis (TB) was declared a global health emergency by the World Health Organization (WHO) in 1993, in spite of this, it remains an important cause of mortality and morbidity throughout the world. Tomas et al. (2013) finds that tuberculosis has been in a gradual decline since the 1990s and 2000s with an estimate of nine million incidence cases of tuberculosis in 2010. TB is caused by mycobacterium tuberculosis which is an air-borne disease and transmitted when an individual with the active form of the disease sneezes, coughs, spits or speaks (Bender, Andrews, & Peter, 2010; Bodenmann et al., 2009; Kan, Kalin, & Bruchfeld, 2013; Nuzzo, Golub, Chaulk, & Shah, 2013). It is estimated that one third of the global population is infected with tuberculosis but not all infected people can develop the disease. It is possible for the disease to remain latent, asymptomatic, and non-infectious for many years (van der Werf & Zellweger, 2016). However, with about 10% of cases the infection can reactivate at any time (Werf & Kramarz, 2016a).

The reemergence of tuberculosis in low-prevalence industrialized countries in the West and Australia has become a public health challenge. A part of the reemergence of the disease is attributed to multiple antibiotic resistance and the disease’s interaction with AIDS/HIV (Tomás et al., 2013). According to Panchal et al. (2013) TB is strongly connected with poverty; in developed and less developed countries, 95% of the deaths linked to TB take place in places of poverty and marginalization in developed countries. According to the WHO (2016) population groups who are vulnerable to tuberculosis includes prisoners, injecting drug users, the homeless, ethnic minorities, and migrants – documented or undocumented, refugees, economic and labor migrants, asylum seekers – are those who experience access to health services is complicated by factors of social discrimination, poverty, and isolation.

Various political and socio-economic factors have recently surged the human migration rate that has also contributed to changes in different patterns of tuberculosis infection (Werf & Kramarz, 2016a). Many Western countries and Australia has seen an increase in TB infection with the influx of migrants and refugees (Rogo et al., 2017). According to Tomas et al. (2013) in
countries of North America, Europe, and Australia, TB disproportionately impacts foreign-born populations that have migrated from Africa, Asia, and/or Latin America because TB infection rates in these areas are much higher. In countries of low incidence, the rate of infection among foreign-born migrants is ten to twenty times that of the autochthonous population (Tomás et al., 2013). However, there are studies that indicate low infection rates in non-immigrant populations (Barniol et al., 2009) but the risk of transmission within the immigrant communities in the host country is very high.

Reactivation of latent TB infection is common among immigrant populations and is considered the main reason behind many of the TB cases that occur even many years after the arrival of migrants into the host country. Current measures and interventions in place are not enough to detect latent TB and many call for more active surveillance (Moore-Gillon, Davies, & Ormerod, 2010). Notwithstanding the high proportion of TB cases among immigrants in low-incidence countries, there is an ensuing debate about the screening and educational programs and their public health impact. Research notes that TB control and treatment services in low-incidence countries that house large population of immigrants are facing a great deal of challenges from the changing patterns of TB. The primary research question the current study looks to answer is:

How is latent tuberculosis tackled among immigrant populations in low-incidence Western countries and Australia in terms of screening, educating and adhering to treatments in patients?

The current report looks to access and analysis relevant research literature in the field to answer the research question. Understanding these factors plays an imperative role today in evaluating and adapting the current programs and processes in place.

1.2 RESEARCH AIMS & OBJECTIVES

The general aim of this literature review is to explore screening processes for immigrants, their perceptions and knowledge of TB in addition to educational programs catered for them, and immigrant patient adherence to TB treatment. Using the developed research question and the primary aim of the study, the objectives of the research have been devised.
1. Use current peer-reviewed academic papers and articles to examine the latent TB screening process/programs and patient education programs for immigrant populations in developed countries of the West and Australia.
2. Use current peer-reviewed academic papers and articles to examine how well immigrant populations with latent TB adhere to their treatment programs.
3. Implement the literature critique model by Caldwell et al. (2005) when analyzing results of the literature review.

There are three primary themes that are being used to organize and analyze the literature review;

1. Screening of immigrant populations with latent tuberculosis.
2. Education/awareness of latent tuberculosis in immigrant populations.
3. Immigrant populations with latent tuberculosis adhering to treatment plans and medication.

1.3 JUSTIFICATION OF RESEARCH

Many immigrant populations that are migrating to developed countries of the West and Australia are at higher risk of reactivating the latent TB disease. In many low-incidence industrialized countries with high flux of immigration from less-developed countries, the general tuberculosis control strategies is composed of minimizing transmission through identifying and curing a high portion of cases. The main components of this strategy includes early detection of TB, adequate treatment adherence for active infections, and detection and prophylactic treatment of latent infections, in some cases (Tomás et al., 2013). However, there are notable difference between countries when it comes screening and education programs for immigrants such as screening/education locations, the programs’ administrative and financial costs, and legalities for providing care (Werf & Kramarz, 2016b; Wieland et al., 2012).

Often times a migrant’s legal, economic and social circumstances can have detrimental impacts on the disease’s progression, diagnosis, treatment, and adherence to the scheme. Not only does this put immigrants at risk, it places a large risk to non-immigrant populations. Immigrants face an array of issues in the process of migration which includes challenges like communication problems, adapting to new surroundings, loss of social support, acculturation, and discrimination which can be further aggravated by fear of TB, the stigmas associated to its diagnosis, fear of deportation, and changes that may need to be made when undergoing TB treatment. Results from
The current research can provide medical professionals insight into the macro- and micro-level impacts of TB on immigrant populations. Understanding these factors may lead to public health policy changes that are more lenient on immigrants and can aid the wider community as a whole. Nurses can gain practical insight and knowledge from the results for patient care to immigrant populations that may have latent TB. The current study can also contribute to existing literature in order to improve care and public health policies.
2 Methodology

2.1 Systematic Literature Review

The current study uses the approach of a systematic literature review of qualitative, quantitative, and mixed methods studies. The literature review uses rigid methods and analysis to identify, evaluate and synthesize scientific evidence from primary studies focusing on latent tuberculosis among immigrant populations. According to Boland et al. (2013) a systematic literature review is designed to “locate, appraise, and synthesize” the best available evidence that is related to a specific research question in order to provide informed evidence-based answers. In evidence based nursing, a systematic literature review aids nurses in deciding whether the evidence provided is relevant to a specific patient as it provides balanced clinical expertise pointing out risks and benefits of specific procedures, treatments and processes (Bettany-Saltikov, 2012). The use of the approach for this study is relevant to the study of tackling latent tuberculosis in immigrants allowing professionals insight into the screening process, adherence to treatment, views, and attitudes towards tuberculosis.

2.2 Search Strategy

Searches for the current study were carried out in the following databases: NCBI/PubMed, PLOS one, Embase, and Springer. These databases are used because of the amount of articles they house and provide access to which are relevant to the topic of study. Search topics in these databases included terms like “tuberculosis”, “immigrants”, “screening”, “adherence to treatment”, and “education” in combination with search terms and MeSH descriptions. The concept of “immigrant” in the current study uses a broad interpretation which includes asylum-seekers, refugees, economic refugees, and international migrants. Refinement of search terms are extremely necessary in order to ensure that time is spent narrowing down appropriate literature (Holly, Salmond, & Saimbert, 2011). A second stage manual search was conducted on bibliographies of the selected articles in order to ensure that the maximum possible relevant articles are identified. A final internet search using Google Scholar was used to minimise the possibility of losing relevant sources.
### Table 1 - Search Strategy Keywords

<table>
<thead>
<tr>
<th>Database</th>
<th>Search Items</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCBI/PubMed</td>
<td>#1 “tuberculosis” [Mesh] OR tb OR Tuberculosis. #2 “Migrants” [Mesh] OR “emigration and immigration” OR “refugees” [Mesh] OR immigrant* OR migrant OR refugee OR foreign. #3 “Screening” [Mesh] OR “prevalence” OR “testing” OR “pre-screening” #4 “Education” [Mesh] OR “knowledge” OR “perceptions” #1 AND #2 AND #3 AND/OR #4.</td>
<td>642</td>
</tr>
<tr>
<td>PLOS One</td>
<td>#1 “tuberculosis” [Mesh] OR tb OR Tuberculosis. #2 “Migrants” [Mesh] OR “emigration and immigration” OR “refugees” [Mesh] OR immigrant* OR migrant OR refugee OR foreign. #3 “Screening” [Mesh] OR “prevalence” OR “testing” OR “pre-screening” #4 “Education” [Mesh] OR “knowledge” OR “perceptions” #1 AND #2 AND #3 AND/OR #4</td>
<td>553</td>
</tr>
<tr>
<td>Embase</td>
<td>#1 “tuberculosis” OR tb #2 “Migrants” OR “refugees” OR immigrant* foreign*. #3 “Screening” OR “prevalence” OR “testing” #4 “Education” OR “knowledge” OR “perceptions” #1 AND #2 AND #3 AND/OR #4</td>
<td>742</td>
</tr>
<tr>
<td>Springer</td>
<td>Limits: Item type: Article; Data range from 2008 to 2017. #1 “tuberculosis” OR tb #2 “Migrants” OR “emigration and immigration” OR “refugees” OR refugee OR foreign. #3 “Screening” OR “testing” OR “pre-screening” #4 “Education” OR “knowledge” OR “perceptions” #1 AND #2 AND #3 AND/OR #4</td>
<td>1286</td>
</tr>
</tbody>
</table>

#### 2.3 Inclusion & Exclusion Criteria

Both qualitative and quantitative studies were included in the systematic literature review. The search was limited to studies that were published in English. Also, it was necessary that publication remain recent making it necessary to limit the publication date from 2009-2017. However, the place of study was partially restricted in the search to only include industrialized Western countries and Australia. Studies that were literature reviews of any kind were excluded.
from the study. Also, studies that had conducted any kind of randomized control trial were excluded from this literature review. Such studies were excluded because they are unable to provide relevant data in terms of the selected themes used to analyze the literature.

2.4 STUDY SELECTION

The initial results using the databased highlighted above identified a total of 3,223 articles. This was reduced to 2,394 articles when taking away duplicates/overlapping articles in from each database (829 duplicates). Afterwards, titles and abstracts were reviewed leading to the removal of 2,041 articles since they were irrelevant to the research topic. The 353 articles remaining were then read, both abstracts and full text versions, resulting in 22 articles that were selected as meeting the inclusion criteria set above. Each of the articles bibliographies were then searched in addition to searches on Google Scholar which further identified 6 articles that met the inclusion criteria. A total of 28 articles were finalised for the inclusion in the literature review.
The selected articles were then compiled into a matrix in order to synthesize them based on the themes that were devised for analysis. The themes included are screening of immigrants, education/knowledge of immigrants on latent tuberculosis, and adherence of treatments by immigrants. The matrix of studies can be found in appendix A.

2.5 FRAMEWORK FOR ANALYSING RESEARCH ARTICLES

Baker (2014) asserted the necessity for becoming familiar to the work being analyzed in order to examine its relevance, strengths, and limitations to the research question when critiquing
a piece of literature. Hence, literature review uses the model developed by Caldwell et al. (2005) in critiquing literature (see fig. 2) as the standard.

The model proposed by Caldwell et al. (2005) has a basic framework that breaks down the process of critiquing into four main question that need to be answered. This includes; ensuring that the literature review is current and comprehensive; if the sample if adequately described and reflective of the population for quantitative studies; if the selection criteria for recruiting patients is described and if a sampling method is identified for qualitative studies; and if the conclusion of the study is comprehensive (Caldwell et al., 2005).
3 LITERATURE REVIEW

3.1 RESULTS AND FINDINGS

A total of 28 articles were reviewed for the current literature review with the all the articles summaries and implications provided in Appendix A of this report. A complete analysis in this chapter of each piece of literature was not possible due to constrictions of word limit for the current report. Each of the articles presented one or more of the themes designated for analysis. Each of the articles are organized based on the themes that they held and analyzed based on the Caldwell et al. (2005) model discussed earlier. The purpose of the investigation was identify trends in the literature that may lead to contradictions or gaps/weaknesses that need to be filled. Analysis of each of the pieces of literature has been organized based on the themes being discussed and chronologically, based on publication date from oldest to newest.

3.1.1 Screening

Panchal et al. (2013) studies the potential impacted on prospective TB incidence of implementing a strategy of targeted LTBI screening at the time an immigrant registers with primary care. The study finds that LTBI screening at primary care registration provides for an effective strategy for potentially identifying immigrants that are at high risk for developing TB (Panchal et al., 2013). However, the study includes missing data into its statistical analysis making it extremely probable for the study to have extreme bias. The missing data is associated with the study’s cohorts’ attrition with internal migration away from the region during the observation period and the possibility of under ascertainment of TB cases before 2006 (Panchal et al., 2013).

Schepisi et al. (2013) assessed adherence to and yield of TB screening program based on symptom screening conducted at primary care centers for regular and irregular refugees/asylum seekers and immigrants in Rome, Italy. There was evidence found that verbal symptom screening for TB of migrants in primary healthcare centers had yielded a higher percentage of migrants visiting specified TB clinics (Schepisi et al., 2013). The study reports 254 individuals that provided at least one symptom of active TB during screening. These patients that were referred to a TB clinic, about half of them were present for further diagnosis and eventual treatment. A drawback to the study was lack of detail on the screening model used. The study does not outline the
symptoms of TB that were used to determine a migrant’s eligibility to be recommended to TB clinics. It was found that 30 per cent of migrants were not referred for further diagnostic evaluation (Schepisi et al., 2013) which ultimately questions the entire results.

Bennett et al. (2014) used TBHI screening results to analyze the prevalence of LTBI among refugee population that arrived in San Diego, California from January 2010 and October 2012. Based on the study, the screening initiative indicated 43 per cent of cases with LTBI to come from Sub-Saharan Africa (Bennett, Brodine, Waalen, Moser, & Rodwell, 2014). The study found that these patients were less likely to initiate treatment than compared to refugees from the Middle East. Bennett et al. (2014) also found that refugees with at minimum a postsecondary education were more likely to participate in screening, understanding the disease and then initiating treatment. One of the drawbacks to the study is related to it methodology which heavily relied on self-report data on factors such as smoking, diabetes, malignancy, ESRD, and education (Bennett et al., 2014). Therefore, there is a great chance of information bias which may have limited the accuracy of the variables or result in underreporting because of perceived stigma.

Heuvelings et al. (2016) focus on techniques used for screening in European countries and Canada for LTBI. The study focuses the screening efforts placed on a category of the “vulnerable” population which includes migrants, those of foreign birth, homeless people, drug/alcohol abusers, prisoners, and people with HIV in big cities (Heuvelings et al., 2016). The study finds that screening uptake improves after vulnerable populations are specifically accommodated based on their unique needs (Heuvelings et al., 2016). The study is lacking in differentiating between populations and their correlations with screening. The major research gap in the study is clustering the screening effects into one broad category labelled as the “vulnerable population. Therefore, the results of the study are difficult to comprehend as generalizations are made too son in the study.

Pareek et al. (2016) examines the significance of LTBI on high-income countries with foreign-born patients in order to determine the best possible screening processes that may lower the disproportionate burden of TB on these countries. The study focuses on multiple countries by reviewing their screening strategies in terms of yield and cost effectiveness. The study finds that common screening methods used for LTBI includes tuberculin skin tests and interferon gamma release assay which is conducted post-arrival to the host countries (Pareek et al., 2016). The study finds that most high-income countries do not practice the screening for LTBI and those who do,
do so post-arrival However, Pareek et al. (2016) finds this method to be programmatically difficult to implement with the amount of immigrants accepting and completing treatment to be suboptimal.

Zenner et al. (2017) examine the screening program Blackburn TST-based LTBI screening between 1989 and 2001, and further studied the treatment program between 2009 and 2013 that had used QuantiFERON (QFT) testing. According to the study, screening programs were aimed at recent migrants from high incidence TB areas that were identified through registrations with primary care physicians or through referral from the port of arrival (Zenner et al., 2017). The comparative study of the two screening methods shows that there was better predictive value of QFT than compared to TST. Zenner et al. (2017) also observes a greater rate of reactivation of LTBI in the immigrant population particularly immigrants from South-east Asia, primarily from Pakistan and India. However, there is a major research gap found in Zenner et al. (2017) study which is the length of the follow up timing with participants being far ranging and in some cases unknown. There are also cases in the study with participants that had entered the UK, resided and then exited the UK (with date of exit unknown), only to reenter again.

3.1.2 Education

Tardin et al. (2009) aimed to analyze TB in a low-incidence area (i.e. area in Geneva) using a computerized database which had identified an unusually high proportion of patients coming from a specific country between 2004 and 2006. Aside from its primary aim, the study also conducted a cultural evaluation to examine the social stigma of TB in the community especially for contact tracing methods. The study was primarily quantitative with its enquiring focusing on 13 patients diagnosed with TB and using RFLP (restriction fragment length polymorphism) analysis. Tardin et al. (2009) was able to identify all the possible ethical issues in the study, to maintain ethnical credibility Tardin et al. (2009) was able to address these issues and maintain its integrity as well as the participants. The main findings of the study is the revelation that the community has low acceptance of the diagnosis of TB as its considered a ‘dirty and sinful’ disease that only impacts people of low status or living deprived life (Tardin et al., 2009). The study provided a cultural evaluation that allowed a number of strategies using community characteristics for facilitating contact tracing by enhancing TB testing by portraying it as a desirable social behavior.
Wieland et al. (2012) examines the use of English as a second language program at a community center as the backdrop setting of understanding perceptions about TB among foreign-born persons. The study was qualitative in that it used focus groups as a means for data collection among 83 participants. The study found that there was a plethora of misconceptions about transmission of TB and nearly no knowledge of latent TB. The hindrance to obtaining TB related knowledge was practical consideration for the foreign-born participants like transportation cost, and conflicts with their work schedule.

Butcher et al. (2013) examined 52 participants who were refugees and undergoing Isoniazid treatment for LTBI. The questionnaire distributed to participants focused on total knowledge and total side effects scores. The study found that there was a range of misconceptions about how TB was spread via water, dust, wind or pollution (Butcher et al., 2013). These misconceptions impacted the patient’s willingness to take medication and comply with the treatment standards.

Colson et al. (2014) examines the TB knowledge, attitudes and beliefs of foreign born people in the US and Canada. The study finds that a majority of the participants had correctly answered their knowledge based question on TB, while a majority also answered the perceived questions in the affirmative (Colson et al., 2014). Participants from Mexico and Latin America had a higher model adjusted knowledge score than immigrants from other regions of the world.

Gao et al. (2015) studied the knowledge and perceptions of LTBI among Chinese immigrants in Canada. The study is brilliantly executed by honing in on a specific immigrant population in a high-income low incidence country. The study uses a mixed methods methodology which is different from other studies discussed under this theme who used quantitative research approaches. Gao et al. first uses a cross-section patient survey with focus group discussions with Chinese immigrants to understand the cultural perception of LTBI (2015). The results of the study are significant as they suggest that a major concern in receiving – the complex healthcare system. This took away the immigrant groups want for testing and treatment.

Gao et al.’s (2017) focused on studying education material for immigrants with regards to tuberculosis and LTBI. The study used a video that was culturally-tailored, multi-lingual, 4.5 minute, health promotional video focus on LTBI with Canadian immigrants (Gao et al., 2017). Gao et al. (2017) found that 84 per cent of viewers had found the video helpful while viewing the
video caused a 21 per cent increase in knowledge about LTBI. This includes a significant increase in basic knowledge to LTBI transmission, symptoms, and treatments. However, the study did not focus on the potential adverse effects of the video such as exaggerated fear which can be considered an ethical ramification of conducting the study (Gao et al., 2017). The study also lacked a long-term follow up to determine if the knowledge was gained was actually sustained. A major gap in the study is the lack of clinical evidence that correlates the acquisition of knowledge to greater treatment or seeking screening.

3.1.3 Adherence to Treatment

Trauer and Krause’s (2011) study focused on newly arrived refugees from February 2006 to January 2009 studying the prevalence of latent TB and their adherence to treatments. The study found that older age, male patients from the Eastern Mediterranean region were associated with increased latent TB. However, the results found that only 44 per cent of refugees had completed treatment (Trauer & Krause, 2011). The common reason for discontinuation or non-adherence to treatments was due to gastrointestinal side effects and their loss to follow up. There were no cultural obstacles to the acceptance of treatment or stigmas that hindered treatment regimes.

Nuzzo et al. (2013) looked to determine the proportion of refugee patients at Baltimore City Health Department TB program successfully completing their LTBI treatment compared to other referral groups. Examine 841 patients it was concluded that 81 per cent of refugees had completed their LTBI treatments compared to 50 per cent of non-refugee patients, and 35 per cent of US born patients (Nuzzo et al., 2013). The reason for the findings are not presented because the research approach focused mostly on quantitative research which does not look to examine participant opinions or perspectives, keeping strictly to empirical measures of analysis. This lack of analysis in the study prevents it from reaching its full potential and bring to question the conclusions drawn in the study. The lack of explanation is major research gap that needs to be filled in order to understand the phenomena of more refugees adhering to treatment than native born patients.

Kan et al. (2013) aimed on studying treatment completion in refugees in order to identify factors that were associated with failure to complete preventive treatments. The study had found that younger patients from Somalia and asylum seekers were more likely to not complete their preventive treatments. However, the trend of completers of medication has increased by 16 per
cent most like caused by a skewness from an influx of European immigrants (Kan et al., 2013). The skewed data used for comparison purposes in the study makes it more difficult to provide accurate conclusions bringing to question the entire study itself.

Peluso et al. (2014) focused on analyzing a student-run free clinic for LTBI patients in a predominately Hispanic immigrant community. The study found that their found, which focused on cultural case management, improved adherence to LTBI treatments. The model at the free clinic had used methods of matching patients and providers based on language competence and social or cultural affiliations (Peluso et al., 2014). There was improved communication between patient and provider through shared language, direct phone call access, and patient centered interviews (Peluso et al., 2014). The drawback to the study is that it used a relatively small sample size which makes it difficult to draw definitive conclusions from statistical comparison of factors that are linked to treatment outcome and adherence to treatment.

Subedi et al (2015) examined the evaluation and treatment of LTBI in refugees at various member clinics of Philadelphia Refugee Health Collaborative (PRHC) vs. non-PRHC clinics. Subedi et al. (2015) examines a specific model implemented in PRHC practices which are composed of hiring a bilingual refugee health service coordinator. This resulted in refugees being screened in great proportion, attending follow-up appointments, and completing the course of treatment. The model studied bases its success on a multidisciplinary approach whereby doctors, nurses, social workers, and case workers manage the screening, evaluation, and treatment follow-up of refugees. From the sample, 89 refugees completed follow-up appointments and 34 completed treatments in PRHC clinics compared to only 31 completing follow-ups and 9 completing treatments in non-PRHC clinics (Subedi et al., 2015).

Rogo et al. (2017) in their quantitative study studied 120 patients with LTBI in Rhode Island. The study followed these participants over their 9 month course of Isoniazid, all of them being children. The study focused on comparing refugee patients with those who were not refugees in order to develop a basis for their conclusions. The study has found that there was greater rate of completion among refugee populations as they had adhered better to treatment regimes, especially among female patients. The refugee population also attended more scheduled visits compared to non-refugee patients in the study.
3.2 Service Improvement

The literature review provides insight into the clinical issues that are related to screening, education, and adherence to treatment among immigrant populations with latent TB. Older studies in the current literature review, those pre-dating 2010 have shown that there is generally low level of knowledge about latent TB and widespread misconceptions about the disease, especially with regards to its transmission. Some of the respondents in the studies did not have basic knowledge about the nature of bacteria and infection related to airborne transmission (Colson, Franks, Sondengam, Hirsch-Moverman, & El-Sadr, 2010; Nkulu, Hurtig, Ahlm, & Krantz, 2010; Wieland et al., 2012) but participants in other studies had attributed the disease to its correct facts (Colson et al., 2014; Gao et al., 2017; Rogo et al., 2017). The attitudes and perceptions differed in each study based on its research location and the immigrant’s ethnicity group being studies. For example, in Gao et al. (2015) Chinese immigrants viewed the disease to irresponsible lifestyles or caused from living conditions while the study conducted by Kan et al. (2013) found that Somali refugees considered TB to be a form of divine punishment for those that practiced a form of witchcraft or were dishonest.

The results, when only focusing on education of immigrants, provides insight into how the other three themes are impacted. With lack of education more immigrants are likely not to adhere to preventive treatments, active treatments, and participate in screenings which was evident from the results obtained from studies like Bodenmann et al. (2009); Kulanes et al. (2010); Minodier et al. (2010); and Rogo et al. (2017). Therefore, healthcare organizations and policy making bodies need to focus on widening their reach in immigrant populations with the aim of educating them TB and latent TB. Greater awareness in the population will result in immigrants participating a great deal more in screening and treatment. Heuvelings et al. (2016) found in their study that mobile screening units in Canada had increased the percentage of screenings in the immigrant population of the country. Keeping in line with this service, it is recommended that low-incidence but high-income countries with large immigrant populations should invest in mobile health units that are dedicated to preventive diseases, like latent TB, become available to their immigrant communities. A similar case was studied by Ospina et al. (2012) which found that community health workers improved screening and contact tracing among immigrants with TB in Barcelona. Using a group of volunteer nurses the strategy of a mobile health unit designated to specific areas
that hold large populations of immigrants can help in bring the incidence rate down. None of the literature reviewed in the current study have examined this particular strategy most probably because it is non-existent. However, the actual implementation of this strategy may led to research in this area which focuses on the impact of mobile health units on screening, education, and adherence to treatment for latent TB.

4 CONCLUSIONS

The current study aimed at study how latent TB was tackled in the immigrant populations of low-incidence, and high-income countries of the West and Australia. The literature review was able to answer the research question to the fullest extent based on the available data. The current report uses 28 articles which were selected using the procedure of systematic literature review. Each of the articles were then analyzed using Caldwell et al. (2005) model for critiquing academic literature. Based on the review, it is found that immigrant populations have a great lack of education in the topic of latent TB often associated with their cultural misconceptions. Articles published prior to 2010 found greater misinformation among immigrant populations while more recent articles, particularly those published in 2017 saw a greater amount of awareness amongst them. The study has found that there are various ways in which latent TB screening occurs, each differing based on the host country conducting the screening process. However, a majority of countries screen latent TB prior to arrival of the host country. Studies have found that this allows for a greater chance of reactivation of latent TB among the immigrant population. There is no universal form of screening causing disparities of TB incidences in each host country. One of the most critical findings of the study was the great participation of refugees in adherence of TB and latent TB treatments compared to other forms of immigration and even native born patients. Unfortunately, the studies analyzed were unable to provide the underlying cause for this phenomenon which proves a wide research gap available in the literature.

Based on the literature review findings a service improvement recommendation was made to improve the status of TB among immigrant populations in low-incidence, high-income countries. The recommendation is made to healthcare organizations of such countries and policy makers – a greater effort in education and awareness programs targeted to immigrant communities in host countries. It was recommended that government and healthcare providers invest in mobile
units dedicated to educating, screening, and providing treatment to immigrant communities for preventable diseases. The justification for this recommendation comes from the literature review which links lack of education and knowledge to lack of screening and non-adherence to treatments. This conclusion is based on correlation and not causation as all the literature studied did not attempt to explain the relationship between these factors.
5 REFERENCES


## APPENDIX A - LITERATURE MATRIX

<table>
<thead>
<tr>
<th>Year; Name of Author(s)</th>
<th>Full title of Article</th>
<th>Title of Journal</th>
<th>Country</th>
<th>Method</th>
<th>Findings</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2009) A. Tardin, M. Dominice Dao, B. Ninet3 and J.-P. Janssens</td>
<td>Tuberculosis cluster in an immigrant community: case identification issues and a transcultural perspective</td>
<td>Tropical Medicine and International Health</td>
<td>Geneva, Switzerland</td>
<td>Quantitative</td>
<td>Genotyping confirmed that 11 of 15 patients had identical isolates. Additional data revealed an unsuspected complex network of social links between 9 of these 11 patients. The transcultural evaluation pointed out the major obstacles to efficient contact tracing, such as importance of social stigma related to TB, differences in communication style and health beliefs, and linguistic barriers.</td>
<td>The combined finding of identical genotypes and important social links between patients confirmed the suspicion of a TB cluster due to recent transmission. The cultural evaluation helped to explain the difficulties encountered during the contact tracing procedure, and offered strategies to improve its efficacy despite the magnitude of the social stigma attached to TB in this community.</td>
</tr>
<tr>
<td>(2009) Patrick Bodenmann, Paul Vaucher1, Hans Wolff, Bernard Favrat, Fanny de Tribolet, Eric Masserey and Jean-Pierre Zellweger</td>
<td>Screening for latent tuberculosis infection among undocumented immigrants in Swiss healthcare centres; a descriptive exploratory study</td>
<td>BMC Infectious Diseases</td>
<td>Lausanne, Switzerland</td>
<td>Quantitative</td>
<td>Of the 161 participants, 131 (81.4%) agreed to screening and 125 had complete examinations. Twenty-four of the 125 patients (19.2%; CI95% 12.7; 27.2) had positive interferon-assay results, two of which had active tuberculosis. Only five patients with LTBI completed full preventive treatments. Five others initiated the treatment but did not follow through.</td>
<td>Screening for tuberculosis infection in this hard-to-reach population is feasible in dedicated urban clinics, and the prevalence of LTBI is high in this vulnerable population. However, the low adherence to treatment is an important public health concern, and new strategies are needed to address this problem.</td>
</tr>
<tr>
<td>(2010) Faustine KK Nkulu, Anna-Karin Hurtig, Clas Ahlm and Ingela Krantz.</td>
<td>Screening migrants for tuberculosis - a missed opportunity for improving knowledge and attitudes in high-risk groups: A cross-sectional study of Swedish-language students in Umeå, Sweden</td>
<td>BMU Public Health</td>
<td>Umea, Sweden</td>
<td>Quantitative</td>
<td>Though most of them (72%) were screened, knowledge was in general poor with several misconceptions. The average knowledge score was 2.7 ± 1.3 (SD), (maximum = 8). Only 40 (15%) of the 268 respondents answered at least half of the 51 knowledge items correctly. The average attitude score was 5.1 ± 3.3 (SD) (maximum = 12) which meant that most respondents held negative attitudes towards TB and diseased persons. Up to 67% lacked knowledge about sources of information while 71% requested information in</td>
<td>The majority had contact with Swedish health professionals through the screening process, knowledge about tuberculosis among these immigrants was low with several misconceptions and negative attitudes. Information may currently be inaccessible to most of these immigrants due to the language barrier and unfamiliarity with the Swedish healthcare system. If TB education was included as a component of screening programmes, ensuring that it was tailored to educational background, addressed misconceptions and access problems, it could well help</td>
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**APPENDIX A - LITERATURE MATRIX**

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Study Title</th>
<th>Journal</th>
<th>Location</th>
<th>Methodology</th>
<th>Key Findings</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Paul W. Colson, Julie Franks, Rita Sondengam, Yael Hirsch-Moverman, Wafaa El-Sadr</td>
<td>Tuberculosis Knowledge, Attitudes, and Beliefs in Foreign-born and US-born Patients with Latent Tuberculosis Infection</td>
<td>Journal of Immigration Minority Health</td>
<td>Manhattan, NYC, USA</td>
<td>Quantitative</td>
<td>Of 251 participants, 66.5% were foreign-born. While misconceptions existed among both US and foreign-born regarding transmission and contagiousness of LTBI, overall knowledge scores did not differ significantly between groups. With respect to attitudinal factors, foreign-born participants were less likely to acknowledge that they had LTBI and felt more “protected” from developing TB.</td>
<td>Improved understanding of foreign-born patients’ KAB may contribute to the reduction of barriers to treatment and improved outcomes. People who immigrate to the United States increasingly represent the face of TB in the US. The development of effective measures to minimize barriers to LTBI treatment acceptance and completion depends on a better understanding of KAB among foreign-born patients who possess diverse views of LTBI and its treatment.</td>
</tr>
<tr>
<td>2010</td>
<td>Kulanes, A., Ahlberg, B. M., and Berggren, I.</td>
<td>“It is more than the issue of taking tablets”: The interplay between migration policies and TB control in Sweden.</td>
<td>Health Policy</td>
<td>Stockholm, Sweden</td>
<td>Qualitative</td>
<td>Fear of being deported emerged as barrier to sharing of complete health information with the doctor. The routine contact tracing and follow-up of infected cases in TB control was expressed as a source of concern since it was feared the health care providers could share the information with the immigration authorities. Interpreter use was expressed as barrier particularly if of same female gender.</td>
<td>It is important to be aware of how a country’s immigration policies impact on TB control activities among immigrants. The existing TB control measures, such as contact tracing, assume new meanings for immigrants. Further research is therefore needed to understand this emerging complexity in order to make TB control more effective.</td>
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<tr>
<td>2010</td>
<td>Minodier, P., Lamarre, V., Carle, M. E., Blais, D.,</td>
<td>Evaluation of school-based program for diagnosis and</td>
<td>Journal of Infection and Public Health</td>
<td>Quebec, Canada</td>
<td>Quantitative</td>
<td>Four thousand three hundred and seventy-five children were offered screening.</td>
<td>School-based TB-screening program is effective if targeted towards recent immigrant children. Factors of refusal</td>
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<td><strong>Ovetchkine, P., and Tapiero, B.</strong></td>
<td>Treatment of latent tuberculosis infection in immigrant children.</td>
<td>82.3% consented to TST and 22.8% were positive. An older age at migration (odds ratio (OR) = 1 [95% CI: 1.0—1.01]), as well as migration from a none-established market economy country (OR varying from 2.41 to 4.23) were significantly associated with positive TST. Among positive children, further evaluation was refused in 5.7%, mainly in migrants from Eastern Europe (OR = 4.05 [95% CI: 2.14—7.69]). Refusal of treatment (11.2%) was more frequent in Eastern European when compared to Southeastern Asian (OR = 6.91 [95% CI: 1.56—30.75]), in blended families (OR = 3.25 [95% CI: 1.29—8.46]) and when the first visit to hospital was delayed (OR = 1.01 [95% CI: 1.0—1.02]). Adequate completion of treatment was noted in 61.3%. Age &gt; 16 years (OR = 1.82 [95% CI: 1.82—2.99]) of testing and treatment seem essentially related to beliefs and behaviours concerning protection by BCG vaccination, risks of LTBI, and ability of TST to detect disease. Young age contributed to compliance. Improving adherence to treatment requires a comprehension of socio-cultural beliefs and behaviours involved in LTBI, as well as accessibility to TBClinics.</td>
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<td>(2010) Bender, A., Andrews, G., Peter, E.</td>
<td>Displacement and tuberculosis: recognition in nursing care</td>
<td>The study highlights the need to pay attention to displacement in regard to building quality relationships in healthcare. Furthermore, it calls attention to the importance, in TB practice specifically, of repeated clarifications about isolation and masking, and making conscious choices about proximity—where to sit or stand, how to greet, when to don masks and when to remove them, necessary to diminish feelings of fear and alienation. Likewise, it calls attention to the varied ‘support role in nursing. Public health professionals must critically question the value judgments made about places as well as the people living in them, and advocate in meaningful</td>
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**APPENDIX A- LITERATURE MATRIX**
that happened on both sides: nurses learning about other places in the world and clients learning about Canada, and how these exchanges contributed to shared understandings of the current place they were now in together. These themes were also there in the ways that nurses focused on and reacted to the condition. This involved paying attention to the individual issues of treatment, the fears and myths surrounding the disease, and concerns of infectiousness that at times also meant dealing with isolation.

ways that may serve to reinforce trust. Of course place cannot be considered sufficient in itself for understanding all relationships in nursing, but certainly does lend a perspective on what nurses’ relational work means in certain contexts.

<p>| (2011) Trauer, J. M., and Krause, V. L. | Assessment and management of latent tuberculosis infection in a refugee population in the Northern Territory | The Medical Journal of Australia | Northern Territory, AUS | Mixed Methods | 458 of 465 eligible refugees were adequately assessed for LTBI, of whom 146 (31.9%) were diagnosed with LTBI. Older age, male sex and World Health Organization Eastern Mediterranean region of birth were associated with increased prevalence of LTBI. Of the refugees diagnosed with LTBI, 10 failed to attend for follow-up and 15 were not offered treatment. Isoniazid therapy was accepted by 93 of 121 refugees (76.9%), and 41 of these (44.1%) completed treatment. He most common reasons for discontinuation of therapy were medication-related side effects (most often gastrointestinal) and loss to follow-up. Increasing age was associated with failure to complete treatment. Outcomes of assessment and treatment for LTBI in newly arrived refugees in the NT are comparable to those for other target groups screened in developed countries. Loss to follow-up caused significant attrition in numbers, but complete data were obtained for a large proportion of eligible refugees. Most refugees who are offered treatment for LTBI accept, but less than half complete treatment. |
| (2011) Guh, A., Sosa, L., Hadler, J. L., and Lobato, M. N. | Missed opportunities to prevent tuberculosis in foreign-born persons, Connecticut, 2005-2008 | International Journal of Lung Diseases | Connecticut, USA | Qualitative | Of 161 foreign-born persons interviewed, 48% experienced TB disease within 5 years after arrival. One third (51/156) reported having undergone post arrival testing for LTBI. Although those with established health care providers were more likely to have reported testing (aOR 4.49, 95%CI 1.48–13.62), only 43% of such persons were The self-reported rate of testing for LTBI among foreign-born persons in Connecticut with confirmed or suspected TB was low and differed significantly by ethnicity and immigration status. Strategies are needed to improve health care access for foreign born persons and expand testing for LTBI, especially among non-Hispanic and undocumented populations. |
| (2011) Pareek, M., Watson, J. P., Ormerod, L. P., Kon, O. M., Woltmann, G., White, P. J., Abu bakar, I., Lalvani, A. | Screening of immigrants in the UK for imported latent tuberculosis: a multicenter cohort study and cost-effective analysis | Lancet Infectious Diseases | UK | Quantitative | Results for IGRA-based screening were positive in 245 of 1229 immigrants (20%), negative in 982 (80%), and indeterminate in two (0.2%). Positive results were independently associated with increases in tuberculosis incidence in immigrants’ countries of origin (p=0.0006), male sex (p=0.046), and age (p=0.0001). National policy thus far would fail to detect 71% of individuals with latent infection. The two most cost-effective strategies were to screen individuals from countries with a tuberculosis incidence of more than 250 cases per 100 000 (incremental cost effectiveness ratio [ICER] was £17 956 [$1=US$1.60] per prevented case of tuberculosis) and at more than 150 cases per 100 000 (including immigrants from the Indian subcontinent), which identified 92% of infected immigrants and prevented an additional 29 cases at an ICER | Screening for latent infection can be implemented cost-effectively at a level of incidence that identifies most immigrants with latent tuberculosis, thereby preventing substantial numbers of future cases of active tuberculosis. |</p>
<table>
<thead>
<tr>
<th>Reference</th>
<th>Study Title</th>
<th>Journal</th>
<th>Location</th>
<th>Study Design</th>
<th>Summary</th>
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</thead>
<tbody>
<tr>
<td>(2012) Ospina, J. E., Orcau, A., Millet, J. P., Sanchez, F., Casals, and Cayla, J. A.</td>
<td>Community health workers improve contact tracing among immigrants with tuberculosis in Barcelona.</td>
<td>BMC Public Health</td>
<td>Barcelona, Spain</td>
<td>Quantitative</td>
<td>960 foreign born TB cases were detected, 388 in the intervention period. Contact tracing was performed on 65.7% of 201 smear-positive cases during the pre-intervention period compared to 81.6% of 152 smear-positive TB cases during the intervention period (p &lt; 0.001). Risk factors associated with incomplete contact tracing of smear-positive index cases included being diagnosed in two hospitals without contact tracing TB unit (OR = 3.5; CI:1.4-8.9) and (OR = 4.6; CI:1.6-13.5) respectively, birthplace in India-Pakistan (OR = 4.4; CI:1.9-10.3) or North Africa (OR = 4.3; CI: 1.8-10.5), having an unknown residence (OR = 5.4; CI:1.6-18.0), being HIV-infected (OR = 6.1; CI:2.5-14.8) or homeless (OR = 3.3; CI:1.3-8.2), and the absence of CHW intervention (OR = 2.4; CI:1.3-4.3). The effectiveness of contact tracing for TB control in areas with high immigration can be improved by incorporating CHWs who act as translators, cultural mediators and facilitators who accompany cases and contacts through treatment and follow-up.</td>
</tr>
<tr>
<td>(2012) Wieland, M. L., Weis, J. A., Yawn, B. P., Sullivan, S. M., Millington, K. L., Smith, C. M., Bertram, SS., Nigon, J. A., and Sia, I. G.</td>
<td>Perceptions of tuberculosis among immigrants and refugees at an adult education center: A community based participatory research approach.</td>
<td>Journal of Immigration and Minority Health</td>
<td>Minnesota, USA</td>
<td>Qualitative</td>
<td>Multiple challenges with TB control and prevention were identified. There were a variety of misperceptions about transmission of TB, and a lack of knowledge about latent TB. Feelings and perceptions related to TB included secrecy, shame, fear, and isolation. Barriers to TB testing include low awareness, lack of knowledge about latent TB, and the practical considerations of transportation, cost, and work schedule conflicts. Barriers to medication use include suspicion of generic Adult education centers with large immigrant and refugee populations as excellent venues for TB prevention, and propose several recommendations for conducting these programs. Content should dispel the most compelling misperceptions about TB transmission while clarifying the difference between active and latent disease. Learners should be educated about TB in the US and that it is curable. Finally, TB programs that include learners and staff in their design and implementation provide greater</td>
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<td>Year</td>
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<td>2013</td>
<td>Nuzzo, J. B., Golub, J. E., Chaulk, P., and Shah, M.</td>
<td>Analysis of latent tuberculosis treatment adherence among refugees and other patient groups referred to the Baltimore City health department TB clinic, February 2009-March 2011</td>
<td>Journal of Immigration and Minority Health</td>
<td>Maryland, USA</td>
<td>Quantitative</td>
</tr>
<tr>
<td>2013</td>
<td>Colson, P. W., Couzens, G. L., Royce, R. A., Kline, T., Chavez-Lindell, T., Welbel, S., Pang, J., Davidow, A., Hirsch-Moverman, Y.</td>
<td>Examining the impact of patient characteristics and symptomatology on knowledge, attributes, and beliefs among foreign-born tuberculosis cases in the US and Canada</td>
<td>Journal of Immigrant and Minority Health</td>
<td>US &amp; Canada</td>
<td>Quantitative</td>
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## APPENDIX A- LITERATURE MATRIX

<table>
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<tr>
<th>Year</th>
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<th>Country</th>
<th>Study Type</th>
<th>Summary</th>
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</thead>
<tbody>
<tr>
<td>2013</td>
<td>Kan, B., Kalin, M., and Bruchfeld, J.</td>
<td>Completing treatment for latent tuberculosis: Patient background matters</td>
<td>International Journal of Tuberculosis and Lung Disease</td>
<td>Stockholm, Sweden</td>
<td>Quantitative</td>
<td>Younger patients, patients originating from Somalia and asylum seekers were more likely to be non-completers. The proportion of completers increased from 71% in 2002 to 87% in 2007. However, this trend appears to be caused mostly by an increase in the proportion of European patients. The finding of a low rate of treatment completion among Somalis should be regarded as a call for intervention on the individual patient level, also taking into account socio-cultural aspects such as perceptions of health care by the Somali community. Treatment completion continues to be of concern as it is not improving among risk populations.</td>
</tr>
<tr>
<td>2013</td>
<td>Schepisi, M. S., Gualano, G., Fellus, C., Bevilacqua, N., Vecchi, M., Piselli, P., Battagin, G., Silvestrini, G., Attanasio, A., Vela, A., Rocca, G., Rinaldi, A., Benedetti, P., Geraci, S., Lauria, F. N., and Girardi, E.</td>
<td>Tuberculosis case finding based on symptom among immigrants, refugees, and asylum seekers in Rome.</td>
<td>BMC Public Health</td>
<td>Rome, Italy</td>
<td>Quantitative</td>
<td>Among 2142 migrants enrolled, 254 (11.9%) reported at least one symptom suggestive of active tuberculosis and 176 were referred to the tuberculosis clinic. Of them, 80 (45.4%) did not present for diagnostic evaluation. Tuberculosis was diagnosed in 7 individuals representing 0.33% of those screened and 7.3% of those evaluated for tuberculosis. The overall yield of this intervention was in the range reported for other tuberculosis screening programmes for migrants, although we recorded an unsatisfactory adherence to diagnostic workup. Possible advantages of this intervention include low cost and reduced burden of medical procedures for the screened population. Further evaluation of this approach appears to be warranted.</td>
</tr>
<tr>
<td>2013</td>
<td>Panchal, R. K., Browne, I., Monk, P., Woltmann, G., Haldar, P.</td>
<td>The effectiveness of primary care based risk stratification for targeted latent tuberculosis infection screening in recent immigrants to the UK: A retrospective cohort study.</td>
<td>Thorax</td>
<td>UK</td>
<td>Quantitative</td>
<td>250 cases (29%) were potentially preventable in Flag-4-registered immigrants. Overall, 511 cases (60%) were potentially preventable among primary-care registered immigrants, implying a significant proportion without Flag-4 status. Prospective TB incidence (95% CI) after Flag-4 registration was 183 (163 to 205) cases/100 000 person-years, with a NNS (95% CI) of 145 (130 to 162). Targeted screening was most effective for 16–35 year olds from TB incidence regions 150–499/100 000 (NNS (95% CI)=65 (57 to 74), preventing 159 (18.7%) cases). Unpreventable TB risk increased with delayed primary care registration after UK entry. LTBI screening at primary care registration offers an effective strategy for potentially identifying immigrants at high risk of developing TB.</td>
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# Appendix A - Literature Matrix

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Location</th>
<th>Study Type</th>
<th>Summary</th>
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</thead>
<tbody>
<tr>
<td>2013</td>
<td>Butcher, K., Biggs, B. A., Leder, K., Lemoh, C., O’Brien, D., Marshall, C.</td>
<td>Understanding of latent tuberculosis, its treatment and treatment side effects in immigrant and refugee patients.</td>
<td>BMC Research Notes</td>
<td>Victoria, AUS</td>
<td>Quantitative</td>
<td>Fifty-two participants were recruited, 20 at isoniazid commencement and 32 already on isoniazid. The average TKS were 5.04/9 and 6.23/9 respectively and were significantly associated with interpreter use. Approximately half did not know how tuberculosis was transmitted. The average TSES were 5.0/7 and 3.5/7 respectively, but were not influenced by socio-demographic factors. There was suboptimal knowledge about LTBI. Improvements in health messages delivered via interpreters and additional methods of distributing information need to be developed for this patient population.</td>
</tr>
<tr>
<td>2014</td>
<td>Bennett, R. J., Brodine, S., Waalen, J., Moser, K., Rodwell, T. C.</td>
<td>Prevalence and treatment of latent tuberculosis infection among newly arrived refugees in San Diego Country, January 2010-October 2012</td>
<td>American Journal of Public Health</td>
<td>California, USA</td>
<td>Quantitative</td>
<td>The prevalence of LTBI was highest among refugees from sub-Saharan Africa (43%) and was associated with current smoking and having a clinical comorbidity that increases the risk for active tuberculosis. Although refugees from sub-Saharan Africa had the highest prevalence of infection, they were significantly less likely to initiate treatment than refugees from the Middle East. Refugees with postsecondary education were significantly more likely to initiate LTBI treatment. Public health strategies are needed to increase treatment rates among high-risk refugees with LTBI. Particular attention is required among refugees from sub-Saharan Africa and those with less education.</td>
</tr>
<tr>
<td>2014</td>
<td>Peluso, M. J., Hung, A., Lukasiewicz, A., Chang, H., and Ramallo, J.</td>
<td>Successful management of latent tuberculosis infection in an underserved community by a student-run free clinic</td>
<td>Journal of Health Care for the Poor and Underserved</td>
<td>Connecticut, USA</td>
<td>Quantitative</td>
<td>The number of TSTs placed in our clinic varies each year; for example, in 2011 there were 49 TSTs placed, of which 19 (40%) were positive and 15 patients were treated, while in 2012 there were 28 TSTs placed and only four were positive and treated. Patient-reported medication adherence, recorded Cultural case management, or matching patients and providers based on language competence and social or cultural affiliation, may improve adherence. Improved communication through shared language, direct phone access, and a patient-centered interview model may have contributed to patient adherence and satisfaction with the</td>
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### APPENDIX A - LITERATURE MATRIX

<table>
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<tr>
<th>Reference</th>
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<th>Country</th>
<th>Study Design</th>
<th>Summary</th>
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<tr>
<td>(2015) Subedi, P., Drezner, K. A., Dogbey, M. C., Newbern, E. C., Yun, K., Scott, K. C., Garland, J. M., Althuler, M. J., and Johnson, C. C.</td>
<td>Evaluation of latent tuberculosis infection and treatment completion for refugees in Philadelphia, PA, 2010-2012</td>
<td>International Journal of Tuberculosis and Lung Disease</td>
<td>Pennsylvania, USA</td>
<td>Quantitative</td>
<td>Of the 2094 refugees who arrived in Philadelphia in 2010–2012, the Philadelphia Department of Public Health was notified of 149 who required additional evaluation for TB. Among these, 57 (38.3%) were confirmed to have LTBI, and none were diagnosed with active TB. All LTBI cases were recommended for anti-tuberculosis prophylaxis and 43 (75.4%) completed treatment. Refugees receiving care from PRHC clinics were more likely to be screened within 30 days of arrival (OR 4.70, 95%CI 2.12–10.44), attend a follow-up appointment (OR 4.53, 95%CI 1.36–16.27), and complete treatment (OR 9.44, 95%CI 2.39–37.3). Refugees who attended PRHC clinics were more likely to be evaluated promptly and to complete LTBI treatment. The PRHC clinics serve as a model for communities seeking to improve refugee health care.</td>
</tr>
<tr>
<td>(2015) Gao, J., Berry, N. S., Taylor, D., Venners, S. A., Cook, V. J., Mayhew, M.</td>
<td>Knowledge and perceptions of latent tuberculosis infection among Chinese immigrants in Canada</td>
<td>International Journal of Family Medicine</td>
<td>Canada</td>
<td>Mixed Methods</td>
<td>The survey identified a mean basic knowledge score: 40.0% (95% CI: 38.3%, 41.7%). FGDs confirmed that Chinese immigrants’ knowledge of LTBI was low, and they confused it. Identified striking gaps in knowledge surrounding an LTBI diagnosis. Concerns of stigma may influence acceptance and adherence of LTBI treatment in Chinese immigrants.</td>
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<th>Study Type</th>
<th>Summary</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>2016</td>
<td>Heuvelings, C. C., de Vries, S. G., and Grobusch, M. P.</td>
<td>Tackling TB in low-incidence countries: Improving diagnosis and management in vulnerable populations.</td>
<td>International Journal of Infectious Diseases</td>
<td>Canada &amp; Europe</td>
<td>Qualitative</td>
<td>In low tuberculosis incidence regions, tuberculosis is mainly concentrated among hard-to-reach populations like migrants, homeless people, drug or alcohol abusers, prisoners and people living with HIV. To be able to eliminate tuberculosis from these low incidence regions tuberculosis screening and treatment programs should focus on these hard-to-reach populations.</td>
<td>Screening by chest X-ray (CXR) is an effective and cost-effective intervention among all vulnerable populations. Adding sputum culture to CXR screening as a pre-migration screening tool for migrants from high-incidence countries increases the number of TB diagnoses in the home country and reduces the importation of TB into the host country. As spearheaded by non-affluent countries with a high burden of co-infections, collaborative TB/HIV prevention and treatment frameworks need to be further developed in order to reduce the burden of TB in people living with HIV, and to reduce the burden of HIV in people diagnosed with TB.</td>
</tr>
<tr>
<td>2016</td>
<td>Pareek, M., Greenway, C., Noori, T., Munoz, J., and Zenner, D.</td>
<td>The impact of migration on tuberculosis epidemiology and control in high-income countries: A review</td>
<td>BMC Medicine</td>
<td>Multiple</td>
<td>Qualitative</td>
<td>Migrants with LTBI are coming to lower incidence settings and in the initial years following arrival in the destination country, have a higher risk of LTBI reactivation which decreases slowly over time but remains higher than rates in the host population. This higher rate of reactivation in the initial one to two years after migrants arrive likely reflects latent tuberculosis infection which has been acquired in their country of origin shortly before migration although there is also likely to be an ongoing complex interplay, in the destination country, of host and environmental factors which</td>
<td>The reasons for the burden of disease in the foreign-born, migrant, population are primarily due to migration from high TB burden settings and the reactivation of remotely-acquired latent TB infection. As a consequence there is increasing focus on how best to enhance TB control through the coordinated screening of migrants for TB. Most countries focus on screening migrants for active TB, this has a relatively low yield on its own and it is likely that the most effective and cost effective means of screening migrants for TB will comprise multiple, inter-linking elements: pre-arrival screening for active TB and targeted post arrival screening for LTBI in migrants from</td>
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<tr>
<th>Year</th>
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<th>Study Title</th>
<th>Country</th>
<th>Study Design</th>
<th>Study Description</th>
<th>Intermediate/High TB Burden Settings</th>
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<tr>
<td>2017</td>
<td>Zenner, D., Loutet, M. G., Harris, R., Wilson, S., and Ormerod, L P.</td>
<td>Evaluating 17 years of latent tuberculosis infection screening in north-west England: A retrospective cohort study of reactivation.</td>
<td>England, UK</td>
<td>Quantitative</td>
<td>97 out of 1820 individuals screened for LTBI were reported to have active TB. Crude incidence rates among LTBI-positive, treatment-naïve individuals were 4.1 and 2.3 per 100 person-years in the QuantiFERON and tuberculin skin test cohorts, respectively. Among the QuantiFERON cohort, Poisson regression showed that LTBI positivity (IRR 22.6, 95% CI 6.8–74.6) and no chemoprophylaxis increased the probability of becoming a TB case (IRR 0.17, 95% CI 0.05–0.6). High TB rates in LTBI-positive, treatment-naïve individuals and a strong association between no treatment and becoming a TB case, demonstrating feasibility and effectiveness of LTBI screening and providing important policy lessons for LTBI screening in England and beyond.</td>
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<tr>
<td>2017</td>
<td>Gao, J., Cook, V. J., and Mayhew, M.</td>
<td>Preventing tuberculosis in low incidence setting: Evaluation of Multi-lingual, online, educational video on latent tuberculosis</td>
<td>Canada</td>
<td>Mixed Methods</td>
<td>Of 1598 survey respondents, 193 viewers had a mean knowledge score of 59%, compared to 38% in non-viewers. Eighty-four percent of viewers rated the video as helpful. When controlling for other factors, viewing the video was associated with a 1.04 (95% CI 0.85–1.26) or a 21% increase in a knowledge score. Qualitative data suggested the video was acceptable and may facilitate behavior change. This online, educational video shows promise as a tool to supplement clinical care. Viewing the video alone was associated with a modest but statistically significant increase in basic knowledge pertaining to LTBI transmission, symptoms, and treatment. Given the basic knowledge evaluated in the survey, it was reasonable to expect that viewing the video alone could result in a near perfect score yet it was only associated with a mean knowledge score of 59%, 21% higher than non-viewers. This finding illustrates the importance of reinforcing messages through other means</td>
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<td>2017</td>
<td>Rogo, T., Eleanya, C., Hirway, P., Pelland, D., Lewis, C., Dennephy, P., and Losikoff, P.</td>
<td>Adherence to latent tuberculosis infection treatment in population with high number of refugee children.</td>
<td>Rhode Island, USA</td>
<td>Quantitative</td>
<td>Of 120 patients with LTBI, 93% were foreign-born and 30% were refugees. Overall, 94 children (78.3%) completed therapy. Higher rates of treatment completion were seen among patients who were female, referred within the same hospital system, used an interpreter, and did not report side effects. Overall rates of completion of LTBI treatment were high in this population. Better adherence to clinic visits, likely due to the increased support and care coordination provided to the refugee children, improved treatment completion rates.</td>
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<td>effects. Refugees attended more scheduled visits compared to non-refugees (p=0.019).</td>
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