Acceptability of TB Screening Among At-Risk and Vulnerable Groups:

A Systematic Qualitative/Quantitative Literature Metasynthesis

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22. Soldiers and Military personnel
23. Transportation workers
24. Homeless
25. Indigenous
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Acceptability of Screening among At-Risk and Vulnerable Groups: A Systematic Qualitative/Quantitative Literature Metasynthesis

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ABSTRACT

Structured summary

The acceptability of screening/active case finding (ACF) among populations at-risk for TB was previously unknown and under-researched. Despite the rapid proliferation of screening efforts worldwide, documentation of acceptability of TB testing has lagged. To assess the acceptability of targeted screening among 31 risk groups, a team of reviewers queried 5 databases, sought references from experts of specific risk groups, and scrutinized the grey literature (guidances, norms, standards) produced by technical agencies. There were 468 Tb screening studies reviewed, and 218 (47%) of these were voluntary screening efforts and contained detailed information on proportion of eligible individuals who freely accepted.

Table 1 shows the range and weighted average proportion of eligible persons who consented to undergo TB screening in rank order. TB screening was well accepted by 21 out of 33 groups considered. Only Indigenous populations, Persons testing for HIV (VCT), Attendees of Health centers, men who have sex with men (MSM), and Health Care Workers (HCW) had consent rates below 80%, but their median rates of uptake were still above the 80% mark.

Table 1: Average Weighted Proportion of Persons Accepting TB screening in 218 studies

<table>
<thead>
<tr>
<th>Risk Groups</th>
<th>Mean %</th>
<th>w. mean %</th>
<th>N</th>
<th>Std. Deviation %</th>
<th>Minimum %</th>
<th>Maximum %</th>
<th>Median %</th>
<th>Range %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soldiers/Military*</td>
<td>96</td>
<td>99</td>
<td>2</td>
<td>0.05</td>
<td>93</td>
<td>100</td>
<td>96</td>
<td>7</td>
</tr>
<tr>
<td>Farm &amp; Factory*</td>
<td>97</td>
<td>97</td>
<td>3</td>
<td>0.02</td>
<td>95</td>
<td>98</td>
<td>98</td>
<td>3</td>
</tr>
<tr>
<td>Homeless*</td>
<td>66</td>
<td>96</td>
<td>5</td>
<td>0.24</td>
<td>41</td>
<td>97</td>
<td>75</td>
<td>56</td>
</tr>
<tr>
<td>Mentally ill</td>
<td>94</td>
<td>96</td>
<td>3</td>
<td>0.02</td>
<td>93</td>
<td>95</td>
<td>94</td>
<td>2</td>
</tr>
<tr>
<td>Diabetics</td>
<td>96</td>
<td>94</td>
<td>2</td>
<td>0.03</td>
<td>94</td>
<td>98</td>
<td>96</td>
<td>4</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>85</td>
<td>94</td>
<td>6</td>
<td>0.12</td>
<td>68</td>
<td>96</td>
<td>90</td>
<td>28</td>
</tr>
<tr>
<td>Drug Dependent*</td>
<td>84</td>
<td>93</td>
<td>3</td>
<td>0.13</td>
<td>69</td>
<td>94</td>
<td>89</td>
<td>25</td>
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<tr>
<td>Residents of Urban poor areas</td>
<td>87</td>
<td>91</td>
<td>11</td>
<td>0.12</td>
<td>59</td>
<td>99</td>
<td>88</td>
<td>40</td>
</tr>
<tr>
<td>Sex Workers</td>
<td>86</td>
<td>84</td>
<td>2</td>
<td>.12</td>
<td>84</td>
<td>88</td>
<td>88</td>
<td>4</td>
</tr>
<tr>
<td>Children Under 5</td>
<td>87</td>
<td>87</td>
<td>2</td>
<td>-</td>
<td>84</td>
<td>91</td>
<td>86</td>
<td>6</td>
</tr>
<tr>
<td>Transport workers*</td>
<td>85</td>
<td>86</td>
<td>3</td>
<td>0.13</td>
<td>73</td>
<td>98</td>
<td>84</td>
<td>25</td>
</tr>
<tr>
<td>Migrants</td>
<td>77</td>
<td>85</td>
<td>8</td>
<td>0.15</td>
<td>55</td>
<td>96</td>
<td>81</td>
<td>41</td>
</tr>
<tr>
<td>PMTCT*</td>
<td>79</td>
<td>81</td>
<td>3</td>
<td>0.14</td>
<td>68</td>
<td>96</td>
<td>88</td>
<td>28</td>
</tr>
<tr>
<td>Immigration</td>
<td>73</td>
<td>80</td>
<td>14</td>
<td>0.20</td>
<td>34</td>
<td>96</td>
<td>79</td>
<td>62</td>
</tr>
<tr>
<td>Adolescents</td>
<td>72</td>
<td>80</td>
<td>3</td>
<td>.14</td>
<td>58</td>
<td>96</td>
<td>79</td>
<td>38</td>
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<td>Transgenders*</td>
<td>77</td>
<td>79</td>
<td>2</td>
<td>0.07</td>
<td>77</td>
<td>91</td>
<td>84</td>
<td>14</td>
</tr>
<tr>
<td>PLHIV</td>
<td>82</td>
<td>78</td>
<td>17</td>
<td>0.13</td>
<td>52</td>
<td>99</td>
<td>83</td>
<td>47</td>
</tr>
<tr>
<td>Refugee Camps/IDP</td>
<td>41</td>
<td>74</td>
<td>2</td>
<td>0.25</td>
<td>23</td>
<td>58</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Elderly- Institutionalized *</td>
<td>83</td>
<td>72</td>
<td>2</td>
<td>0.17</td>
<td>72</td>
<td>95</td>
<td>83</td>
<td>24</td>
</tr>
</tbody>
</table>

1 If the literature on active screening for TB disease in a risk group included fewer than 5 studies, then we included studies of screening for LTBI. These are indicated with an asterisk.
In addition to risk group screening, a review of consent among contact tracing efforts suggests that contact investigation is also acceptable. These studies are very heterogeneous in terms of technique, but broadly speaking contact investigation appears to be a generally accepted practice.

<table>
<thead>
<tr>
<th>Type of Contact Tracing</th>
<th>Mean %</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Minimum %</th>
<th>Maximum %</th>
<th>Median %</th>
<th>Range %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract Tracing - Household</td>
<td>80</td>
<td>24</td>
<td>0.17</td>
<td>39</td>
<td>99</td>
<td>85</td>
<td>60</td>
</tr>
<tr>
<td>Contact Tracing - Community</td>
<td>88</td>
<td>27</td>
<td>0.12</td>
<td>57</td>
<td>100</td>
<td>91</td>
<td>42</td>
</tr>
<tr>
<td>Contact Tracing - Health care</td>
<td>59</td>
<td>4</td>
<td>0.14</td>
<td>43</td>
<td>73</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>Contact Tracing - Other</td>
<td>87</td>
<td>3</td>
<td>0.07</td>
<td>83</td>
<td>95</td>
<td>84</td>
<td>12</td>
</tr>
</tbody>
</table>

If the TB control community is serious about community engagement and ethical TB control, further attention is needed to the issue of palatability of TB screening. These studies suggest that in some settings and some populations, TB screening is not routinely taking human rights or individuals’ rights into consideration.

Although this inference exercise seems to suggest that TB screening and active case finding are widely acceptable to almost all risk groups, it is important to emphasize that the issue of acceptability as a concept has not been studied in all cases. These acceptability proportions are really simply recruitment rates in studies which are biased by a series of incentives and disincentives which may not reflect acceptability of routine screening practice. Nevertheless, there are several major findings:

1. Simple TB screening (i.e. a one-step point of care process) appears to be more acceptable to
almost all groups studied than referral or multiple, return visits, but the evidence is weak.\textsuperscript{2}

2. Simple TB screening appears to be more acceptable than more complex, invasive screening involving blood draws, gastric aspiration, or over-night hospital admission, but evidence for this is weak\textsuperscript{2}.

3. Inclusion of HIV-testing in the TB screening algorithm (or fear of inclusion) is a potential deterrent in some risk groups (e.g. HCW) but not others, but the evidence is weak\textsuperscript{3} [3]

4. TB screening and treatment are a low priority for groups facing housing insecurity, nutritional insecurity, addiction, the threat of violence, deportation, etc.

5. There is limited evidence in a small number of settings that screening in hard to reach street population populations (homeless/IDU) is more acceptable if the benefits are immediate and tangible (e.g. use of incentives and enablers).\textsuperscript{[1]}

6. Certain hidden populations (e.g. homeless/IDU/alcoholics/sex workers/street children/undocumented migrants/residents of poor areas) report similar concerns about the quality and confidentiality of TB screening in health care facilities and may be better served by street-based or bar-based screening alternatives.\textsuperscript{[4-7]}

7. Acceptability of TB screening is dependent on the quality of the human interaction as well as perceived negative consequences – legal, social, political, economic. \textsuperscript{[8]}

8. There is weak evidence to suggest that acceptability of TB screening may be a function of periodicity and may decline over time. So the interval between TB screens should reflect a balance between potential health benefit and potential risk of refusal\textsuperscript{[9]}.


\textsuperscript{3} Including HIV testing in the TB screening exercise does not decrease consent in community-wide screening (see Mitchell et al community screening acceptability literature review).
INTRODUCTION

Screening is increasingly framed as a potential part of the remedy for stalled case detection rates and diminishing returns from the traditional methods of passive detection of M. Tuberculosis (TB) that rely upon health seeking by symptomatic individuals.\textsuperscript{4} Indeed TB screening has been shown to detect additional TB cases in several controlled trials. Moreover, its effectiveness in routine use among certain key populations is also suggestive of benefit, though the overall evidence base remains very weak (Kranzer et al 2012). Screening strategies present both opportunities and challenges for the health system. Screening may identify earlier TB disease and a different sort of TB patient than the traditional approaches. Moreover, the range of interventions described as “TB Screening” is very broad, the potential target populations are equally diverse, and the screening and diagnostic algorithms applied vary widely making it challenging to derive broad conclusions about the value and acceptability of TB screening.

Study Rationale

One of the issues that is frequently overlooked in the development of screening policy is the potential acceptability of screening among individual target groups. Indeed TB screening is already compulsory for specific at-risk and vulnerable populations for utilitarian public health reasons or political ends, rendering the issue of “acceptability” a rather moot point in practice and perhaps therefore the subject of minimal scholarly concern.\textsuperscript{[10]} Indeed, three comprehensive systematic literature reviews have been published on screening and active case finding in the last three years (among migrants, persons with HIV, and contacts of TB cases) and it is noteworthy that none of them consider the issue of acceptability explicitly.

Despite the lack of attention to the acceptability question among policy makers, acceptability is a critical pre-requisite of effective TB control.\textsuperscript{[11]} To inform the development of global policy on TB screening it is crucial to reflect upon the acceptability of potentially invasive, costly or inconvenient measures, and the potential repercussions of voluntary screening in terms of perceived and enacted stigma as well as treatment adherence.\textsuperscript{[12-13]} Compulsory examination, compulsory screening, compulsory detention, compulsory treatment, and compulsory vaccination for TB may be expedient, but their ethical implications are heavily contested.

It is necessary therefore to explore the acceptability of targeted screening or active case finding endeavors in specific populations. An in-depth appreciation of these issues is difficult due to the limited information available, however through inference and extrapolation, insights on acceptability may be derived.

Study Objective

In this systematic literature review, we address one question on acceptability of screening:

1. What is the acceptability of targeted TB screening among specific risk groups in the

\textsuperscript{4} For the purposes of this review, screening is understood to mean the “systematic identification, in a predetermined target group, of people with suspected active TB by the application of tests, examinations, or other procedures which can be applied rapidly”. This is in contrast to “Active case finding” which implies diagnosis through diverse outreach activities beyond the health services (Golub 2005). The terms are sometimes used inter-changeably.
Review Protocol

Acceptability of targeted TB screening among specific risk groups in the 1985-April 2011 period

Introduction

Although there is widespread recognition that Tuberculosis is not the equal opportunity disease that its air borne transmission route would imply, there has still been a historical tendency to seek one-size-fits all approaches to its prevention, diagnosis and management[14]. A consultative approach to TB strategy development in which communities are full partners has emerged belatedly and persons with TB are increasingly included in policy and planning (e.g. GIPT principle).[5]

A recent systematic review of delay to diagnosis strongly suggests that the health seeking behavior (i.e. acceptability of TB testing) under the passive case-finding paradigm varies widely by risk group[5],[15]. We hypothesize therefore that active case finding and screening may also be acceptable to particular populations to varying degrees.

There is little written on the acceptability of active case finding and/or TB screening, however a brief review of acceptability studies for other screening tests suggests that there are common factors which come into play in an individual’s assessment of the desirability of undergo health screening. These issues can be grouped into 5 domains (See Figure 3).

---


6 Passive-case finding is less readily embraced by person with: “co-morbidities of the suspect including alcoholism and drug dependence; extrapulmonary TB; rural residence; low access (geographical or "sociopsychological" barriers); elderly; poor; women, history of immigration; low educational level; low awareness of TB; “incomprehensive beliefs”[sic]; self-treatment; and stigma[15].

In Table X examples of each of the domains of acceptability derived from the literature on other types of sensitive screening are provided. Not all domains are equally salient for all risk groups.

**Table 3: Domains of Acceptability of Screening for other Diseases**

| Why me? | Individual factors | risk perception [16-18]  
|         |                    | degree of altruism [19]  
|         |                    | fear of disease[20]  
| Why us? | Group’s specific concerns | stigma[21-25]  
|         |                    | cultural appropriateness/clarity of questions[26-27]  
| Where?  | Contextual factors | Cost of screening (direct and opportunity)  
|         |                    | convenience,[17, 28-29]  
|         |                    | choice of venue/and the informal and non-medical site to testing[17, 25-26, 30-31]  
|         |                    | Privacy[18, 24, 31-34]  
|         |                    | confidentiality[25-26, 33]  
|         |                    | home visits threatening to some vulnerable groups[35-36]  
| What?   | Screening Technique | safety[29, 33]  
|         |                    | time to screen[37-38]  
|         |                    | whether the person has a choice of screening method[25]  
|         |                    | invasiveness[34]  
| Who?    | Screener characteristics | Gender of screener[32]  
|         |                    | rapport, empathy/non-judgmental[21, 23, 33, 39-40]  
|         |                    | the ratio between questioning and listening[35]  
| What now? | Implications | cost of treatment [32]  
|         |                    | availability of treatment[40]  
|         |                    | fear of disclosure of transgression (e.g. infidelity) – routes of transmission[20]  

There is little evidence to suggest that the positive predictive value and the negative predictive value of the test enter into individual’s decision making. However, this may be because this information is simply not routinely shared with them.

**Study Design**

Due to the notable absence of published studies of TB screening acceptability in some risk groups, a pragmatic approach to literature assessment was adopted. This review could not be a systematic literature review due to the scope of the assignment, but rather is a qualitative quantitative meta-synthesis of existing guidance and best practices with regard to specific risk groups. A meta-synthesis is broader than a systematic literature review because it includes existing systematic reviews, social science and qualitative work[41].
Although an imperfect proxy, these bodies of knowledge may provide insights into the acceptability, feasibility, by taking into account what is known about each risk groups’ unique needs, challenges, and enabling characteristics.

Search Strategy for **PICOT: What is the acceptability of systematic screening for active TB among x population in the 1985-April 2011 period?**

**Inclusion Criteria**

In this review, we considered 30 possible risk groups. We can subcategorize them into groups likely to be encountered in health services, occupational exposure or congregate environments, and finally a residual category of vulnerable populations who face social exclusion and access barriers to health care.

**Risk Groups found in health services**
1. Adolescents
2. Alcohol dependent
3. Attendees of health care facilities
4. Children under 5
5. Diabetics
6. Drug dependent
7. HIV-infected/PMTCT
8. Malnourished
9. Persons with Previous TB
10. Persons seeking VCT for HIV
11. Pregnant women
12. Smokers

**Congregate/occupational/environmental risk groups**
13. Elderly (institutionalized)
14. Mentally ill (institutionalized)
15. Factory and farm workers
16. Healthcare workers /Lab staff
17. Military/Soldiers
18. Miners and ex-miners
19. Orphans and institutionalized children
20. Prisoners & prison staff
21. Refugees/internally displaced populations (IDPs)
22. Urban slum residents
23. Transportation workers

**Behavioral/marginalized Risk Groups**
24. Homeless
25. Indigenous and minority ethnic groups
26. Marginalized men who have sex with men (MSM)
27. Migrants/Immigration
28. Nomads/Pastoralists
29. Sex workers (FSW)
30. Street children/youth
31. Transgender, intersex


Moreover, in some instances, the inclusion criteria were broadened beyond TB. If the literature on active screening for TB disease in a risk group included fewer than 5 studies, then we included studies of screening for LTBI.

Similarly, if the group had more than ten studies of TB screening, contact tracing studies from this group were excluded. However, if the risk group had less than ten studies on routine TB screening or active case finding, then contact investigation studies in this group were included.

For the qualitative component, if there were no qualitative studies on attitudes toward TB screening, we searched for acceptability of other types of potentially sensitive screening, such as sexually transmitted infection (STI) screening, diabetes screening, alcohol screening, and voluntary counseling and testing for HIV (VCT/PCT).

**Exclusion criteria**

Please consult Appendix 2 for exclusion criteria because it varied by risk group.

Hospitalized patients were not included because this was a combination of passive and active case finding.

---

7 In one study of hospitalized patients, 90% accepted TST but 33.7% were anergic.42 Woeltje, K.F., et al., *Tuberculin skin testing of hospitalized patients*. Infection Control and Hospital Epidemiology, 1997. **18**(8): p. 561-565.
Data collection process

Quantitative search strategy

1. We conducted 32 literature searches in two databases - ISI WEB of Science & EMBASE (see Appendix 2 Risk Group search strategy)
2. We collaborated with the TB Screening Group at JHU to identify relevant studies.
3. We hand-searched the reference lists, appendices, and supplementary web material of the index article to identify key resources, particularly Kranzer et al 2011.
4. We consulted colleagues to identify manuscripts in preparation on studies in hidden populations and on risk groups for which little was published in peer review journals (e.g. MSM, sex workers, adolescents,)

Screening Step 1: the results section of each study was reviewed to see if the number of screened persons and the number of eligible persons could be extracted. Those with both values were included.

Screening step 2: The abstracts of the selected records were reviewed, and a selection was made for full review.

Screening Step 3: Full papers were read and data were abstracted. The crude recruitment rates were calculated for each study. All studies reporting 100% recruitment were further scrutinized for information on inclusion criteria and consenting procedure. Those stating that screening was mandatory in the study or that did not describe the consenting process were excluded.

Data items

A data extraction form was developed (See Appendix 5). Data were extracted into an Excel spread sheet by a single reviewer per group. When acceptability was not measured or described as a formal topic, the refusal rate in screening studies was considered a proxy for lack of acceptability of screening. If the proportion screened was available from the abstract, the datum was extracted into the data set.

Qualitative data search strategy

1. We relied upon the databases generated through quantitative search above.
2. For groups for whom very little literature was identified on TB and ACF/Screening (n=6), we expanded the strategy to consider acceptability of other types of potentially sensitive or stigmatized screening, such as diabetes screening, alcohol screening, sexually transmitted disease screening, voluntary testing and counseling for HIV (VCT/PICT), screening for postpartum depression, and intimate partner violence (IPV).
3. We accessed the grey historical literature specific to each group available in the KNCV digital archive (22,000+ records). We identified 220 potentially relevant WHO or STOP TB Partnership TB manuals, guidance, strategies, guidelines, and books dedicated to each group. We expanded to include manuals available on-line in WHO, IULTD, ATS, CDC, KNCV websites.

Qualitative Data Screening Step 1: Drawing from the databases developed above, the
authors digitally searched the titles and abstracts of 31 individual risk group databases (11,346 records) for variations of the following ten keywords:

1. Acceptability  
2. Utilization  
3. Screen in  
4. Refusal  
5. Uptake  
6. Satisfaction  
7. Recruitment  
8. Opt  
9. Choice  
10. Consent

Papers identified in this screening step were read in full and relevant findings extracted.

**Risk of bias in individual studies**

This review is likely to be affected by a significant degree of reporting bias and publication bias which may over estimate the acceptability of screening since studies with high refusal rates face bigger hurdles to publication. To try to overcome this challenge, authors have triangulated data from published and unpublished reports of the same study to detect reporting bias and have included studies that were never published to attempt to mitigate the potential publication bias.

These studies were not assessed for quality due to their heterogeneity.

**Summary measures**

The principal summary measure is the proportion of eligible members of the target population who are actually screened. The proportion (screened/eligible) is hypothesized to be a proxy for acceptability of TB screening.

**Data analysis**

The quantitative analysis was descriptive. The average and weighted average consent rates were captured. Given the low numbers of studies in most risk groups and the heterogeneity of the studies, no sensitivity analysis was conducted.

The qualitative analysis was simple content analysis using domains of acceptability that were defined a priori. Where possible potential influences on the acceptability of screening, the proportion screened was explored.

Where possible, the following questions were explored

1. Are there differences in Acceptability by Region or Context (urban/rural) within a risk group?  
2. Are there differences in Acceptability by Gender within a risk group?  
3. Are there differences in Acceptability by Incentives and enablers?  
4. Is enhanced case finding as acceptable as community-wide screening?  
5. Are there differences in Acceptability by Inclusion of HIV testing?  
6. Are there differences in Acceptability by Screening algorithm?  
7. Are there differences in Acceptability by Study type?
**Results**

**Study selection**

The numbers of studies screened, assessed for eligibility, and included in the review, are outlined in tabular form. Reasons for exclusions at each stage are noted where feasible.

<table>
<thead>
<tr>
<th>At-Risk or Vulnerable Group</th>
<th># of records in EMBASE</th>
<th># of Records in ISI Web of Science</th>
<th>Manuals, guidelines, norms, (n=203)</th>
<th>Duplicate s removed</th>
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<td><strong>Risk Groups found in health services</strong></td>
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<td>1. Adolescents</td>
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<td>4</td>
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<tr>
<td>2. Alcohol dependent</td>
<td>159</td>
<td>284</td>
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<td>409</td>
</tr>
<tr>
<td>3. Attendees of health care facilities</td>
<td>17</td>
<td>26</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>4. Children under 5</td>
<td>1437</td>
<td>622</td>
<td>15</td>
<td>1959</td>
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<td>5. Diabetics</td>
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<td>131</td>
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<td>6. Drug dependent</td>
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<td>102</td>
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<td>458</td>
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<tr>
<td>8. Persons with Previous TB</td>
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<td>0</td>
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<td>262</td>
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<td>15. Mentally ill</td>
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<td>17. Orphans/institutionalized</td>
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<td>69</td>
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<td>18. Prisoner</td>
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<td>465</td>
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<td>629</td>
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<td>20. Soldiers/military</td>
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<td>21. Transportation workers</td>
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<td>27</td>
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<td>22. Refugee (camps) IDPs</td>
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<td><strong>Behavioral/marginalized</strong></td>
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<td>23. Homeless</td>
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<td>71</td>
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<td>24. Indigenous</td>
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<td>26. Migrant,</td>
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<td>476</td>
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<tr>
<td>27. Nomadic/pastoralist</td>
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<td>28. Sex worker</td>
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<td>78</td>
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<td>92</td>
</tr>
<tr>
<td>29. street children/ street youth</td>
<td></td>
<td>0</td>
<td>4</td>
<td>69</td>
</tr>
<tr>
<td>30. Transgender</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>55*</td>
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</table>
Table 5: Yield of Screening and Selection Procedures for Qualitative Information

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<thead>
<tr>
<th>At-Risk or Vulnerable Group</th>
<th>Universe</th>
<th>Selected for review in Step 1-key word searching</th>
<th>Number of studies with acceptability information</th>
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<tr>
<td>1. Adolescents</td>
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<tr>
<td>2. Alcohol dependent</td>
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<td>13</td>
<td></td>
</tr>
<tr>
<td>3. Attendees of health care facilities</td>
<td>26</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4. Children under 5</td>
<td>1959</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>5. Diabetics</td>
<td>131</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6. Drug dependent</td>
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<td>114</td>
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</tr>
<tr>
<td>7. Malnourished</td>
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<tr>
<td>8. Persons with Previous TB</td>
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</tr>
<tr>
<td>9. PLHIV</td>
<td>679</td>
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<td>10. Pregnant women</td>
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<tr>
<td>11. smokers</td>
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<td>12. Elderly</td>
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<tr>
<td>13. Factory worker</td>
<td>168</td>
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<tr>
<td>14. Health care worker</td>
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<td>16. Miners</td>
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<tr>
<td>17. Prisoners</td>
<td>465</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>18. Resident of Urban slum</td>
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</tr>
<tr>
<td>19. Soldiers</td>
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</tr>
<tr>
<td>20. Transportation workers/ Truck drivers/</td>
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<tr>
<td>21. Internally displaced (IDP)/refugee</td>
<td>180</td>
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</table>

At-risk general

| 22. Homeless | 71 | 6 |
| 23. Indigenous | 298 | 3 |
| 24. Marginalized MSM | 33 | 1 |
| 25. Migrant | 476** | 1 |
| 26. Nomadic populations | ** | 3 | 4 |
| 27. Sex workers | 92 | 7 | 3 |
| 28. street children/orphans/abandoned children | 69 | 4 | 2 |
| 29. Transgender | 55* | 3 | 1 |

If a study considered a population that fit more than one risk group, for example pediatric migrants or elderly alcoholics or pregnant factory workers, the study was included in both datasets.\(^8\)

---

Study characteristics

Risk of bias within studies

The heterogeneity of the studies included precludes a thorough assessment of the risk of bias of each study.

Synthesis of results

Table 6: Average Consent (Recruitment) Rates by Risk Group

<table>
<thead>
<tr>
<th>Risk Groups</th>
<th>Mean %</th>
<th>w. mean %</th>
<th>N</th>
<th>Std. Deviation %</th>
<th>Minimum %</th>
<th>Maximum %</th>
<th>Median %</th>
<th>Range %</th>
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</thead>
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<tr>
<td><strong>Risk Groups found in health services</strong></td>
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<td></td>
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<tr>
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<td>80</td>
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<td>.14</td>
<td>58</td>
<td>96</td>
<td>79</td>
<td>38</td>
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<tr>
<td>2. Alcohol dependent</td>
<td>-</td>
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<td></td>
<td></td>
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<td>59</td>
<td>68</td>
<td>3</td>
<td>.07</td>
<td>52</td>
<td>67</td>
<td>57</td>
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<td>4. Children Under 5</td>
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<td>2</td>
<td></td>
<td>84</td>
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</tr>
<tr>
<td>5. Diabetics</td>
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<td>94</td>
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<td>94</td>
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<td>8. Persons with Previous TB</td>
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<td></td>
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<tr>
<td>9. PLHIV</td>
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<td>.13</td>
<td>52</td>
<td>99</td>
<td>83</td>
<td>47</td>
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<tr>
<td>- PMTCT</td>
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<td>81</td>
<td>3</td>
<td></td>
<td>68</td>
<td>96</td>
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<td>10. Pregnancy</td>
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<td>12 Smokers</td>
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<td>97</td>
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<td>72</td>
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Marginalized Groups
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<tr>
<th>Group</th>
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<th>%</th>
<th>% Positive</th>
<th>% Negative</th>
<th>% Indifferent</th>
<th>% Unknown</th>
<th>% Agreed</th>
<th>% Disagreed</th>
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<td>30. Sex Workers</td>
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<td>32. Transgenders</td>
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</table>

*One study—100% consented to TST placement, and 91% agreed to TST reading.

### Qualitative Results on Acceptability of Screening

Quite a number of studies emphasized the importance of the demeanor of the screener and the quality of the rapport between screener and suspect. Although this has not been rigorously studied for TB screening, it would seem obvious. Moreover patient-provider interaction and satisfaction has been shown to be important for acceptability of TB treatment.[43-44]

For street populations (homeless/idu/sex workers/alcoholics/mentally ill/street youth) the benefits and risks of screening could be very wide-ranging, from traumatizing to life saving.[45] The following are quotes from homeless addicts from London, reflecting on the positive consequences of their TB screening which included acquisition of housing, acquisition of substance abuse treatment,

*But I end up going in hospital and they say everything for a reason, maybe I needed this TB to get the start I needed, so that I can get a flat. Cause this, bed-sit is a start to getting a flat inat [sic]... (P11)*

*I had enough of it, and I put my hands out, I need help, and that’s when I went back to the primary care unit and said, look, I need some help. And then they put me on the methadone program, and stabilised me and it means me not to go out shoplifting anymore, it keeps me out of trouble, so I don’t have to go shoplifting, keeps me out of prison, just got the alcohol to deal with now (P4)*

Swigart V, Kolb R (2004) asked homeless persons in the US the question “*Can you tell me about your main reasons for deciding whether to have the TB screening or not?*” 51% of participants reported having symptoms or a family history of TB as positively influencing their decision to accept screening, whereas only 27% mentioned the convenience of the screening at the shelter. The participants who did not accept TST screening reported fear of the results (3); disinterest (1); lack of symptoms (1), or desire to sleep (1).[46]

### Incentives and enablers as a determinant of acceptability of TB screening

Most health behavior theories posit that screening uptake would be higher when the screening takes places as a part of a contact investigation and the imminent personal risk is clear to potential participants. However, there is plenty of evidence to suggest that some of the most
at-risk populations do not subscribe to this. Indeed health workers are the least enthusiastic about TB screening, despite being perhaps the most cognizant of its benefits.[10] A 2012 Cochrane review[1] of material incentives on TB screening uptake found that

“material incentives may increase the return rate for reading of tuberculin skin test results compared to normal care (two trials, 1,371 participants: RR 2.16, 95% CI 1.41 to 3.29, low quality evidence). Similarly, incentives probably improved clinic re-attendance for initiation or continuation of antituberculosis prophylaxis (three trials, 595 participants: RR 1.58, 95% CI 1.27 to 1.96, moderate quality evidence), and may have improved subsequent completion of prophylaxis in some settings (three trials, 869 participants: RR 1.79, 95% CI 0.70 to 4.58, low quality evidence).

The researchers identified 11 eligible studies. Ten were conducted in the United States: in adolescents (one trial), in injection drug or cocaine users (four trials), in homeless adults (three trials), and in prisoners (two trials). One additional trial recruited malnourished men receiving active treatment for TB in Timor-Leste.

Material incentives may also be more effective than motivational education at improving return for tuberculin skin test results (low quality evidence), but may be no more effective than peer counseling, or structured education at improving continuation or completion of prophylaxis (low quality evidence). There is limited evidence to support the use of material incentives to improve return rates for TB diagnostic test results and adherence to antituberculosis preventive therapy. The data are currently limited to trials among predominantly male drug users, homeless, and prisoner subpopulations in the United States, and therefore the results are not easily generalized to the wider adult population, or to low- and middle-income countries, where the TB burden is highest. Further high-quality studies are needed to assess both the costs and effectiveness of incentives to improve adherence to long-term treatment of TB.”[1]

A note on gender as a determinant of TB screening acceptability

Most studies did not disaggregate recruitment rates by gender. However, we know from other studies that gender does play a role in the diagnostic process.[47]

<p>| Table 7 Consent for TB Screening among Risk Groups found in health services |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Risk Group</th>
<th>studies where screening was mandatory and/or refusal not reported</th>
<th>studies where participation was voluntary</th>
<th>Minimum consenting to TB Screening %</th>
<th>Maximum consenting to TB screening %</th>
<th>Average proportion who consent to TB screening %</th>
<th>Weighted average of proportion who consent to TB screening %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescents</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol dependent</td>
<td>13</td>
<td>0</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendees of health care facilities</td>
<td>6</td>
<td>3</td>
<td>57</td>
<td>78</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>Children under 5</td>
<td>4</td>
<td>2</td>
<td>84</td>
<td>91</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Diabetics</td>
<td>2</td>
<td>2</td>
<td>94</td>
<td>98</td>
<td>96</td>
<td>94</td>
</tr>
<tr>
<td>Drug dependent</td>
<td>4</td>
<td>5</td>
<td>69</td>
<td>100</td>
<td>89</td>
<td>93</td>
</tr>
<tr>
<td>Malnourished</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persons with</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous TB</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>---------------------</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>PLHIV</td>
<td>36</td>
<td>18</td>
<td>52</td>
<td>100</td>
<td>86</td>
<td>78</td>
</tr>
<tr>
<td>PMTCT clients</td>
<td>0</td>
<td>3</td>
<td>68</td>
<td>96</td>
<td>79</td>
<td>81</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>0</td>
<td>3</td>
<td>85</td>
<td>95</td>
<td>92</td>
<td>94</td>
</tr>
<tr>
<td>People Seeking HIV tests</td>
<td>2</td>
<td>4</td>
<td>41</td>
<td>97</td>
<td>70</td>
<td>69</td>
</tr>
<tr>
<td>Smokers</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Risk Groups found in health services**

1. *Adolescents*

   Although previously it was assumed that children above five, constituted a “Golden Age” where the risk of TB was exceedingly low, new information about the social mixing and risk-taking patterns of adolescents has recast this group into a concern for TB control programs. New studies show that adolescents 12-18 year in African settings have only slightly less TB than adults from the same community.[9, 48] Three incidence studies among 16,369 adolescents in South Africa, Uganda and Kenya were recently completed and the acceptability of one time symptom and contact screening ranged from 58 to 96% with a weighted average of 80% consenting to TB screening with symptoms, TST and recent contact as the primary screen and chest x-ray and morning and spot sputum as the secondary screens.[9, 49] One study included IGRA, and this led to the lowest recruitment rate (58%) owing to fear of needles. In Uganda, 68% parents agreed to have their children participate in TB screening every 4 months, and 63% adolescents provided assent. Repeated screening over the course of 18-24 months was acceptable to 63-89%, but frequency of reports of TB symptoms and TB contacts declined over time.[2, 9, 50] This implies that acceptability of TB screening can be expressed in multiple ways – consent, drop out between screening steps, but also under-reporting of symptoms in the primary screen.

   In the Western Cape of South Africa, (where one study included a passive case finding arm), a trend is seen in greater number of withdrawals among the regularly screened group in the second year, and prior to visits involving a blood draw.[2].

   Coly and Morisky (2004) found that foreign born, non-English speaking adolescents in the US were more likely to complete the diagnostic and treatment process that their US peers suggesting that adolescents may not be a homogenous group in all settings.

2. *Alcohol dependent*

   Acceptability of conducting screening among persons with alcohol dependency is infrequently studied. One US outbreak investigation of a bar patrons had 100% participation in TST administration, but only 91% return for readings.[51] A total of 13 studies were identified for review, but zero contained information on acceptability. There is limited evidence from contract tracing studies among alcoholics that the quality of the rapport between the vulnerable person and screener may influence acceptability.[52] Yamazachi et al found that

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9 In Western Kenya, TB prevalence in 15-90 year olds was 2.5/1,000 (1.6-3.4) for smear-positive PTB and adolescents and adolescents 12-18 were found to have 3.2/1,000 (95% CI 1.9, 4.5) culture confirmed PTB.
alcoholics tend to postpone screening. [53].

3. Attendees of health care facilities

Consent to screen persons in the out-patient department (OPD) of health care facilities ranged from 57-67%. Seven studies were initially flagged as studies of acceptability of conducting TB screening among attendees of health care facilities waiting for other services. However, after full screening, three provided refusal rates and none provided further qualitative information on this topic. Although this group is often thought to be an “easy win” for TB control because the costs of screening them and the inconvenience to them are hypothesized to be minimal, acceptability is not that high.

Moreover, a positive screen among attendees in health care does not necessarily always lead to a proper TB diagnosis or acceptance of treatment. For example, in an Indian study of adult outpatients, 21.5% (477/2210) with cough >2 weeks did not provide a sputum sample or provided fewer than three specimens (Santha, 2005).

4. Children under 5

A total of 47 studies met the initial criteria for inclusion and 11 were suspected of having information relevant to the issue of acceptability of conducting TB screening among children under five. Few studies differentiated between children under five and those under 14. Parental consent to screen in under fives ranged from 84-91%.

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>Sx</td>
<td>CXR Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td>CXR Sm Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Cx Other</td>
<td>CXR Sm Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx TST</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>Other</td>
<td>Not specified</td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>CXR, TST</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td></td>
</tr>
</tbody>
</table>

Participation in tuberculin surveys was as high as 95.8% in tribal areas of India but the informed consent was not clearly described. [54] Two Canadian studies described acceptability of TST screening in migrants-children [55-56], with acceptability of 68%, suggesting that acceptability may vary by ethnicity and social position.

Acceptability of gastric aspiration and induced sputum among infants has been studied in rural Western Kenya[57]. Particularly problematic for male heads of household was the need for mothers to spend multiple overnight periods with their infant in the hospital for the purposes of TB diagnosis.

“...I would not agree to that because at times he would challenge me that, ‘which disease is that one that has to be taken to hospital at night?’” FGD3 P9 (female)
“…it is the one people are taken at night…why can they not be taken during the day?”
One male respondent said

Parents expressed fear of possible harm to their infant during insertion of a gastric tube and the importance of avoiding painful procedures. Fear of potential short-term or long-term adverse events was put forward by discussants and is reflected in the following quotes;

“…you would fear because at times you would think that the child would swallow that thing (the tube)…” FGD1 P4 (female)

“…parents would fear that the child is suffering a lot.” FGD1 P1 (female)

Parents worried that any testing, particularly blood draws, was an HIV test.

Several studies assert that suspects can read TSTs as well as trained clinicians, suggesting that screening with TST might be simplified to 1 visit, and increase acceptability.[58]

5. Diabetics

Acceptability of conducting screening among diabetics ranged from 94-96% in the two studies where it was documented. Of five studies selected in the initial screen, none proved to have qualitative insights into diabetic’s attitudes toward TB screening.

6. Drug dependent

Consent to TB screening ranged from 69-100% among studies reporting refusal rates. From among 114 studies identified in the initial selection, five studies yielded qualitative information. Acceptability of conducting screening among persons who are drug dependent is challenging to summarize because screening programs tailored to this group may use a wide range of incentives and enablers, introducing a degree of heterogeneity into the screening process that makes generalization precarious or impossible. A total of 114 studies met the inclusion criteria, but only nine studies contained the proportion who accepted screening.

Table 8 Common Screening Algorithms used to diagnose TB among Substance abusers by Setting

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>Sx</td>
<td>Sm Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx Sm</td>
<td></td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>TST IGRA</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR</td>
<td></td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR</td>
<td>CXR Sm Cx Clinical</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>CXR Sm Cx Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td>Sm</td>
</tr>
</tbody>
</table>
In New York in 1999, rates of return for TST results were 93% when a $15.00 incentive was given to injection drug users in a needle exchange program.[59] A later study in 2011, found less acceptance. Of 809 participants, 530 (66%) accepted a TST and 81% (429/530) returned for TST reading. Moreover, only 2 accepted further screening.[60] The wide range of acceptability in the same context with the same group may be a function of time or implementation, but could also be indicative of the presence of two distinct sub-groups within the drug dependent population—those who participate in harm reduction activities and those who don’t. Efforts to make screening a one step process would enhance acceptability.

When TB screening was offered as part of a comprehensive bundle of primary care services to drug users in drug treatment program, 100% accepted and 87% were compliant with prophylaxis.[61] The physical co-location of TB screening within drug treatment programs is cited as a factor in acceptability.[6]

In a San Francisco study, injection drug users refused a blood draw for IGRA 7% of the time, but more interestingly, phlebotomists failed to identify a vein in 8% of potential participants.[62]

7. Elderly

Only two studies reported consent rates (72%, 95%) for TST screening and both were among institutionalized elderly. Acceptability of conducting other types of TB screening among elderly populations is understudied. Of 364 TB studies in the elderly screening sample, 23 were flagged for review. Of these, only one contained information, indicating that nursing home residents are less likely to complete LTBI.[63]

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>Sx</td>
<td>CXR, Sm, Cx, Other</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>TST</td>
<td>CXR, Sm, Cx</td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR, TST</td>
<td>CXR, Sm, Cx, Clinical</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>Sx, CXR, TST</td>
<td>CXR, Sm, Cx, Clinical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CXR, Sm, Cx, Other</td>
</tr>
</tbody>
</table>

Parenthetically, there was one cost effectiveness study.[64] The aggregate tuberculosis incidence rate for nursing home residents in 29 of the United States was 1.8 times higher than the rate seen in elderly persons who were living in the community (95 percent confidence interval on the relative risk 1.64, 2.02).[65] This may imply that the elderly can be considered two distinct populations, and TB screening programs should be geared differently to ensure acceptability of screening in those in congregate settings.

8. Malnourished

There were no studies of TB screening in malnourished populations available to review. Acceptability of conducting screening among malnourished persons has not been described in
the literature in great detail. A total of nineteen studies were flagged in initial screening, but none contained insights on screening acceptability in this group.

9. Mentally Ill

Acceptability of conducting screening among persons with mental illness has not been studied in any depth as most screening programs take place in residential treatment programs or residential housing programs, and are compulsory or near compulsory[66]. Of the 292 records screened in step 1, zero studies appeared to explore acceptability as a subject. Recruitment rates in 3 studies of institutionally mentally ill patients ranged from 93 to 96% with a weighted mean of 95%. Acceptability may differ from ambulatory patients with less severe mental illness.

10. Persons with Previous TB

Acceptability of conducting screening among persons with previous TB is understudied even though this is a priority group. There were no studies that gave recruitment rates for TB screening. However, one study of screening for hearing loss conducted in former TB patients had an acceptance rate of 97.6%.[67] A South African study of miners found 100% acceptance of HIV screening in those with previous TB.[68] These studies were used as proxies.

In 77 studies in this population, there were none with relevant findings on acceptability of TB screening. In principle, this is a group that has already been TB screened and so one could assume that hypothetically screening was acceptable. On the other hand, relapse cases are more likely to be persons who found completion of TB treatment unacceptable, so special efforts are likely to be necessary to make screening acceptable in this population. Persons with previous TB are likely to be resident in congregate settings, or to have co-morbidities which may impair health seeking behavior and therefore insights for these populations are likely to apply with previous TB patients as well.[67, 69]

At least one study of relapsed TB patients reveals a degree of hostility on the part of TB programs. One author asserted that persons with previous TB were "congesting health centers and impeding treatment routines and services"[70]. Another study suggests that this group is often invisible and misclassified as a new case in the passive system.[71]

To design screening programs for this population, it may be more helpful to create screening approaches for two sub-populations – those with reinfection and those who relapse due to default. The defaulters will mostly likely need meaningful incentives and enablers to complete screening, diagnosis and treatment.[68]

11. PLHIV

Consent to TB screening ranged from 52 to 100% in the 17 studied reviewed. The average was 86% consent, with a weighted average of 78%. Acceptability of conducting TB screening among people living with HIV or AIDS” (PLWHA) is an important issue even though screening guidelines have already been developed. In one study, the use of TST as part of the screening algorithm reduced the uptake of IPT (OR 3.93, 95%CI 1.18–16.04).[72]
Several studies suggest that TB screening should be bundled with other health care needs of PLHIV. In rural Mozambique a community outreach worker approach that combines HIV, TB, Vitamin A, and malaria screening improved accountability and satisfaction[73]

A 2010 qualitative study in South Africa found that many HIV+ clients were not aware that TB could be prevented by IPT and had not been informed or offered TB screening.[74] Lack of clarity on the benefits of TB screening would certainly be a reason for low uptake in some settings.

12. Pregnant women

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Incidence</strong></td>
<td>CXR</td>
<td>CXR Sm</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>Sm Clinical Other</td>
</tr>
<tr>
<td></td>
<td>TST Sm Cx</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>Sx</td>
<td>Sx Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR</td>
<td>CXR Sm Cx Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx CXR Sm Cx</td>
<td>Sx Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR Sm Cx Other</td>
<td>CXR Sm Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td>Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Other</td>
<td>Sx Cx Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Cx</td>
<td>Sm Cx Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Cx Clinical</td>
<td>Sm</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Other</td>
<td>Sx TST IGRA Cx</td>
</tr>
<tr>
<td></td>
<td>Sx TST</td>
<td>Sx TST</td>
</tr>
<tr>
<td><strong>Medium incidence</strong></td>
<td>CXR</td>
<td>CX Clinical Other</td>
</tr>
<tr>
<td></td>
<td>CXR TST</td>
<td>CXR Sm</td>
</tr>
<tr>
<td></td>
<td>CXR TST Sm Cx Other</td>
<td>CXR Sm Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx</td>
<td>Sx Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR Sm Cx</td>
<td>Sx Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR Sm Cx Other</td>
<td>CXR Sm Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td>Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Cx</td>
<td>Cx Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Other</td>
<td>CXR Sm Other</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Other Cx Clinical</td>
<td>Sm</td>
</tr>
<tr>
<td></td>
<td>Sx TST IGRA Cx</td>
<td>Sx TST IGRA Cx</td>
</tr>
<tr>
<td><strong>Moderate incidence</strong></td>
<td>TST</td>
<td>CXR Sm</td>
</tr>
<tr>
<td></td>
<td>Sx</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR Sm Cx</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td><strong>Low incidence</strong></td>
<td>CXR TST</td>
<td>CXR Cx</td>
</tr>
<tr>
<td></td>
<td>Sm Cx</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>Clinical Other</td>
</tr>
<tr>
<td></td>
<td>TST Other</td>
<td>Sm Cx</td>
</tr>
</tbody>
</table>

12. Pregnant women
Consent to screen for TB ranged from 85-95%, with a weighted mean of 94%. Acceptability of conducting screening among pregnant women has been examined recently in India, South Africa, and Malawi.[75-77]. In five districts in Malawi, the majority of pregnant clients found the introduction of TB screening into antenatal clinics to be acceptable. Some expressed concern at submitting a second sputum specimen, citing transportation/distance as the main obstacle. Other concerns were stigma and fears relating to HIV and taking TB treatment during pregnancy and breast-feeding.

Women in Bangladesh were less trusting that the results of TB screening would remain confidential and hence more likely to delay or avoid screening for symptoms[78]. Since there is some evidence that the risk of TB in pregnant women is greater in the post partum period, the timing of TB screening deserves greater scrutiny.[79]

In a US study, 89.9% of pregnant women returned for their TST reading.[80] Efforts to make screening a one step process would enhance acceptability among pregnant women.[75]

**Table 11 Common Screening Algorithms used to diagnose TB among Pregnant Women by Setting**

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>TST sx</td>
<td>Sm Cx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sm Cx Clinical Other</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>Sx TST</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CXR Sm Other</td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR TST</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>CXR clinical</td>
<td>CXR Sm Cx Clinical</td>
</tr>
</tbody>
</table>

13. **Persons seeking VCT**

A majority (70%) of persons seeking VCT for HIV accepted TB screening in four studies where the refusal rates were given. In a South African study from KwaZulu-Natal, the location of screening and confidentiality were critical to acceptability of VCT by adolescents: 43% of out of school youth stated a preference for a VCT site or hospital far from home, (or, if they could afford it, a private doctor), to reduce the chances of being seen by someone they knew.[81-82]

14. **Smokers**

Acceptability of conducting screening among smokers is difficult to discern due to a lack of studies. No consent rates were given for the ten studies reviewed. One qualitative study suggested that smokers may refuse TB screening if they feel that a TB diagnosis would lead to additional pressure to give up smoking.

*Oh. They worry about what they would find. That they might have it, yeah.*
Because they smoke too much. We got a lot of smokers here. They are afraid they might find out what they have. And they don’t want to ‘cause they do love to smoke. (53-year-old sheltered female)[46]

One of the barriers to reaching smokers is that there are not a homogenous risk group and may share very few common characteristics beyond their shared addiction. Combining TB screening with screening for other health risks in this population has potential. For example, implementing the ASSIST (Alcohol, Smoking and Substance Involvement Screening Test) that enables early case detection has been widely promoted by WHO.10

| Table 12. Consent for TB Screening among Congregate/Occupational Risk Groups |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| Congregate/Occupational/ Institutionalized Risk Groups | Minimum consenting to TB Screening % | Maximum consenting to TB screening % | Average proportion who consent to TB screening % | weighted average of proportion who consent to TB screening % |
| Institutionalized Mentally Ill | 93 | 98 | 94 | 95 |
| Institutionalized Elderly | 72 | 95 | 83 | 72 |
| Factory and Farm workers | 95 | 100 | 98 | 97 |
| Health care workers | 56 | 91 | 78 | 59 |
| Miners(6) + Ex-miners (2) | 66 | 93 | 81 | 70 |
| Orphans, institutionalized minors | 71 | 71 | 71 | 71 |
| Prisoners | 18 | 98 | 71 | 72 |
| Refugees/internally displaced (IDP) | 23 | 79 | 53 | 74 |
| Residents of Urban poor areas | 59 | 99 | 87 | 91 |
| Soldiers/Military personnel | 93 | 99.9 | 96 | 99 |
| Transportation workers | 73 | 98 | 85 | 80 |

**Congregate/Occupational/Environmental Risk Groups**

15. **Factory & Farm workers**

Twelve studies were thought to consider acceptability of conducting screening among factory and farm workers. However, upon closer inspection of abstracts, it became clear that screening was conducted in a compulsory manner in five studies conducted in Qatar, Iran, US, Kuwait.  

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Taiwan and thus the issue of acceptability was not studied.\cite{83-85} From among the remaining studies, consent ranged from 95-100\% with a weighted average of 97\%.

Several authors have suggested that in certain settings TB screening programs run by industries may be a means of identifying and dismissing ill workers without compensation.\cite{86} To increase uptake, it may be preferable to have screenings conducted by independent local health authorities or with union participation.

CDC Recommendations on TB screening among migrant farm workers emphasize the importance of engaging outreach workers from the same cultural/language background as a means of increasing acceptability, but the data to support this recommendation was not provided, perhaps because it is rather commonsensical.\cite{83} In South Africa, the use of lay health workers (LHW)on farms has been shown to be acceptable and cost effective for DOTS and may be also useful for symptom screening.\cite{87-88}

One Australian study of office workers found 89.7\% (185/205) uptake of screening in the context of a contact investigation.\cite{89}

16. Health care workers

Participation rates in TB screening among Healthcare workers (HCWs) has been considered in a systematic literature review in 2007. A total of 25 publications were identified and the participation rates of HCWs in TST surveys ranged from 80 to 100\%.\cite{90} However, our review identified studies with acceptability as low as 56\% and a weighted mean of 59\%.

In Edmonton, 72.4\% of HCW who received a written letter inviting them to screening participated. Less than three quarters was described as evidence of high participation and acceptability in this population.\cite{91} Compliance with annual screening of emergency workers in New York city was also 75\%.\cite{92} In Malaysia 90.8\% of HCW accepted screening for LTBI. Across 14 hospitals in Melbourne, participation in LTBI screening varied widely from, 13\%-66\% suggesting a role of hospital administration and context in determining acceptability.

One study implied that HCW participation in screening was correlated to the perceived risk of TB in the workplace.\cite{93} Another opinion piece implied that the competence of the occupational health nurse was a critical determinant.\cite{94}

Even when screening was compulsory among health workers, participation rates could be as low as 85\% and not conform to the prescribed periodicity.\cite{95-96} HCW in the US and Canada are less likely to complete LTBI treatment than the general population.\cite{63} The screening steps for detecting a case of TB in health care workers varied in a review of the literature, but the two most common approaches were TST and Chest X-ray.

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>CXR</td>
<td>Sm Cx Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td></td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>TST</td>
<td>Sm Cx Other</td>
</tr>
<tr>
<td></td>
<td>Sx TST IGRA</td>
<td></td>
</tr>
</tbody>
</table>
A qualitative study by Joseph et al., 2004 quoted in the NICE reviews, indicated that some health care workers in low burden settings did not feel that the risk of TB merited annually screening. Fear of stigma from a LTBI diagnosis was mentioned by some participants.[97] Stronger sentiments were expressed in a qualitative paper on health care worker attitudes toward TB screening in Uganda by Buregyeya et al.[98] Health care workers expressed concerns that a TB diagnosis would not be maintained confidential by supervisors and colleagues would infer a positive HIV status. Health care workers wanted an off-site one-stop-shop where multiple health care services were offered. Some health care workers conducted screening tests on themselves as a way to mitigate any potential for stigma or breach of confidentiality.[98] In the Uganda survey of health care workers, none reported routine screening for TB, although 89% were willing to participate in a TB screening program.

17. Miners

Six studies reported recruitment rates varying from 66-93%, yielding a weighted average of 70% consent. Among 55 papers on TB screening among miners, there were no papers that specifically addressed the acceptability of conducting screening among miners qualitatively. This may be because occupational health regulations and best practices require regular TB screening. There were several studies of screening among ex-miners in which screening was voluntary. However, these screenings were often conducted to determine eligibility for monetary compensation for TB disease as an occupational disease, and although voluntary, were perhaps difficult to refuse.[99-100]. The economic implications of screening results are likely to heavily influence the acceptability of screening in this population.

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>Sx, CXR, CXR TST, Sx CXR Other, Sx CXR Sm Cx</td>
<td>Sm, Cx, CXR, Clinical criteria, Sm Cx</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR Sm Cx Other, CXR TST, CXR TST Sm Cx</td>
<td>Sm, Cx, CXR</td>
</tr>
</tbody>
</table>

18. Orphans and minors in congregate settings.
The acceptability of conducting TB screening among orphans and children in congregate settings is difficult to characterize given the diversity in this group. One study found consent rates of 71% among adoptive parental of orphans.

Since many countries require TB screening for international adoption, the TB burden among orphans in orphanages is well known, but the acceptability of screening is unexamined because it is compulsory. For example, studies of incarcerated children in Pakistan and youth enrolled in a jobs program in the US applied mandatory TB screening to residents.[101-102] Among older children in primary and secondary boarding schools there is also limited information. Three studies were identified. In Toronto, of 1775 eligible “high risk” students (i.e. foreign-born) 42.9% (761) agreed to participate in TB screening with TST, and 40.6% (720) were screened. Significant skin-test reaction’s were detected in 22.5% (162/720) of the participants screened. Of these, 87.7% (142/162) saw a physician; subsequently, 2 cases of TB (1 active and 1 inactive) were detected. Of the remaining 140 students 44.3% (62) were prescribed isoniazid, of whom 9.7% (6/62) refused chemoprophylaxis.[103]

19. Prisoners

Acceptability of conducting screening among prisoners is not widely understood because screening is often conducted without informed consent. Among 18 studies listing recruitment rates, the weighted average acceptability of TB screening was 72% with a range from 18 to 100%. A total of 241 abstracts of studies were reviewed for acceptability information. In one Pakistani study, TB screening was accepted by 100% of randomly selected inmates, but HIV screening was rejected by 2.2% of the same cohort(8/365)[104]

Some anecdotal and ethnographic work suggests that the acceptability of screening may be related to perceived benefits from a positive diagnosis, such as improved food quality or sleeping conditions.

Acceptability of TB screening among prison staff and administration has been studied in the United States and Morocco. [105] Only 51% of jail leadership complied with annual TB screening of staff, potentially suggesting limited acceptability of current guidelines in this population.[106] Similarly, a study in US lock ups reported “no time to screen inmates”. [107]

While TB screening may be acceptable while incarcerated, compliance with treatment has been shown to be largely unacceptable for ex-prisoners in many settings.[63] [108-109] This is particularly the case when imprisoned TB patients are deported to a different country during TB treatment.[110]

A qualitative evaluation of an educational intervention to improve screening in Honduran prisons concluded that low literacy health education materials, actively engaging prisoners in the campaigns, incorporating the language, values, and experiences encountered within prison culture would facilitate acceptance of TB control activities. Campaign weaknesses included the creation of illustrations that could perpetuate the stigma associated with TB and use of some materials in which the purpose was not apparent.[111]

Acceptability in this population may also be related to the quality of screening, which has been shown to have deficits in some settings.[112] The screening steps for detecting a case of TB in prisoners varied, but the two most common approaches were symptom screen and chest X-rays.

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial</th>
<th>Examples of Subsequent Diagnostic</th>
</tr>
</thead>
</table>

Table 15: Common Screening algorithms for Prisoners by Setting
screening algorithms | steps
---|---
High Incidence | Sx
Sx, CXR, sm | CXR Sm
CXR Sm Cx Clinical
Sm
Sm, Cx

Medium incidence | Sx
Sm, Other | CXR, Sm Clinical
Sm
Sm Clinical
Sm Cx
Sm Cx Clinical
Sm Cx Clinical Other

Moderate incidence | Sx
Sx, CXR
Sx, CXR TST
Sx, TST, Sm, Cx | CX Sm Cx
CXR Sm Cx Clinical
CXR Sm Cx Clinical Other
Sm Cx
Sm Cx Other

Low incidence | CXR
CXR, TST
TST
Sx, CXR, TST
Sx, TST | CXR
CXR Sm
CXR Sm Cx
CXR Sm Cx Clinical
CXR Sm Cx Clinical Other
Sm Cx

20. Refugees and internally displaced persons.

Acceptability of conducting screening among refugees and internally displaced persons (IDPs) was a topic of nine studies, but only three gave consent rates, yielding a wide range of acceptability from 23 to 79%, with a weighted average of 74%. Levesque et al found in the Canadian context that acceptability of screening with Mantoux was 76.7%. Interestingly, perceiving tuberculosis as a severe disease (OR 0.29, 95% CI 0.09-0.91) and consulting for an immigration examination (OR 0.42, 95% CI 0.18-0.98) were associated with refusal of TST screening.[113] Two studies noted that although TB screening appears quite feasible, treatment adherence can be low.

In one study among internally displaced populations in armed conflict, the ability to access screening depended on whether or not there was a curfew and whether or not the there was a separate examination room for screening to take place.[114]

While this may suggest that IDPs are opposed to TB screening, it is likely that there are other operational and logistical factors affecting the uptake in these study contexts. The screening steps for detecting a case of TB in refugees in or coming from camps varied and are listed below.

Table 16 Common Screening Algorithms used to diagnose TB among Refugees and IDPs by Setting

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
| Medium incidence | CXR
Sx CXR | CXR Sm Cx
CXR Sm Cx Clinical Other |
21. Residents of Urban poor areas

Among 11 studies reviewed, the range of consent for TB screening among urban household residents ranged from 59-99% with a weighted average of 91%. Acceptability of conducting screening among residents in urban poor areas has been researched in various regions. Tupasi et al concluded that symptom screening followed by sputum examination was acceptable in urban settlements in the Philippines. [115] Walton et al found that TB case-finding was acceptable in Haitian poor areas particularly when combined with other health services, such as reproductive health care and ART. [116] What makes this area challenging is that many of the large prevalence surveys do not report what incentives were given, making it hard to assess the generalizability of the findings. For more information, see the companion review on the acceptability of community screening (Mitchell et al 2012)

22. Soldiers and Military personnel

Two of five studies reported a consent rate. These were 93 and 99.9%, yielding a weighted average of 99% consent. Acceptability of conducting screening among soldiers is understudied as screening is often compulsory. The screening steps for detecting a case of TB in military personnel varied, but the two most common approaches were TST, either with Chest X-ray or a symptom screen, and Chest X-ray alone.

Table 17: Common Screening algorithms used in diagnosis of TB in Military Populations

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>CXR</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>CXR TST</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td>Moderate incidence</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>CXR TST</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>Sm Cx Clinical</td>
</tr>
<tr>
<td></td>
<td>Sx TST</td>
<td></td>
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</tbody>
</table>

23. Transportation workers

Acceptability of conducting TB screening among transportation workers is under studied. Among three studies among bus and airplane workers with consent rates, the range was 73-98%, with a weighted average of 80% acceptance. Edelson and Phypers conducted a systematic review of TB transmission on public transportation in 2011. [117] TB outbreaks on buses and trains are increasingly documented [118-119]. Among passengers in the Washington DC area, 92% of bus passengers approached consented to TST. [120]. The acceptability of mobile VCT has
been heavily studied in long haul truckers who engage in transactional sex, and it is widely acceptable. Gany et al (2005) found that while uptake of symptom screenings was high among immigrant taxi drivers in the UK, only 78(63%) of the 123 returned for TST readings suggesting a limited motivation for TB Screening. Among drivers with positive test results 64% were not treated for latent TB infection.

Table 18 Consent for TB Screening Among Marginalized Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Minimum consenting to TB Screening %</th>
<th>Maximum consenting to TB screening %</th>
<th>Average proportion who consent to TB screening %</th>
<th>Weighted average of proportion who consent to TB screening %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeless</td>
<td>41</td>
<td>100</td>
<td>79</td>
<td>96</td>
</tr>
<tr>
<td>Indigenous</td>
<td>40</td>
<td>97</td>
<td>82</td>
<td>69</td>
</tr>
<tr>
<td>Migrants</td>
<td>34</td>
<td>96</td>
<td>66</td>
<td>85</td>
</tr>
<tr>
<td>Men who have sex with men (MSM)</td>
<td>64</td>
<td>91</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Nomadic/pastoralist populations</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Street children/street youth</td>
<td>86^</td>
<td>99^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transgenders</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
</tr>
</tbody>
</table>

^HIV screening studies

24. Homeless

The acceptability of conducting TB screening among people who are homeless has been studied in low incidence countries. We found a range from 41-100% consent for TB screening among 6 studies, with a weighted average of 96%. Three European studies in Glasgow, South London, and Rotterdam, before and after introduction of incentives for screening, suggest that acceptability is increased when incentives are offered and screening includes mobile digital X-ray units (MXUs).[121-124]

One study highlighted two factors in screening uptake a) the quality of the rapport and b) perceived confidentiality as pivotal for women with children.[125] Similarly, a "culturally competent Nurse Case Management (NCM) approach, combined with incentives, was successful in Los Angeles.[126]

A study in New Orleans had participation rate of only 52%.[127] High acceptance of screening (89.93%) in shelters in Rome, was attributed to the novel use of an "integrated social network" approach.[128]

A comparative study of factors associated with uptake of HIV testing among street youth in 2 US cities found that contact with an outreach worker did not necessarily increase acceptability of test.[129] A peer outreach model that embedded screening in a bundle of basic services—shelter, food, clothing appeared to be acceptable in one study, but it was not rigorously evaluated.[130] For some homeless adolescents, testing HIV positive was perceived as
advantageous in the procurement of basic needs such as food and shelter and screening was therefore highly acceptable.[131]

The screening steps for detecting a case of TB in homeless persons in shelters or hostels varied, but the two most common approaches were chest X-ray and tuberculin skin testing. A combination of symptom screening, chest Xray, and tuberculin skin testing was used as frequently as TST alone.

**Table 19: Common Screening algorithms for diagnosis of TB among Homeless persons**

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Medium incidence</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Moderate Incidence</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Low incidence</td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
<tr>
<td></td>
<td>CXR Sm</td>
<td>CXR Sm Cx</td>
</tr>
<tr>
<td></td>
<td>CXR TST</td>
<td>CXR Sm Cx Clinical</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>Sm Cx</td>
</tr>
<tr>
<td></td>
<td>Sx CXR Sm Cx</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sx CXR TST Sm Cx</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sx TST</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sx TST Sm Cx</td>
<td></td>
</tr>
</tbody>
</table>

25. Indigenous

It is hard to summarize the acceptability of screening in this diverse group. Among nine studies included, the range was 40-97%, with a weighted average of 69%. Among indigenous children, participation rate in TST screening among the Cree in Canada was 94% suggesting it may vary by age cohort.[132]

Acceptability of conducting screening among indigenous people is a topic treated in some depth in the Anthropological literature, but relatively neglected in the TB control community.

Two Canadian studies among the Inuit in Labrador and 10 groups in Alberta argued for early and meaningful involvement of the community in planning any screening program.[133] [134] Screening uptake was felt to be better if culturally relevant health education preceded it. Another Canadian study identified "negative memories and experiences relating to the colonial history of TB treatment "as a significant barrier to screening.[135]

A study in remote Northern Australia identified discomfort with screening by non-indigenous clinicians. This problem was compounded by communication barriers.[136]. In Paraguay, the limited ability of the national program to address high rates of TB among the Ache were attributed to “hostile intergroup interactions” and “behavioral noncompliance”[137]. Similarly in Brazil, an “inadequate approach to patient during sputum collection” and “inadequate professional training” were felt to reduce the acceptability of screening in indigenous communities.[138]

Several authors argue that an intercultural health system must be in place to ensure that the indigenous people will utilize TB screening. Conceptually, there are four fundamental prerequisites that must be present (United Nations, 2009):
1) Fundamental respect for human rights of indigenous peoples.

2) There must be recognition of indigenous people as unique. Indigenous people are often conflated with groups of “vulnerable people” or “the poor” which erases key differences.

3) There must be political will aiming at improving health of the indigenous group.

4) There must be a conscious decision on the part of the national society to engage in an exchange and sharing of knowledge, value and customs to overcome the mono culturalist structures.

Prior to starting active case finding or TB screening, the existing belief and practice about TB should be well understood and incorporating core elements of traditional belief systems proved useful[139]. Engagement of literate tribal youth volunteers was successful in one study in Tamil Nadu.[140] In an Ecuadorian study, screeners respected the busy hours and agricultural calendar of indigenous families. By conducting screening in early evening hours, acceptability was enhanced.[139]

26. Migrants

Twelve studies on the acceptability of conducting screening among migrants were identified out of 169 reviewed. The range of consent was from 34-96% with a weighted average of 85%. Several studies had methodological flaws, most commonly, selection bias: only assessing acceptability of screening among migrants who had agreed to be TB screened. Screening of migrants can be controversial due to the political and international character of the exercise. [10, 141-142] The fact that it is typically compulsory makes it difficult to assess the acceptability of it by the proxy variable proportion screened. Only three studies posed the question of acceptability to migrants. Brewin et al queried migrants in a social service centre for asylum seekers, a hospital clinic for new entrants and primary care setting and found that in Britain TB screening was widely acceptable. This study did not include migrants who did not accept screening and this bias makes the findings hard to embrace.

A study in Brescia, Italy found that “being unmarried, of Senegalese nationality, and being interviewed by a health-care worker in the same native language as the immigrant were significantly associated with completion of screening for LTBI. In the multiple logistic regression, being interviewed in the native language (OR 2.5, 95% CI 1.3-4.8, P=0.004) and being of Senegalese origin (OR 2.3, 95% CI 1.4-3.6, P=0.0005) were independently associated with adherence to LTBI screening.”[143] One study asserted that use of a “transcultural” perspective could overcome initial resistance to screening.[144] Evidence for this hypothesis using a pre/post design came from Italian study in which a dedicated nurse and cultural interpreter team were developed. Screening acceptability improved with the team approach, compared to the previous year (89% vs. 68%).[145]

Somali migrants in London recommended engagement of Somali volunteers.[146] However a Swedish qualitative study of Somali migrants came to the opposite conclusion with regard to culture-matched/language-matched screeners. Interpreter use was expressed as a barrier particularly if of same female gender due to fear of breach of confidentiality both in the Somali community as well as to immigration authorities. [142]. Coreil et al. (2004) conducted focus
groups with Haitians living in South Florida and found that fear of confidentiality breach was also a disincentive to screening.

A Netherlands study of QFT-GIT for screening found 61% consented to screening. Compared to non-consenters, the consenters were significantly more often from Sub-Saharan Africa (P=0.001) and countries with high TB incidences (P<0.001). Reasons for refusal were predominantly a lack of time and fear of having a blood draw[147].

27. Marginalized Men who have Sex with Men (MSM)

The acceptability of conducting TB screening among marginalized men who have sex with men (i.e. MSM) has not been a significant focus of TB programs. Some NTP programs in low and middle income countries are not aware of the role that MSM play in their TB epidemics. Some TB programs staff believe MSM are largely concentrated in high income countries. However, MSM are widely dispersed geographically and are estimated to have 19.3 times higher odds of having an HIV-infection than the general population in low- and middle-income countries.\textsuperscript{11} MSM make up a significant proportion of PLHIV studies in some settings with concentrated HIV epidemics, however their participation rates are not commonly disaggregated. Homosexuality has been found to be a risk factor for TB disease in homeless populations in the US.\textsuperscript{[148]} Of thirty three studies of TB screening in MSM were identified, three articles provided information on the proportion who consented to screening in the context of contact tracing—two from the US and one from Bangladesh.\textsuperscript{[72, 149-150]} Acceptability of TB screening ranged from 43% to 91%.\textsuperscript{[150]} Several large studies of TB screening in MSM did not list consent rates, possible due to the use of snowball sampling.\textsuperscript{[151-152]} Peer-to-peer referral for TB screening has been shown to be acceptable in MSM sex workers population.\textsuperscript{[152]}

28. Nomadic /Pastoralist populations

Although it is often assumed that nomadic populations will not have high rates of M. Tb, in the 2010 Ethiopia Prevalence survey, the point prevalence of smear positive TB among pastoralists was 167/100,000 (95% CI 64-269) among 4255 screened. This is almost three times the TB rate in urban clusters of 77/100,000 (95% CI 0-159) and almost double the rate of rural clusters of 103/100,000(95% CI 62-143).

Acceptability of conducting screening among nomadic and pastoralist populations is an important topic, but accessibility of screening is perhaps the bigger obstacle to effective TB screening in this group.\textsuperscript{[153-155]} The acceptability of mobile VCT has been studied in this population and uptake is not high\textsuperscript{[156-158]}. Pastoralists in Kenya have gender differences in rates of MTb reflecting differential access to care and health seeking behavior.\textsuperscript{[159]} The novel use of “TB villages” as TB treatment sites has been successful and could be perhaps modified for TB screening.\textsuperscript{[160]} Screening in this population should not rely solely on smear microscopy or TST because of the high rates of \textit{M. bovis} in this population.

29. Sex workers

Acceptability of conducting TB screening among sex workers has attracted little scholarly attention although the rates of TB are very high[161]. In one US study assessing the willingness of sex workers to be screened for TB in an outbreak investigation among exotic dancers, the uptake was 88%. In a 1997 Kenya study among a cohort 745 female sex workers, the use of TST was abandoned after six months due to its unpopularity among participants, suggesting that other screening techniques are likely to be more acceptable.[161] Peer-to-peer referral for TB screening in Bangladesh has been shown to be highly acceptable in both male and female sex workers population particularly when combined with provision of hygiene facilities.[152] The acceptability of mobile VCT and different modalities of STI screening have been heavily studied in this population and we can infer a high rate of uptake.

30. Street children / abandoned children/ out of school youth

Acceptability of conducting TB screening among street children has not been rigorously scrutinized. However, it is clear that screening programs for street children can be complex due to varying legal requirements for parental consent and mandatory disclosure laws in some settings.[162]. The acceptability of mobile VCT and other health services has been heavily studied in this population. The abstracts of one hundred studies were identified and reviewed, however none described acceptability of TB screening specifically.

Studies of other types of screening can yield insights into the potential acceptability of TB screening in street children. A number of ethnographic studies identified a non-specific distrust of formal social and health services and harassment by police as negative influences on attitudes toward public health services.[163]

In Montreal a cohort of street youth was HIV tested every six months for six years and retention was 86%.[164] This suggests that screening is acceptable when coupled with incentives. In Toronto, as many as 99.7% (695/697) of street youth who were offered incentives provided a saliva or blood specimen for screening, however incentives were not defined.[165]

A comparative trial of factors associated with uptake of HIV testing among street youth in 2 US cities found that contact with an outreach worker did not necessarily increase acceptability of test.[129] A peer outreach model that embedded screening in a bundle of basic services—shelter, food, clothing appeared to be acceptable in one study, but it was not rigorously evaluated.[130] For some homeless adolescents, testing HIV positive was perceived as advantageous in the procurement of basic needs such as food and shelter and screening was therefore highly acceptable.[131]

31. Transgender

Acceptability of conducting screening among transgender persons has been understudied. One study in an outbreak on the East Coast of the US had a consent rate of 91%, while in Bangladesh 77% of Transgenders with chronic cough were willing to provide sputum samples.[150, 152] Many studies use word of mouth and peer referral which makes a recruitment rate difficult to collect. The acceptability of mobile VCT and STI screening has been heavily studied in this population.

Traditional contact investigation has proved inconvenient with transgender people. Instead, CDC reports an experience in the US in which transgender social networks and “houses” were explored. This strategy was accompanied by place-based TB screenings in bars and social spaces.
Transgender women in New York and Bangladesh felt comfortable when visiting a community-based clinic that did not specify that it treated LGBTQ people because for many of them identifying as a woman was important. The work of the clinic was spread by word of mouth, and by references of other transgender people who made use of its services. The staff refer to the people by their preferred names instead of their legal names, for example, and offer a caring environment to their patients and a holistic approach to their health, which included hormones therapy (Melendez & Pinto, 2009). Transgender people have been successfully trained as TB screeners and sputum collectors in Dhaka.[152]

32. Screening of Contacts of a TB Case

Despite the importance of reaching Contacts of a TB case, the success of outreach efforts often varies widely. In a multicultural setting, acceptability may depend on the ability of the health system to overcome cultural and communication challenges. In the Netherlands TB contact investigations are less likely to be conducted when the index-cases are from non-Western countries (89% vs. 93%, POR 0.6, 95%CI 0.5-0.7).[166-167] Even though a Netherlands study of QFT-GIT found that non-Western suspects (P=0.001) and those from countries with high TB incidences (P<0.001) were more likely to consent to screening. Reasons for refusal were predominantly a lack of time and fear of having a blood draw[147]. There are various speculations as to the causes of disparity including: fear of stigma, unwillingness to participate, concurrent double screening policies (immigration), communication difficulties between health care worker and contacts, and financial barriers to compliance. Contact Tracing in households (91%± 17%) and communities (85%± 12%) may be slightly more acceptable than CT initiated as the result of a health care outbreak 73%(±145), but the number of studies in health settings was low.

<table>
<thead>
<tr>
<th>Type of Contact Tracing</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract Tracing - Household</td>
<td>80%</td>
<td>24</td>
<td>0.17</td>
<td>39%</td>
<td>99%</td>
<td>85%</td>
<td>60%</td>
</tr>
<tr>
<td>Contact Tracing - Community</td>
<td>88%</td>
<td>27</td>
<td>0.12</td>
<td>57%</td>
<td>100%</td>
<td>91%</td>
<td>42%</td>
</tr>
<tr>
<td>Contact Tracing - Health care</td>
<td>59%</td>
<td>4</td>
<td>0.14</td>
<td>43%</td>
<td>73%</td>
<td>60%</td>
<td>30%</td>
</tr>
<tr>
<td>Contact Tracing - Other</td>
<td>87%</td>
<td>3</td>
<td>0.07</td>
<td>83%</td>
<td>95%</td>
<td>84%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Table 21 Common Screening Algorithms used to diagnose TB among Contacts by Setting

<table>
<thead>
<tr>
<th>Study Settings</th>
<th>Examples of Initial screening algorithms</th>
<th>Examples of Subsequent Diagnostic steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Incidence</td>
<td>CXR</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>CXR Sm</td>
<td>CXR Clinical</td>
</tr>
<tr>
<td></td>
<td>CXR Sm Cx</td>
<td>CXR Clinical Other</td>
</tr>
<tr>
<td></td>
<td>CXR TST</td>
<td>CXR Cx Clinical Other</td>
</tr>
<tr>
<td></td>
<td>Sm</td>
<td>Sm Cx</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Medium incidence</strong></td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
<tr>
<td></td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
<tr>
<td><strong>Moderate incidence</strong></td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
<tr>
<td></td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
<tr>
<td><strong>Low incidence</strong></td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
<tr>
<td></td>
<td>CXR</td>
<td>CXR TST</td>
</tr>
</tbody>
</table>

Generalizing about acceptability of contact tracing is difficult because there is so much variation in the intensity of the tracing that it may be difficult to aggregate the data meaningfully. The inverse relationship between intensity of tracing and acceptability is illustrated by this example from a TB REACH project.
Yemen where refusal rates increase with a proportional decrease in the number of household visits made by the implementers.

Table 22 Changes in Screening Uptake over time in Yemen

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of adult index cases invited to participate</td>
<td>409</td>
<td>622</td>
<td>902</td>
<td>1084</td>
</tr>
<tr>
<td>Number of adult index cases who have relatives at home</td>
<td>409</td>
<td>622</td>
<td>902</td>
<td>1084</td>
</tr>
<tr>
<td>Number of Household visits</td>
<td>384</td>
<td>586</td>
<td>840</td>
<td>1003</td>
</tr>
<tr>
<td>Number of household contacts screened for symptoms</td>
<td>1029</td>
<td>2644</td>
<td>3669</td>
<td>5041</td>
</tr>
<tr>
<td>Number of index cases who refused household visit or to bring their HH to be investigated</td>
<td>15</td>
<td>36</td>
<td>62</td>
<td>81</td>
</tr>
<tr>
<td>Refusal rate of TB Contacts</td>
<td>3.7%</td>
<td>5.7%</td>
<td>6.8%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

Risk of bias across studies

There is a very strong likelihood of publication and selection bias in the studies that met the inclusion criteria, but the severity of the bias could not be effectively measured. The likely direction of the bias is towards acceptability of screening.

DISCUSSION

There were 13 groups whose acceptance of TB screening was consistently high.

Table 23 . Groups with Weighted mean Acceptability above 80% in Rank order

<table>
<thead>
<tr>
<th>Risk Groups</th>
<th>Mean %</th>
<th>weighted. mean %</th>
<th>Std. Deviation %</th>
<th>Minimum %</th>
<th>Maximum %</th>
<th>Median %</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. Soldiers/Military</td>
<td>96</td>
<td>99</td>
<td>0.05</td>
<td>93</td>
<td>100</td>
<td>96</td>
</tr>
<tr>
<td>15. Farm &amp; Factory (5)</td>
<td>97</td>
<td>97</td>
<td>0.02</td>
<td>95</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>25. Homeless (5)</td>
<td>66</td>
<td>96</td>
<td>0.24</td>
<td>41</td>
<td>97</td>
<td>75</td>
</tr>
<tr>
<td>13. Mentally Ill ((2)</td>
<td>94</td>
<td>95</td>
<td>0.02</td>
<td>93</td>
<td>95</td>
<td>94</td>
</tr>
<tr>
<td>5. Diabetics (2)</td>
<td>96</td>
<td>94</td>
<td>0.03</td>
<td>94</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>10. Pregnancy (3)</td>
<td>85</td>
<td>94</td>
<td>0.12</td>
<td>68</td>
<td>96</td>
<td>90</td>
</tr>
<tr>
<td>6. Drug Dependent (5)</td>
<td>84</td>
<td>93</td>
<td>0.13</td>
<td>69</td>
<td>94</td>
<td>89</td>
</tr>
<tr>
<td>21. Residents of Urban poor areas (11)</td>
<td>87</td>
<td>91</td>
<td></td>
<td>59</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>30. Sex Worker(1)</td>
<td>88</td>
<td>88</td>
<td>0.0</td>
<td>88</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>4. Children Under 5 (2)</td>
<td>87</td>
<td>87</td>
<td></td>
<td>84</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>24. Transport workers (3)</td>
<td>85</td>
<td>86</td>
<td>0.13</td>
<td>73</td>
<td>98</td>
<td>84</td>
</tr>
<tr>
<td>27. Migrants (8)</td>
<td>77</td>
<td>85</td>
<td>0.15</td>
<td>55</td>
<td>96</td>
<td>81</td>
</tr>
<tr>
<td>- PMTCT (3)</td>
<td>79</td>
<td>81</td>
<td></td>
<td>68</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>- Immigration</td>
<td>73</td>
<td>80</td>
<td>0.20</td>
<td>34</td>
<td>96</td>
<td>79</td>
</tr>
</tbody>
</table>
There were six groups whose weighted mean acceptability was reasonable, ranging from 70%-79%. TB screening in these groups is acceptable to the majority of those to whom it offered voluntarily, but is not universally embraced. Many of these groups currently undergo mandatory screening due to their extremely high risk of TB disease, so their feelings about screening may have little practical implications. Health care workers have the lowest consent rates for screening of the risk groups included.

### Table 24. Groups with Weighted mean Acceptability above 50% in Rank order

<table>
<thead>
<tr>
<th>Risk Groups</th>
<th>Mean %</th>
<th>Weighted mean %</th>
<th>Std. Deviation</th>
<th>Minimum %</th>
<th>Maximum %</th>
<th>Median %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transgenders (2)</td>
<td>77</td>
<td>79</td>
<td>0.07</td>
<td>77</td>
<td>91</td>
<td>84</td>
</tr>
<tr>
<td>PLIHIV (18)</td>
<td>82</td>
<td>78</td>
<td>0.13</td>
<td>52</td>
<td>99</td>
<td>83</td>
</tr>
<tr>
<td>Refugee Camps/IDP (2)</td>
<td>41</td>
<td>74</td>
<td>0.25</td>
<td>23</td>
<td>58</td>
<td>41</td>
</tr>
<tr>
<td>Elderly- Institutionalized (2)</td>
<td>83</td>
<td>72</td>
<td>0.17</td>
<td>72</td>
<td>95</td>
<td>83</td>
</tr>
<tr>
<td>Prisoners (16)</td>
<td>71</td>
<td>72</td>
<td>0.29</td>
<td>18</td>
<td>98</td>
<td>86</td>
</tr>
<tr>
<td>Miners (6)</td>
<td>81</td>
<td>70</td>
<td>0.11</td>
<td>66</td>
<td>93</td>
<td>84</td>
</tr>
</tbody>
</table>

Indigenous populations, Persons testing for HIV (VCT), Attendees of Health centers, men who have sex with men (MSM), and Health Care Workers (HCW) had consent rates ranging from 59-69%. This is curious because common sense would suggest that attendees at health care centers, persons testing at VCT centers, and health care workers would seem the easiest and most willing to be TB screened. One possibility is that the lower recruitment rates are more a function of staff screening efforts and less a reflection of individual attitudes toward screening. In other words, this may reflect partial or uneven implementation of recruitment of TB screening more that actual acceptability. Or alternatively, the weighted mean is biased downwards by a few particularly unpopular large screening efforts because the media acceptability is still high in these groups.

The proportion of eligible persons who ultimately participate in screening is an imperfect though highly convenient proxy of the acceptability of screening in a population. Consent has been shown to be influenced by the demeanor of the research staff, incentives offered, and other intangibles.

### Table 25. Groups with Weighted mean Acceptability below 70% in Rank order

<table>
<thead>
<tr>
<th>Risk Groups</th>
<th>Mean %</th>
<th>Weighted mean %</th>
<th>Std. Deviation</th>
<th>Minimum %</th>
<th>Maximum %</th>
<th>Median %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous (9)</td>
<td>82</td>
<td>69</td>
<td>0.20</td>
<td>40</td>
<td>97</td>
<td>89</td>
</tr>
<tr>
<td>Persons testing for HIV (VCT) (4)</td>
<td>73</td>
<td>69</td>
<td>0.23</td>
<td>41</td>
<td>97</td>
<td>85</td>
</tr>
<tr>
<td>Attendees of Health centers (3)</td>
<td>59</td>
<td>68</td>
<td>0.07</td>
<td>52</td>
<td>67</td>
<td>57</td>
</tr>
<tr>
<td>MSM (2)</td>
<td>76</td>
<td>61</td>
<td>0.48</td>
<td>64</td>
<td>91</td>
<td>-</td>
</tr>
<tr>
<td>Health Care Workers (5)</td>
<td>78</td>
<td>59</td>
<td>0.14</td>
<td>56</td>
<td>91</td>
<td>80</td>
</tr>
</tbody>
</table>

Alcohol dependent persons, the Malnourished, Nomadic/pastoralist populations, Orphans/Children in congregate settings, Persons with Previous TB, Smokers, and Street children/ street youth did not have TB screening studies with relevant information, so they were excluded from the quantitative part of this review.
Bar surveys are a common feature of public health surveillance in many areas and have been shown to be well accepted.[168-169] Otherwise hard-to-reach individuals are often more willing to participate in surveys in a bar setting than in other settings (Ross et al, 2008). Bars often represent an important space for social networking for migrants, ex-prisoners, smokers, alcohol users, immune-compromised persons, the elderly, sex workers, and the homeless (Measure, 2008). Bars may also serve individuals with diabetes and/or mental health issues.

The advantage of a place survey over other types of surveys is that it does not explicitly target certain groups or require self-disclosure of hidden or stigmatized populations. Therefore it can avoid some of the problems with stigma, refusal and non-response that clinic-based surveys encounter (Measure, 2008).[170]

**Limitations**

This synthesis has a number of limitations. The most serious limitation of these analyses is the dearth of studies that truly focus on acceptability of screening. The lack of qualitative ethnographic work on reasons for refusal of TB screening, as well as the perceived risks and benefits of screening, and the incomplete descriptions of methods in many TB studies complicates the search for clear answers [10, 171].

Out of necessity a “vote with your feet” proxy for acceptability (% screened among # eligible) has been employed. However, we acknowledge that “Acceptability” is a composite social construct that denotes more complex and inter-related ideas. It is very difficult to quantify and synthesize because acceptability is already a synthesis.[172]. It is unclear if the recruitment rates of well-executed, well-resourced studies found here can be deemed as legitimate proxies for acceptability of screening in routine programmatic settings. Unfortunately the bulk of the published literature concerned TST screening in low incidence settings and this is likely to be a poor proxy for the acceptability of symptom screening and other less invasive and less cumbersome methods.

Another limitation is that is includes only cross sectional studies, but a proper answer to the acceptability question might also consider the inclusion of longitudinal cohort studies with periodic screening[173]. There is preliminary evidence that a population that is subject to too frequent TB screening may under-report symptoms to avoid invasive testing.[17]

This review is likely to be affected by significant degree of reporting bias and publication bias which may over estimate the acceptability of screening since studies with high refusal rates face bigger hurdles to publication. To overcome this challenge, authors have triangulated data from published and unpublished reports of the same study to detect reporting bias and have included studies that were never published to attempt to mitigate the potential publication bias.

Such a high level synthesis in the face of significant methodological diversity is a perennial challenge of the systematic review technique and it was not always possible to report key nuances and make concise summary tables[174-175]. Statistical methods for combination of qualitative and quantitative data, where there are many missing values, such as Bayesian augmentation methods might have been more appropriate for this analysis.[176-177] Marked

12 Quoted in Corbett et al 2010 "In the 12% of "households randomly selected for survey of tuberculosis" and HIV prevalence, 10 092 adults (81% of 12 426) provided" sputum before intervention and 11 211 (77% of 14 569)"provided sputum after five rounds of intervention, with "lower participation in men (65% [3970/6151] before" intervention, 57% [4061/7185] after intervention) than in" women (98% [6121/6275] before intervention, 97% [7150/7384] after intervention; web appendix p 5).

differences by age and gender within risk groups in some settings suggest that ACF/screening has other dimensions that preclude broad generalizations about acceptability.[173, 178]  

Finally, some have argued that it is highly problematic to look at acceptability of the primary screening step in isolation from acceptability of diagnosis and treatment. Where it has been possible (e.g. adolescents) we have included the slope of the drop off between the primary and secondary screening step to try to indicate the full refusal.

**Conclusions**

Despite a lack of attention to the issue of acceptability in screening and active case finding among populations exposed to is, it can be inferred that community–based screening or active case finding is widely acceptable in most contexts, including hard to reach communities, conflict zones, and among most at-risk and vulnerable groups.

This review used a comprehensive strategy and creative approach to identify potential studies on acceptability of screening within a very large literature on active case finding. The main strengths of the analysis are the diverse sources from which the results were drawn and the harmonization of disparate study results into coherent, digestible information.

TB screening initiatives are well received by most risk groups (59-99%) and acceptability can be enhanced with the group-specific modifications described in the qualitative literature. Researchers should take greater care in documenting and reporting acceptance and refusal rates. The issue of acceptability among health workers must also be further considered, since they seem to be the least enthusiastic about TB screening, despite being perhaps the most cognizant of its benefits.[10]

**FUNDING**

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**Appendices**
Appendix 2 Search Strategy for: *What is the acceptability of universal TB screening among specific risk groups in the 1985-April 2011 period?*

Eligibility criteria

1. **TIME SPAN** = 1985-April 2011  
2. **LANGUAGES** = English, Spanish, Portuguese, French, Dutch, German,  
3. Peer-Review literature: EMBASE or ISI Web of Science  
4. Grey Literature: WHO website or KNCV TB Foundation Archive

5. **TITLE CONTAINED ONE OF THE FOLLOWING** = 42,204  
   - tubercul*  
   - lung tuberculosis  
   - pulmonary consumption  
   - consumption, pulmonary  
   - TB

6. **COMBINED WITH ARTICLES ON SUBJECTS BELOW** = >100,000
   
   1. case find*  
   2. mass + radiograph*  
   3. screen*  
   4. contact examin*  
   5. screening survey*  
   6. cross-sectional  
   7. case-detect*  
   8. detect*  
   9. case-find*  
   10. prevalence + stud*  
   11. contact investigat*  
   12. algorithm  
   13. household + survey  
   14. pre-employment + testing  
   15. undiagnos*  
   16. missed*  
   17. delay*  
   18. contact trac*  
   19. incidence  
   20. checking  
   21. pre-entry  
   22. intensified + case  
   23. active + case  
   24. passive  
   25. TB suspect*  
   26. outreach  
   27. mobiliz*  
   28. grass-root*  
   29. community + involvement  
   30. community + particip*  
   31. empower*  
   32. grass-root$  
   33. civil society  
   34. engage*  
   35. reach

7. The TB Screening/Active case finding universe was 27,230 records

8. **ANY ARTICLES WITH TITLES CONTAINING THESE WORDS WERE EXCLUDED:**
   
   1. deer  
   2. cattle  
   3. possum  
   4. macaque*  
   5. guinea pig*  
   6. animal  
   7. vaccine  
   8. BCG  
   9. mice  
   10. regimen  
   11. fixed-dose  
   12. side-effect*  
   13. survival  
   14. biopsy  
   15. interferon-gamma  
   16. pathophysiology  
   17. mortality  
   18. clinical + outcome*  
   19. meningitis  
   20. Treatment+ outcome*  
   21. genotyp*  
   22. bacille Calmette  
   23. Missing+data  
   24. drug resistance survey*  
   25. re-vaccination  
   26. candidate  
   27. bovi*  
   28. non-tubercul*  
   29. strain  
   30. Case+ report  
   31. dose-response  
   32. adverse  
   33. phenotyp*  

6. **The TB screening/Active case finding universe was therefore reduced to 14,315 records**
Note: When a search yielded more than 500 hits on a particular risk group, we could not download them from web of science, so we applied these additional exclusion criteria:

EXCLUDE ARTICLES ON Subject Areas=

1. Agriculture,
2. Allergy
3. Anatomy & Morphology
4. Anesthesiology
5. Applied Radiology,
6. Biochemistry & Molecular Biology
7. Biology
8. Biophysics
9. Cardiac & Cardiovascular Systems
10. Cell Biology
11. Chemistry,
12. Chemistry, Medicinal
13. Chemistry, Organic
14. Dentistry,
15. Dermatology
16. Ecology
17. Endocrinology & Metabolism
18. Engineering, Biomedical
19. Environmental Sciences
20. Evolutionary Biology
21. Food Science & Technology
22. Gastroenterology & Hepatology
23. Genetics & Heredity
24. Geriatrics & Gerontology
25. Gerontology
26. Hematology
27. History & Philosophy Of Science
28. Immunology
29. Legal Mathematical & Computational Biology
30. Microbiology
31. Multidisciplinary
32. Nephrology Neuroimaging
33. Nuclear Medicine
34. Nutrition & Dietetics
35. Oncology
36. Ophthalmology
37. Oral Surgery & Medicine
38. Orthopedics
39. Otorhinolaryngology
40. Parasitology
41. Pathology
42. Pharmacology & Pharmacy
43. Physical
44. Rehabilitation
45. Rheumatology
46. Surgery
47. Toxicology
48. Urology
49. Veterinary Sciences
50. Virology
51. Zoology

In the case of HIV and children under 5 risk groups, there were over 10,000 results returned, so to concentrate on high burden countries, we excluded the following Countries/Territories=

1. USA
2. Wales
3. England
4. France
5. Switzerland
6. Canada
7. Netherlands
8. Spain
9. Italy
10. Finland
11. Australia
12. Germany
13. Denmark
14. Belgium
15. Ireland
16. Sweden
17. Portugal
18. Greenland
19. Luxembourg
20. Norway
<table>
<thead>
<tr>
<th>At-Risk or Vulnerable Group</th>
<th>Search strategy</th>
<th>modification</th>
<th># of records in EMBASE</th>
<th># of Records in ISI Web of Science</th>
<th>Manuals, guidelines, norms,</th>
</tr>
</thead>
<tbody>
<tr>
<td>General search for qualitative work</td>
<td>Topic=(acceptability) AND Topic=(screening) AND Topic=(qualitative)</td>
<td></td>
<td>71</td>
<td>57</td>
<td>131</td>
</tr>
<tr>
<td>1. Alcohol dependent</td>
<td>alcohol.mp. or exp ALCOHOL/</td>
<td></td>
<td>159</td>
<td>284</td>
<td>5</td>
</tr>
<tr>
<td>2. Attendees of health care facilities</td>
<td>TI=(primarySAME care OR waiting SAME room OR out SAME patient OR emergency SAME department)</td>
<td></td>
<td>17*</td>
<td>26</td>
<td>4*</td>
</tr>
<tr>
<td>3. Children under 5</td>
<td>(children or infant or orphan or adoles*)</td>
<td></td>
<td>1437</td>
<td>622</td>
<td>15</td>
</tr>
<tr>
<td>4. Diabetics</td>
<td>(TS=diabetes.mp. or exp diabetes mellitus)</td>
<td></td>
<td>196</td>
<td>107</td>
<td>5</td>
</tr>
<tr>
<td>5. Drug dependent</td>
<td>TS= (drug dependen* OR residential treatment OR cannabis OR intraven* drug abuse OR illicit drug OR detox* OR drug abuse* OR misuse OR injection drug use* OR street drug OR recreational drug OR opioid OR methamphetamine OR methadone OR cocaine OR crack cocaine OR drug-use OR IDU OR marijuana OR substance use* OR substance abuse* OR drug rehabilitation OR amphetamine* ) refined by: [excluding] subject areas=(cell biology or food science &amp; technology or chemistry, organic or microbiology or oncology or urology &amp; nephrology or parasitology or cardiac &amp; cardiovascular systems or virology or chemistry, applied or clinical neurology or toxicology or chemistry, medicinal or computer science, interdisciplinary applications or transplantation)</td>
<td></td>
<td>2573*</td>
<td>202</td>
<td>11</td>
</tr>
<tr>
<td>6. Elderly</td>
<td>(older or elder* or senior or geriat*).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer]</td>
<td></td>
<td>364</td>
<td>318</td>
<td>517</td>
</tr>
<tr>
<td>7. Malnourished</td>
<td>TS=(hunger OR malnourish* OR famish* OR underweight OR stunt* OR food insecure* OR nutrition* OR underfed* OR undernourish* OR starv* OR wast* OR famine) refined by: [excluding] subject areas=(evolutionary biology or surgery or gastroenterology &amp; hepatology &amp; urology &amp; nephrology or genetics &amp; heredity or virology or oncology or toxicology or orthopedics or transplantation or parasitology or marine &amp; freshwater biology or agronomy or plant sciences or fisheries or cell biology or soil science or zoology or chemistry, medicinal or</td>
<td></td>
<td>146</td>
<td>102</td>
<td>0</td>
</tr>
<tr>
<td>At-Risk or Vulnerable Group</td>
<td>Search strategy</td>
<td>modification</td>
<td># of records in EMBASE</td>
<td># of Records in ISI Web of Science</td>
<td>Manuals, guidelines, norms, ...</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------</td>
<td>--------------</td>
<td>------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>endocrinology &amp; metabolism )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Mentally Ill</td>
<td>(mental* SAME ill* or mental disease or mental health or psych* or cogniti* or disab*)</td>
<td>291</td>
<td>103</td>
<td>3</td>
<td>274</td>
</tr>
<tr>
<td>9. Persons with Previous TB</td>
<td>TI=(previous OR prior OR relaps* OR re-infect*)</td>
<td>45</td>
<td>54</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>10. PLHIV</td>
<td>TI= (HIV or TB/HIV or immunecompromise or human immunodeficiency virus or co-infect* or AIDS)</td>
<td>2,169</td>
<td>486</td>
<td>36</td>
<td>679</td>
</tr>
<tr>
<td>11. Pregnant women</td>
<td>(pregnanc* OR antenatal OR women of reproductive age OR matern*)</td>
<td>193</td>
<td>106</td>
<td>4</td>
<td>237</td>
</tr>
<tr>
<td>12. smokers</td>
<td>TS=(nicotine or tobacco or smoke*)</td>
<td>refined by: [excluding] subject areas=( biochemistry &amp; molecular biology or obstetrics &amp; gynecology or biology or pathology or cell biology or toxicology or zoology )</td>
<td>247</td>
<td>83</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Factory worker</td>
<td>TS=(factory OR maquila* OR sweat SAME shop OR textile SAME industr* OR garment SAME industr* OR work SAME camp OR plantation OR worker OR labor SAME camp OR occupation=SAME expos* OR labor SAME conditions OR factories)</td>
<td>154</td>
<td>93</td>
<td>2</td>
<td>168</td>
</tr>
<tr>
<td>14. Health care worker</td>
<td>TI=(healthcare SAME worker* or nurs* or doctor* or outreach SAME work* or healthcare SAME workforce or occupational or clinician* or occupational exposur* or nosocomial SAME transmission or hospital)</td>
<td>347</td>
<td>184</td>
<td>15</td>
<td>440</td>
</tr>
<tr>
<td>15. Miner</td>
<td>TS=((mine* OR silic* OR shaft OR mining ) NOT data SAME mining)</td>
<td>55</td>
<td>98</td>
<td>4</td>
<td>153</td>
</tr>
<tr>
<td>16. orphans/abandoned children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Prisoner</td>
<td>TS=(prison* or correction* or institutionalized or incarcerat* or jail* or detent* or convict* or offender* or penal or penitent* or reformatory or congregat*)</td>
<td>241</td>
<td>291</td>
<td>12</td>
<td>465</td>
</tr>
<tr>
<td>18. Resident of Urban slum</td>
<td>(shanty or slum or favela or urban or squatter settlement or housing or crowding or informal settlement or shack TI= (shant* OR slum OR favela OR urban* OR squatter* SAME settlement OR)</td>
<td>504</td>
<td>495</td>
<td>11</td>
<td>629</td>
</tr>
<tr>
<td>At-Risk or Vulnerable Group</td>
<td>Search strategy</td>
<td>modification</td>
<td># of records in EMBASE</td>
<td># of Records in ISI Web of Science</td>
<td>Manuals, guidelines, norms,</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>------------------------</td>
<td>------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>19. Soldier</td>
<td>TS=(soldier* or armed SAME forces or military or veteran* or troop or enlisted or armed SAME service*)</td>
<td>housing* OR crowd* OR informal* SAME settlement* OR shack OR ghetto OR tenament* OR dwell* OR township OR barrio OR densely SAMEpopulat* )</td>
<td>9</td>
<td>64</td>
<td>0</td>
</tr>
<tr>
<td>20. Transportation workers/ Truck drivers/</td>
<td>TI=(transport* OR truck* SAME driver* OR bus SAME drive* OR taxi OR public SAME transport OR bus OR driver)</td>
<td></td>
<td>-</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>21. Refugee, Internally displaced</td>
<td>TS=( refugee or internally displaced or traveler or asylum seek*)</td>
<td></td>
<td>124</td>
<td>48</td>
<td>2</td>
</tr>
<tr>
<td>22. At-risk general</td>
<td>TI=((vulnerable SAME population* or special SAME population* OR high-risk SAME group* or at-risk or highest risk or risk SAME communit*) NOT TI=factor*</td>
<td>refined by: [excluding] subject areas=( oncology or evolutionary biology or cardiac &amp; cardiovascular systems or mathematical &amp; computational biology or immunology or genetics &amp; heredity or nutrition &amp; dietetics or virology or orthopedics or rheumatology or pathology or pharmacology &amp; pharmacy or biology or surgery or urology &amp; nephrology or veterinary sciences )</td>
<td>171</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Homeless</td>
<td>TI=(homeless OR shelter* OR transient OR non-residential OR itinerant)</td>
<td></td>
<td>74</td>
<td>73</td>
<td>5*</td>
</tr>
<tr>
<td>24. Indigenous</td>
<td>TS=(indigenous or native* or aboriginal* or ethnic or indigen* or tribal or minorit* or caste or autochthon* )</td>
<td>refined by: [excluding] subject areas=( evolutionary biology or fisheries or geosciences, multidisciplinary or immunology or plant sciences or zoology or urology &amp; nephrology or archaeology or biology or transplantation or veterinary sciences or virology )</td>
<td>46</td>
<td>287</td>
<td>3</td>
</tr>
<tr>
<td>25. Migrant, Migrant or traveler or Roma or tinker or immigra* or seasonal SAME worker</td>
<td></td>
<td></td>
<td>20</td>
<td>458</td>
<td>18</td>
</tr>
<tr>
<td>At-Risk or Vulnerable Group</td>
<td>Search strategy</td>
<td>modification</td>
<td># of records in EMBASE</td>
<td># of Records in ISI Web of Science</td>
<td>Manuals, guidelines, norms,</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------------------</td>
<td>------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>26. MSM</td>
<td>TS=(homosex* OR gay OR queer OR same-sex OR homoero* OR msm OR sexual* OR same sex OR sexual network OR social network OR gay-identified OR bisexual OR bi-sexual)</td>
<td>24</td>
<td>28</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>27. Nomadic pastoralist populations</td>
<td>TS=(nomad* OR itinerant OR pastoralist)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Sex worker</td>
<td>TS= (sex SAME work* OR sex SAME trade OR prostitut* OR escort OR transactional SAME sex OR commercial SAME sex* OR sex SAME trade OR sex SAME traffi* OR courtesan OR sex SAME exchange)</td>
<td>8</td>
<td>14</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>29. street children/</td>
<td>TI=(street child* OR street youth OR child labor OR rag picker* OR out-of-school OR runaway OR child beggar* OR children on the street OR children of the street)</td>
<td>43</td>
<td>50</td>
<td>4</td>
<td>69</td>
</tr>
<tr>
<td>30. Transgender</td>
<td>TS= (transgender* OR transvest* OR transexu* OR intersex* OR sexual minority OR female-identif* OR male-identif* OR sexual devian* OR sexual divers* OR gender dysphori* OR transman* OR transwoma* OR hijra OR kathoey)</td>
<td>See below</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 27 Transgender Expanded Search**

| TI= (transgender* OR transvest* OR transexu* OR intersex* OR sexual minority OR female-identif* OR male-identif* OR sexual devian* OR sexual divers* OR gender dysphori* OR transman* OR transwoma* OR hijra OR kathoey) | WEBs OF SCIENCE Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=1985-2011 | 2,612 |

**COMBINED ABOVE**

| 39 |

**Checked refs of these cites**

| 16 |

**TOTAL**

| 55 |
Table 28 Expanded Search strategy for street children
search criteria (and any limitations)

| TOOLTIP = (tubercul* OR lung tuberculosis OR pulmonary consumption OR consumption, pulmonary NOT animal NOT non-tubercul* NOT bovis NOT gene* NOT antibody*) AND TOOLTIP=(case find* OR mass radiograph* OR screen* OR contact examin* OR screening survey* OR cross-sectional OR case-detect* OR detect* OR case-find* OR prevalence stud* OR contact investigat* OR algorithm OR household OR pre-employment OR testing OR undiagnos* OR missed* or delayed* OR eval* OR incidence OR checking OR assessment OR pre-entry OR care-seeking OR mandatory OR voluntary) | 34,000+
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE= TI=(street child* OR street youth OR child labor OR rag picker* OR out-of-school OR runaway OR child beggar* OR children on the street OR children of the street) AND the above</td>
<td># of Records in ISI Web of Science</td>
</tr>
<tr>
<td>TITLE= TI=(street child* OR street youth OR child labor OR rag picker* OR out-of-school OR runaway OR child beggar* OR children on the street OR children of the street) AND TI=HIV</td>
<td># of Records in ISI Web of Science</td>
</tr>
<tr>
<td>((street child* or street youth or child labor or rag picker* or out-of-school or runaway or child beggar* or children on the street OR children of the street).m_titl. AND the first row</td>
<td># of records in EMBASE</td>
</tr>
<tr>
<td>((street child* or street youth or child labor or rag picker* or out-of-school or runaway or child beggar* or children on the street OR children of the street).m_titl. AND TI=HIV</td>
<td># of records in EMBASE</td>
</tr>
<tr>
<td>duplicates REMOVED</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3 ACRONYMS

ACSM Advocacy, Communication & social mobilization
AFB Acid-fast bacilli
AFRO WHO Regional Office for Africa
AIDS Acquired Immunodeficiency Syndrome
ARTI Annual risk of tuberculosis infection
ARV Antiretroviral
AZT Zidovudine
BCG Bacille Calmette Guérin
CB Coordinating Board
CDC Centers for Disease Control and Prevention
CMS Central medical stores
DEWG DOTS Expansion Working Group
DFID Department for International Development
DOT Directly Observed Treatment
DOTS branded name of the WHO recommended tuberculosis control strategy
DOTS Internationally recommended strategy for TB control
DOTS Plus TB control strategy for multi drug resistant tuberculosis based on the DOTS scheme
DST Drug susceptibility testing
E Ethambutol
ECHO Humanitarian Aid Office of the European Union
FDC Fixed-dose combination
FIND Foundation for Innovative New Diagnostics
GATB Global Alliance for TB Drug Development (TB Alliance)
GAVI Global Alliance for Vaccines and Immunization
GDEP Global DOTS Expansion Plan
GDF Global Drug Facility
GDP Gross Domestic Product
GFATM Global Fund to Fight AIDS, TB and Malaria
GLC Green Light Committee
GMP Good Manufacturing Practice
GNP Gross National Product
GPSTB Global Plan to Stop TB
GTRI Global TB Research Initiative
H FA Health For All
H Isoniazid
HAART Highly Active Antiretroviral Therapy
HBC High-burden countries
HIV Human immunodeficiency virus
IDU Injection Drug Users
IEC Information, education and communication
ILO International Labour Organization
INRUD International Network for the Rational Use of Drugs
IPT Isoniazid Preventive Therapy
IUATLD International Union Against Tuberculosis and Lung Disease
IVR Initiative for Vaccine Research
KNCV Royal Netherlands Tuberculosis Association
MDR TB Multi drug resistant Tuberculosis, TB bacillus resistant to at least Isoniazid and Rifampicin
MDR-TB Multidrug-resistant tuberculosis
MOH Ministry of Health
MSH Management Sciences for Health
NGO Nongovernmental organization
NIAID National Institute of Allergy and Infectious Diseases
NICC National Interagency Coordination Committees
NIH National Institutes of Health
NRL National Reference Laboratory
NTP National Tuberculosis Control Programme
OECD Organization for Economic Cooperation and Development
PIA Phased implementation of activities
PIH Partners In Health
PLWHA People living with HIV/AIDS
PLWHA, PLWH People living with HIV/AIDS,
PPM Public-Private Mix
PPM-DOTS Public private mix DOTS, a strategy to involve private health care providers in DOTS strategy
QA Quality assurance
R Rifampicin
R&D Research and Development
R&D Research and development
RBM Roll Back Malaria
RCC Regional Interagency Coordination Committee
RMB Resource Mobilization
S Streptomycin
SBIR Small Business Innovative Research
SCC Short Course Chemotherapy
SEARO WHO Regional Office for South-East Asia
SRL Supranational Reference Laboratory
STB WHO Stop Tuberculosis Department
STI Sexually Transmitted Infection
SW Sex Workers
SWAP Sector Wide Approach
TASO The AIDS Support Organization
TB Tuberculosis
TB/HIV TB and HIV co-infection
TBCTA TB Coalition for Technical Assistance
TBDI TB Diagnostics Initiative
TBIAC Tuberculosis Vaccine Initiative Advisory Committee
TDR Special Programme on Research and Training in Tropical Diseases
UNAIDS Joint United Nations Programme on HIV/AIDS
UNICEF United Nations Children's Fund
USAID United States Agency for International Development
VCT Voluntary counselling and testing
WG Working group
WHO World Health Organization
Z Pyrazinamide
Appendix 4 Operational Definitions of Risk Groups for the purposes of Screening

Risk Groups found in health services

Adolescents
Persons aged 12-14

Alcohol dependent
Persons with alcohol addiction are individuals with a psychological and/or physical addiction to products containing alcohol

Attendees of health care facilities
Attendees are persons who attend health facilities (e.g., health posts, health centers, clinics, hospitals, outpatient departments, etc.) for any physical ailment, particularly suspected TB cases.

Children under 5
Children below the age of 5 are persons who range in age from 0 thru 4 years (WHO, 2010). Orphans and abandoned children (OAC) and street children are discussed separately.

Diabetics
Persons with Diabetes mellitus have a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced

Drug dependent
Persons who are drug dependent engage in the harmful or hazardous use of psychoactive substances, including both prescription and illicit drugs.

Elderly
The UN agreed cutoff is 60+ years to refer to the elderly population. However, in some settings the chronological age of 65 years is a more readily accepted definition of 'elderly' or older person.

Malnourished
According to WHO, severe acute malnutrition is defined as a very low weight for height (below -3z) scores of the median WHO growth standards.

Mentally Ill
Mental illness can be defined as a condition that causes problems in some combination of a person's thinking abilities, emotional functioning, social functioning, or ability to sustain age-appropriate independence. Persons with mental illness is a generic reference to a very diverse category of individuals ranging from those with short-term psychological illness that is managed with outpatient treatment to those with chronic or severe mental illness that may require institutional or residential care.

Persons with Previous TB
Person with previous TB have been diagnosed with tuberculosis but may or may not have been successfully treated.
PLHIV
Persons who are infected with the human immunodeficiency virus, are commonly referred to as “people living with HIV or AIDS” (PLWHA).

Pregnant women
For the purpose of this exercise, we refer to women of reproductive age who are currently pregnant, regardless of trimester or obstetric outcome.

Smokers
Smokers is reference to persons who are psychologically or physically addicted to the consumption of tobacco via inhalation (smoking).

Congregate/Occupational/Environmental Risk Groups

Farm & Factory workers
Factory workers refer to individuals who spend several hours in closed and crowded working environments.

Health care workers
Healthcare workers (HCWs) are defined as “all people engaged in actions whose primary intent is to enhance health.” They include all persons, paid and unpaid, who provide health services, such as doctors, nurses, pharmacists, and laboratory technicians. They also include management and support workers, such as finance officers, cooks, drivers, cleaners, security guards, community-based care, home-care and informal caregivers.

Miners
For the purposes of this exercise, miners are considered to be those who labor underground to excavate compounds and mineral commodities such as coal, gold, or diamonds.

Orphans and institutionalized children
The concept of OVC generally refers to orphans and other groups of children who are more exposed to risks than their peers. OVC are groups of children that experience negative outcomes, such as the loss of their parents, education, morbidity, and malnutrition, at higher rates than do their peers.

Prisoners
Prisoners are defined as persons who are deprived of their liberty and a detained in residential facilities with other individuals accused or convicted of crimes.

Residents of Urban slums
A slum, as defined by United Nations agency UN-HABITAT, is a run-down area of a city characterized by substandard housing and squalor and lacking in tenure security. Slum residents are the people who live in such areas.

Soldiers/Military

Transportation workers/ Truck drivers/
Transportation workers and Truck drivers are hired to drive long or short distances in order to deliver persons and/or goods from one place to another, from the place of pickup to the place of delivery.
Behavioral/marginalized Risk Groups

Homeless
Different definitions of homelessness are used in different contexts. People who are homeless are perhaps unwilling but, more commonly, unable to acquire and maintain regular, safe, and adequate housing, or lack "fixed, regular, and adequate night-time residence.

Indigenous
Indigenous people are from communities that live within, or are attached to, geographically distinct traditional habitats or ancestral territories, and who identify themselves as being part of a distinct cultural group, descended from groups present in the area before modern states were created and current borders defined. They generally maintain cultural and social identities, and social, economic, cultural and political institutions, separate from the mainstream or dominant society or culture (WHO, 2011).

Migrant, IDP, refugee
Refugees are people who have crossed an international frontier and are at risk or have been victims of persecution in their country of origin. Internally displaced persons (IDPs), on the other hand, have not crossed an international frontier, but have, for whatever reason, also fled their homes.

Marginalized MSM
The term "Men who have Sex with Men" (i.e. MSM) is used to describe males who have sex with other males, regardless of their sexual identity, or whether or not they have sex with women as well (UNAIDS, 2009). In this sense, MSM describes a sexual practice and not necessarily an identity. MSM are not a homogenous category in most countries, and thus this exercise focuses only on marginalized MSM.

Nomadic/pastoralist populations

Sex worker
Sex worker is an individual engaged in “any occupation in which an individual provides sexual services in exchange for money and/or other items of value” (Morrison and Whitehead, 2007:202).

Street children
Street child is a term for a child residing primarily in the streets of a city. It includes children who might not necessarily be homeless or without families, but who live in situations where there is no protection, supervision, or direction from responsible adults.

UNICEF has defined three types of street children:
- Street-Living- children 'of' the street, some with no family connections. They sleep, eat and live on the streets.
- Street-Working- children who are forced to work on the street to support their families' income by selling or begging. They will return 'home' to sleep and will return to the street the next day. They are children 'on' the street.
- Street-Family- children who live on the streets with their families.

Transgender

The term transgender is used to describe a varied group of people. It includes people who identify with the opposite gender assigned to their biological sex, such as biological men who identify as women and the opposite, and people who identify with both genders, or bi-gender. It also includes, but is not restricted to people who undergoes sex reassignment surgeries and people accessing hormone therapy. It is less common, but also happens, that intersex people (whose genitals and reproductive system possess male and female characteristics) are also included in the transgender category.
Appendix 5: data extraction form

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Number</td>
</tr>
<tr>
<td>2.</td>
<td>Country</td>
</tr>
<tr>
<td>3.</td>
<td>Year</td>
</tr>
<tr>
<td>4.</td>
<td>Authors</td>
</tr>
<tr>
<td>5.</td>
<td>Eligible to be screened</td>
</tr>
<tr>
<td>6.</td>
<td>Number screened</td>
</tr>
<tr>
<td>7.</td>
<td>Reasons for refusal</td>
</tr>
<tr>
<td>8.</td>
<td>What policies enable effective case-finding in this population?</td>
</tr>
<tr>
<td>9.</td>
<td>What are the economic considerations impacting case-finding in this group?</td>
</tr>
<tr>
<td>10.</td>
<td>Are there particular racial, ethnic, linguistic, and/or cultural considerations impacting case-finding in this group?</td>
</tr>
<tr>
<td>11.</td>
<td>What are the recommended strategies to help @ to reach an appropriate TB care facility?</td>
</tr>
<tr>
<td>12.</td>
<td>What are the recommended screening and active case finding strategies for @?</td>
</tr>
<tr>
<td>13.</td>
<td>What are the opportunities and enabling factors that make reaching this group easier?</td>
</tr>
<tr>
<td>14.</td>
<td>What specific skill sets and cultural competencies (HRM) are necessary to reach this group?</td>
</tr>
<tr>
<td>15.</td>
<td>Where are the recommended sites or institutions where this population is concentrated?</td>
</tr>
<tr>
<td>16.</td>
<td>Advice on organizations or institutions should be involved in the strategy?</td>
</tr>
<tr>
<td>17.</td>
<td>Screening algorithm used</td>
</tr>
</tbody>
</table>
### Appendix 6: Potential locations for TB screening

<table>
<thead>
<tr>
<th>Potential site of Screening</th>
<th>Risk group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community level</td>
<td>High prevalence sub-population (poor areas, urban poor areas, indigenous/tribal pop, etc)</td>
</tr>
<tr>
<td></td>
<td>Household contacts, other close contacts</td>
</tr>
<tr>
<td>Hospital out/in-patients &amp; primary healthcare centers</td>
<td>All attendees</td>
</tr>
<tr>
<td></td>
<td>People with HIV / VCTC clinic</td>
</tr>
<tr>
<td></td>
<td>Chronic respiratory disease</td>
</tr>
<tr>
<td></td>
<td>Previous TB / CXR abnormality</td>
</tr>
<tr>
<td></td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td></td>
<td>Other immunocompromised</td>
</tr>
<tr>
<td></td>
<td>Pregnant women</td>
</tr>
<tr>
<td></td>
<td>Elderly</td>
</tr>
<tr>
<td></td>
<td>Alcoholics</td>
</tr>
<tr>
<td></td>
<td>IV drug users</td>
</tr>
<tr>
<td></td>
<td>Mental health clinic</td>
</tr>
<tr>
<td>Residential institutions</td>
<td>Prisoners</td>
</tr>
<tr>
<td></td>
<td>Shelters for homeless, alcohol/drug users</td>
</tr>
<tr>
<td>Immigration and refugee services</td>
<td>Immigrants from high prevalence settings</td>
</tr>
<tr>
<td>Workplace</td>
<td>Health care workers</td>
</tr>
<tr>
<td></td>
<td>Miners</td>
</tr>
<tr>
<td></td>
<td>Other high prevalence work-places</td>
</tr>
</tbody>
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### References

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