Radiological screening of refugees in Germany

To the Editor:

In 2015, Germany registered 1091894 refugees. On arrival, refugees admitted to reception centres underwent statutory chest radiograph (CXR) screening for tuberculosis (TB), regardless of the country of origin. Notified TB cases increased by 29.4% from 4533 in 2014 to 5865 in 2015 [1]. We evaluated the yield of active TB screening using statutory CXR and the spectrum of TB disease diagnosed through mass screening.

Reports of CXRs of 38001 refugees from 76 countries across four reception centres in Germany were obtained and reviewed (Boostedt, n=1584; Braunschweig, n=2390; Duderstadt, n=3799; Karlsruhe, n=30228). The median age was 27.1 years (interquartile range 21.7–34.8 years); 25.8% were female. A quarter of the refugees were from Syria (25%) followed by Iraq (14%) and Afghanistan (11%). CXRs were suggestive of TB in 127 refugees. A detailed clinical record review revealed 37 individuals were lost to follow-up, TB was excluded in 38 and 52 were diagnosed with TB and treatment was initiated. Of those, 42 (81%) were microbiologically confirmed by culture and/or nucleic acid amplification, mirroring Dutch reports of 87% culture confirmation [2]. Overall TB prevalence was 140 per 100000, similar to migrant screening in the Netherlands, with 119 TB diagnoses per 100000 individuals screened [3]. TB prevalence was 0.05% (95% CI 0.02–0.10%), 0.09% (95% CI 0.04–0.17%), 0.23% (95% CI 0.08–0.49%) and 0.26% (95% CI 0.17–0.38%) in refugees from countries with TB incidences of <20, 20–50, 50–100 and >100 per 100000, respectively (table 1) [4]. Prevalence was lowest among Syrian (31 per 100000) and Iraqi (37 per 100000) refugees, contradicting Belgian reports of prevalence rates of 94.2 per 100000 among Syrians [5]. The highest rates were found among refugees from Somalia and Eritrea with prevalence rates that were 4–10 times higher than World Health Organization (WHO) incidence estimates [4].

By including CXR from four centres from different federal states we tried to obtain a representative sample of refugees arriving in Germany. German immigration statistics from 2015 and 2016 reported the following countries of origin for asylum seekers: Syria (37%), Iraq (14%), Afghanistan (11%), Pakistan (2%) and Eritrea (2%), a distribution similar to our dataset.

A third of individuals with a CXR suggestive of TB were lost to follow-up. Thus TB prevalence might be underestimated. The high numbers lost to follow-up highlight the challenges when screening highly mobile populations. Nevertheless, continuous medical supervision is essential since ALDRIDGE et al. [6] report high TB incidence rates among migrants from a high TB incidence country despite pre-entry screening. In their study, 80% of TB disease occurred after arrival. Thus, it is critical to ensure access to adequate TB services after initial screening.

In this study the number needed to screen to detect one individual with TB was more than 3000 among Syrians. In contrast, the number needed to screen among Somalis was only 94. In line with other studies, this suggests that mass screening of individuals from low-incidence countries such as Syria is inefficient, but screening among refugees from high incidence countries with long-lasting conflicts such as Somalia seems a worthwhile exercise [7, 8].

More data are required to identify the optimal TB incidence threshold balancing yield, efficiency and possible negative impact of missing individuals with prevalent TB. A screening algorithm based on WHO TB incidence estimates might be misleading as evidenced by the high prevalence of TB among Somalis, both in our study and in others [9]. The impact of mycobacterial transmission from refugees missed by screening is unknown. A recent meta-analysis concluded that current studies provide insufficient evidence to show that screening for active TB impacts on TB epidemiology [10]. Screening therefore mainly aims to


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modify individual morbidity and mortality. Screening, however, should not be a one-off event as individuals with abnormal CXRs have a significant risk of developing TB during follow-up [9]. These refugees should be monitored closely to diagnose active TB disease without delay. Close attention to new symptoms suggestive of incipient TB should be maintained in all structures caring for migrants, particularly in young migrants from high-incidence countries.

At present, a nationwide systematic follow-up system is lacking in Germany; ambulatory TB care is provided by more than 400 regional health authorities. Data protection regulations, limited IT interoperability and different registration systems challenge consistent follow-up of refugees.

Screening for latent TB infection (LTBI) and prophylactic treatment of LTBI in refugees might be considered for TB control among refugees. However, evidence on the effectiveness and cost-effectiveness of such a strategy for these populations is sparse [11]. Further prospective research is required to improve current algorithms and regulations that are often derived from regional statutory requirements without a scientific basis [12].

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References

TABLE 1 Details of tuberculosis (TB) diagnoses obtained by mass chest radiograph (CXR) screening

<table>
<thead>
<tr>
<th>Origin (WHO TB incidence rate per 100000; 95% CI)</th>
<th>Screened</th>
<th>Median (IQR)</th>
<th>CXRs suspicious of TB; per 100000 (95% CI)</th>
<th>TB rates per 100000 (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan (189; 122–270)</td>
<td>4331 (11%)</td>
<td>23.8 [19.5–30.8]; 24.9%</td>
<td>20 (0.46%; 0.28–0.71%)</td>
<td>139 (51–302)</td>
</tr>
<tr>
<td>Iraq (43; 38–49)</td>
<td>5403 (14%)</td>
<td>26.6 [22.1–34.2]; 30.3%</td>
<td>14 (0.26%; 0.14–0.43%)</td>
<td>37 (4–136)</td>
</tr>
<tr>
<td>Pakistan (270; 175–386)</td>
<td>856 (2%)</td>
<td>28.1 [23.7–33.4]; 4.8%</td>
<td>4 (0.47%; 0.12–1.2%)</td>
<td>234 (28–846)</td>
</tr>
<tr>
<td>Syria (20; 15–25)</td>
<td>9622 (25%)</td>
<td>28.2 [21.9–36.8]; 27.8%</td>
<td>19 (0.20%; 0.12–0.31%)</td>
<td>31 (6–91)</td>
</tr>
<tr>
<td>Eritrea (65; 30–113)</td>
<td>937 (2%)</td>
<td>23.6 [20.5–27.8]; 24.4%</td>
<td>9 (0.96%; 0.44–1.82%)</td>
<td>640 (235–1394)</td>
</tr>
<tr>
<td>Gambia (174; 131–223)</td>
<td>3281 (9%)</td>
<td>22.8 [19.8–27.1]; 1.9%</td>
<td>16 (0.49%; 0.28–0.79%)</td>
<td>336 (168–600)</td>
</tr>
<tr>
<td>Nigeria (322; 189–488)</td>
<td>1030 (3%)</td>
<td>28.4 [23.5–33.4]; 22.0%</td>
<td>3 (0.29%; 0.06–0.85%)</td>
<td>97 (2–542)</td>
</tr>
<tr>
<td>Somalia (274; 177–391)</td>
<td>375 (1%)</td>
<td>21.9 [18.8–27.1]; 26.7%</td>
<td>7 (1.87%; 0.75–3.84%)</td>
<td>1075 (293–2753)</td>
</tr>
<tr>
<td>Russian federation (80; 69–92)</td>
<td>263 (0.7%)</td>
<td>32.2 [25.7–42.0]; 46.8%</td>
<td>2 (0.76%; 0.09–2.74%)</td>
<td>0.00 (0.00–1413)</td>
</tr>
<tr>
<td>Non-EU Eastern Europe (15;42–NA)</td>
<td>6010 (16%)</td>
<td>31.0 [23.7–39.9]; 39.6%</td>
<td>16 (0.27%; 0.15–0.43%)</td>
<td>166 (80–306)</td>
</tr>
</tbody>
</table>

WHO: World Health Organization; IQR: interquartile range; EU: European Union. Non-EU Eastern Europe countries include Albania [n=2382], Bosnia-Herzegovina [n=509], Macedonia [n=1311], Serbia [n=976], Montenegro [n=55] and Kosovo [n=777]. A total of 5836 refugees were from other countries. TB prevalence among those refugees was 118/100000 (95% CI 48–245). WHO TB incidence data were obtained from the WHO Global Tuberculosis Report [4].

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