Analyzing the effectiveness of increasing investment in educational support for children in shrinking Japanese cities

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In Japan, many municipalities have suffered from population decline due to low birth rates and an aging population. In 2022, the Japanese

population over the age of 65 was 36.21 million, accounting for 28.9% of the total population. In addition, approximately 1,300 shrinking cities are within the 1,700 municipalities in Japan.

Moreover, the large number of shrinking cities in Japan is unprecedented on a global scale. As a response to the low birthrate, the Japanese government is discussing "unprecedented" measures to reverse the decline, such as providing financial assistance for education to families with young children.

Assistant Professor Haruka Kato, at the Graduate School of Human Life and Ecology, Osaka Metropolitan University, clarified the effectiveness of increasing educational support for children in preventing population decline. In detail, the study employed Bayesian network analysis, a technique for machine learning, using a dataset of economic, social, and educational indicators. The dataset consists of cross-sectional data from 259 indicators of approximately 1,300 shrinking cities, representing the majority of city-level government statistics in Japan. The research is published in the journal *PLOS ONE*.

This study demonstrates that social and educational indicators strongly affect the population decline rate. This implies that municipalities that invest more in education for children tend to have lower population decline rates. Surprisingly, educational indicators exert a greater influence than economic indicators, such as the financial strength index. The indicators include the "number of children per teacher in elementary school" and the "number of students per educational computer in schools."

According to Professor Kato, "This relevance of educational indicators might be unique to Japan, which has experienced a declining population due to its low birthrates. Education accounts for a low percentage of national and administrative fiscal expenditures in Japan, primarily

because social welfare expenditures for older adults are a heavy burden. However, among the fiscal expenditure limitations in Japan, the suggestion is that increasing investment in education for children might help solve the problem of shrinking cities. In addition, the conclusion would be effective in some Asian countries, such as South Korea and China, which will decline in population due to low birth rates and aging populations."

More information: Haruka Kato, Urban modeling of shrinking cities through Bayesian network analysis using economic, social, and educational indicators: Case of Japanese cities, *PLOS ONE* (2023). DOI: 10.1371/journal.pone.0284134

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