Fluoride Level in Drinking Water Sources of Sudurpashchim Province, Nepal

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Authors

Fluoride Level in Drinking Water Sources of Sudurpashchim Province, Nepal

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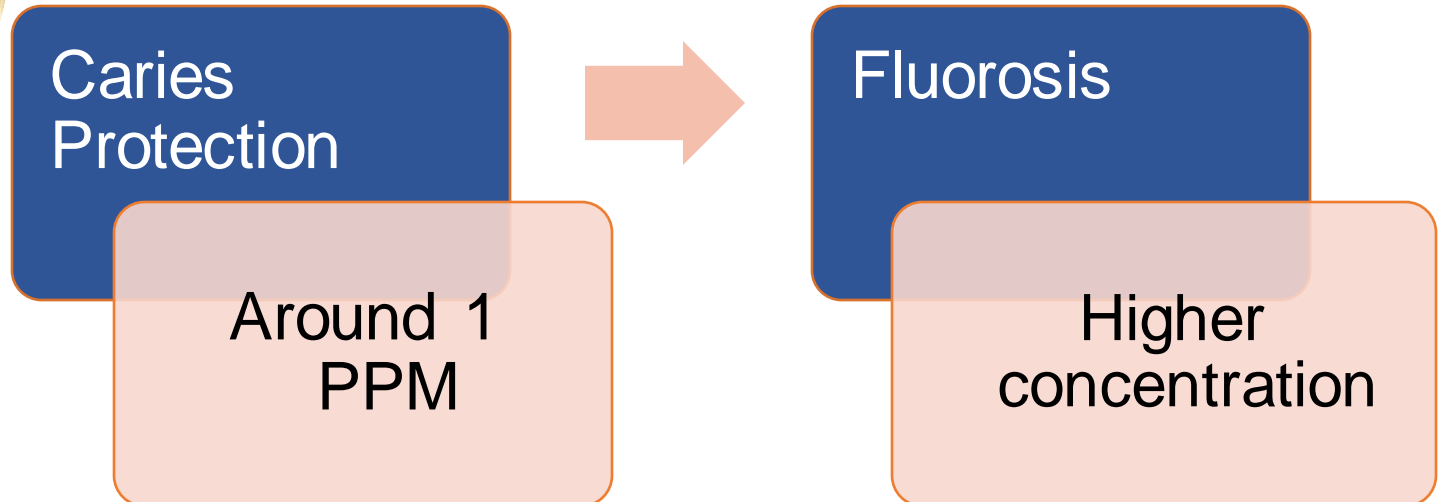
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Background

Fluorine exists as fluoride in varying concentrations in water.

Caries Protection

Around 1 PPM

Fluorosis

Higher concentration

Edmunds WM, Smedley PL. Fluoride in Natural Waters. In: Selinus O, editor. Essentials of Medical Geology: Revised Edition. Dordrecht: Springer Netherlands; 2013. p. 311–36.

Background

- Sudurpashchim province has 9 districts and 88 municipalities.

- [One sub-metropolitan city and 33 municipalities and 54 rural municipalities]

- High caries prevalence

- No data on Fluoride in water

Background

- Map and track the concentration of fluoride in drinking water

    - WHO Resolution on Oral Health, 2020

World Health Organization. Resolutions EB148.R1 Oral health. Available from https://apps.who.int/gb/ebwha/pdf_files/WHA74/B148_REC1_EXT-en.pdf

Objectives

To assess the level of fluoride in drinking water in the Sudurpashchim Province of Nepal

To compare fluoride levels in natural, municipal, and bottled drinking water sources in Sudurpashchim Province

To compare fluoride levels in drinking water sources in different geographic regions of Sudurpashchim Province
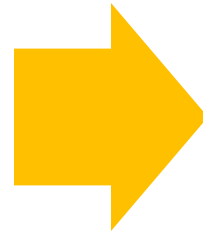
Methods

- Quantitative cross-sectional study

- Natural, municipal and bottled water sources from selected rural municipalities, municipalities and sub metropolitan city.

- May- June 2023

- Ethical approval from NHRC (Ref No. 2798)

Methods

Selection of Municipalities

- 1 municipality & 1 Rural Municipality from Each district along with only sub metropolitan city
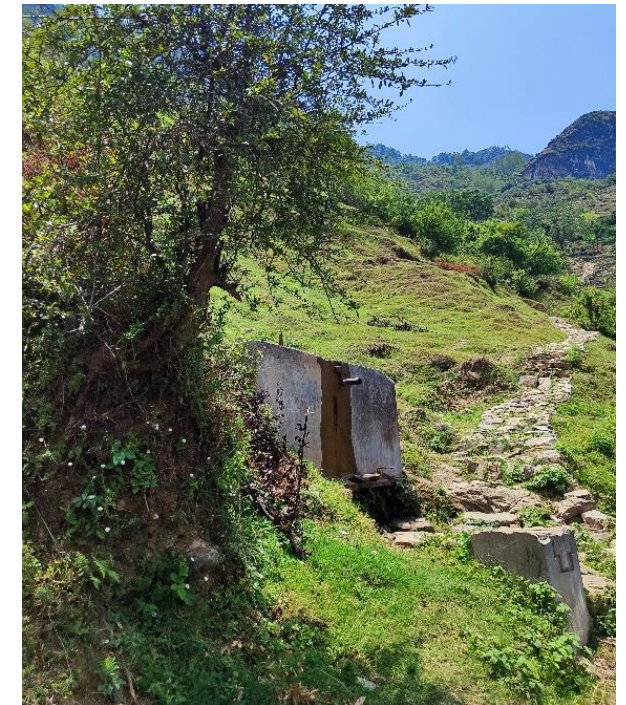- [{(9 x 2)+1} = 19]

Water samples

- 3 water samples from each district (natural, municipal and bottled water)
- 19 x 3 = 57

Methods

- Water samples collected in clean plastic bottles by the principal investigator

Methods

- Samples transported to a NS certified lab in Kathmandu within 2 week of sample collection

- American Public Health Association (APHA) 4500 F⁻ D method of fluoride estimation

- A total of 10 % of water samples retested to check for reliability.

Methods

- Data entry: Microsoft Excel 2016

- Data analysis: SPSS v. 21

- Comparison of mean fluoride concentration done using Kruskal-Wallis test

Results

- Most of the water samples had fluoride level of less than 0.1 ppm

- Maximum: 0.9 ppm [in a water sample taken from a hand Pump in Laljhadi, Kanchanpur]

- Minimum: <0.1 ppm

Fluoride Estimation Sudurpashchim

Fluoride Concentrations

Resources	N	Minimum	Maximum	Median	Mean	SD
Municipal Supply System	19	<0.1	0.9	0.1	0.19	0.20
Natural Resources	19	<0.1	0.4	0.1	0.15	0.09
Packaged Water	19	<0.1	0.3	0.1	0.11	0.04
Overall	57	<0.1	0.9	0.1	0.15	0.13

Results

- No statistical difference in water fluoride concentration according to water sources, geographic location.
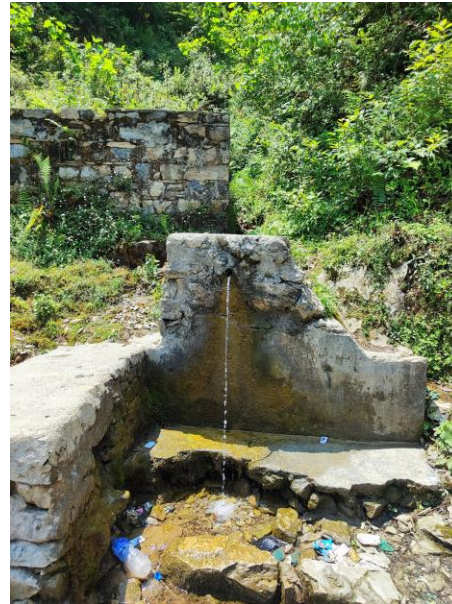
Discussion

A fluoride concentration <0.7 ppm in water:

No protection from dental caries

Fluoride above 1.5 ppm in water:

Harmful to both dental and skeletal health.

Optimum fluoride concentration:

Protection from dental caries and also dental fluorosis.

Take Home Message

- Fluoride concentration in drinking water of Sudurpashchim is lower than is recommended

- The preventive aspect of fluoride on dental caries can be capitalized if the fluoride level is estimated and appropriate measures are taken for maintaining an optimum level of fluoride in drinking water resources
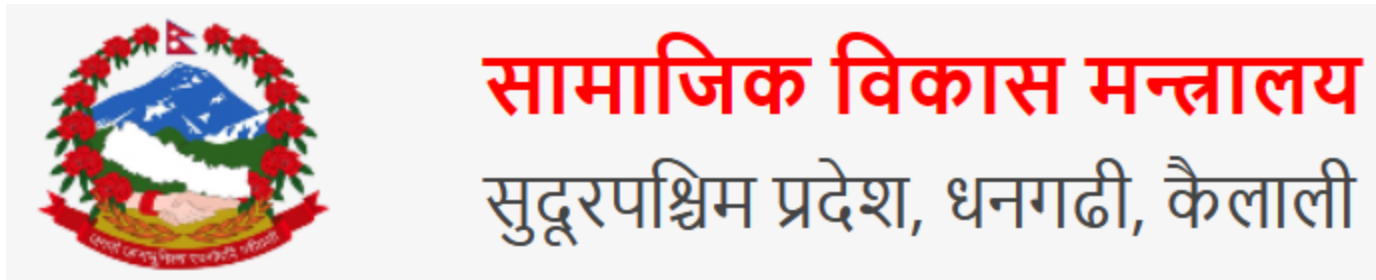
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Fluoride Estimation Sudurpashchim

Acknowledgement

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