Reconstructing the population dynamics of foreigners in Japan along with the age since immigration.

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[Background] To estimate the risk of infectious diseases among foreign residents, it is critical to reconstruct the underlying population dynamics of foreign migrants. The present study aimed to reconstruct the demographic prevalence of foreign residents in Japan by length of stay and estimate the risk of infection with Mycobacterium tuberculosis. [Methods] We examined a total of six Asian countries, i.e.,the Philippines, China, Vietnam, Nepal, Indonesia, Myanmar from which 80 % of tuberculosis among foreign residents are notified. Solving the McKendrick equation, we estimated the force of exit as a function of calendar time and the length of stay and reconstructed the number of foreign residents by length of stay in each year. [Results] The number of foreign residents as of 2017 was estimated at 532,182 in China, 263,214 in Vietnam, 110,384 in the Philippines, 74,575 in Nepal, 38,926 in Indonesia, and 18,770 in Myanmar, respectively. Compared with the observed data, overall pattern was well captured, and with a structure of time since immigration. The risk of tuberculosis infection was subsequently estimated. [Conclusions] The population dynamics of foreign residents by the length of stay was successfully quantified. Extending the proposed method to reconstruct the dynamics by age, sex and residential status, more object-oriented prevention programs of tuberculosis may be conceived.