Rampant and neglected: malignant mouth cancer & dental disease: their burdens & ultralow cost solutions for PNG

PNG Update Conference
University of PNG
Port Moresby June 2018

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“This lecture reflects my personal professional opinion”
~ world’s most common childhood disease:

* will affect over 90% of world’s children

~ world’s most common chronic disease

~ world’s most common cause of pain

* over 80% of children will suffer pain from it

~ dental disease ~
“tooth decay”

Growing problem to solve:

~ one dentist per 90,000 people

~ population may double within two decades
Dental disease in PNG: 1985 to 2013


- *54% of teenagers aged 12 to 15 years had decayed teeth* Southern Highlands Province. K. Bandara, PNG Med J 1997 Sept-Dec;40(3-4):150-6.

- **28% of 15 to 19 years, 70% of 35 to 44 years, 66% 45+ years, had decayed teeth** in Eastern Highlands. Davies, oral health pilot survey 1990, quoted in: analysis of decentralized dental services in Papua New Guinea, B. Gwale Master Dental Science, Univ Sydney 1996.

- *3.9 decayed teeth per person* Bamu River Western Province, 2013. Srishti Datta, YWAM, 5thYear dental student, King’s College London Dental Institute, UK.

- **95% of adults with decayed teeth, 63% children decayed teeth** Oro Province
- (average number decayed teeth per person: Adults 3.4 decayed teeth per person, Children 1.8 decayed teeth per child

- *37% of all adults surveyed currently in pain from teeth.* B. Reed, 2012, KTF survey decayed teeth prevalence, Kokoda Track villages.

Strong pain disables, children become malnourished, growth potential decreased
• **unmet burdens of dental disease and pain**

• **doubling future burden**

• **crushing need for effective and permanent prevention**

• *Prevention represents the single best investment in health*

• **Australia’s development impact reduced by dental disease**

• ~ **educational impact loss**

• ~ **economic impact loss**

• ~ **health impact loss**
• *Its prevention the cheapest of all world’s major diseases*

• *three preventive methods that halve dental disease*

• *the key agent: fluoride*

• *Best known are: fluoride toothpaste & water fluoridation*

• *Fluoride is a natural mineral*

• *found in varying amounts in all water*

• *makes teeth stronger & resistant to decay*

• *remineralises decayed teeth (“reverse decay”)*

### Natural fluoride levels in drinking water sources

<table>
<thead>
<tr>
<th>PNG and Solomon Islands 2016</th>
<th>F ion ppm (mg/L) (ideal target = 1.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Port Moresby</strong></td>
<td>0.0358 (&lt;4% of ideal)</td>
</tr>
<tr>
<td>Alotau town</td>
<td>0.0388 (&lt;4% of ideal)</td>
</tr>
<tr>
<td>Alotau airport</td>
<td>0.0477 (&lt;5% of ideal)</td>
</tr>
<tr>
<td>Kokopo, New Britain (recent volcanic soil)</td>
<td>0.0359 (&lt;4% of ideal)</td>
</tr>
<tr>
<td>Oro Province: <strong>15 villages</strong> 2014-6 Popondetta</td>
<td>0.012 to 0.105 (1 to&lt;11%of ideal)</td>
</tr>
<tr>
<td></td>
<td>0.0535 (&lt;6% of ideal)</td>
</tr>
<tr>
<td><strong>Solomon Islands</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Honiara</strong></td>
<td>0.1159 (&lt;12% of ideal)</td>
</tr>
<tr>
<td>Gizo City, Ghizo Island</td>
<td>0.0252 (&lt;3% of ideal)</td>
</tr>
</tbody>
</table>

- Minimum concentration of fluoride in drinking water to prevent dental decay is defined as 0.50 to 1.49 ppm for warm climates (WHO)
- Means no tooth decay protective effect from these low natural fluoride levels
- **87% population rural** ~ leaves one preventive solution for PNG
Effectiveness

Over three hundred million people have benefitted from its use

In thirty nations of Europe and Central and South America over the past thirty years

Benefits all people, children & adults, rural disadvantaged & urban poor

Reduction in decay RAPID

REDUCES 10% per year reaching 50% to 65% in five years

Belize, Bolivia, Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Surinam, Uruguay, Venezuela

Austria, Belgium, Czech Republic, France, Germany, Poland, Slovakia, Spain, Switzerland, Laos, Vietnam

cost versus benefits

- **an ultralow cost solution**
- cost benefit ratio for every one dollar/kina spent on prevention around 40 to $/k 240 saved in future treatment costs
- cost less than 10 cents per person per year
- while water fluoridation costs 90 cents per person per year

- For Bolivia in 1994 with 7.2 million people: (PNG 8 million)
- Total cost for first five years including implementation: US$ 785,000 to prevent 10 million decayed teeth over 5 years
- Represents a saving in curative dental health care of US$ 32 million

references: PAHO Manual Promoting Oral Health The Use of Salt fluoridation to Prevent Dental Caries. Saskia Estupinan-Day 2005
simple addition of fluoride to common table salt, or salt fluoridation

WHO credited salt fluoridation as the single most effective, equitable & practical strategy for the mass reduction of tooth decay in the world’s population

gives automatic protection

fluoridated salt is an innovative approach that will transform PNG dental health within five years

Professor Mahmoud Siddiqi, Head of the University of PNG Dental School, strongly advocated for salt fluoridation in the landmark publication:

**Oral health in Papua New Guinea**

LA Crocombe, M Siddiqi, G Kamae. Nature India. April 2017. 10.1038

No increase in salt consumption
No taste alteration
Safety well established by international research:

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Total Decay Reduction</th>
<th>annual reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamaica</td>
<td>1995</td>
<td>83%</td>
<td>10%</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>1992</td>
<td>73%</td>
<td>11%</td>
</tr>
<tr>
<td>Anguilla</td>
<td>1991</td>
<td>66%</td>
<td>20%</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1997</td>
<td>42%</td>
<td>4% (over 10 years)</td>
</tr>
<tr>
<td>Guyana</td>
<td>1995</td>
<td>52%</td>
<td>6% (over 8 years)</td>
</tr>
</tbody>
</table>


**Early experimental studies**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Decay reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>1966 to 1976</td>
<td>66% children 2 to 6 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>59% children 12 to 14 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>no change in Decay in control children</td>
</tr>
<tr>
<td>Spain orphanage</td>
<td>1966 to 1969</td>
<td>50% children 6 to 13 years</td>
</tr>
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</table>

In 1971, a young US dentist aid volunteer, also a Marist missionary sister, was on the world’s first medical aid ship, the SS HOPE visiting Jamaica.

She despaired over the hundreds of painful teeth she had to remove.

Next decade in Jamaica providing dental pain relief.

Dr Rosalie Warpeha became affectionately known as “Doctor Sister”.

Rosalie went back to the USA to research best way to reduce dental disease in her adopted country.

Salt fluoridation never tried in a developing country on national scale.

Rosalie decided salt fluoridation would be an ideal solution for an island nation like Jamaica.

Persuaded Jamaican Government,

Salt fluoridation program began in 1987.

83% reduction in tooth decay in children in 5 years.
adding iodide and fluoride to table salt

- Fortifying table salt as a vehicle for preventive health delivery not a new idea for the Papua New Guinea Government when *it legislated to add iodide to imported table salt in 1995*
- In 1995, the PNG Government made iodide addition to salt compulsory by *amendment to Pure Food Act chapter 233 banning non-iodised salt*
- The industrial process of mixing fluoride to already iodised tablet salt is simple and very low cost for the Asian & Australian salt industries
- Adding fluoride to iodised table salt does not change effectiveness of iodide

In 2007, WHO World Health Assembly recognized that universal access to fluoride for dental health is a part of the basic human right to health.

In 2005, WHO published a practical guide for governments & health professionals for introducing national salt fluoridation programs.

WHO Oral Health Program provides technical support for new programs.

Three recommendations:

1. an appeal for a small amount of aid for a national fluoride mapping study of drinking water sources by the PNG Dental School:
   - research on a national scale would verify my initial research that showed natural fluoride levels in drinking water is very low across PNG
   - If we know definitively that natural water fluoride levels are low across the nation, we know that salt fluoridation is suitable for the whole country

2. to provide aid for PNG Dental School to educate the people & Government in the effectiveness and safety of fluoridated salt:
   - gain their approval and promote the need for action now
   - This is key, as everyone needs to be on board for this to work

   - dental disease takes away the enjoyment of life
   - Its pain is stealing away the smiles of children
   - Action to fund and legislate for salt fluoridation will bring children’s smiles back

3. Action and aid now will enhance the health and impact the lives and well-being of PNG children within five years

   - Without fluoridated salt, no solution for the suffering children of PNG
• **rampant, neglected & often deadly:** **malignant mouth cancer**

![Image of malignant mouth cancer](image1)

• **PNG world’s highest rate of malignant mouth cancer**

• **Mouth cancer comprises 25% of all cancers in PNG compared to 2% in Australia**

• **becoming a disease of young people in PNG**

• **highest incidence of mouth cancer in women in world**

references:
• Untreated:
  • quickly leads to death
  • much pain, suffering
  • social isolation
  • loss of function & facial deformity
• number one cancer killer in males, and third highest killer among females:
  • often because of delays in diagnosis, leading to delays in treatment
• PNG research by Dr Takavi Maga found early diagnosis is very uncommon and delayed detection is the norm:
• patient long term survival rates be low as 20%
• If delays reduced, & growth removed while still small = long term survival rate could increase to 80%
• landmark studies in India proved early detection made significant improvement in survival rates:

Four types of delays result in late diagnosis & treatment:

1. delay in the patient seeking care due to their lack of knowledge of mouth cancer symptoms
2. delay from health worker not recognising early signs of mouth cancer thus delaying their diagnosis of cancer
3. delay in time it takes to arrange a biopsy, so treatment can start
4. final delay is in getting treatment

Together delays can average six to eight months

For one patient with a large cancer, an operation can take all day:
so waiting lists can become long
In contrast, by being diagnosed early, while the cancers are small, operations are shorter:
meaning up to five times as many operations in a single day
early operation = survival rates go up towards 80%

• Funding our three pitches will enhance well the impact of Australian health aid spending with
• many more young cancer victims surviving
• aid spending needed for our three pitches is tiny

• two predictions made by Dr Chris Acott:
  • 1. mouth cancer cases will double in twelve years’ time &
  • 2. treatment could consume most of the health budget within a few years
1. **long term aid to increase early diagnosis**
   - by education of health workers & the public about the signs of early mouth cancer &
   - to seek help early
   - Health workers routinely examine the mouth: dental workers, community health workers, doctors
   - so everyone becomes “mouth aware for cancer”

2. **All three groups upskilled in detecting early cancer quickly**

3. They then need to swiftly refer on to a surgeon or dentist able to do a biopsy

2. **more dentists need upskilling in biopsy techniques**

4. **Oral pathologists trained & positions funded to examine biopsies**
3. reduce the three most important causes of mouth cancer:
- betel nut chewing
- tobacco use
- heavy alcohol consumption

Each risk factor alone can multiply the risk of cancer by ten times compared to non-drinkers and non-smokers & with combined risk factors, it multiplies to around forty times

- 50 to 80% of people smoke tobacco
- Once reserved for sacred events, up to 80% now chew betel nut, including pregnant women

- growing tragedy is that it is now common for children as young as eight years to chew betel nut regularly

- A local ENT surgeon, Dr Molumi, said these children would be likely to get cancer before the age of 30
• **permanent public campaigns for prevention:**
• to warn about the most common causes of cancer
• together with national educational websites perhaps using Facebook
• Facebook page to educate about signs of early mouth cancer with photos:
  “Sapos yu igat maus kensa?” (Do you have mouth cancer?)
• Using Facebook for public health education means no cost to access the page & easy access from mobile phones
• At schools, *permanent prevention campaign about dangers of betel nut chewing & smoking*
We would like to thank the Kokoda Track Foundation and YWAM charities for their support to enable my research on dental disease and thank Dr Takavi Maga and his patients for their photos.

Three recommendations:

1. dental school funding both for training of health workers to speed up diagnosis
2. design public education strategies for early detection
3. design public education strategies for cancer prevention

health impacts will be more young people having 80% chance of a long productive life rather than 20% chance & less mouth cancer in PNG

The Government’s vision of making PNG a healthier and happier society will need funded solutions for the two great burdens of malignant mouth cancer and painful dental disease

solutions suggested: proven, innovative & ultralow cost

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“The first wealth is health” Ralph Waldo Emerson