

Epidemiological Overview of Smokeless Tobacco

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NICPR, NOIDA. Nov 27-28, 2017

Background

- The burden of smokeless tobacco use is highest in India.
- Smokeless tobacco use in India is inexorably linked with betel quid/areca nut
- This talk will focus equally on smokeless tobacco and areca nut.

Outline

- Users of smokeless tobacco, betel quid / areca nut -> Prevalence and Characteristics
- Less known adverse health effects
- Control of smokeless tobacco/ areca nut use and its challenges

Modes of ST Use

- **Chewing** – contain tobacco leaves, other leaves (e.g., betel leaf), nuts (areca nut), other condiments
- **Sucking** – contain moist powdered tobacco with alkaline agents, e.g., snus, khaini, lozenges
- **Applying** – powdered or pasted products, e.g., mishri, bajjar, gudakhu, creamy snuff
- **Gargling** – tobacco water (tuibur)
- **Inhalation** – extremely fine dry powder, e.g., nasal snuff



Qiwam



Betel quid (paan)



Zarda



Gutka



Moist snuff



Dry snuff



Snus



Chimó



Moist snuff
(caffeinated)



Plug



Nasway



Toombak



Twist



Red tooth powder



Shammah



Orbs



Strips



Sticks



Tobacco-coated toothpicks



Mawa



Rapé

Forms of Areca Nut Use

- Betel quid (usually with tobacco)
- Manufactured areca nut products (usually with tobacco but also without tobacco)
- Areca nut by itself, manufactured products or not
- Areca nut by itself, as produce

Information on Smokeless Tobacco Use

- The most reliable information is available from GATS-India.
- In the recently released results of GATS-India II, the number ST users is estimated as close to 200 million.
- ST use is common among women – 58 million women users.

Information on Areca Nut Use

- Information on betel quid or arecanut use has generally been subsumed under the category of smokeless tobacco use.
- The inference on areca nut use is often drawn looking at the type of product consumed

Information on Areca Nut Use

- GATS II however, provided some information on betel quid or areca nut use without tobacco.
- The prevalence of betel quid without tobacco was 8.7%; areca nut, 8%; and, pan masala without tobacco 4.8%.

Association of Areca-nut use with other related variables

| | | GATS India | | GATS Bangladesh |
|----------------------------|----------------------|-----------------------------|--------------------------------|-----------------------------|
| Variables | Options | Areca-nut with tobacco N(%) | Areca-nut without tobacco N(%) | Areca-nut with tobacco N(%) |
| Use of SLT after waking up | Within 5 minutes | 881 (13.3) | 79 (13.5) | 130 (6.2) |
| | 6 to 30 minutes | 2277 (34.4) | 201 (34.4) | 505 (24.2) |
| | 31 to 60 minutes | 1326 (20.0) | 132 (22.6) | 499 (23.9) |
| | More than 60 minutes | 2135 (32.3) | 172 (29.5) | 952 (45.6) |
| Age of initiation SLT | <=10 | 472 (7.3) | 42 (8.0) | 151 (7.4) |
| | 11 to 15 | 1001 (15.5) | 107 (20.4) | 241 (11.8) |
| | 16 to 20 | 2269 (35.2) | 193 (36.8) | 371 (18.2) |
| | 21 to 25 | 1259 (19.5) | 98 (18.7) | 319 (15.7) |
| | >25 | 1443 (22.4) | 85 (16.2) | 953 (46.8) |

Odds ratio for noticing any advertisement or signs promoting SLT products at various places.

| Sr. No | Various places | GATS India | | GATS Bangladesh |
|--------|---|------------------------|---------------------------|------------------------|
| | | <u>AN with Tobacco</u> | <u>AN without Tobacco</u> | <u>AN with Tobacco</u> |
| 1 | Stores | 1.85 (1.71, 2.00) | 0.47 (0.33, 0.66) | 1.30 (1.09, 1.55) |
| 2 | Radio | 1.35(1.15, 1.58) | 0.55 (0.30, 1.04) | 1.15 (0.56, 2.38) |
| 3 | Billboards/hoardings | 1.26 (1.15, 1.37) | 0.36 (0.24, 0.54) | 1.25 (0.83, 1.89) |
| 4 | Posters | 1.35 (1.24, 1.48) | 0.39 (0.27, 0.58) | 1.72 (1.26, 2.36) |
| 5 | Cinemas | 1.55 (1.37, 1.76) | 1.09 (0.74, 1.61) | 3.08 (1.93, 4.90) |
| 6 | Public transportation vehicle or stations | 1.24 (1.23, 1.35) | 0.52 (0.37, 0.73) | 2.02 (1.41, 2.89) |
| 7 | Public walls | 1.25 (1.13, 1.39) | 0.50 (0.33, 0.76) | 0.93 (0.57, 1.51) |

Mouth Cancer

- Mouth Cancer is generally the commonest forms of cancer, especially among men.
- Many etiological factors have been proposed for mouth cancer, several have been confirmed
- In India, the single most important causal factor for mouth cancer is the use of tobacco in the form of chewing and smoking
- Presented here some evidence from our studies in India

Mumbai Cohort Study

- **Objective:**

Estimation of Tobacco Attributable Mortality

- **Method:**

Prospective Cohort Study with mortality as the end point.

- **Location:**

Island city of Mumbai (A-H wards)

- **Recruitment period** : 1990-1997

- **Sample size:** *Phase I* - 100000 men and women ≥ 35 year

Phase II - 50000 men ≥ 45 year

Incident Cancers

- The database of incident cancers in Mumbai for 1991-2003 was obtained from the Cancer Registry
- This database did not include address so address was inputted from the original forms
- The cancer incidence database was matched with the cohort database using gender, age, name and address as matching variables

Pednekar et al. Cancer Causes and Control. 2011; 22(6), 859-68

Cancer incidence, adjusted HRs*, and 95% CIs, by tobacco use: Mumbai Cohort Study, Men, 1991-2003

| Cancer Site [†] | | Non-user | Smokeless | Smoker | Bidi [‡] |
|---|-----------|----------|------------------------|------------------------|------------------------|
| Lip, oral cavity and pharynx (C00–14) | n | 44 | 107 | 136 | 89 |
| | HR(95%CI) | 1.0 | 1.48(1.03,2.13) | 3.03(2.14,4.29) | 3.55(2.40,5.24) |
| Digestive organs (C15–26) | n | 76 | 159 | 121 | 61 |
| | HR(95%CI) | 1.0 | 1.43(1.07,1.90) | 1.70(1.27,2.28) | 1.55(1.07,2.23) |
| Respiratory and intrathoracic organs (C30–39) | n | 27 | 64 | 114 | 76 |
| | HR(95%CI) | 1.0 | 1.71(1.08,2.73) | 4.30(2.80,6.60) | 5.54(3.46,8.87) |

Relative risk of oesophagus cancer among men

| Cancer | Cancer cases | RR (95% CI) |
|------------------------|--------------|----------------------|
| Oesophagus (15) | | |
| Never user | 7 | 1.0 |
| Smokeless | 36 | 3.65 (1.59 to 8.38) |
| Smoker* | 40 | 5.75 (2.54 to 12.98) |

Relative risk of larynx cancer among men

| Cancer | Cancer cases | RR (95% CI) |
|--------------------|--------------|---------------------|
| Larynx (32) | | |
| Never user | 9 | 1.0 |
| Smokeless | 26 | 1.86 (0.85 to 4.06) |
| Smoker* | 40 | 4.33 (2.07 to 9.05) |

Trend in India

- During last three decades, due to targeted advertisement and marketing, use of packaged smokeless tobacco called 'gutka' increased tremendously among adolescents
- A precancerous condition, submucous fibrosis, is in now almost a pediatric epidemic
- There are several signs of increasing incidence of oral cancer among young males

The widespread **gutka** use among **young** individuals due to targeted advertising and promotion campaign has caused an epidemic of oral **submucous fibrosis** and is leading to an increased incidence of **oral cancer** among young persons.

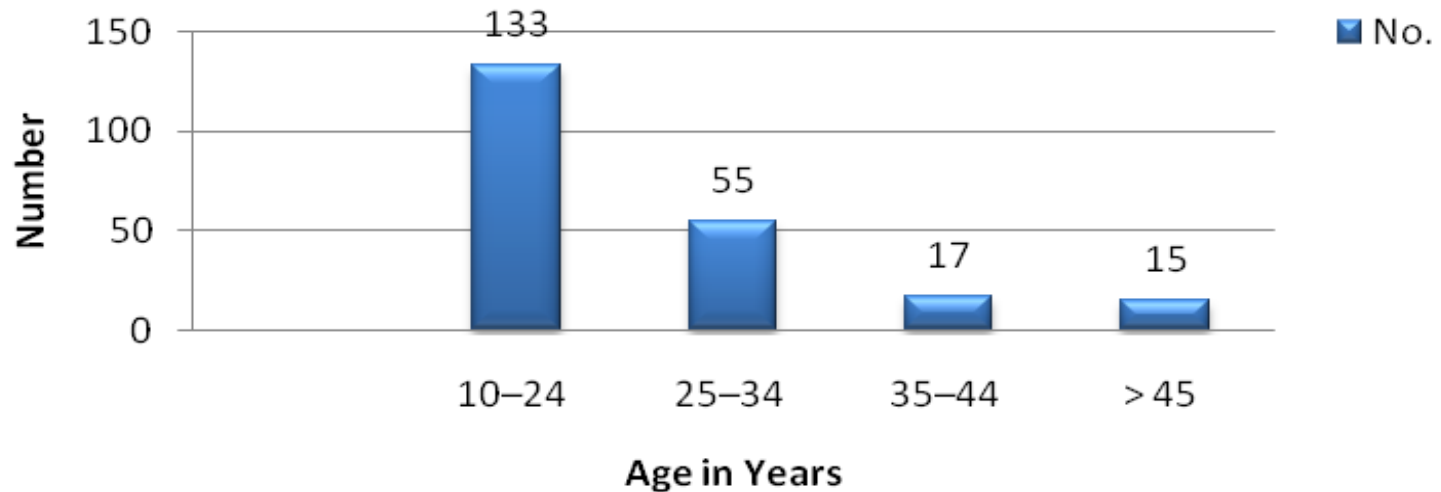
(NMJI; 11(3): 113-116, 1998; J Ind Med Assoc 1999;85;1885-99)



A comparison of the age distribution of recently reported oral submucous fibrosis cases and incident cases reported in the past.

| Age | Gupta et al. 1998 | Hazarey et al. 1998 | Gupta et al. 1980 |
|--------------|-------------------|---------------------|-------------------|
| 15-34 | 138 | > 140 | 1 |
| 35-54 | 25 | < 60 | 19 |
| 55 and over | 1 | | 6 |
| Total | 164 | 200 | 26 |

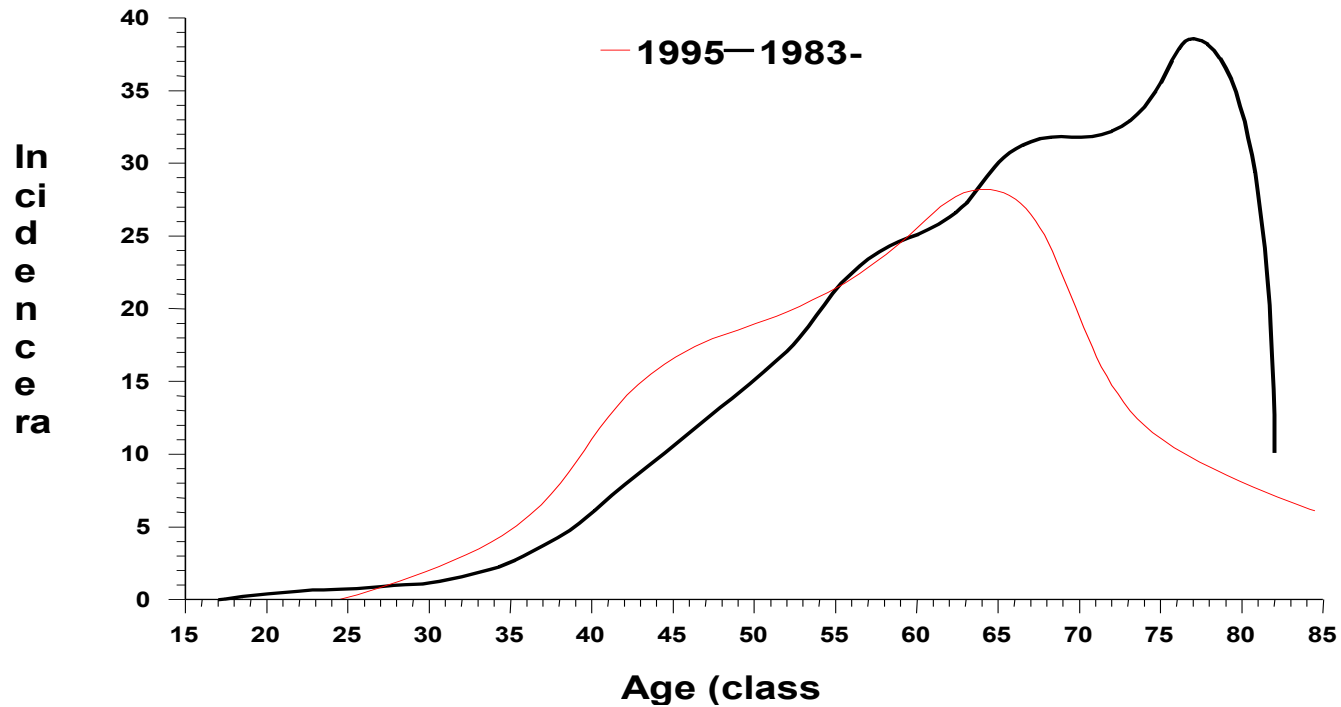
Age distribution of submucous fibrosis cases from a case-control study in Karnataka



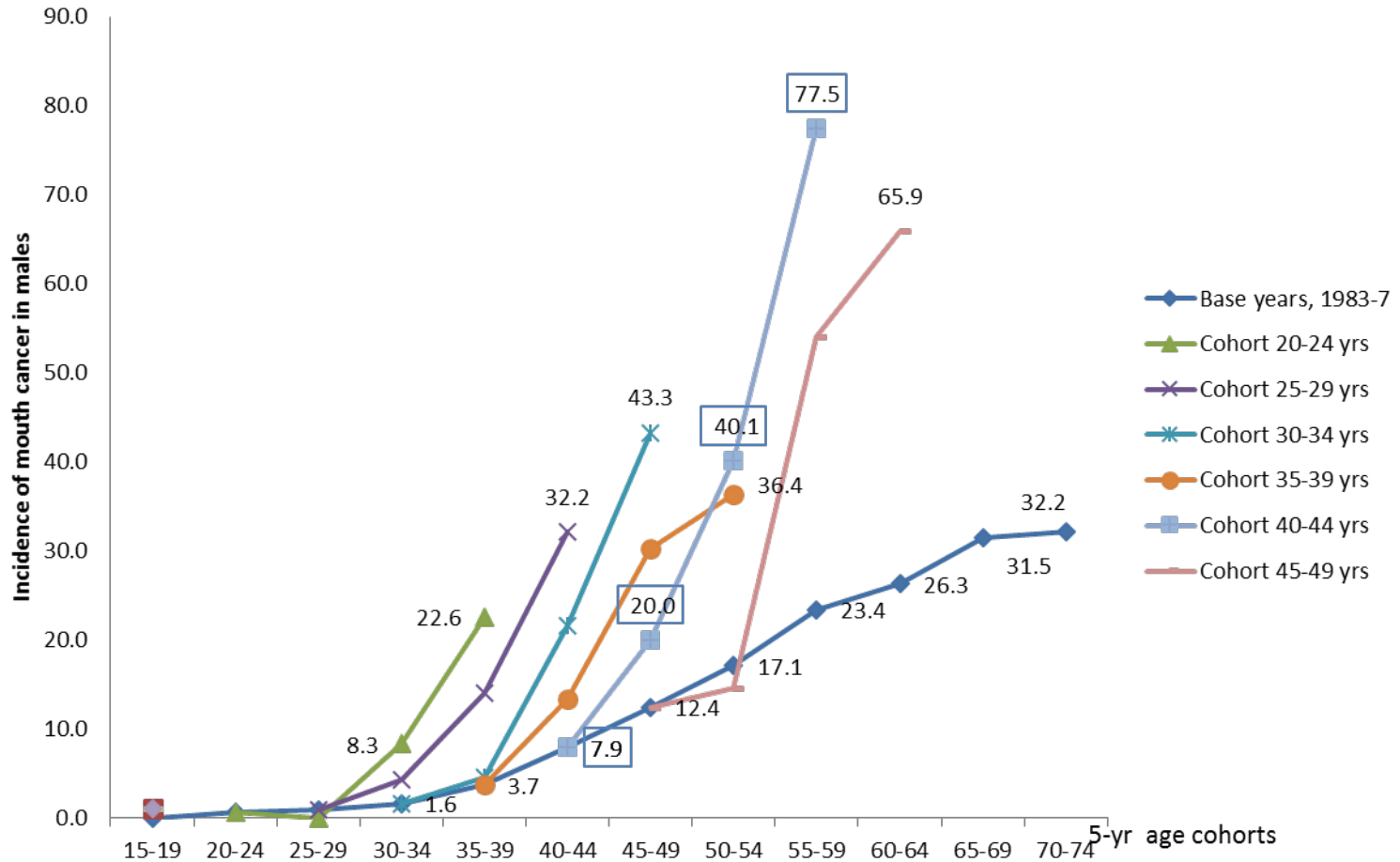
Ref: Bathi RJ et al. Quintessence International 2009; 40(6); e19-e25

In this study OR for gutka chewing was 1,142.4

Incidence rates of oral cancer in the city of Ahmedabad



Mouth cancer incidence rates using cohort approach among men in the city of Ahmedabad



Reproductive Health Effects

When used by pregnant women:

SLT –

- Low birth Weight
- Reduced gestational period
- Still birth
- Anemia

Areca nut –

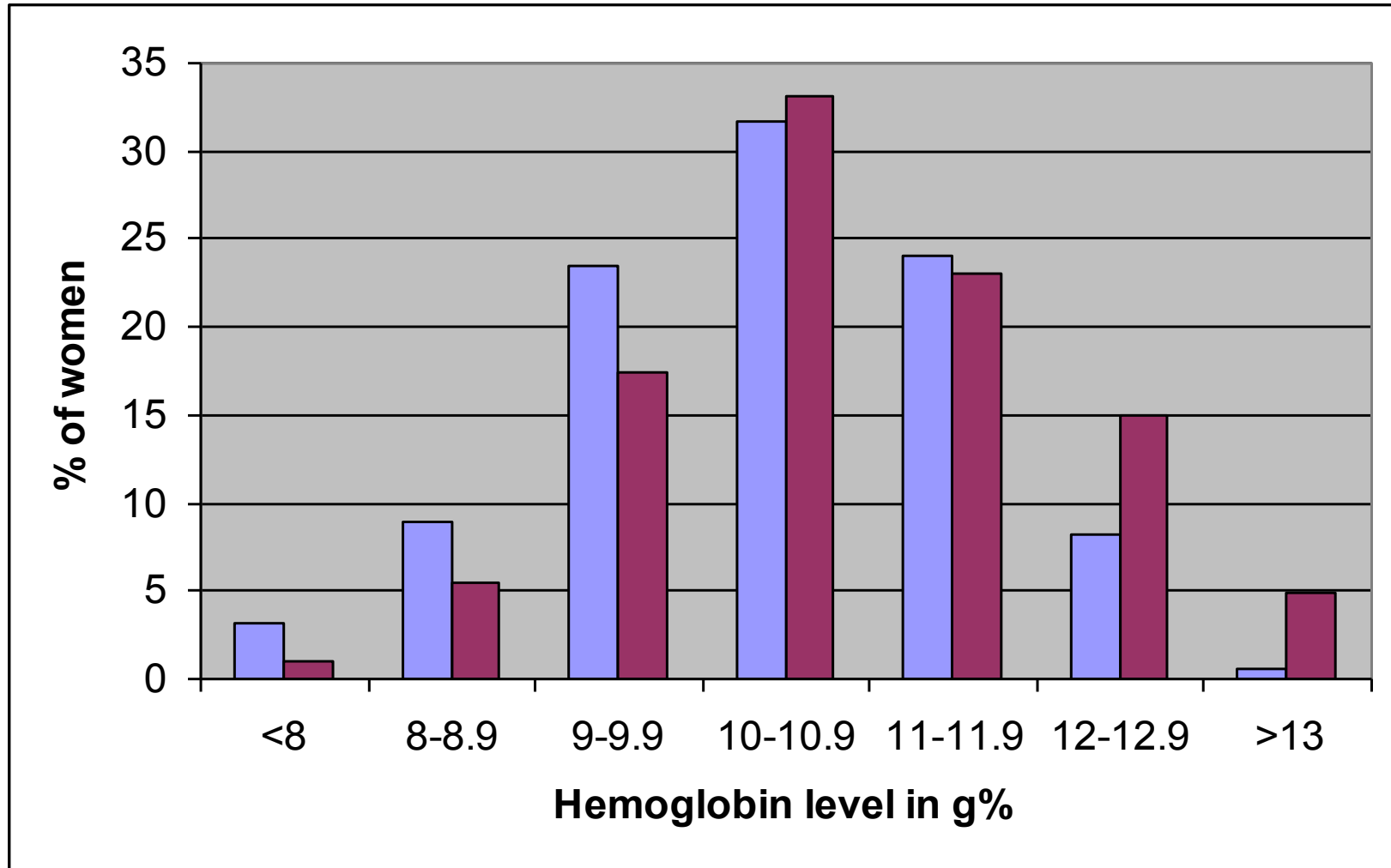
- Similar results in several studies

Pooled odds ratio and attributable burden of adverse pregnancy outcomes due to smokeless tobacco

| | Pooled odds ratio (fixed effects) | Population attributable fraction* (PAF) (95% CI) | Total no. of annual cases. |
|------------------|-----------------------------------|--|----------------------------|
| Low birth weight | 1.88 (1.38-2.54) | 0.12 (0.05-0.19) | 75,00,000 |
| Preterm birth | 1.39 (1.01-1.91) | 0.06 (0.001-0.12) | 35,19,118 |
| Stillbirth | 2.85 (1.62-5.01) | 0.22 (0.08-0.37) | 5,70,860 |

*Prevalence of SLT use in women 15-49 year age group- 14.9%

Hemoglobin levels in pregnant SLT users and non-users



Circulatory System Diseases

- ST users have a slightly higher risk of death due to circulatory causes compared to never-tobacco users in cohort studies:
- RR=2.1 (1.5-2.9) for all Cardiovascular Disease related deaths (Bolinder et al, 1994)
- RR=1.25 (1.05–1.49) for Ischemic heart disease deaths (ICD10, I10-I11,13,21,24,25,46,50) (Gupta et al, 2005)
- Chewing tobacco raises risk of acute myocardial infarction (InterHeart study) OR =2.23 (1.41-3.52) (Teo et al, 2006)

Risks for Men

| Cause of Death | Never tobacco use | Smokeless |
|----------------|-------------------|------------------|
| Respiratory | 63 | 169 |
| RR | 1.0 | 1.50 (1.12-2.03) |
| COPD | 38 | 102 |
| RR | 1.0 | 1.42 (1.07-2.00) |
| Tuberculosis | 58 | 160 |
| RR | 1.0 | 1.46 (1.07–2.00) |

Gupta et al. Int J Epidemiol 2005 Dec;34(6):1395-402.

Risk for ... - Women

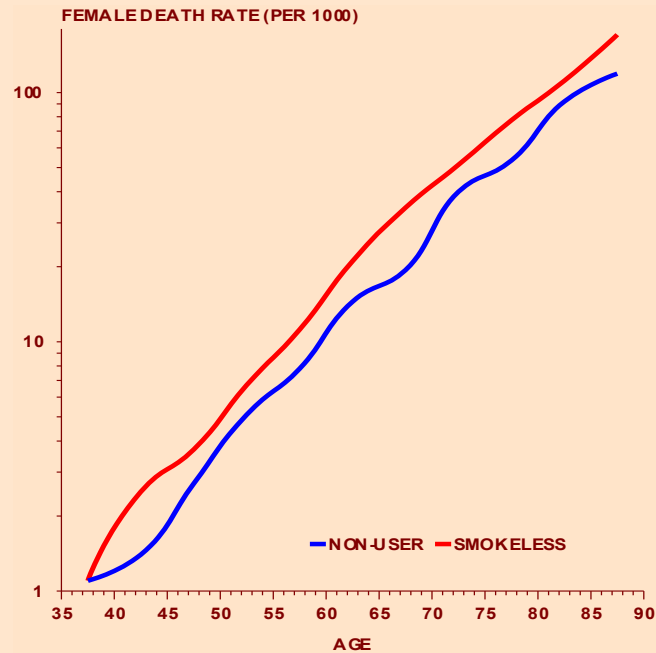
| Cause of Death | Never tobacco use | Smokeless |
|----------------|-------------------|------------------|
| Neoplasms | 65 | 177 |
| RR | 1.0 | 1.57 (1.16-2.13) |
| Circulatory | 283 | 735 |
| RR | 1.0 | 1.09 (1.02-1.38) |
| IHD | 197 | 544 |
| RR | 1.0 | 1.25 (1.05-1.49) |

Gupta PC et al. Int J Epidemiol 2005 Dec;34(6):1395-402.

All-Cause Mortality Risks

| | Deaths | HR | 95% CI |
|-----------|--------|------|-----------|
| Smokeless | | | |
| Women | 2570 | 1.25 | 1.11-1.35 |
| Men | 1787 | 1.16 | 1.06-1.26 |

AGE-SPECIFIC MORTALITY RATES AMONG FEMALE SMOKELESS TOBACCO USERS AND NON-USERS OF TOBACCO, COHORT STUDY, MUMBAI



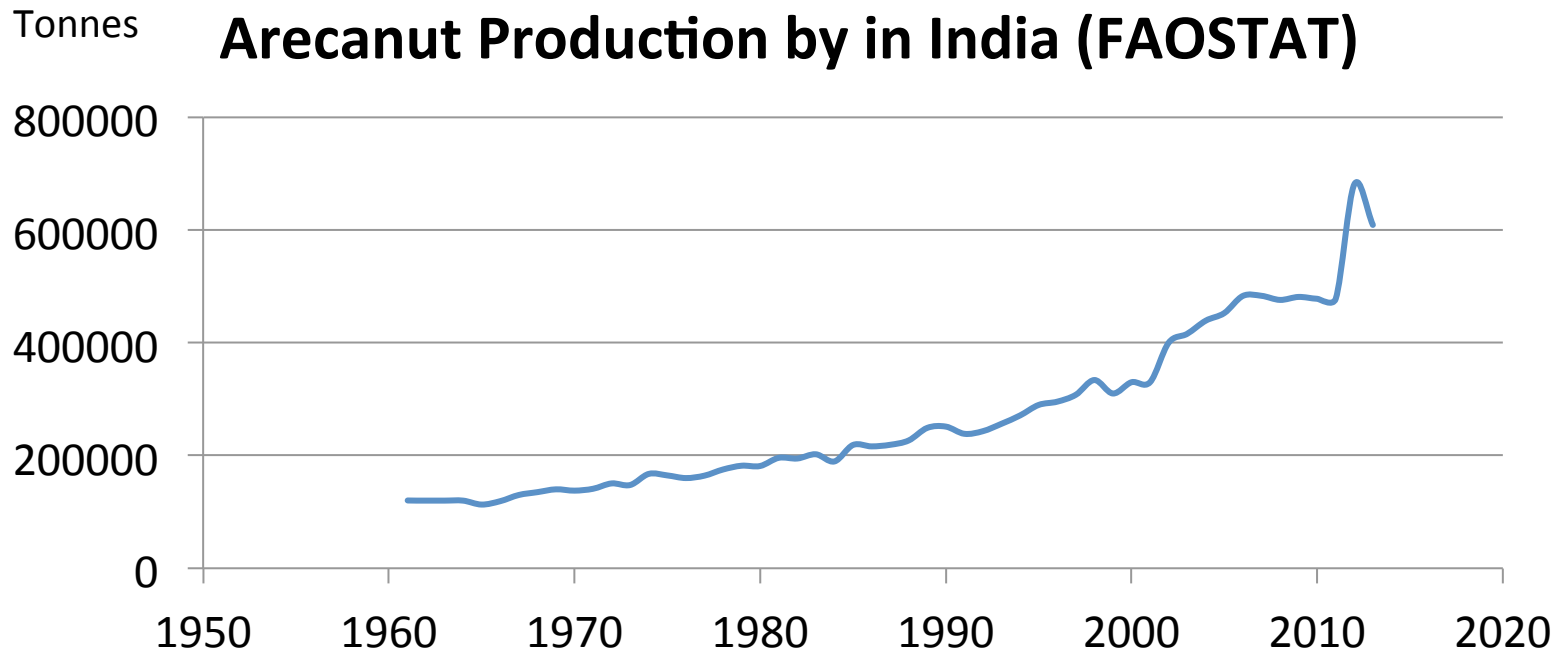
All-Cause Mortality

In a cohort study of 20,033 persons with 10 yr follow-up in Bangladesh , participants who had ever used betel were significantly more likely to die from all causes (HR: 1.26; 95% CI: 1.09–1.44)

(Bull World Health Organ 2015;93:684–692)

Areca Nut Control Problematic

- Important role in the economy



Control Policies in India

- Bans on manufactured products containing both tobacco and areca nut (No. states = 29)
- Ban on smokeless tobacco products – 11 states
- Bans on manufactured products containing areca nut (some States)
- Implementation - incomplete

Some Good News

- GATS II data has provided some good news.
- The prevalence of smokeless tobacco use has decreased from 25.9% to 21.4% - a relative reduction of 17%.
- The decrease has occurred across nearly all socio-demographic groups and in all states.
- Lot more however, needs to be achieved.

Research Recommendations

- Continuation of surveillance especially among adolescents not covered by GATS - has not happened for a long time.
- Identification of specific policies that have contributed to reduction in prevalence.
- Incorporation of tobacco control messaging into existing verticals of the National Health Mission.

Thank You
for
Your Attention