Vitamin B12 deficiency is common in vegetarian and economically deprived populations of the world. India provides a striking example. Unlike in the Western populations, this is not due to defects in the intrinsic factor-mediated gastrointestinal absorption but due to smaller intake of the vitamin in the diet. In nature, B12 is produced only by prokaryotes (microbes) and animals who eat microbes bring it in the food cycle. Smaller intake of animal origin foods is, therefore, a major cause of B12 deficiency. This may be driven by religious and cultural beliefs or poverty. Therefore, vegans and vegetarians and members of certain religions (Jain and Hindus) are at higher risk.

Pune Maternal Nutrition Study is a prospective preconceptional cohort in villages around Pune, India. It was set up to study maternal nutritional influences on fetal growth and future risk of noncommunicable disorders. The children born in the study (and their parents) are regularly followed up and are now in early 20s. Serial measurements of physical characteristics, circulating nutrients, and biochemical-endocrine markers have allowed to construct a life-course model of various conditions. B12 deficiency is common in this population; it progressively increased from 15% at 6 years of age to 58% at 18 years at which time it was higher than that in the parents.

Our analysis shows that ~10 to 12% of the deficiency is contributed by genetic factors that are not very different to those in the western populations. In addition, lower maternal transfer to the baby, prolonged breast feeding, lower milk intake in childhood, rapid childhood and adolescent growth, family environment (a surrogate for dietary practices and other lifestyle), and lower leucocyte count (a surrogate for hygiene and infections) contribute to B12 deficiency.

A picture emerges where nutrient deficiencies evolve during the life course with biological factors in the center, surrounded by family and
community influences that in turn are affected by national, international, and political factors. Immediate solutions to the problem include supplements and food fortification, but novel solutions are awaited to tackle the multifactorial and complex etiology.