

# Good oral health leads to good cardiovascular health: A 15 year follow-up study in Finnish elders

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## Abstract

**Objectives:** Good oral health affects general health by improving nutritional intake and reducing vascular inflammation associated with heart disease.

**Methods:** Kuopio Oral Health and Heart Study was initiated as a case-control investigation (256 CAD cases and 250 controls, mean age=60) in 1995. We appended mortality status to the baseline data and formulated this 15-year longitudinal study where causal association may be established. The relationship of good oral health measured by the number of remaining teeth on the survival from cardiovascular mortality was examined by proportional hazard regression analyses adjusting for age, sex and smoking, diabetes, hypertension, total/HDL cholesterol ratio and education. Because the number of remaining teeth are influenced by genetics, we also examined whether keeping the teeth in good repair improved longevity. Thus, we compared cardiovascular longevity among those who had all natural teeth (NT), NT and partial denture (PD), PD and full denture (FD), and all FD.

**Results:** In a fully adjusted multivariate models, keeping each additional 10 teeth at baseline significantly improved CVD survival by 27% compared with those who had no teeth. Also, keeping the remaining teeth in good repair surpassed the impact of having many teeth suggesting maintaining good oral health improved the survival above the number of the remaining teeth. Although statistically not significant, those with PD and NT with mean number of teeth of 15.4 had better survival compared with those who had all natural teeth with mean number of teeth of 22.5.

**Conclusions:** In this age 60 and older population, each increment of 10 teeth from the "no teeth" state was associated with a 27% improved CVD survival. Both having as many teeth and keeping them in good repair improved cardiovascular survival above and beyond the established risk factors.

## Background

- ❖ Healthy aging → increases the productive time  
→ decreases the dependent time
- ❖ Two factors affect economics of aging:
  1. Health of seniors → contributes to economics of society; playing golf or gifts to grand-children etc.
  2. Creative Public policy → utilizes seniors' contribution to the societal benefits
- ❖ Two factors (1 and 2) go hand in hand.
  1. Enhancing elders' health and minimizing sickness → less burden for society.
  2. Good oral health brings about good general health !!
- ❖ Small early investment in oral health → large benefit return !!

Good Oral health → healthy diet → protein, fruits/vegetables  
→ Vascular inflammation ↓ Heart disease ↓

## Materials and Methods

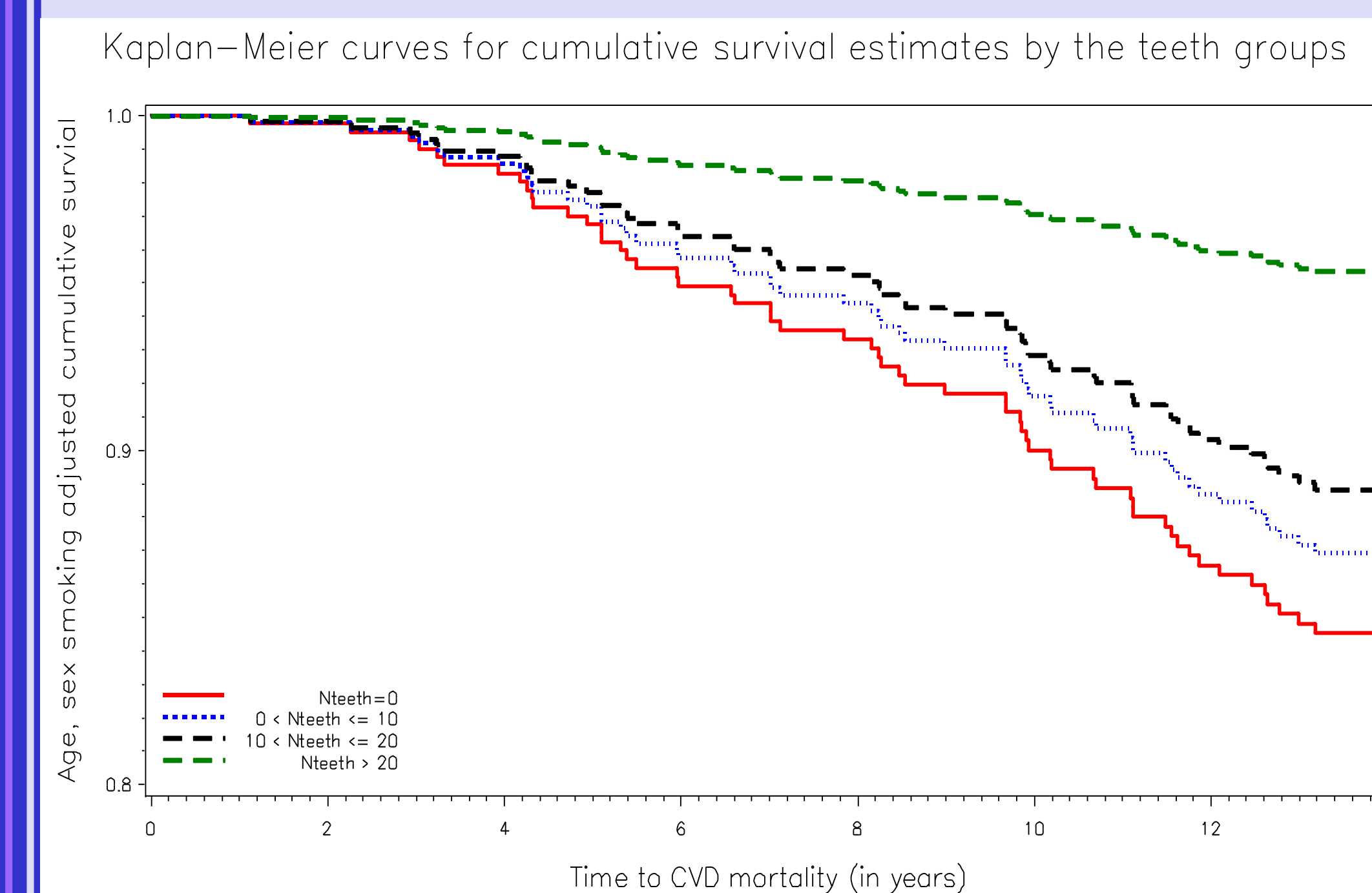
- ❖ Kuopio Oral Health and Heart [KOHH] Study: case-control study initiated in 1995-1996
- ❖ Appended mortality data → longitudinal follow-up study
- ❖ Ethical Committee of the Kuopio University Hospital approved cross-sectional study portion.
- ❖ Boston University IRB approved the longitudinal study portion.
- ❖ **Baseline dental data:** among 256 coronary artery disease [CAD] and 250 age- and sex-matched controls.
- ❖ **Predictor:** number of teeth (study 1) and dental prostheses as a measure of good oral repair (study 2)
- ❖ **Outcome:** 15-year cardiovascular and all-cause survival.
- ❖ **Competing factors adjusted:** Age, sex and smoking, diabetes, hypertension, total/HDL cholesterol ratio and education

## Statistical methods and Results

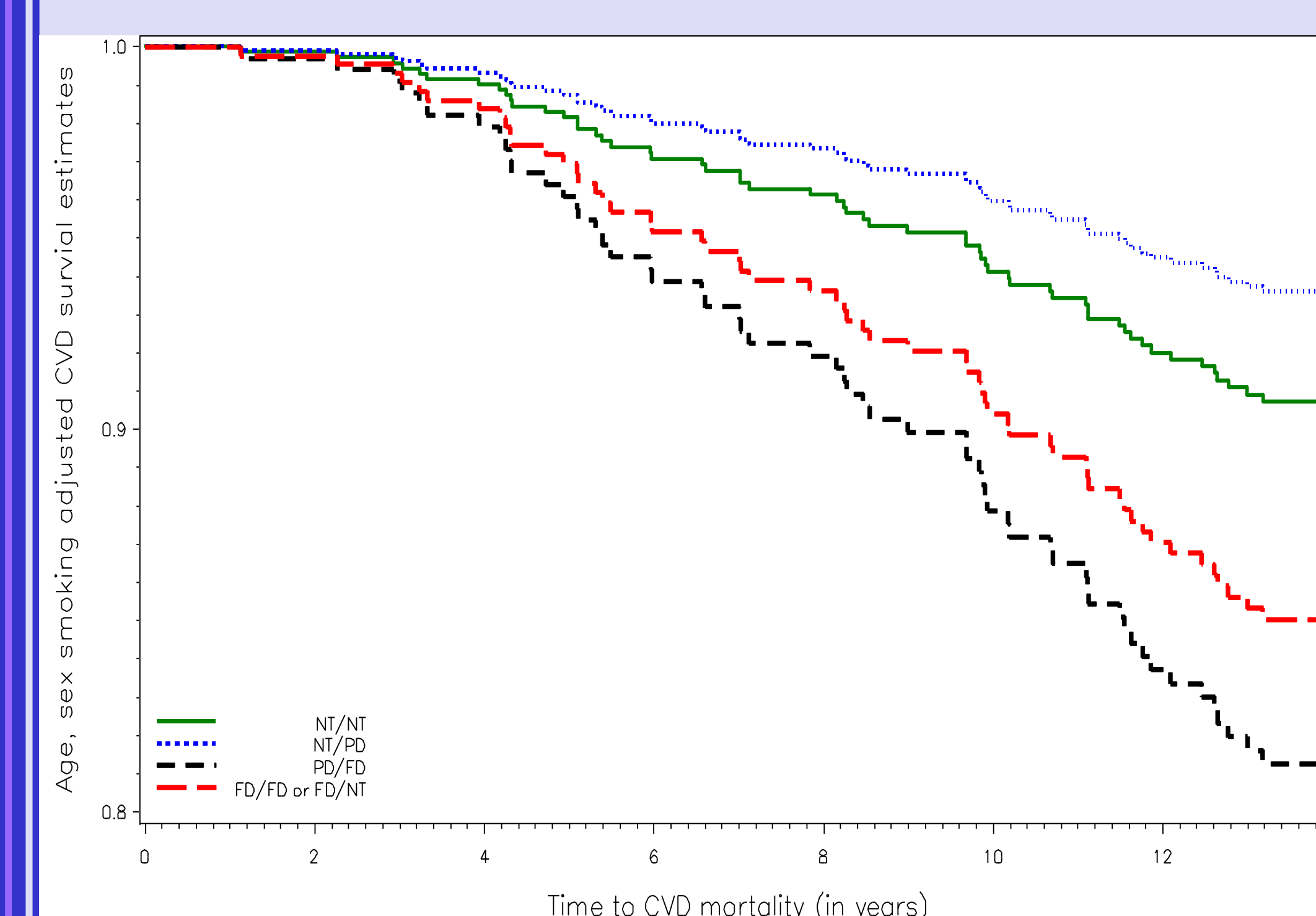
- ✓ In a cohort with mean Age >= 60
  - ✓ With high prevalence of CVD
  - ❖ Bivariate analyses: T-tests, chi square test or median tests
  - ❖ Multivariate analyses: Cox proportional hazard regression
  - ❖ Systemic confounding factors such as age, sex and smoking, diabetes, hypertension, total/HDL cholesterol ratio and education adjusted.
- Results:**
- ❖ Previously we reported that oral health was associated with Diabetes,<sup>1,2</sup> Hypertension<sup>3</sup>, Coronary heart disease.<sup>4</sup>
  - ❖ Each increment of 10 remaining teeth at age 60 improved CVD survival by 27 % in study 1 (graph 1).<sup>5</sup>
  - ❖ Persons who had average of 15.4 teeth with good oral repair had 25% improved longevity than those who had 22.5 teeth in study 2 (graph 2).<sup>6</sup>
  - ❖ The moral of these two studies → having as many teeth (study 1) and keeping them in good repair (study 2) improve longevity.

## Results

Graph 1. More remaining teeth, Better longevity



Graph 2. Good oral Maintenance, Better longevity



Famous nonagenarians with good teeth and longevity



(courtesy of Wikimedia)

## Discussion

- ❖ Mean age of our cohort at baseline= 60
- ❖ Finland state-supported basic dental care → better longevity.
- ❖ Blood pressure medicines, cholesterol medicines all have side effects.
- ❖ Providing good oral health promotes better general health without side effects.
- ❖ When oral health is controlled, statin may not be necessary → CRP was inversely associated with CVD mortality. Need further study to confirm this finding.

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