Fluoride distribution in aquifers of the Indus Basin, Punjab, Pakistan

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Naturally elevated levels of fluoride in groundwater are know to cause mottling of teeth and debilitating joint and bone disease in villages across the Indus Basin. As a step towards predicting which villages are affected and why, over 19,000 wells were tested with a field kit in the regions bounded by the rivers Jehlum, Chenab, and Ravi (Fig. 1). Overall, 11% of the wells tested did not meet the World Health Organization guideline of 1.5 mg/L for fluoride in drinking water. Classification relative to the WHO guideline by the kit agreed with laboratory measurements by ion chromatography for 96% of a subset of 50 samples. With the exception of a section of the Ravi River floodplain, the available data show show that most of the villages with high fluoride levels are located in the slightly elevated doab regions between the rivers, where the electrical conductvity of groundwater is generally also elevated. A subset of contrasting villages were drilled to recover aquifer sands. Results from analyzing these sediments as well as additional groundwater parameters will be presented.

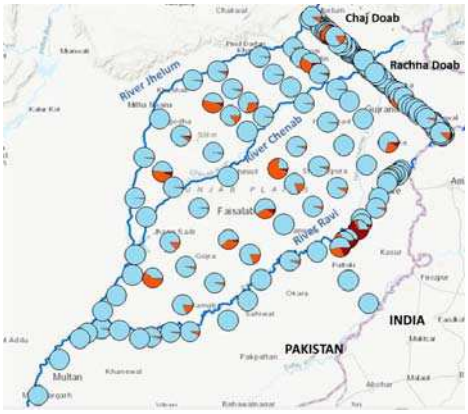

Figure 1. Pie diagrams showing the fluoride content of wells in villages across a portion of the Indus Plain of Pakistan tested with field kits: blue ≤1.5; red 1.5-3; brown >3 mg/L.