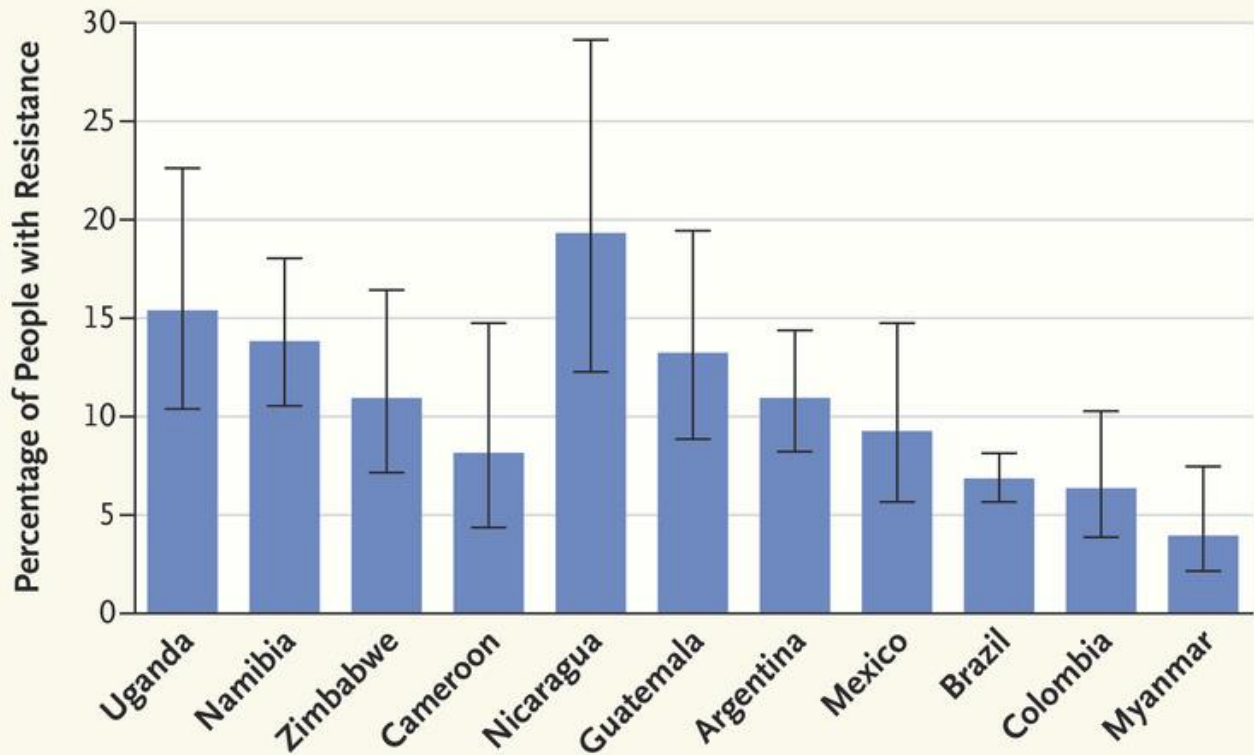


CCT Weekly Practice Mathematics

Unit 1 – Drug Resistance



Source: New England Journal of Medicine [<https://www.nejm.org/doi/full/10.1056/NEJMp1710608>]

The graph above shows the prevalence of HIV drug resistance in populations of different countries.

Source of questions: Centre for Teacher Accreditation (CENTA®) – m.centa.org

Question 1

Roughly, which country or countries have a drug resistant population which is closest to the average number of drug resistant populations shown in the graph?

- a) Guatemala
- b) Namibia or Guatemala
- c) Nicaragua
- d) Can't say

Question 2

The population of Uganda at the time when this survey was conducted was 4.5 million. How many people in Uganda would have responded positively to the HIV drug at that time?

- a) 3825000
- b) 3487500
- c) 675000
- d) 382500

Source of questions: Centre for Teacher Accreditation (CENTA®) – m.centa.org

Question 3

The ratio of the populations of Uganda and Brazil at the time was 1 : 50. Roughly how many people in Brazil were resistant to the drug?

- a) 225 million
- b) 209 million
- c) 34 million
- d) 16 million

Unit 2 – Population Growth

The formula to calculate future population is given below:

$$P_f = P_p \times (1 + i)^n$$

where,

P_f = future population, P_p = present population, i = growth rate, n = number of years

Question 4

The population of Xanadu at the end of the year 1990 was 2 million. Use the formula given above to calculate how many more people were added to its population by the end of 1992, if the growth rate in this period was 2%.

- a) 80800
- b) 122416
- c) 2080800
- d) 800, 0000

Question 5

The same formula given above is used to calculate the growth of bacterial population in a petri dish in a lab. Scientists conducting the experiment find that a single bacterium multiplies into 1 million bacteria in three minutes. What is the growth rate per minute?

- a) 99%
- b) 100%
- c) 9900%
- d) 10000%

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Answers

1. (d)
Unless the respective populations of the countries are known, it is not possible to say which of these countries has a drug resistant population (number) close to the global average.
2. (a)
85% of the population would have responded positively. 85% of 4.5 million (4,500,000) is 3,825,000.
3. (d)
Brazil's population at the time was 50×4.5 million. 7% of that population, who are drug resistant, was roughly 16 million.
4. (a)
Substituting the value of present population = 2 million, $i = 0.02$, and $n = 2$ will give the 1992 population as 2,080,800. The number of people added to the population will therefore be 80,800.
5. (c)
Substituting the value of future population = 1 million, present population = 1, $n = 3$, and then solving for i will give the value 99. This value needs to be multiplied by 100 to get the percentage growth rate.