

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

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'Through Struggle to the Stars'

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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

- **1.9 to 6.0 decayed teeth per person in 1985** in Tari District, Southern Highlands Province. Huli oral health by Paul Newell PNG Med J 2002 Mar-Jun;45(1-2):63-79.
- *** 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.

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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

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



- 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



= **“Value for money”**

references: PAHO Manual Promoting Oral Health The Use of Salt fluoridation to Prevent Dental Caries. Saskia Estupinan-Day 2005
US National Library of Medicine National Institutes of Health Schweiz Monatsschr Zahnmed. 2005;115(9):778-84. Cost aspects of
salt fluoridation. Gillespie GM, Marthaler TM
Modeling an economic evaluation of a salt fluoridation program in Peru. R. J. Mariño et al. Journal of Public Health Dentistry 71
(2011) 125–130.

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:

Safety references: PAHO/WHO Manual Promoting Oral Health The Use of Salt fluoridation to Prevent Dental Caries. Saskia Estupinan-Day 2005.

Fluoride and oral health. O'Mullane D, Baez R, Jones S. et al. Community Dental Health 2016. 33:69-99.

Salt fluoridation and general health. K.E. Bergmann, R.L. Bergmann. Robert Koch Institute, Division of Epidemiology of Non-communicable Diseases Berlin, Germany and Department of Pediatrics, Virchow-Klinikum Humboldt University, Berlin, Germany. Adv Dent Res 9(2): 138-143, July, 1995

research on effectiveness of salt fluoridation

Country	<i>national programs</i>	Total Decay Reduction	annual reduction
Jamaica	1995	83%	10%
Costa Rica	1992	73%	11%
Anguilla	1991	66%	20%
Venezuela	1997	42%	4% (over 10 years)
Guyana	1995	52%	6% (over 8 years)

references: (PAHO/WHO Manual Promoting Oral Health The Use of Salt fluoridation to Prevent Dental Caries. Saskia Estupinan-Day 2005, Estupinan-Day S, Baez R, Horowitz H, Warpeha R. Salt Fluoridation and dental caries in Jamaica. Community Dent Oral Epidemiol 2001;29:247-252; Solórzano I, Beltrán E, Salas M, Chavarría S, Estupiñán S. Prevalence and trends of dental caries in Costa Rican school children from 1984 to 1999. Journal of Dental Research 2001;90 (Special Issue):36.

Early experimental studies

Decay reduction

Hungary	1966 to 1976	66%	children 2 to 6 years
		59%	children 12 to 14 years
			no change in Decay in control children

Spain orphanage	1966 to 1969	50%	children 6 to 13 years
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references: (PAHO Manual 2005; Toth K. Ten years domestic salt fluoridation in Hungary. Acta Paediatr Acad Sci Hung 1978;19(4):319-327; Viñes JJ. Caries-preventive salt fluoridation. Br Dent J 1985;158(2):45-49).



DOCTOR SISTER ROSALIE WARPEHA

salt fluoridation champion of Jamaica



- 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

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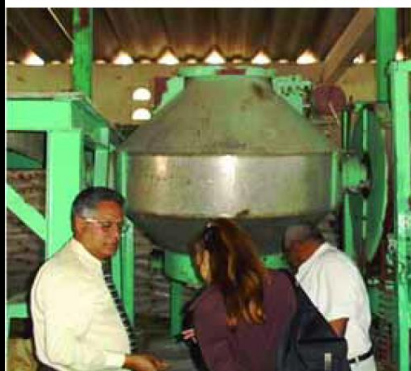


adding iodide and fluoride to table salt

- 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

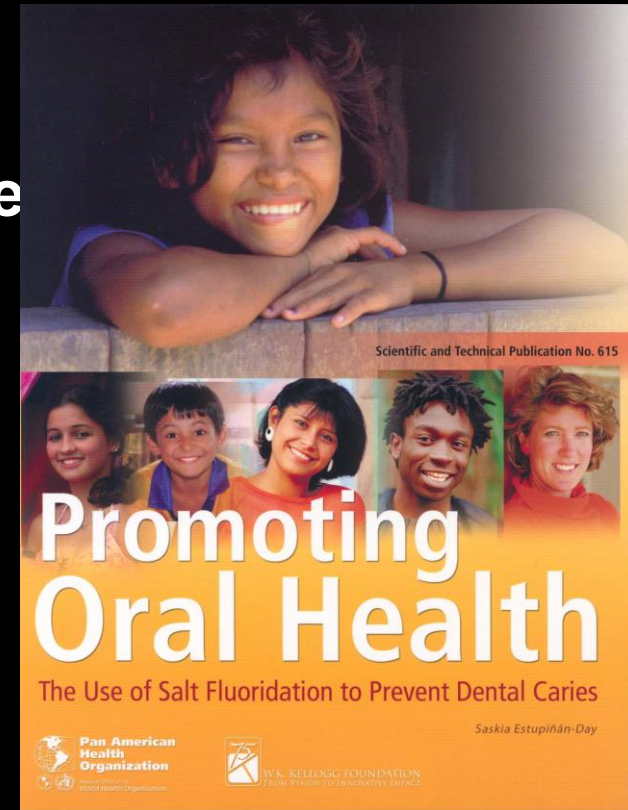


Figure 5.7 Dry method equipment: 2 ton capacity rotary mixer used for dry mixing of salt and fluoride and iodide additives.



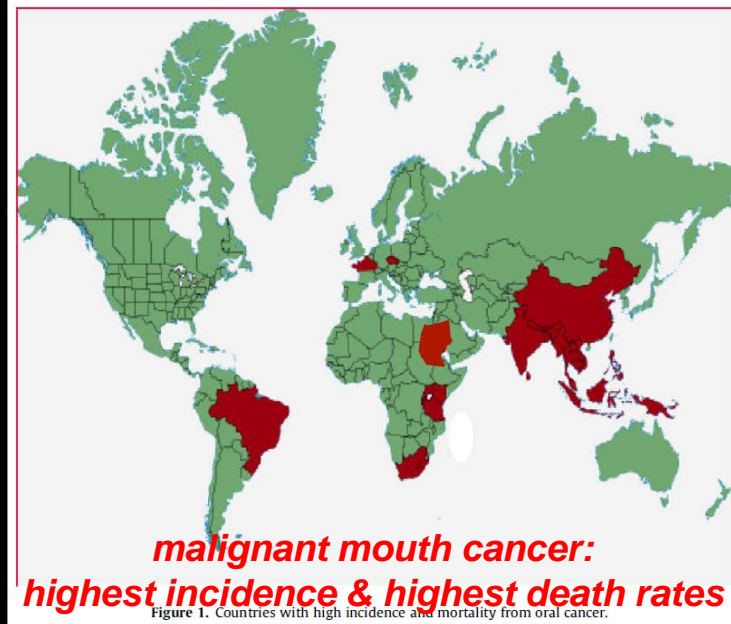
WORLD HEALTH ORGANISATION SUPPORT

- 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

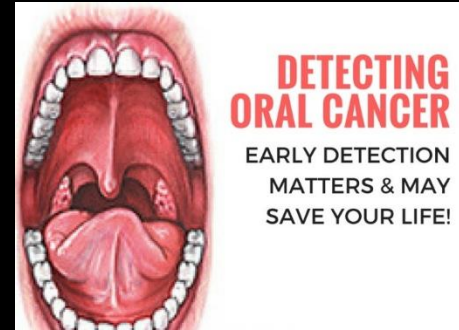


- **PNG world's highest rate of malignant mouth cancer**
- **Mouth cancer comprises 25% of all cancers in PNG compared to 2% in Australia**
- **becoming a disease of young people in PNG**
- **highest incidence of mouth cancer in women in world**

references:

World Health Organisation Cancer country Profiles 2014 at http://www.who.int/cancer/country-profiles/png_en.pdf
Moer M, Baurmann F, Foliaki S, et al. Cancer Epidemiology in the Pacific Islands – Past, Present and Future. Asian Pacific J Cancer Prevention 2010. 11:99-106

- **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:



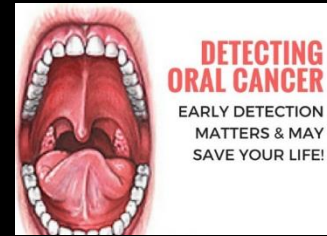
references: Sankaranarayanan R, Ramadas K, Thara S, Muwonge R, Thomas G. and others. 2013. Long Term Effect of Visual Screening on Oral Cancer Incidence and Mortality in a Randomized Trial in Kerala, India. Oral Oncology 49 (4): 314–21.

Sankaranarayanan R, Ramadas K, Thomas G, Muwonge R, Thara S. and others. 2005. Effect of Screening on Oral Cancer Mortality in Kerala, India: A Cluster-Randomised Controlled Trial. The Lancet 365 (9475): 1927–33

- **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%**

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- **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**

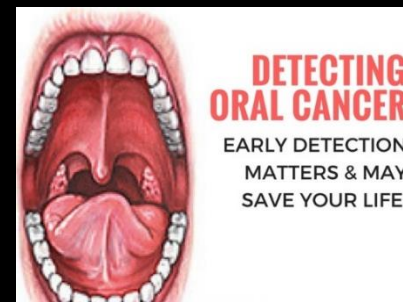
- **two predictions made by Dr Chris Acott:**

- **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”

- **All three groups upskilled in detecting early cancer quickly**
- 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**
- **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 &

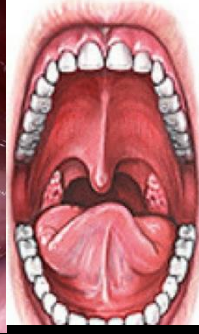
- with combined risk factors, it multiplies to around **forty times**

- 50 to 80% of people smoke tobacco

- Once reserved for sacred events, up to 80% now chew betel nut, including pregnant women

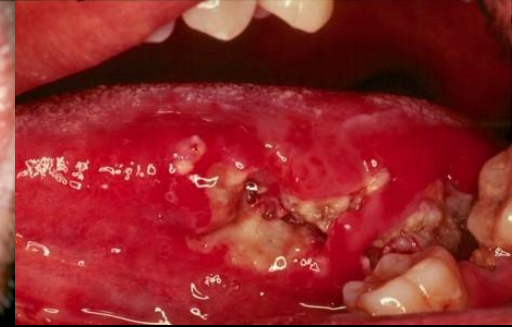
- growing tragedy is that it is now common for **children** as young as eight years to chew betel nut regularly

- **A local ENT surgeon, Dr Molumi, said these children would be likely to get cancer before the age of 30**



DETECTING ORAL CANCER

**EARLY DETECTION
MATTERS & MAY
SAVE YOUR LIFE!**



- **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**

- **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



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

“The first wealth is health” Ralph Waldo Emerson