Mitigation of ingested fluoride through Calcium rich foods

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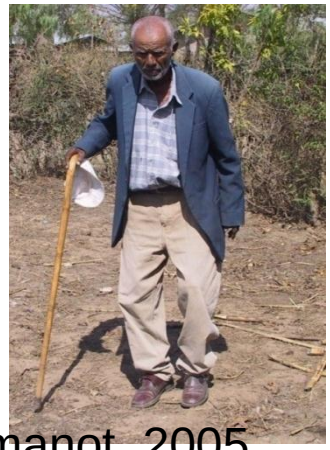
Excess fluoride

Dental fluorosis

Non-skeletal fluorosis

Constipation, bloating, polyuria, polydipsia, deformities of red blood cells, spermatozoa, …

Skeletal Fluorosis



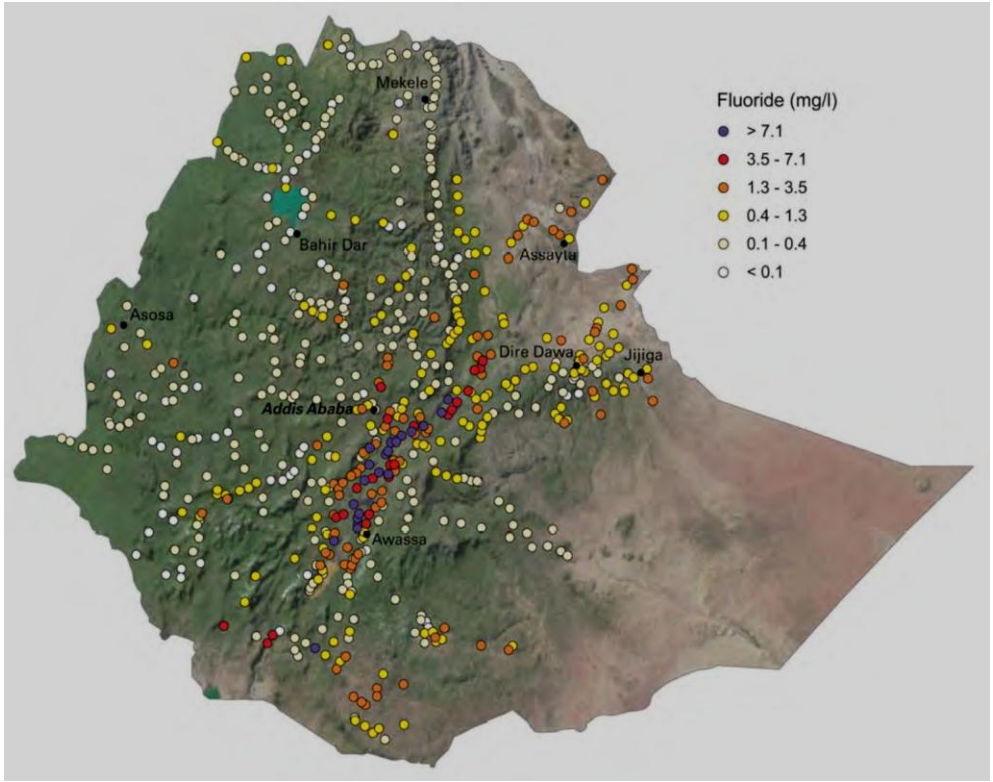
Tekele-Haimanot, 2005

Social and economic factors

Adolescents feel they singled out,
Early retirement, marriage, ...

Melaku & Ismail, 2002

Ethiopian Rift Valley



The ERV

- 14 mil at risk of fluorosis
- about 8mil already affected
- water access an sanitation

Proposed solutions

- Alternative water source
- Defluoridation
- Nutritional intervention

Hypothesis

Calcium forms insoluble compound with fluoride and can reduce the bioavailability of fluoride (in gut)

Chemical property of CaF_2

Objective

- To evaluate the possibility of mitigation of ingested fluoride using calcium rich foods or calcium blended flour

Methods

- Feeding (animals and humans) Ca rich diet and analysis of urinary fluoride

Animal Trial

Four group of rats (albino Wistar) used for 6 weeks

G1 - FF: Fluoride free water and CSB

G2 - FC: Fluoridated water (10ppm) and CSB

G3 - CA: Fluoridated water (10ppm) and Calcium blended with CSB

G4 - M: Fluoridated water (10ppm) and *Moringa Stenopetala* leaf powder blended with CSB

(CSB = CornSoyaBlend; 70:30)

Urinary and fecal fluoride analyzed

0.2mg Ca or equivalent supplied

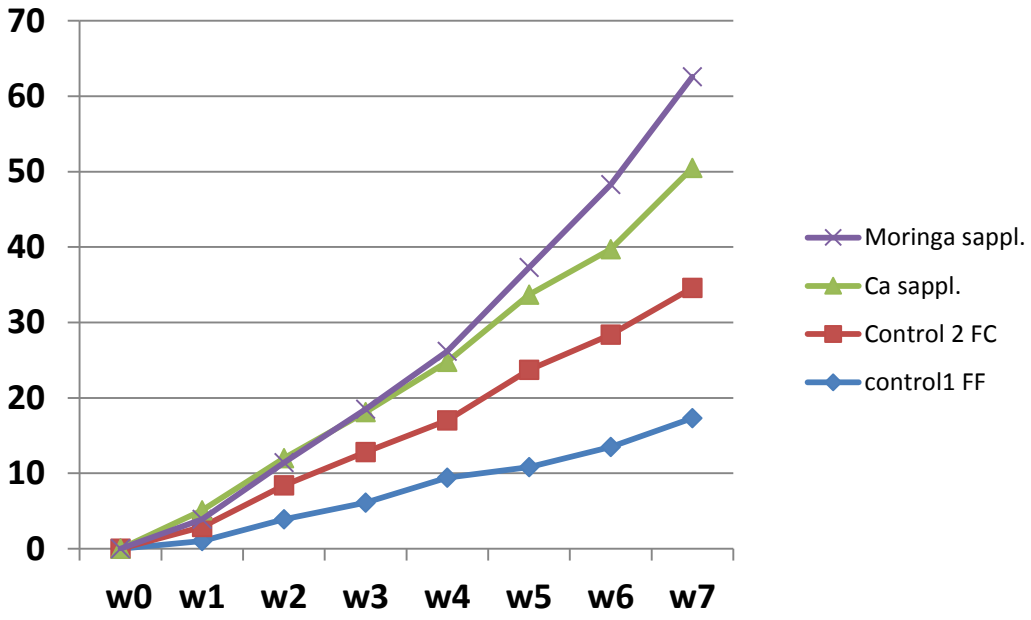
Human trial

- 28 volunteer reproductive age group women selected from halaku (adamitulu)
- 7 subjects each for
  - Control
  - Milk (mama)
  - Calcium Citrate blended wheat flour (Bread)
  - Moringa dry leaf blended with wheat flour (Bread)

Urinary fluoride as a marker

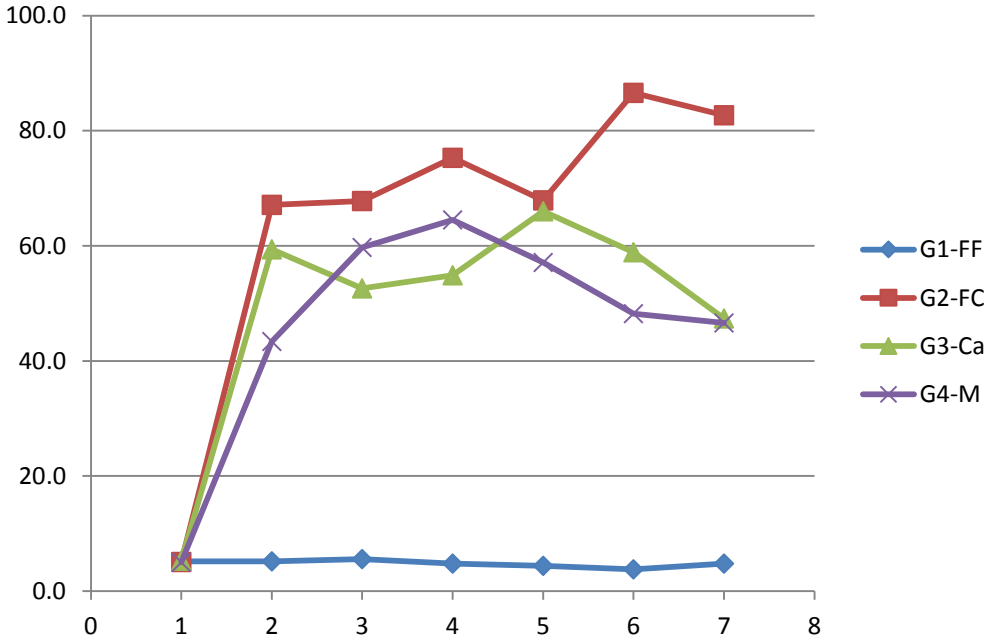
- ***Calcium 200mg equivalent***
- ***The water fluoride content was 6.2mg***

Animal Trial



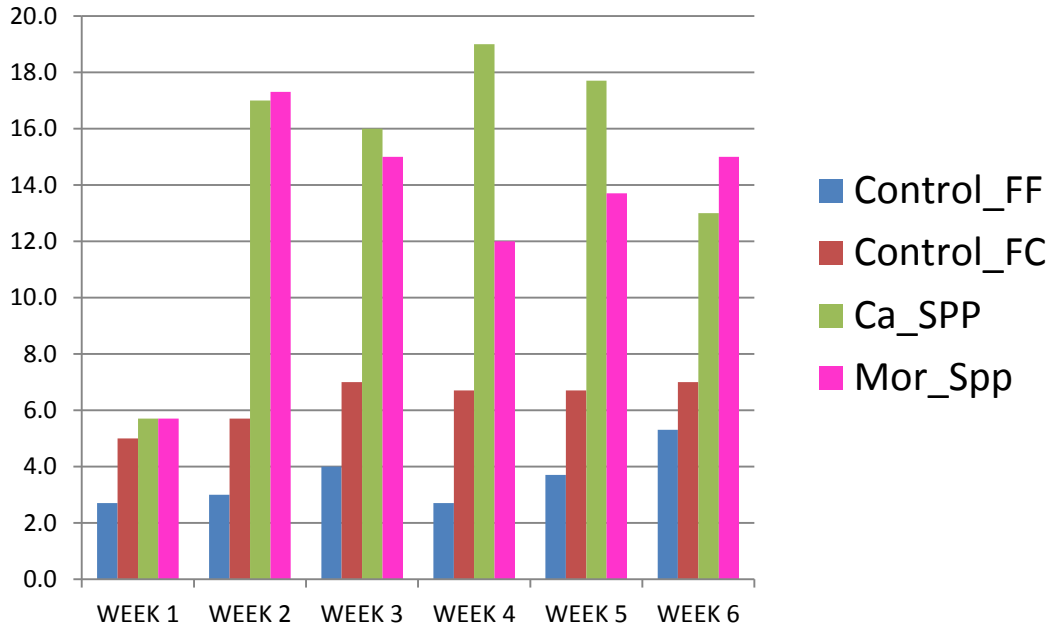
Weight increment of rats over 7 weeks

Fluoride (mg/L) in urine of rats supplemented with ca / Moringa



Group	N	Mean F
G1-FF	18	4.7[a]
G2-FC	18	76.1[b]
G3-Ca	18	56.0[c]
G4-M	18	55.2[c]

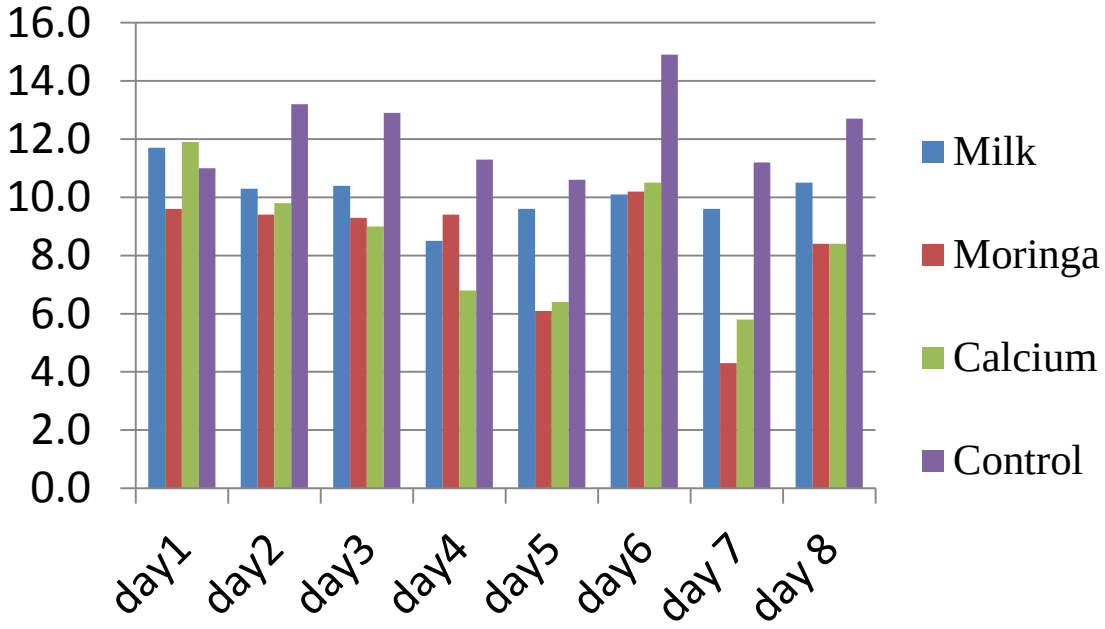
Fluoride in feces of rats (mg/kg)

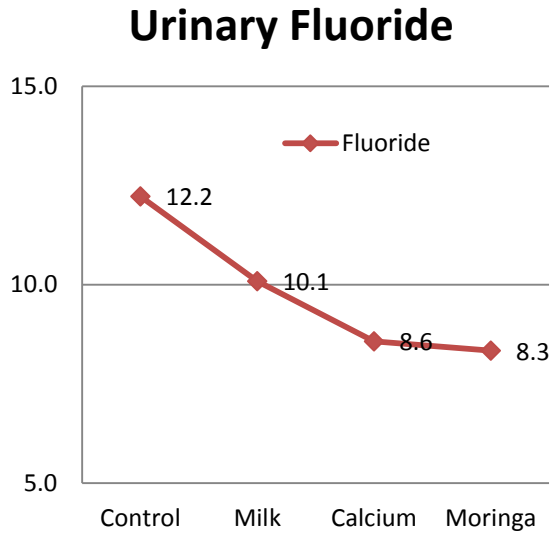


- Fecal fluoride increased in supplemented rats
- Fecal fluoride of non-supplemented rats is not significantly different from control

•Excretion of fecal fluoride depends on nutrient intake

Urinary fluoride after supplementation, women





Conclusion and recommendation

- Calcium rich foods may help in mitigating ingested fluoride and reducing risk of fluorosis
  - Conversely, fluoride may reduce the bioavailability of Calcium
- The production and use of Calcium rich foods shall be promoted
- Further interventional study on efficacy is necessary

Acknowledgment...

- EPHI (Director General, MTMRD, Zoonosis & FSNRD)
- CFSN

Thank You