Neglected Tropical Diseases among Migrant Workers: A Malaysian Case Study

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Better standard of living resulted in the influx of workers from neighbouring countries to Malaysia.

Figure 1: Malaysia and adjacent countries. Source: WorldAtlas.com, 2016
Table 1: Socio-demographic status between Malaysia and neighbouring countries (Indonesia, India, Bangladesh, Nepal and Myanmar.)

<table>
<thead>
<tr>
<th></th>
<th>Malaysia</th>
<th>Indonesia</th>
<th>India</th>
<th>Bangladesh</th>
<th>Nepal</th>
<th>Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population (July 2017 est.)</strong></td>
<td>31,381,992</td>
<td>260,580,739</td>
<td>1,281,935,911</td>
<td>157,826,578</td>
<td>29,384,297</td>
<td>55,123,814</td>
</tr>
<tr>
<td><strong>Population growth rate (2017 est.)</strong></td>
<td>1.37%</td>
<td>0.86%</td>
<td>1.17%</td>
<td>1.04%</td>
<td>1.16%</td>
<td>0.91%</td>
</tr>
<tr>
<td><strong>Net migration rate (2017 est.)</strong></td>
<td>-0.30 migrant(s)/1,000 population</td>
<td>-1.10 migrant(s)/1,000 population</td>
<td>0.00 migrant(s)/1,000 population</td>
<td>-3.1 migrant(s)/1,000 population</td>
<td>-2.20 migrant(s)/1,000 population</td>
<td>-1.50 migrant(s)/1,000 population</td>
</tr>
<tr>
<td><strong>Urbanization</strong></td>
<td>76.0%</td>
<td>55.3%</td>
<td>34.0%</td>
<td>36.6%</td>
<td>19.7%</td>
<td>30.6%</td>
</tr>
<tr>
<td><strong>Sanitation facility access</strong></td>
<td>96%</td>
<td>60.8%</td>
<td>39.6%</td>
<td>60.6%</td>
<td>45.8%</td>
<td>77.4%</td>
</tr>
<tr>
<td><strong>Drinking water resources</strong></td>
<td>98.2%</td>
<td>87.4%</td>
<td>94.1%</td>
<td>86.9%</td>
<td>91.6%</td>
<td>80.6%</td>
</tr>
</tbody>
</table>

Figure 2. Source: Temporary Work Visit Pass (PLKS), Immigration Department (Ministry of Home Affairs)
Number of migrant workers in Malaysia (2013-2014) according to nationality


Figure 3. Source: Temporary Work Visit Pass (PLKS), Immigration Department (Ministry of Home Affairs)
Figure 4. Source: Temporary Work Visit Pass (PLKS), Immigration Department (Ministry of Home Affairs)
Health screening requirements

Figure 5: Medical screening process of migrant workers in Malaysia. Source: FOMEMA
<table>
<thead>
<tr>
<th>Category</th>
<th>Examination</th>
<th>Physical Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical History</td>
<td>HIV/AIDS</td>
<td>Pulmonary Tuberculosis</td>
</tr>
<tr>
<td></td>
<td>Peptic Ulcer</td>
<td>Epilepsy</td>
</tr>
<tr>
<td></td>
<td>Malaria</td>
<td>Hypertension</td>
</tr>
<tr>
<td></td>
<td>Diabetes Mellitus</td>
<td>Psychiatric Illnesses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Examination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Examination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Tests</td>
<td>Blood Test:</td>
<td>Respiratory System</td>
</tr>
<tr>
<td></td>
<td>For Blood Grouping (A,B,AB or O and Rh).</td>
<td>Nervous System</td>
</tr>
<tr>
<td></td>
<td>For HIV, Hepatitis B, VDRL and Malaria.</td>
<td>Genitourinary System</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Blood Test:
- For Blood Grouping (A,B,AB or O and Rh).
- For HIV, Hepatitis B, VDRL and Malaria.

Urine Tests:
- For colour, specific gravity, sugar, albumin and microscopic examination.
- For opiates, cannabis and pregnancy (for female).

Physical examination of the foreign worker must be carried out first before chest X-ray examination.

Source: FOMEMMA
<table>
<thead>
<tr>
<th>References</th>
<th>Samples</th>
<th>Migrant population</th>
<th>Parasitic analysis</th>
<th>No. of samples</th>
<th>No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zainul et al, 1992</td>
<td>Blood</td>
<td>Women with still births</td>
<td>Toxoplasmosis</td>
<td>144</td>
<td>51 (35.7)</td>
</tr>
<tr>
<td>Suresh et al., 2002</td>
<td>Stool</td>
<td>Clinical samples/Workers</td>
<td>STH and Protozoa</td>
<td>173</td>
<td>62 (36)</td>
</tr>
<tr>
<td>Rajah et al., 2002</td>
<td>Stool</td>
<td>Clinical samples/Workers</td>
<td>Blastocystis</td>
<td>173</td>
<td>10 (5.8)</td>
</tr>
<tr>
<td>Kamarulzaman &amp; Khairul Anuar, 2002</td>
<td>Blood</td>
<td>Clinical suspected case (worker)</td>
<td>Leishmaniasis</td>
<td></td>
<td>1</td>
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<tr>
<td>Khairul Anuar et al., 2002</td>
<td>Blood</td>
<td>Clinical samples/Workers</td>
<td>Blood parasites</td>
<td>241</td>
<td>2 (0.83)</td>
</tr>
<tr>
<td>Zurainee, 2002</td>
<td>Blood</td>
<td>Workers</td>
<td>Serological detection:</td>
<td>698</td>
<td>266 (38.1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Amoebiasis, Echinococcosis, Filaria</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(Brugia malayi and Wuchereria</td>
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<td></td>
<td></td>
<td></td>
<td>bancrofti), Leishmaniasis, Malaria,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Schistosomiasis, Trypanosomiasis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nissapatorn et al, 2002</td>
<td>Blood</td>
<td>HIV-AIDS/HBD</td>
<td>Toxoplasmosis</td>
<td>303</td>
<td>152 (50.0)</td>
</tr>
<tr>
<td>Nissapatorn et al, 2003a</td>
<td>Blood</td>
<td>HIV/AIDS, HKL</td>
<td>Toxoplasmosis</td>
<td>301</td>
<td>75 (25.0)</td>
</tr>
<tr>
<td>Nissapatorn et al, 2003b</td>
<td>Blood</td>
<td>AIDS, HKL</td>
<td>Toxoplasmosis</td>
<td>406</td>
<td>6 (1.4)</td>
</tr>
<tr>
<td>Chan et al., 2008a</td>
<td>Blood</td>
<td>Plantation workers/Detention camp</td>
<td>Toxoplasmosis</td>
<td>501</td>
<td>171 (34.1)</td>
</tr>
<tr>
<td>Chan et al., 2008b</td>
<td>Blood</td>
<td>Plantation workers/Detention camp</td>
<td>Toxoplasmosis</td>
<td>501</td>
<td>171 (34.1)</td>
</tr>
<tr>
<td>Amal et al., 2008</td>
<td>Blood</td>
<td>Plantation workers/Detention camp</td>
<td>Toxoplasmosis</td>
<td>501</td>
<td>171 (34.1)</td>
</tr>
<tr>
<td>Chan et al., 2009</td>
<td>Blood</td>
<td>Plantation workers/Detention camp</td>
<td>Toxoplasmosis</td>
<td>336</td>
<td>138 (42)</td>
</tr>
</tbody>
</table>
Justification for study

- Last study was more than a decade ago (Zaini, et.al. 2002).
- Mainly clinical patients coming in for treatment at University of Malaya Medical Centre (UMMC)
Methodology

A total of 610 migrant workers were recruited between September 2014 and August 2015, employed in five sectors; construction, manufacturing, agriculture and plantations, food services and domestic services.

388 workers returned stool samples

Screened for helminth and protozoa by formalin ethyl acetate concentration technique and modified Ziehl-Neelsen staining

Molecular screening for hookworm and *Strongyloides* species

485 workers returned blood samples

Serological screening from 485 serum samples for anti-*Strongyloides* IgG

Serodiagnosis of cystic echinococcosis from 135 serum samples
Migrant Workers in Malaysia: Current Implications of Sociodemographic and Environmental Characteristics in the Transmission of Intestinal Parasitic Infections

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Intestinal Parasitic Infections

A high proportion of the workers (n=244/388, 62.9%) were **positive** for at least one parasite species.

Infections were significantly influenced by:
- **Nationality** (Nepalese)
- **Length of working years in the country** (Less than 1 year)
- **Employment sector** (food service sector)
- **Educational level** (high school level)

Results showed that most workers with
- **Poor personal hygiene practice**
- **Lack of health awareness**
Hookworm infections among migrant workers in Malaysia: Molecular identification of Necator americanus and Ancylostoma duodenale

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Hookworm Infections

A total of **51 samples (13.1%)** were positive by microscopy for hookworm infections.

PCR amplicons were successfully obtained from 82.4% of 51 samples
- 81.0% (34 of 42) identified as *Necator americanus*
- 16.7% (7 of 42) as *Ancylostoma spp.*
- 2.4% (1 of 42) as mixed infections of both species; *N. americanus* and *Ancylostoma spp.*

- All eight *Ancylostoma spp.* were confirmed to be *Ancylostoma duodenale.*
- This is the first time *A. duodenale* was reported in Malaysia.
Strongyloides stercoralis infections

The overall seroprevalence of *S. stercoralis* using the ELISA commercial kit for immunoglobulin G (IgG) was **35.8%** (n=173; 95% CL: 31.5-40.1%). Seroprevalence using the rSs1a-ELISA was **13.0%** (n=63; 95% CL: 10.0-16.0%).

Subsequent testing by a nested PCR against DNA from stool samples showed successful DNA amplification from three male samples (**0.8%; 3/388**).

Despite the low prevalence of *S. stercoralis* infection and seroprevalence of the antibodies in the study population, the results highlight the importance of:

- **Improvements in personal hygiene** and **sanitation standards** among migrant workers in Malaysia
- Call for implementation of relevant control strategies.
Serodiagnosis of Cystic echinococcosis (CE)

A total of 135 serum samples were tested for antibodies to *Echinococcus*. Screening for Cystic echinococcosis (CE) and compared by adopting **two commercial IgG ELISA kits** and a **prototype IgG4 lateral flow dipstick test**.

- Among the three tests, **concordant results were observed among 38 samples** and discordant results among 97 samples.
- Statistical analysis showed fair agreement among them.

✓ This study highlights the **presence of CE infections among migrant workers**.
✓ This information is **crucial for public health officials** when offering diagnosis and treatment for these workers.
Results highlight the requirements to refine current health policies particularly for workers entering Malaysia for employment to include:

- Implementation of mass drug administration for newly arrive workers as stated by WHO (2001).

- Health awareness programs aimed at:
  - Increasing the importance of personal hygiene and sanitation
  - Disease transmission
  - Healthy behaviors in controlling parasitic infections
Other similar works

- Studies on parasitic infections amongst migrant workers have been conducted worldwide particularly in Asia;
  - **Thailand** (Saksirisampant *et al.*, 2002; Nuchprayoon *et al.*, 2009; Ngrenngarmlert *et al.*, 2012)
  - **Taiwan** (Lo & Lee, 1996; Wang, 1998; 2004; Meng-Hsuan *et al.*, 2011)
  - **Taipei** (Cheng & Shieh, 2007)
  - **Kingdom of Saudi Arabia** [Abha district (Al-Madani & Mahfouz, 1995), Riyadh (Kalantan, 2001), Al-Khobar (Abahussain, 2005), Makkah (Wakid *et al.*, 2009), Al-Baha (Mohammad & Koshak, 2011), and Medina (Taha *et al.*, 2013)]
  - **Qatar** [Abu-Madi *et al.* (2008; 2010; 2011)]
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