

The Malthusian Dilemma

In the 18th century, British economist and clergyman Thomas Robert Malthus published an essay arguing that the growth of the human population would overtake the growth of food supplies, because the population size was *multiplied* by a fixed amount each year, whereas food production only increased by *adding* a fixed amount each year. That is, he assumed populations grew exponentially but food supplies grew linearly as functions of time.

Example. The population of a country is initially 2 million people and is increasing at 2.8% per year. The country's annual food supply is initially adequate for 2 million people and is increasing at a constant rate adequate for an additional 0.2 million people per year.

- a. Find formulas for the population P and the number of people who can be adequately fed, N , both in millions of people, as functions of time t .

- b. Sketch graphs of P and N . In approximately what year will this country first experience shortages of food?

