

Interpreting population pyramids
Part I: In class, 6/28

Part II: Expository Essay Due to Canvas, Thursday, 6/30/16

This assignment meets General Education Learning Outcome, GELO 3: Apply a scientific approach to answer questions about the earth and environment.

You will complete the worksheet below with partners or small groups in class. Individually, you will then write an essay on **population issues revealed** through the worksheet, class lectures, and the video *World in the Balance*.

Purpose: We use demographic indicators and population pyramids to understand population dynamics, make decisions about **environmental and policy issues, and predict future trends.** In this activity you will:

Pages 1-7:

1. Compare population pyramids for developing and industrialized countries and analyze population growth, and environmental and/or policy issues within the countries.
2. Examine other demographic data that can influence the impact of population on the environment.
3. For questions that require mathematical calculations, the answers are provided. You must do the computations (show your work) that will result in that answer.

Page 8:

4. Integrate the concepts into an essay on population.

Part I: Calculations

Problem 1

Examine the population pyramids of the two most populous countries in the world, China and India (page 4). From the shape of the population pyramids, predict which country is growing faster and explain why.

India is growing faster, which is 1.2% population rate than China 0.4%. The fertility rate is higher than China, and the death rate is lower than China.

Calculate the percent of population under the age of 15. First estimate the total number of people in China and India that are less than 15 years old (look at **Population Pyramids for China & India 2014**). Divide that number by the midyear population (**Table 1 – Demographic Indicators for 2015**) and multiply by 100 to get the % of the total population under the age of 15. Please show your calculations.

China = 289 millions

$$\frac{289}{1.361} = 212.34 \times 100 = 212.34\%$$

India = 408

$$\frac{408}{1.251} = 326.14 \times 100 = 326.14\%$$

Percent (%) of population under the age of 15 in China: **Answer: approximately 17%**

Percent (%) of population under the age of 15 in India: **Answer: approximately 28%** ↑ Births

Why is the percentage of individuals under the age of 15 a good indicator of future population growth?

Age 15 replace the elderly who will pay away by reducing in years to come

Is the population of China or India growing faster? List 2 demographic indicators (from Table 1) that support your answer.

India is growing faster
① Higher fertility rate
② Lower mortality rate

Problem 2

Refer to the **IDB Summary Demographic Data for Kenya**

Using the midyear population data for **Kenya**, calculate the % of women of childbearing age in 2000 and 2025 (# women 15 - 49 years old divided by total # women). Please show your calculations.

$$2000 = \frac{7,318}{15,122} = 48\%$$

$$2025 = \frac{14,120}{24,397} = 58\%$$

Percent (%) of women of child-bearing age in 2000: **Answer: 48%**

Percent (%) of women of child-bearing age in 2025: **Answer: 58%**

How will this change impact future population growth?

Women of child-bearing age is increasing, which will have higher population rate than before.
- More infants growth.

Problem 3

Refer to the **IDB Summary Demographic Data for the United States**

Calculate the adult dependency ratios for 2000 and 2025. Divide the midyear population data into 3 sections: children under age 15, working age adults (15 - 64 years old), and senior citizens over age 65. Calculate the adult dependency ratio (# of senior citizens divided by # of working age adults). Please show your calculations.

	2000	2020
Children	58,554	69,569
Adults	182,172	216,573
Senior	31,836	63,196

$$\text{Year 2000} = \frac{34,854}{182,172} = 19\%$$

$$\text{Year 2025} = \frac{63,196}{216,573} = 29\%$$

Adult dependency ratio in 2000: **Answer: 19%**

Adult dependency ratio in 2025: **Answer: 29%**

In Japan there's no gate police, younger ppl need to work, no one take care seniors.

Because - living longer

What trend do you notice? How do you explain this change?

The adult dependency is increasing as population is decreasing in comparison to the # of senior citizens alive & live expectancy.

What will be the impact of this trend on government policies? Why is it important for a country to have the majority of its population in the 15 - 64 age group?

- revenue
- people working
- support seniors

Govt. policies will have to shift towards caring for the senior citizens, as there is an inadequate # of working adults to do so. It is important because that is the country's workforce & providers

Problem 4

From class lecture, discussions, demographic data and video: World in the Balance describe two key issues (gender, health, environmental, social or political) that are influencing the current population patterns for:

India - social, political.

- ① "gender excide"; sex based abortions; women have no control of reproductive health.
- ② Reproduction of sons, since daughters are social liability as well as economic

Japan

- ① Decreasing family/household sizes; decreasing population
- ② Long life expectancy
- ③ Low immigration rate

Kenya

- ① Spread of HIV/AIDS causing death, especially in women
- ② Prostitution in women of child bearing age leading to reproduction due to lack of contraception.
- ③ First African country to reduce population by using family plan

Problem 5

The growth rates for China, India, Kenya, Japan and the US in 2015 are shown in the table below. **The growth rate of a country (or how fast a population is growing) is calculated as the (number of births + migrants - deaths) divided by the total population (use 1000 here, since birth and death rates are per 1000).**

Using the data in **Table 1, Demographic Indicators for 2015**, determine the biggest contributor to the growth rate of each of these countries: births (fertility), deaths (mortality) or migration? (Consider indicators for high or low birth, death & migration rates)

Country	Growth rate in 2015	Biggest contributor
India	1.2%	high fertility, low death
China	0.4%	↑ fertility
Kenya	1.9%	high fertility, low mortality
Japan	-0.2%	low fertility, high mortality
U.S.	0.8%	high migration rates, high-ish birth rate

References below from: US Census Bureau International Data Base (IDB)
<http://www.census.gov/population/international/data/idb/informationGateway.php>

Population Pyramids for China and India (2014)

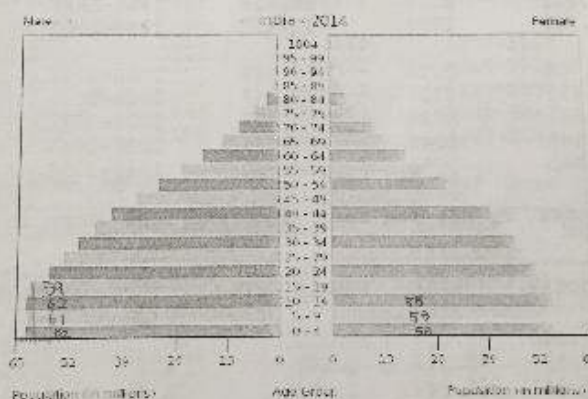
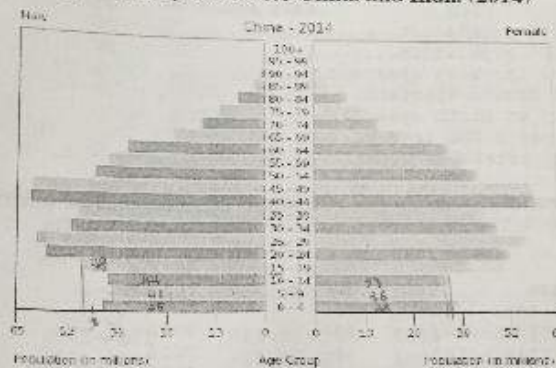


Table 1. Demographic Indicators for 2015

Country Summary	India	China	Kenya	Japan	US
Population					
Midyear population (in millions)	1,251	1,361	46	127	321
Fertility					
Total fertility rate	2.5	1.6	3.3	1.4	2.0
Birth rate (per 1,000 population)	20	12	26	8	13
Mortality					
Life expectancy at birth (years)	68	75	64	85	80
Death rate (per 1,000 population)	7	8	7	10	8
Migration					
Net migration rate (per 1,000 population)	0	0	0	0	3

U.S. Census Bureau
IDB Summary Demographic Data for Kenya
Demographic Indicators: 2000 and 2025

	2000	2025
Births per 1,000 population.....	29	19
Deaths per 1,000 population.....	14	7
Rate of natural increase (percent).....	1.5	1.2
Annual rate of growth (percent).....	1.5	1.2
Life expectancy at birth (years).....	48.0	64.2
Infant deaths per 1,000 live births.....	69	34
Total fertility rate (per woman).....	3.7	2.2

**Midyear Population Estimates and Average Annual Period Growth Rates:
1950 to 2050**

(Population in thousands, rate in percent)

Year	Population	Year	Population	Period	Growth Rate
1950	6,121	2005	33,830	1950-1960	2.9
1960	8,157	2006	34,708	1960-1970	3.2
1970	11,247	2007	35,610	1970-1980	3.7
1980	16,331	2008	36,529	1980-1990	3.6
1990	23,358	2009	37,457	1990-2000	2.5
2000	29,986	2010	38,383	2000-2010	2.8
2001	30,652	2020	46,249	2010-2020	1.9
2002	31,387	2030	52,473	2020-2030	1.3
2003	32,168	2040	59,231	2030-2040	1.2
2004	32,982	2050	64,820	2040-2050	0.9

Midyear Population, by Age and Sex: 2000 and 2025 (Popn in thousands)

AGE	-----2000-----			-----2025-----		
	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
TOTAL	30,340	15,217	15,123	49,357	24,960	24,397
0-4	4,538	2,296	2,242	4,577	2,310	2,267
5-9	4,247	2,148	2,099	4,946	2,498	2,448
10-14	4,201	2,123	2,078	5,797	2,929	2,868
15-19	3,846	1,941	1,905	6,166	3,117	3,050
20-24	3,233	1,643	1,590	5,420	2,741	2,679
25-29	2,516	1,284	1,233	4,161	2,106	2,055
30-34	1,908	976	932	3,806	1,929	1,877
35-39	1,380	699	681	3,604	1,836	1,768
40-44	1,061	527	535	3,191	1,642	1,548
45-49	856	413	442	2,428	1,285	1,143
50-54	702	333	369	1,608	861	747
55-59	572	266	306	1,206	618	588
60-64	449	204	245	934	443	490
65-69	340	149	191	666	294	371
70-74	237	105	132	438	184	254
75-79	146	65	81	243	99	143
80+	108	47	61	167	66	100

Source: U.S. Census Bureau, International Data Base

U.S. Census Bureau
IDB Summary Demographic Data for United States

Demographic Indicators: 2000 and 2025

	2000	2025
Births per 1,000 population.....	14	14
Deaths per 1,000 population.....	9	9
Rate of natural increase (percent).....	0.6	0.5
Annual rate of growth (percent).....	0.9	0.9
Life expectancy at birth (years).....	77.1	80.8
Infant deaths per 1,000 live births.....	7	6
Total fertility rate (per woman).....	2.1	2.2

Midyear Population Estimates and Average Annual Period Growth Rates:
 1950 to 2050
 (Population in thousands, rate in percent)

Year	Population	Year	Population	Period	Growth Rate
1950	163,271	2005	298,734	1950-1960	1.7
1960	180,671	2006	298,444	1960-1970	1.3
1970	208,082	2007	301,140	1970-1980	1.0
1980	227,728	2008	303,828	1980-1990	0.9
1990	250,132	2009	306,499	1990-2000	1.2
2000	282,339	2010	309,163	2000-2010	0.9
2001	285,024	2020	336,032	2010-2020	0.8
2002	287,676	2030	363,811	2020-2030	0.8
2003	290,343	2040	392,173	2030-2040	0.8
2004	293,028	2050	420,081	2040-2050	0.7

Midyear Population, by Age and Sex: 2000 and 2025 (Popn in thousands)

AGE	2000			2025		
	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
TOTAL	278,863	134,778	140,788	349,666	171,918	177,748
0-4	18,868	9,639	9,227	23,516	12,018	11,508
5-9	18,781	10,122	8,659	23,163	11,831	11,332
10-14	19,908	10,196	9,712	22,888	11,692	11,196
15-19	19,909	10,237	9,672	22,469	11,496	10,973
20-24	18,600	9,501	9,099	22,128	11,296	10,832
25-29	17,919	8,826	8,993	21,491	10,882	10,609
30-34	19,628	9,721	9,904	22,993	11,647	11,347
35-39	22,314	11,108	11,209	23,080	11,654	11,426
40-44	22,832	11,231	11,402	22,319	11,282	11,037
45-49	19,808	9,780	10,128	20,682	10,327	10,355
50-54	17,266	8,399	8,867	20,044	9,914	10,130
55-59	13,314	6,396	6,917	20,292	9,948	10,344
60-64	10,877	5,046	5,831	21,128	10,188	10,940
65-69	9,436	4,334	5,102	19,647	9,284	10,363
70-74	8,753	3,876	4,877	16,041	7,346	8,695
75-79	7,422	3,103	4,319	12,268	5,377	6,891
80-84	4,913	1,866	3,047	7,857	3,079	4,778
85-89	2,705	888	1,817	4,353	1,609	2,744
90-94	1,179	319	861	2,312	750	1,562
95-99	420	81	339	1,018	282	736

Source: U.S. Census Bureau, International Data Base

Part II: Population Essay (25 points)

Write a 2½ -page essay on population issues, using data from your calculations and the video *World in the Balance*. Your essay should be organized as below:

Paragraph 1: Introductory Paragraph/Thesis Statement – Introduce the topic and include your thesis statement.

Paragraph 2: Supporting Point – Include one idea to support your thesis, and support with data or information from calculations.

Paragraph 3: Supporting Point – Include one idea to support your thesis, and support with data or information from calculations.

Paragraph 4: Supporting Point – Include one idea to support your thesis, and support with data or information from the video.

Paragraph 5: Concluding Paragraph – Briefly restate thesis, 3 supporting points, and include a concluding thought.

Population Essay Rubric	Excellent: 5	Good: 4	Fair: 3	Poor: 2
Introduction	Introduction addresses the topic directly, and has a clear thesis statement.	Introduction addresses the topic, and has a clear thesis statement.	Introduction attempts to address the topic, and has a fairly clear thesis statement.	Introduction poorly addresses the topic, and has an unclear thesis statement.
Body Paragraphs	Body paragraphs contain clear topic sentences, support the thesis, and are exceptionally well organized.	Body paragraphs have topic sentences, support the thesis, and are fairly organized.	Body paragraphs support the thesis, attempt to address the topic, and are fairly organized.	Body paragraphs do not sufficiently support the thesis and are not organized.
Examples	Examples are specific, sufficient, and significant; they are clearly explained and connected directly to the thesis.	Examples are specific, sufficient, and reasonably well explained; they support the thesis.	Examples and explanations are fair and/or insufficient; they provide some support to the thesis.	Examples and explanations are unclear and insufficient; they provide little support to the thesis.
Conclusions	Conclusion clearly restates the thesis, reinforces the major points and makes a broader statement about the topic.	Conclusion sums up the thesis and reinforces it well.	Conclusion does not fully sum up or reinforce the thesis.	Conclusion sums up the thesis poorly with little reinforcement.
Writing (spelling, grammar, punctuation, and word choice) and following directions.	Spelling, grammar, and punctuation are accurate and nearly perfect; language is precise and well chosen, sentences are rich and varied. Format is exactly as directed.	Spelling, grammar, and punctuation are mostly accurate with few errors; language is well chosen, sentences are varied. Format is as directed.	Spelling, grammar, and punctuation are fair with some obvious errors; language is fair, some sentence variety. Format is not as directed.	Spelling, grammar, and punctuation are poor with frequent errors; language is poor, little sentence variety. No attempt to format essay as directed.