International Programs Area

International work has been conducted by the Census Bureau for nearly a century

What we do

- Technical assistance and capacity building (since 1930s)
- Training and statistical development (since 1946)
- Demographic and economic research (since 1950s)
- International Data Base (since 1960s)
- Software and methodological development
100% Reimbursable: Sponsors and Inter-agency Cooperation

- U.S. Agency for International Development
- U.S. National Institutes of Health
- Office of the Global AIDS Coordinator (PEPFAR)
- Other U.S. agencies
- World Bank
- UNAIDS
- UNFPA, UNDP
- National statistical organizations
Places We Have Worked

Most recent assistance provided
- 2006 to present
- 2000 to 2005
- 1999 or earlier
- No assistance

U.S. Population: 322,273,944
World Population: 7,289,825,998
Demographic and Economic Research

- Assessment of the impact of Indonesia's tsunami and Cyclone Nargis in Burma
- Subnational projections for Nigeria, Iran, Iraq, India, China, Syria, and cities around the world
- Pension reform in China
- Comparative study of the older population in China, Ghana, India, Mexico, Russia, and South Africa.
- Analyses of patterns, levels, and trends of HIV/AIDS infection in developing countries
- HIV/AIDS Surveillance Data Base is the most complete repository for prevalence and incidence data in the world.
International Programs

International Data Base
Last Updated: July 2015

For help in using the International Data Base (IDB), please click here.
Click here for map interface access to IDB data.

Select Report

- Demographic Overview

Select up to 25 Years

- 1950
- 1951
- 1952
- 1953
- 1954
- 1955
- 1956
- 1957
- 1958
- 1959

Select Region(s)

- UN Regions
- Legacy Regions
- State Dept. Categories

Aggregation Options

- Show individual Country data only
- Show aggregated Region data
Software Development Activities

- Census and Survey Processing (CSPro) – a public-domain software package for entering, editing, tabulating and mapping census and survey data.
- Population Analysis Spreadsheets (PAS) system – consists of 45 spreadsheets for population analysis
- Demographic Analysis and Population Projections System (DAPPS) – software package for creating cohort-component population estimates and projections
- Subnational Projections Toolkit -- workbooks to support cohort-component or mathematical extrapolation projections
Population Estimates and Projections

- 228 countries and areas, including the United States
- Individual countries updated on a flow basis
- Results available on the International Data Base
Demographic Analysis, Population Projections, Data Sources, and Uncertainty
Our basic accounting system for demographic analysis

The Demographic Balancing Equation

A way of relating population size (and growth) to the same population at a different point in time:

\[
\text{Pop}(t2) = \text{Pop}(t1) + \text{Births} - \text{Deaths} + \text{Net Migration}
\]

\[
(P2) = (P1) + (B) - (D) + (NM)
\]

Rearranging to indicate changes in population:

\[
\text{Pop}(t2) - \text{Pop}(t1) = \text{Births} - \text{Deaths} + \text{Net Migration}
\]

\[
(P2) - (P1) = (B) - (D) + (NM)
\]
Population by Age and Sex

Population Pyramid: 1989

[Graph showing population distribution by age and sex for 1989]
Cohort-Component Population Projections (the gold standard)

- Begins with a population distributed by age/sex
- Projects the population forward (typically year by year) based on estimated:
  - Age-specific fertility (generates births)
  - Age/sex-specific mortality
  - Age/sex-specific net migration
- Each year, a new population by age and sex is estimated

“Demography is Destiny”…
This Table Comes from a Cohort-Component Projection Based on a 1989 Census Count

<table>
<thead>
<tr>
<th>Year</th>
<th>Age 0</th>
<th>Age 1</th>
<th>Age 2</th>
<th>Age 3</th>
<th>Age 4</th>
<th>Age 5</th>
<th>Age 6</th>
<th>Age 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>64,581</td>
<td>62,550</td>
<td>62,257</td>
<td>60,514</td>
<td>58,836</td>
<td>56,486</td>
<td>54,070</td>
<td>52,128</td>
</tr>
<tr>
<td>1990</td>
<td>65,294</td>
<td>63,525</td>
<td>62,062</td>
<td>61,918</td>
<td>60,244</td>
<td>58,607</td>
<td>56,266</td>
<td>53,874</td>
</tr>
<tr>
<td>1991</td>
<td>64,707</td>
<td>64,242</td>
<td>62,969</td>
<td>61,606</td>
<td>61,501</td>
<td>60,032</td>
<td>58,431</td>
<td>56,083</td>
</tr>
<tr>
<td>1992</td>
<td>64,185</td>
<td>63,452</td>
<td>63,546</td>
<td>62,377</td>
<td>61,055</td>
<td>61,109</td>
<td>59,826</td>
<td>58,242</td>
</tr>
<tr>
<td>1993</td>
<td>60,717</td>
<td>62,601</td>
<td>62,448</td>
<td>62,649</td>
<td>61,531</td>
<td>60,404</td>
<td>60,618</td>
<td>59,356</td>
</tr>
<tr>
<td>1994</td>
<td>56,326</td>
<td>59,325</td>
<td>61,677</td>
<td>61,645</td>
<td>61,880</td>
<td>60,913</td>
<td>59,978</td>
<td>60,202</td>
</tr>
<tr>
<td>1995</td>
<td>56,555</td>
<td>55,341</td>
<td>58,776</td>
<td>61,229</td>
<td>61,236</td>
<td>61,584</td>
<td>60,757</td>
<td>59,840</td>
</tr>
<tr>
<td>1996</td>
<td>55,925</td>
<td>55,791</td>
<td>54,972</td>
<td>58,498</td>
<td>60,979</td>
<td>61,067</td>
<td>61,530</td>
<td>60,716</td>
</tr>
<tr>
<td>1997</td>
<td>52,120</td>
<td>55,292</td>
<td>55,522</td>
<td>54,790</td>
<td>58,333</td>
<td>60,869</td>
<td>61,035</td>
<td>61,512</td>
</tr>
<tr>
<td>1998</td>
<td>51,420</td>
<td>51,476</td>
<td>55,042</td>
<td>55,352</td>
<td>54,650</td>
<td>58,246</td>
<td>60,839</td>
<td>61,016</td>
</tr>
<tr>
<td>1999</td>
<td>52,102</td>
<td>50,873</td>
<td>51,188</td>
<td>54,849</td>
<td>55,196</td>
<td>54,527</td>
<td>58,177</td>
<td>60,780</td>
</tr>
<tr>
<td>2000</td>
<td>50,310</td>
<td>51,594</td>
<td>50,590</td>
<td>50,996</td>
<td>54,674</td>
<td>55,044</td>
<td>54,405</td>
<td>58,057</td>
</tr>
</tbody>
</table>
Data Sources Used in Estimates and Projections

- Censuses
- Surveys
- Administrative records
  - Vital statistics
  - Migration flows
- Other sources considered
  - Academic studies
  - Other professional estimates/reports
Cohort-Component Projections and Intercensal Analysis

Fitting it All Together - here is the basic idea

- A census count by age and sex can be projected to the time of the next census via the cohort-component method
- The projection provides a standard against which the new census results can be evaluated
- However, a new census count never matches the projected count exactly. Why?
  - Coverage error in the new census or in the earlier census (“base population”)
  - Errors in projection components (fertility, mortality, net migration)
Who Does International Cohort-Component Projections?

- Some organizations specialize in either mortality estimates, fertility estimates, or migration estimates.
- Some organizations provide population estimates or projections, including cohort component.
- Two organizations regularly fit all these pieces together through demographic analysis and offer cohort-component estimates and projections for countries throughout the world:

  U.S. Census Bureau, Population Division
  International Programs Area

  United Nations, Population Division
International Data Base (IDB) –
http://www.census.gov/population/international/data/idb/informationGateway.php

- Annual estimates and projections by single year of age through 2050

- “Base year” of detailed demographic estimates varies per country; total population estimates and projections from 1950 to 2050

- Updates to IDB on a flow basis, currently annual for a portion of countries that have new data
Demographic estimates provided by the Population Divisions of the US Census Bureau and the UN are both based on cohort-component projections. The resulting estimates do not always match official statistics because adjustments have been made (to at least one component) in order for all components to fit together under the balancing equation. Although both organizations respect the balancing equation, the pieces of the puzzle are adjusted differently and thus may show a different picture.
DAPPS

- Developed by the Census Bureau to provide user-friendly software for population estimates and projections and demographic analysis.

- Components of projections (population, mortality, fertility, net migration) are entered into DAPPS.

- DAPPS then runs a cohort component projection and provides a variety of useful graphics and tabular output.
Add New Data:
Population Example

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 - 9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10 - 14</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15 - 19</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20 - 24</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25 - 29</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30 - 34</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35 - 39</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40 - 44</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>45 - 49</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50 - 54</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>55 - 59</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60 - 64</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65 - 69</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>70 - 74</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>75 - 79</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80+</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total: 0 0 0 0

Uncertainty

- Sometimes estimates of the same parameter (e.g. fertility) differ across multiple sources
- Quality assessment required – case by case
- Sometimes there is simply a lack of data
- Among components of demographic change, migration is the most unstable and can change rapidly
- But in some countries mortality and fertility may also fluctuate sharply
  - Famines
  - Natural disasters
  - Wars
Evaluating Censuses Using Projections: Example from North Korea

- North Korea conducted their first census in 1993
- Famine – mid 1990s to about 2000
- Toll of the famine was uncertain owing to a lack of reliable data; estimates of excess deaths ranged from 200,000 to 3 million
- Questions about reliability of available sources
  - Death rates based on famine refugees crossing into China seemed too high, not representative
Our Original Estimates of Famine Impact on Mortality and Fertility

- Indirect evidence of mortality ranging from
  - 1 million – Based on China’s Great Leap Forward famine experience (1958-1960)
  - 600K - Used World Food Programme surveys of child malnutrition in 1997 and 1998 in North Korea, and models relating malnutrition to mortality

- Indirect evidence of fertility dip during the famine based on China’s Great Leap Forward experience
North Korea Conducts 2008 Census

We compared published 2008 census counts to our projection of the 2008 population based on the 1993 census and 1993-2008 estimates of demographic change:

Population 2008 = Population 1993
+ births
- deaths
+ net migration

2008 Census Count
24.1 million

Projected 2008 Pop.
22.6 million
2008 Female Age Structure in North Korea: 2008 Census vs. a Projection From 1993

Challenges in Estimating and Projecting Migration Flows
What Country Am I?, 2005

Source: International Database, U.S. Census Bureau (http://www.census.gov/ipc/www/idbnew.html).
Sources of Data on Migration and Refugees

- Census or survey questions
- “Mirror” statistics – e.g., the outflows from country X are the inflows to country Y
- Borrow age/sex pattern from similar countries
- Registers of the United Nations High Commission for Refugees (UNHCR)

*Note – the variety and detail of above data will vary from country to country and quality/completeness needs to be assessed case to case*
One Example of Mirror Statistics

Table 2.
PERSONS OBTAINING LAWFUL PERMANENT RESIDENT STATUS BY REGION AND SELECTED COUNTRY OF LAST RESIDENCE: FISCAL YEARS 1820 TO 2013 - Continued

<table>
<thead>
<tr>
<th>Region and country of last residence</th>
<th>2000 to 2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10,299,430</td>
<td>1,042,625</td>
<td>1,062,040</td>
<td>1,031,631</td>
<td>990,553</td>
</tr>
<tr>
<td>Europe</td>
<td>1,349,609</td>
<td>95,429</td>
<td>90,712</td>
<td>86,956</td>
<td>91,095</td>
</tr>
<tr>
<td>Austria-Hungary</td>
<td>33,929</td>
<td>4,325</td>
<td>4,703</td>
<td>3,208</td>
<td>2,061</td>
</tr>
<tr>
<td>Austria</td>
<td>21,151</td>
<td>3,319</td>
<td>3,654</td>
<td>2,199</td>
<td>1,053</td>
</tr>
<tr>
<td>Hungary</td>
<td>12,778</td>
<td>1,006</td>
<td>1,049</td>
<td>1,009</td>
<td>1,008</td>
</tr>
<tr>
<td>Belgium</td>
<td>8,157</td>
<td>732</td>
<td>700</td>
<td>698</td>
<td>803</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>40,003</td>
<td>2,465</td>
<td>2,549</td>
<td>2,322</td>
<td>2,720</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>18,691</td>
<td>1,510</td>
<td>1,374</td>
<td>1,316</td>
<td>1,258</td>
</tr>
<tr>
<td>Denmark</td>
<td>6,049</td>
<td>545</td>
<td>473</td>
<td>492</td>
<td>546</td>
</tr>
<tr>
<td>Finland</td>
<td>3,970</td>
<td>414</td>
<td>398</td>
<td>373</td>
<td>360</td>
</tr>
</tbody>
</table>
Estimating Demographic Impact of Syrian Crisis

- Last update of Syria population done in late 2013
- Excess deaths from the conflict
- Impact on fertility from substantial population displacement within the country
- Biggest impact is refugee flows
Multiple Migration Streams Modeled

- Net economic migration, based on intercensal residuals
- Iraqi refugees in Syria, based on UNHCR statistics
- Syrian migration to neighboring countries, based on UNHCR statistics
UNHCR Special Reports on Syria
Syria: Components of Population Change
Per 1,000 Population: 1994 to 2015

Crude birth rate
Crude death rate
Net migration rate

Source: U.S. Census Bureau. International Data Base.
Updating Groups of Impacted Countries

- When we updated Syria, we also updated Jordan, Lebanon, and Turkey
- We synchronized flows of Syrians to other countries and synchronized projected return flows to Syria
Back to the Future: Projecting Demographic Change

- Given uncertainty, we assume that countries will gradually follow worldwide development trends (based on historical experience of less and more developed countries)
- Examples – Life expectancy, fertility rates
- That said, on a country by country basis, we consider whether certain unique patterns may persist
Thank you!

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Daniel.M.Goodkind@census.gov