Role of infection in cancer in Indigenous and Pacific peoples: *H. pylori* - casting a long shadow

Andrea Teng, MBChB MPH FNZCPHM

NZ Census Mortality Study & CancerTrends, BODE³

University of Otago Wellington
Outline

• Trends in cancer inequalities
• Role of infection on cancer with a focus on *H. pylori*
• The long shadow of its determinants
• Cost-effectiveness of intervening
Infection and cancer

- Human papilloma virus (HPV)
- Hepatitis B
- *Helicobacter pylori*
Cancer’s increasing contribution to the mortality gap

Stomach cancer & the cancer mortality gap

The cancer incidence gap in women

Inequity in stomach cancer mortality, SRRs

• Queensland, Aust: Indigenous cf non-Indigenous (1997-06, 95% CI)
  - men 2.1x (1.5 to 2.9), women 2.0x (1.2 to 3.2)

• NZ: Māori cf. European/Other (nMPA, 2006-11)
  - men 3.5x (2.6 to 4.6), women 5.9x (4.3 to 8.1)

• Pacific cf. European/Other
  - men 2.5x (1.5–4.2), women 6.3x (4.0–9.9)

Casting a long shadow: The impact of household crowding on *H. pylori*, and excess stomach cancer in Māori and Pacific people

Andrea Teng (nee McDonald)
Masters in Public Health

*Supervisors: Assoc. Prof Diana Sarfati, Prof Michael Baker, Prof Tony Blakely*
The inequality link

- Household crowding
- H. Pylori infection
- Stomach cancer
The long shadow

- *Helicobacter pylori*
  - predominantly acquired in childhood
  - linked with household crowding / socioeconomic
  - persists as chronic infection in stomach
  - important causal factor of stomach cancer
  - necessary for non-cardia stomach cancer
Health determinants

- Ethnicity
- Low socioeconomic position
- Vulnerable age (childhood)

Exposures / Risk factors

- High level of household crowding
- Lack of hot water, inadequate hygiene, living with an infected person, diet
- Exposure to smoking, high salt diet or low fruit and vegetable intake

Health outcomes

- Increased risk of H. pylori infection
- Increased risk of stomach cancer
H. pylori by household crowding

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>log(Odds Ratio)</th>
<th>SE</th>
<th>Weight</th>
<th>Odds Ratio (IV, Random, 95% Cl)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mendai 1992</td>
<td>1.816</td>
<td>0.59</td>
<td>1.4%</td>
<td>6.15 [1.93, 19.54]</td>
<td>1992</td>
</tr>
<tr>
<td>Webb 1994</td>
<td>0.432</td>
<td>0.294</td>
<td>3.3%</td>
<td>1.54 [0.87, 2.74]</td>
<td>1994</td>
</tr>
<tr>
<td>Malaty 1994</td>
<td>1.504</td>
<td>0.139</td>
<td>5.0%</td>
<td>4.50 [3.43, 5.91]</td>
<td>1994</td>
</tr>
<tr>
<td>Fazel 1994</td>
<td>1.131</td>
<td>0.437</td>
<td>2.1%</td>
<td>3.10 [1.32, 7.30]</td>
<td>1994</td>
</tr>
<tr>
<td>Malaty 1996</td>
<td>0.742</td>
<td>0.137</td>
<td>4.5%</td>
<td>2.10 [1.46, 3.03]</td>
<td>1996</td>
</tr>
<tr>
<td>McCallion 1996</td>
<td>1.210</td>
<td>0.335</td>
<td>2.9%</td>
<td>3.30 [1.75, 5.52]</td>
<td>1996</td>
</tr>
<tr>
<td>Staat 1996</td>
<td>1.723</td>
<td>0.338</td>
<td>2.0%</td>
<td>5.60 [2.89, 10.86]</td>
<td>1996</td>
</tr>
<tr>
<td>Breuer 1996</td>
<td>0.761</td>
<td>0.352</td>
<td>2.7%</td>
<td>2.14 [1.07, 4.27]</td>
<td>1996</td>
</tr>
<tr>
<td>Stone 2000</td>
<td>0.732</td>
<td>0.248</td>
<td>3.8%</td>
<td>2.08 [1.26, 3.38]</td>
<td>2000</td>
</tr>
<tr>
<td>Malaty 2001</td>
<td>0.182</td>
<td>0.331</td>
<td>2.9%</td>
<td>1.20 [0.63, 2.30]</td>
<td>2001</td>
</tr>
<tr>
<td>Eroueti 2001</td>
<td>0.531</td>
<td>0.155</td>
<td>4.8%</td>
<td>1.70 [1.26, 2.30]</td>
<td>2001</td>
</tr>
<tr>
<td>Wizita-Derambure 2001</td>
<td>-0.511</td>
<td>0.6</td>
<td>1.4%</td>
<td>0.60 [0.19, 1.94]</td>
<td>2001</td>
</tr>
<tr>
<td>Cho 2002</td>
<td>0.912</td>
<td>0.394</td>
<td>2.4%</td>
<td>2.49 [1.16, 5.39]</td>
<td>2002</td>
</tr>
<tr>
<td>Chong 2003</td>
<td>0.489</td>
<td>0.37</td>
<td>2.6%</td>
<td>1.63 [0.79, 3.37]</td>
<td>2003</td>
</tr>
<tr>
<td>Rodrigues 2004</td>
<td>0.948</td>
<td>0.303</td>
<td>3.2%</td>
<td>2.58 [1.42, 4.67]</td>
<td>2004</td>
</tr>
<tr>
<td>Özen 2006</td>
<td>1.095</td>
<td>0.459</td>
<td>2.0%</td>
<td>2.99 [1.22, 7.35]</td>
<td>2006</td>
</tr>
<tr>
<td>Goldman 2006</td>
<td>0.03</td>
<td>0.108</td>
<td>5.4%</td>
<td>1.03 [0.63, 1.27]</td>
<td>2006</td>
</tr>
<tr>
<td>Lynn 2007</td>
<td>0.445</td>
<td>0.361</td>
<td>2.7%</td>
<td>1.55 [0.77, 3.17]</td>
<td>2007</td>
</tr>
<tr>
<td>Miranda 2010</td>
<td>-0.131</td>
<td>0.144</td>
<td>5.0%</td>
<td>0.89 [0.66, 1.18]</td>
<td>2010</td>
</tr>
</tbody>
</table>

Subtotal (95% Cl): 60.9% (2.06 [1.53, 2.77])

Heterogeneity: Tau² = 0.33; Chi² = 125.57, df = 18 (P < 0.00001); I² = 86%

Test for overall effect: Z = 4.75 (P < 0.00001)

More than 1/3 of Māori & Pacific *H. pylori* seroprevalence was attributable to crowding

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Seroprevalence %</th>
<th>Household crowding (&lt;15yo) %</th>
<th>Proportion seroprevalence attributable to crowding, PAF % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>European/Other</td>
<td>7</td>
<td>11</td>
<td>14 (9-20)</td>
</tr>
<tr>
<td>Māori</td>
<td>18</td>
<td>38</td>
<td>36 (25-47)</td>
</tr>
<tr>
<td>Pacific</td>
<td>39</td>
<td>51</td>
<td>44 (32-54)</td>
</tr>
</tbody>
</table>
Pooled estimates of adult seroprevalence, by birth cohort and ethnicity, from seven New Zealand studies
H. pylori by ethnicity in Australia

- H. pylori prevalence in two Indigenous communities was 2-3x higher than in non-Indigenous Australian population
  - 91% in a remote rural community
  - 60% in urban community

Have a guess?

What proportion of stomach cancer could be prevented if Māori men in NZ had the same seroprevalence as European men?

A. 30%
B. 50%
C. 70%
D. 90%
Non-cardia stomach cancer

Population screening and antibiotic treatment

• Ford et al (2014) meta-analysis shows this approach reduces stomach cancer by 1/3 in asymptomatic populations
• Further clinical trials are underway
• Screening is increasingly recommended for high risk groups (for *H. pylori* & stomach ca)

Cost of *H. pylori* screening programme per QALY gained

Summary

- *H. pylori* (and its determinants) are the primary driver of excess non-cardia stomach cancer incidence among Māori and Pacific peoples in NZ.

- *H. pylori* ‘screen and treat’ appears to be cost-effective and should be considered for Māori and Pacific adults in NZ.

- These findings are likely to apply to other Indigenous populations in the region with high rates of *H. pylori* infection and stomach cancer.
Acknowledgements

The NZCMS and CancerTrends are funded by the Ministry of Health. Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics NZ or the Ministry of Health.
Appendix
Cancer incidence in the Pacific

**Figure 2:** Cancer incidence and mortality by ethnicity in men (A) and women (B) in the Pacific
