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“Development on the margin”

## Indigenous Children's Chlorpyrifos Exposure in Banana and Plantain Hamlets in Talamanca, Costa Rica

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### Abstract

In Costa Rica, chlorpyrifos-treated bags are used to protect banana and plantain fruits from insects and to fulfil product standards.

To evaluate children's exposure to chlorpyrifos in hamlets situated nearby banana and plantain farms in Talamanca, Costa Rica.

The study was performed in three hamlets: in two, chlorpyrifos-treated bags were used in surrounding banana and plantain plantations whereas in the third, an organic village mostly not. In total, 140 children donated a urine sample of which forty on more than one occasion (n=207). TCPy levels were measured as a biomarker for chlorpyrifos exposure. Also environmental samples were taken.

Children from the banana and plantain hamlets had higher TCPy concentrations in urine than children from the organic hamlet, GM=2.6; 2.2 and 1.3 µg/g, respectively. In the plantain hamlet boys had higher concentrations than girls: GM=2.9 versus 1.5 µg/g creatinine, whereas in the other villages levels were similar for both sexes. Children from the banana village were more homogeneously exposed than children from the plantain hamlet. In the banana and plantain hamlets, chlorpyrifos was detected in several environmental media, including children's (n=12) hand and foot wash samples. Median estimated values of the Absorbed Daily Dose of children from the banana and plantain village were about five times above the chronic US-EPA established reference doses (RfD). Respectively, 2.5 and 10% of these children had estimated values above the acute RfD.

Children living nearby plantations that use chlorpyrifos-treated bags are being exposed and at risk for overexposure. Measures are required to reduce this exposure.

**Keywords:** Banana, biomarkers, children, chlorpyrifos, developing countries, indigenous, plantain, plantations, TCP, urine