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Protect Female-Sandflies to Protect Humans: Control Policies in Cutaneous Leishmaniasis

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Cutaneous Leishmaniasis (CL) is the most common form of leishmaniasis and causes skin lesions, mainly ulcers on exposed parts of the body, leaving life-long scars and serious disabilities. This neglected disease is a serious public health problem in the world, particularly in some regions of Peru. This disease has high costs at the psychological level, as well as at the socio-cultural level due to its potential economic impact.

The final goal of control policies in (CL) is to protect humans. The control policies for (CL) as with any other disease suggest to look for $R_0 < 1$, this is not sufficient when a backward bifurcation occurs. In this work we present an epidemiological mathematical model of (CL) which gives evidence that a backward bifurcation can occur under certain conditions.

We analyze to which parameters the occurrence of a backward bifurcation is more sensitive. One of the parameters that can prevent the occurrence of the backward bifurcation is the ease with which the female-sandflies are infected. Therefore, the control policy of protecting female-sandflies will necessarily facilitate the control policies favoring humans. Nevertheless, the death rate of the sandfly also has a similar effect. The question arises which is better: to protect sandflies or kill them. Real data suggest that killing sandflies is a superior strategy.

In particular, we estimate parameters of our (CL) model for Huánuco-Region in Peru. We observe in a first approximation that conditions for backward bifurcation seem to hold true for that special region in Peru.