A GLOBAL ESTIMATION OF THE POPULATION AT RISK IN THE CONTEXT OF LEPROSY: A MODELING STUDY

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Objective: Despite an effective multidrug treatment, around 210,000 new leprosy cases are detected worldwide annually. To reduce this number additional interventions such as contact tracing and preventive treatment are required. Preferably, these interventions should target those that are at risk of developing leprosy, the so-called 'population at risk'. However, the population at risk in the context of leprosy has never been defined or estimated. This study aims to estimate the number of people needing preventive treatment, as a proxy of the population at risk, in order to reduce the number of leprosy cases.

Methods: The SIMCOLEP model simulates the spread of *M. leprae* in a population structured by households. We used leprosy data of 110 countries that reported new cases to the WHO in 2016. These 110 countries were divided into 3 groups: 1) three most endemic countries; 2) 19 WHO priority countries; and 3) remaining 88 countries. We modelled seven typical leprosy situations based on the level of endemicity and MB proportion, and categorized each country into one of these situations. For each country we predicted the impact of contact tracing and administering a single dose of rifampicin (SDR) to about 25 contacts on the annual number of new cases until 2040. The number of contacts needed to treat was estimated until a 50% and a 90% reduction in new case detection (NCD) was achieved.

Results: The NCD trends show an increase in the number of new cases in the first year (i.e. backlog cases) followed by a significant decrease afterwards. Worldwide, a reduction of NCD by 50% and 90% would be achieved in 5 years and 22 years, respectively. For group 1, a total of 16.7 million people need preventive treatment to achieve a 50% reduction in 5 years. For group 2 and 3 this is 3.1 and 1.0 million people in 6 years, respectively. An additional 16.1 million people need preventive treatment in group 1, 2.3 and 0.8 million people in group 2 and 3, respectively to reduce the global number of new cases with 90% in 22 years for group 1 and in 21 years for group 2 and 3.

Conclusion: The number needed to treat with preventive treatment is 20.4 million up to 5 years to achieve a 50% reduction in the global NCD and 40.1 million people to achieve a 90% reduction in 22 years. This estimate could be interpreted as a practical proxy of the population at risk worldwide for leprosy.