World Population Growth in the 21st Century

“How Many Are Coming To Dinner? I Think We’ll Need More Folding Chairs…”

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300 Rosewood Drive
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Until the 11th millennium BC, humans relied on hunting and gathering for their sustenance; a system that kept the world’s population in check at an estimated one million people for many thousands of years. Then something revolutionary happened... humans invented the practice of agriculture and everything changed. By AD 300-400, it is estimated that more than 50-60 million people lived in the combined Eastern and Western Roman Empires alone.

As a result of the Agricultural and Industrial Revolutions, compulsory vaccinations, and continuing improvements in sanitation and medicine, world population has expanded for the past seven centuries, even in the face of large population losses due to world wars and disease. Between 1700 and 1900 Europe’s population quadrupled from approximately 100 million to over 400 million. Between 1750 and today the population of the Indian subcontinent increased 9.8 times from 125 million people to 1.2 billion. In this century alone the population of Mexico grew 8.3 times, from 13.6 million to 112 million. Kenya’s population increased 12.8 times, from 2.9 million in 1920 to 37 million today.

The world’s population has steadily increased since the peak of the Bubonic Plague during 1348-1350, with its highest annual rate of increase occurring in 1963-2.2%. In 2000, the United Nations Population Division, Department of Social and Economic Affairs estimated that the world’s population was growing at an annual rate of 1.14% or 75 million people per year. By 2009, the world’s population was increasing by over 80 million annually; 220,980 people every day or over 9,200 people every hour – so by the end of your lunch break, there were over 9,200 more people on earth. The United Nations Population Division predicts that by 2050 the world’s population will be between 8.1 billion and 10.6 billion people, with a median estimate of 9.3 billion – and every one of them will be asking “What’s for dinner?”

1 Bubonic Plague is a zoonotic (transferred from animal to human) disease which is spread by small rodents and their fleas. The infection is caused by the bacteria Yersinia Pestis, which is transferred from rodents to humans via biting fleas. If untreated, two thirds of Plague victims will die within four days of infection. DNA testing has conclusively linked Bubonic Plague as the cause of the Black Death which swept through Europe beginning in 1346, and killing an estimated 30 to 60 percent of the continent’s population. By the time this pandemic burned itself out, it killed an estimated 100 million worldwide, reducing global population by 22% from 450 million to 350 million by the time it burned itself out. It took over 150 years before the population of Europe returned to pre-Black Death levels. The Black Death is significant to the story of global population growth because it is the last time that human population experienced a decline.

Sources:
The Mathematics of Population Growth: The world’s human population does not grow linearly, but rather geometrically, (i.e., 1, 2, 4, 8, 16..., etc.) which explains the five-fold increase in population from 1.2 billion to 6.1 billion during the 20th Century. Rapid population growth is predicted to continue for the first half of the 21st century, with rates of growth declining during the latter half of the century. World population is projected to stabilize at just over 10.1 billion by 2100.

"Population, when unchecked, increases in a geometrical ratio."
--Thomas Robert Malthus

Historical and Projected Population Estimates

Despite the projected stabilizing of population by the end of this century, rapid growth is expected in the next 40 years, and will likely place a huge burden on global resources and the agriculture sector in particular. To give you an idea of just how fast population is now growing, consider the following average growth rates for the period 2010-2050, calculated from UN Population Division predictions:

![Projected Population Growth Rates](chart)

Sources and Notes:
Population projections are from the medium case scenario.

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(To put into perspective just how big a number 10.1 billion is, if you decided to count every person on earth at the rate of two per second, it would take you over 160 years to complete the task.)

**Where in the World?:** Population is growing most rapidly in the least developed and developing nations of the world, while population levels in the most developed nations are expected to remain flat or even decrease. Over the next 40 years, 97.1% of the projected increase will occur most markedly in Africa and Asia.

By 2050 Asia is projected to be home to 55.3% of the population of the world and Africa to 23.5% of the world. If predictions materialize, just fewer than 80% (78.8%) of the entire world population will be living in Africa and Asia alone. Africa’s population will increase by 155.9% by 2050 from 2010 levels.

Though Africa and Asia will be home to the most people, they are not alone in anticipating huge population increases. By 2050 Central America’s population is projected to increase by 68.7%, the Middle East’s by 58.9% and Oceania’s by 50.9% while the population of the European Union will decrease by 3.2%.

These population trends indicate a coming shift in demographics that will not only place a great demand and stress on the resources and infrastructure of the nations in question, but the world as a whole. In this age of globalization, a challenge for one nation means a challenge for all.
The Age of Urbanization: Not only will there be a huge demographic shift between regions of the world, but within countries as well. The 21st century is the age of urbanization; urban areas of the world are expected to gain 2.9 billion people by 2050. In 2009, 3.4 billion people live in urban areas, and this is predicted to reach 6.3 billion by 2050. In fact, between now and 2050, urban areas of the world will be absorbing all of the world’s population growth while also absorbing emigration from rural areas as well. As a result, there will likely be 0.5 billion less rural inhabitants in 2050 than today. Again, this shift will mainly occur in developing areas. Asia’s urban population is predicted to increase by 1.7 billion, Africa’s by 0.8 billion and Latin America’s and the Caribbean’s by 0.2 billion each. Overall, 68.7% of the entire world population will be city dwellers by 2050 as opposed to 28.8% in the 1950’s and 49.5% in 2009. By 2050, China will have an urban population of 1 billion people while India will have 0.9 billion living in urban areas.

Today the world has 21 of what are referred to as megacities, those cities with 10 million inhabitants or more. Up until 1975 the world had only three megacities, New York, Tokyo and Mexico City. As soon as 2025, the number of megacities is projected to be 29, with Asia having 16, Latin America, 6, Africa, 3 and Europe and North America 2 each.
“So?” you ask. “If the problem is the number of people on earth, does it matter if they live in cities?” Well the answer is “Yes, it certainly does matter.” Every person living in those cities will need to be fed and not occasionally, but constantly. We all rely on those in our rural areas to grow our food, raise the cattle, produce the milk and harvest the grains that keep our societies fed and working. By 2050 there will likely be 0.5 billion less people in a position to do this for a population that is 2.3 billion greater than it is today.

**Longevity, Gender and the Consequences of Population Control Mandates:** There are more factors to consider when discussing population, including those of longevity and gender. Due to better healthcare, access to education and economic growth, life expectancy has risen across all socioeconomic groups across all areas of the world. The most rapidly growing age group worldwide is those over 80 years old. At the same time, in developing nations, the number of young people is expanding as well. In more developed nations, children under 14 make up only 17.0% of the population, and there are 4.1 adults working for every child. In Sub-Saharan Africa the number of young people is 42.0% of the population and there are only 1.3 working adults per child. In Uganda the ratio of working people to children is 1:1, while women in that country have on average more than six children each.

At the opposite end of the spectrum from Uganda is China. In 1970 the average woman in China also had six or more children. Then in 1978, China implemented its one-child policy in an effort to improve its standard of living and its economy as a whole. Urban couples and those of Han heritage may only have one child while couples in rural areas (in general) may have a second child five years after the birth of their first child, or if the first child is a girl.

In terms of simple population control, the policy has seemed to work. Since 1995 China’s birthrate has stabilized at 1.7%. By essentially eliminating approximately 400 million extra people, the one-child policy has also increased China’s standard of living and strengthened its economy, by concentrating the country’s economic growth in the hands of fewer people. Currently, China is the 2nd largest economy in the world after the US and in 2010 its GDP was 9.3% of the world total, and its per capita GDP (current USD) has grown at a compounded annual rate of 9.1% over the past ten years.

Economic growth is considered desirable, but at what cost? The government of China acknowledges some societal drawbacks to its one-child policy. China’s is one of the most aging societies on earth. By 2050 30%

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**China’s 2010 Population by Age Group**

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Ratio Male to Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>81,595</td>
<td>44,689</td>
<td>36,906</td>
<td>1.21</td>
</tr>
<tr>
<td>5-9</td>
<td>84,050</td>
<td>46,225</td>
<td>37,825</td>
<td>1.22</td>
</tr>
<tr>
<td>10-14</td>
<td>95,313</td>
<td>51,776</td>
<td>43,537</td>
<td>1.19</td>
</tr>
<tr>
<td>15-19</td>
<td>105,348</td>
<td>56,449</td>
<td>48,899</td>
<td>1.15</td>
</tr>
<tr>
<td>20-24</td>
<td>119,964</td>
<td>62,788</td>
<td>57,176</td>
<td>1.10</td>
</tr>
<tr>
<td>25-29</td>
<td>100,759</td>
<td>51,849</td>
<td>48,899</td>
<td>1.06</td>
</tr>
<tr>
<td>Over 30</td>
<td>754,311</td>
<td>382,566</td>
<td>371,745</td>
<td>1.03</td>
</tr>
<tr>
<td>Totals</td>
<td>1,341,340</td>
<td>696,342</td>
<td>644,998</td>
<td>1.08</td>
</tr>
</tbody>
</table>

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Of all persons under the age of 30 in China, males exceed females by 40.5 million

China's "one child" policy was enacted in 1978, 34 years ago

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**Source:**

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“**If we don't halt population growth with justice and compassion, it will be done for us by nature, brutally and without pity and will leave a ravaged world.”**

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Dr. Henry W. Kendall, Nobel Laureate
of its population will be over 60. Due to a preference for male heirs in Chinese society, China is experiencing a birthrate of 121 males for every 100 females. Males under 30 years old outnumber females by 40 million, and the stress of possibly not finding a mate is potentially a casual factor in cases of mental health problems and disruptive social behavior among these men. It is true that China’s one-child policy has generated wealth and globalization, but with that extra wealth and freedom of movement it is becoming more difficult to impose.

**Conclusions:** Feeding the world’s rapidly growing population in the 21st century is a daunting challenge for the agricultural sector. Without even factoring changing global diets, we estimate that total global agricultural output will need to increase by 70% to 100% in the next 38 years. To achieve this required output, massive investment in the agriculture is needed from both the public and private sectors.

Given this insight to our collective future, we have today the knowledge, resources and technologies to meet the demands that will face us. The development of agriculture is what sparked our species’ success and enabled our populations to reach today’s levels. Significant investment in agriculture and alternative forms of energy must begin now instead of later to ensure that there are enough folding chairs for everyone at the table.
Sources:

2. United Nations Department of Economic and Social Affairs/Population Division, World Urbanization Prospects: The 2009 Revision
4. World Population Highlights: Key Findings from Population Reference Bureau’s 2010 World Population Data Sheet
5. Luc-Normand Tellier (2009) "Urban World History: An Economic and Geographical Perspective"
7. Index Mundi: China Economy Profile 2012
8. International Monetary Fund 2010 GDP Estimates

Disclaimers and Notes of Forward Looking Statements:

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Appendix:

Distribution of World’s Population 2010
(in millions)

- **Northern America**: Population: 344, Percent: 4.9
- **Central America**: Population: 155, Percent: 2.3
- **South America**: Population: 392, Percent: 5.7
- **Caribbean**: Population: 41, Percent: 0.6
- **Europe**: Population: 738, Percent: 10.7
- **Asia**: Population: 4,164, Percent: 60.4
- **Australia & New Zealand**: Population: 26, Percent: 0.4

Rest of the World
Population: 175, Percent: 2.6

Projected Distribution of World’s Population 2050
(in millions)

- **Northern America**: Population: 446, Percent: 4.8
- **Central America**: Population: 215, Percent: 2.3
- **South America**: Population: 488, Percent: 5.2
- **Caribbean**: Population: 47, Percent: 0.5
- **Europe**: Population: 719, Percent: 7.7
- **Africa**: Population: 2,191, Percent: 23.6
- **Asia**: Population: 5,142, Percent: 55.3
- **Australia & New Zealand**: Population: 37, Percent: 0.4

Rest of the World
Population: 18, Percent: 0.2

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## Appendix:

### Current and Projected Population by Region and Select Countries, 2010-2050 and 2050-2100

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central America</td>
<td>42,412</td>
<td>42,739</td>
<td>0.7%</td>
<td>42,412</td>
<td>42,739</td>
<td>0.7%</td>
</tr>
<tr>
<td>East Asia</td>
<td>1,573,670</td>
<td>1,680,688</td>
<td>6.7%</td>
<td>1,573,670</td>
<td>1,680,688</td>
<td>6.7%</td>
</tr>
<tr>
<td>European Union</td>
<td>792,422</td>
<td>780,637</td>
<td>-1.5%</td>
<td>792,422</td>
<td>780,637</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Former Soviet Union</td>
<td>278,913</td>
<td>272,419</td>
<td>-2.4%</td>
<td>278,913</td>
<td>272,419</td>
<td>-2.4%</td>
</tr>
<tr>
<td>Middle East</td>
<td>292,583</td>
<td>494,854</td>
<td>-64.9%</td>
<td>292,583</td>
<td>494,854</td>
<td>-64.9%</td>
</tr>
<tr>
<td>North Asia</td>
<td>186,277</td>
<td>220,392</td>
<td>18%</td>
<td>186,277</td>
<td>220,392</td>
<td>18%</td>
</tr>
<tr>
<td>North America</td>
<td>467,287</td>
<td>590,722</td>
<td>24%</td>
<td>467,287</td>
<td>590,722</td>
<td>24%</td>
</tr>
<tr>
<td>Oceania</td>
<td>34,593</td>
<td>55,333</td>
<td>61%</td>
<td>34,593</td>
<td>55,333</td>
<td>61%</td>
</tr>
<tr>
<td>Other Europe</td>
<td>26,657</td>
<td>26,678</td>
<td>0.1%</td>
<td>26,657</td>
<td>26,678</td>
<td>0.1%</td>
</tr>
<tr>
<td>South Asia</td>
<td>1,630,173</td>
<td>2,508,741</td>
<td>52.9%</td>
<td>1,630,173</td>
<td>2,508,741</td>
<td>52.9%</td>
</tr>
<tr>
<td>South East Asia</td>
<td>387,433</td>
<td>730,207</td>
<td>87%</td>
<td>387,433</td>
<td>730,207</td>
<td>87%</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>814,537</td>
<td>877,656</td>
<td>7%</td>
<td>814,537</td>
<td>877,656</td>
<td>7%</td>
</tr>
<tr>
<td>ERIC Countries</td>
<td>2,905,814</td>
<td>3,306,643</td>
<td>13%</td>
<td>2,905,814</td>
<td>3,306,643</td>
<td>13%</td>
</tr>
</tbody>
</table>

### Sources and Notes:

- Population projections made from the medium variant scenario.