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# Population Balancing Equation

Population Balancing Equation is used to calculate **POPULATION GROWTH**between two time periods. It identifies the primary factors which affect the growth of a given population. **However, it is essential to note that this equation will only calculate the population of the current time period and not the population difference between the two periods. In order to calculate the difference, Population of Period 2 should be subtracted by the population of Period 1.**

## Step 1: Understand the Variables

There are 4 main variables which affect the population growth to either rise or decline according to the Population Balancing Equation.
They are:
B   = Number of Births between the previous period (P1) and the current period (P2)
D   = Number of Deaths between the previous period (P1) and the current period (P2)
Im = Number of people who migrate IN to the population.
Om = Number of people migrating OUT of the population.

## Step 2: Factors Increasing Population Grwoth

There are two factors which increases population growth according to the Population Balancing Equation.
1.  Increase in the number of births - If there is a higher number of births between the two time periods relative to the number of deaths, then the population will show a growth in its numbers. E.g. :- The baby boom generation
2.  Increased migration in to the population - An increase in the migration in to the population will increase the population size if the out migration is comparatively smaller in number.

## Step 3: Factors Decreasing Population Growth

There are two factors which affect the population growth to decline.
1. Increased numbers of death - If a population experiences higher numbers of deaths within the time period compared to the number of births, then the population will show a decline in its growth. E.g.:- During time periods of war
2. Increased numbers of Out Migration. - If a country experience a large number of out migration compared to In-migration then the population tends to decline. E.g.:- During times of war, people seek asylum in other countries by migrating out of the war affected population.

## Step 4: Construct the Equation

Now, let see how the equation can be constructed. In order to calculate the population of the current period we first need the population of the previous period. We should then add the number of births between Period One and Period Two; these are the new born babies which increases the size of the population. Next, Along with this addition we should subtract (minus) the number of deaths that happened between the two periods; deaths will account all the people who are no more part of the population due to death. Then, we add the people who came into the population through migration; these are the people who were part of a different population before, but now part of our population due to their In-Migration. And finally, we subtract the people who left our population between the two time periods into a different population; these are people who migrated OUT of our population thus they are no more part of our population.

## Step 5: Understand the Equation

If ; (B) is higher than (D) and (Im) is higher than (Om) then the population in P2 will be greater than P1. If; (B) is less than (D) and (Im) is less than (Om) then the population in P2 will be less than P1. If (B) is higher than (D) and (Im) less than (Om) OR If (B) is less than (D) and (Im) is higher than (Om); then we need to calculate the equation in order to find what the final population size would be.

## Step 6: Understand the Natural Increase/Decrease

Natural Increase calculates the growth in the population due to natural causes; which includes all births and all deaths. For example, during the baby boom generation, USA experienced a higher number of births compared to the number of deaths. Therefore, the population growth increased. However, if we consider a country at war, they are likely to have higher number of deaths in the population compared to the number of births. Therefore the population growth will decline. For instance, hypothetically if no migration is allowed in to and out of a population and if the number of births within the two periods equal the number of deaths (which is highly unlikely) then we find stagnant population growth. Which means the population growth has not changed between the two periods. Next, we will see how Net Migration affects population growth.

## Step 7: Understand the Net Migration

Net Migration calculates the population migrating IN and OUT of  population within a given period of time. If we consider a resource rich, developed country such as the USA, we would typically find more IN migration of population rather than OUT migration. Therefore, the population would show a positive growth. Considering a country like Sri Lanka which had a civil war for 30 years would have experienced more OUT migration compared to IN migration during the 30 year war period. Thus the population of Sri Lanka would have declined. Thus, if we hypothetically consider a country to have no births and no deaths, the population growth of this population will be solely dependent on IN and OUT migration. If In migration is greater than Out migration then the population growth will be positive, if Out migration is greater the population growth will be negative.

## Step 8: Calculate Population Growth (Question)

Question : Population in the previous period was 5.8 Billion. Number of births between the two periods is 1.0 billion and the number of deaths is 1.3 Billion. If there were 2.7 billion people migrating in to the country and 2.5 migrating out of the country. What would be the population of our current period of interest? What is the population difference between the two periods?

## Step 9: Answer

Answer : P2 = P1 + (B - D) + (Im - Om) = **5.8 + (1.0 - 1.3) + (2.7 - 2.5) = 5.7**This shows that the population in the current period is 5.7.  The population difference between the two populations is;**5.7 - 5.8 = -0.1**Thus the population has declined by 0.1 Billion.

