If you aren't counted, you don't count: Estimating the number of female sex workers in Mandalay and Yangon, Myanmar

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**ABSTRACT**

We estimated the number of female sex workers (FSW) in Mandalay and Yangon, Myanmar using multiplier methods. Results were consistent among each other, with medians of ~5000 in Yangon (Range: 3500-7000) and ~3000 in Mandalay (Range: 1600-4400). The estimated proportion of FSW among the adult female population (15-49 years) was 0.45% (0.26-0.71%) in Yangon and 0.56% (0.29-0.82%) in Mandalay, falling within published estimates for the Asia region (0.2-2%).

**METHODS**

The study was conducted in Yangon and Mandalay from October to December 2013. Stratified time-location cluster sampling was used to recruit 450 FSW in Yangon and 328 in Mandalay. Clusters were selected using probability proportionate to size in the first stage and fixed numbers of FSW were selected randomly from each cluster in the second stage. Four PSE methods were used to calculate estimates for each city: unique object, unique event, service multipliers, and wisdom of the crowd. Strata-adjusted and unadjusted estimates were calculated for the multiplier methods and compared respectively. The estimated proportion of FSW among adult female population in each city was calculated and compared against the published estimates.

**RESULTS**

Estimates from the multiplier methods were consistent among each other, with medians of ~5000 in Yangon (Range: 3500-7000) and ~3000 in Mandalay (Range: 1600-4400). The estimated proportion of FSW among the adult female population (15-49 years) was 0.45% (0.26-0.71%) in Yangon and 0.56% (0.29-0.82%) in Mandalay, falling within published estimates for the Asia region (0.2-2%).

**CONCLUSIONS**

Population size estimation methods, when applied properly, could produce plausible size estimates of hidden, hard to reach populations. Using multiple methods with data from various sources could produce more reliable results. These results have immediate applications for establishing the reach of current programs and the need for scale up of services for FSW in Myanmar, and the adoption and application of these methods will be useful for estimating the size of hidden populations, for which the conventional population data is scarce.

**LITERATURE CITED**

1. Statistical Year Book 2011, Central Statistical Organization, Myanmar

**ACKNOWLEDGMENTS**

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**Figure 1. Map of Yangon and Mandalay Cities, Myanmar**

**Figure 2. Unique objects (male bars) distributed to FSW prior to 12 W survey**

**Figure 3. Median Population Size Estimates from Multiplier Methods**

**Table 1. Population size estimates of female sex workers in Yangon and Mandalay, Myanmar (Adjusted estimates were shown)**

**Table 2. Multiplier Method**

<table>
<thead>
<tr>
<th>Method</th>
<th>Number of objects / clients</th>
<th>Adjusted % (SE)</th>
<th>Population size estimate</th>
<th>95% CI</th>
<th>Estimated prevalence</th>
<th>95% CI of estimated prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yangon City (N=450)</td>
<td>Unique object multiplier</td>
<td>498</td>
<td>11.03%</td>
<td>0.59</td>
<td>0.31-0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unique event multiplier</td>
<td>113</td>
<td>2.94%</td>
<td>0.31</td>
<td>0.05-0.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unique service multiplier</td>
<td>1058</td>
<td>28.62%</td>
<td>0.60</td>
<td>0.41-0.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unique treatment within 12 months</td>
<td>848</td>
<td>22.07%</td>
<td>0.58</td>
<td>0.41-0.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined counseling &amp; testing within 12 months</td>
<td>1087</td>
<td>28.89%</td>
<td>0.58</td>
<td>0.41-0.79</td>
<td></td>
</tr>
<tr>
<td>Mandalay City (N=328)</td>
<td>Unique object multiplier</td>
<td>403</td>
<td>14.00%</td>
<td>0.51</td>
<td>0.40-0.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unique event multiplier</td>
<td>107</td>
<td>5.08%</td>
<td>0.57</td>
<td>0.29-0.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unique service multiplier</td>
<td>1202</td>
<td>35.31%</td>
<td>0.54</td>
<td>0.43-0.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined counseling &amp; testing within 12 months</td>
<td>1273</td>
<td>36.50%</td>
<td>0.53</td>
<td>0.42-0.66</td>
<td></td>
</tr>
</tbody>
</table>

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**Wisdom of the Crowd Method**

Calculate the number of FSW in each small geographic area. Combine the estimates to get a total estimate for the whole city.