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BARRIER VACCINATION

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We consider three adjacent regions with different public health conditions linked by migration of individuals. In the absence of migration, the first two regions have good health conditions and the disease free state is stable; for the third region, on the other hand, the only stable state is the endemic one. We also include in the model the willingness of the local populations to be vaccinated, according to the balance between the vaccination and disease risks. The evaluation of the disease risk will be based on the disease incidence for a finite time T , for which we prove that the solution of the system with migration it is close to the solution of the system without migration. Hence, we assume that the vaccination risk is such that: in the first region local population is not willing to be vaccinated; in the second region, disease is introduced by the continuous migration from other regions, introducing a risk of disease which is larger than the vaccination risk; and in the third region, there is sustained transmission of the disease and vaccination is well accepted by the local population.

We use a asymptotic formula for the reproductive ratio, valid in the limit of small diffusion, to find vaccination strategies that are able to prevent outbreaks and still meet the criteria for vaccination acceptance by the populations.