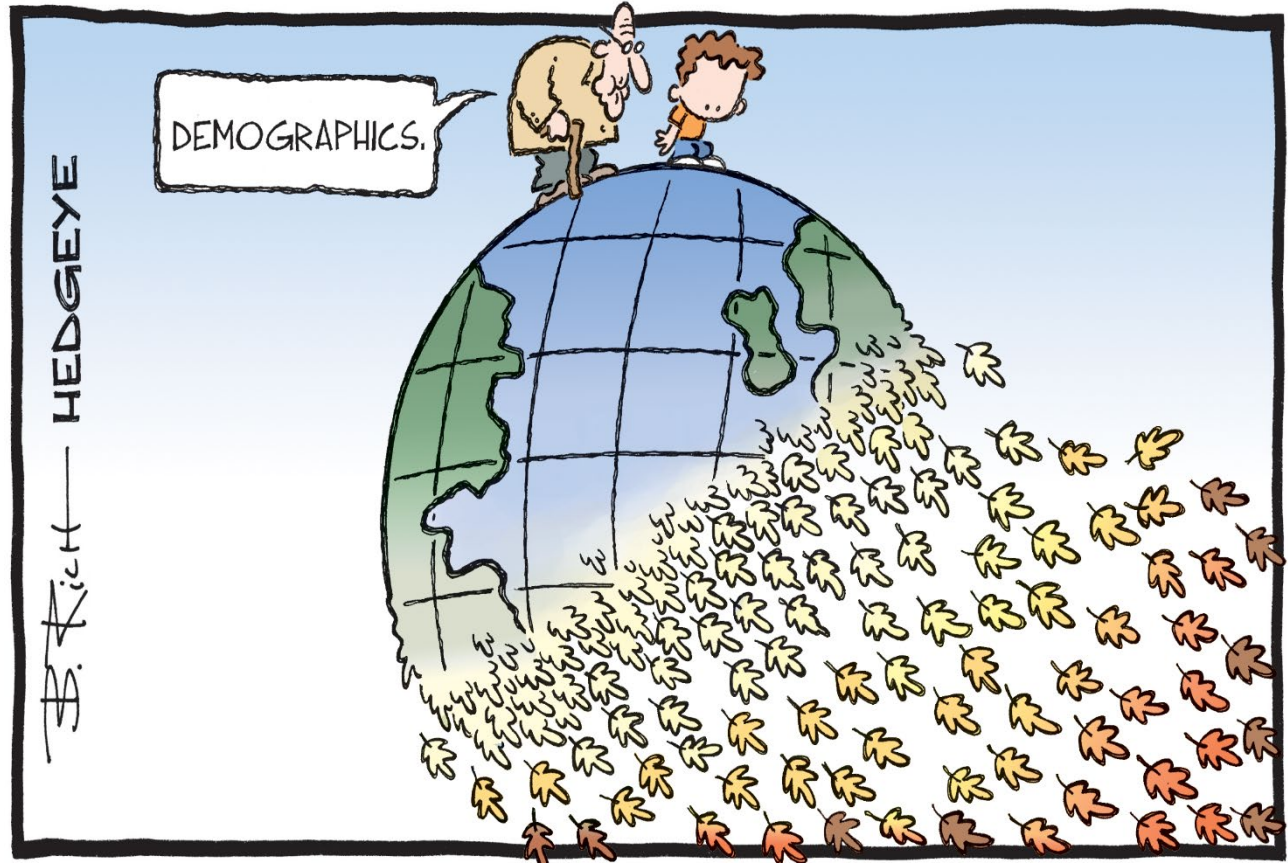




2021 WORLD
DEMOGRAPHY
OUTLOOK



September 22, 2021

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☐ **Fertility**

- *Global Trends*
- *Special Issues*
- *Pandemic Baby Bust*
- *Policy Measures*

☐ **Mortality and Covid-19**

- *Life Expectancy*
- *C19 Comparing Regions*
- *True C19 Death Count*

☐ **Migration**

- *Comparing Regions*
- *Effects of the Pandemic*

☐ **Population Projections**

- *Working Age Population*
- *Dependency Ratios*
- *When Will Global Population Peak?*

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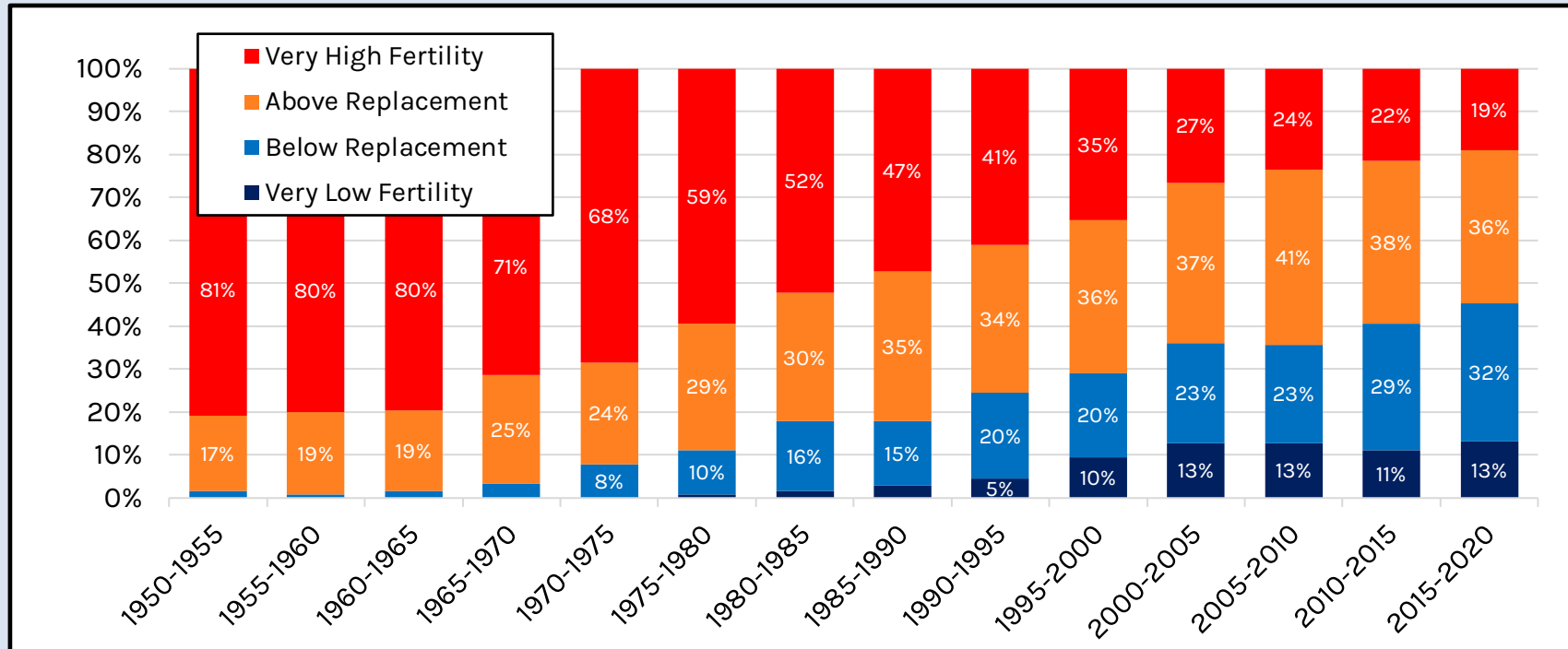
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LOW FERTILITY COUNTRIES GROW

Percent of Total Countries/Territories by Fertility Level*, 1950-2020

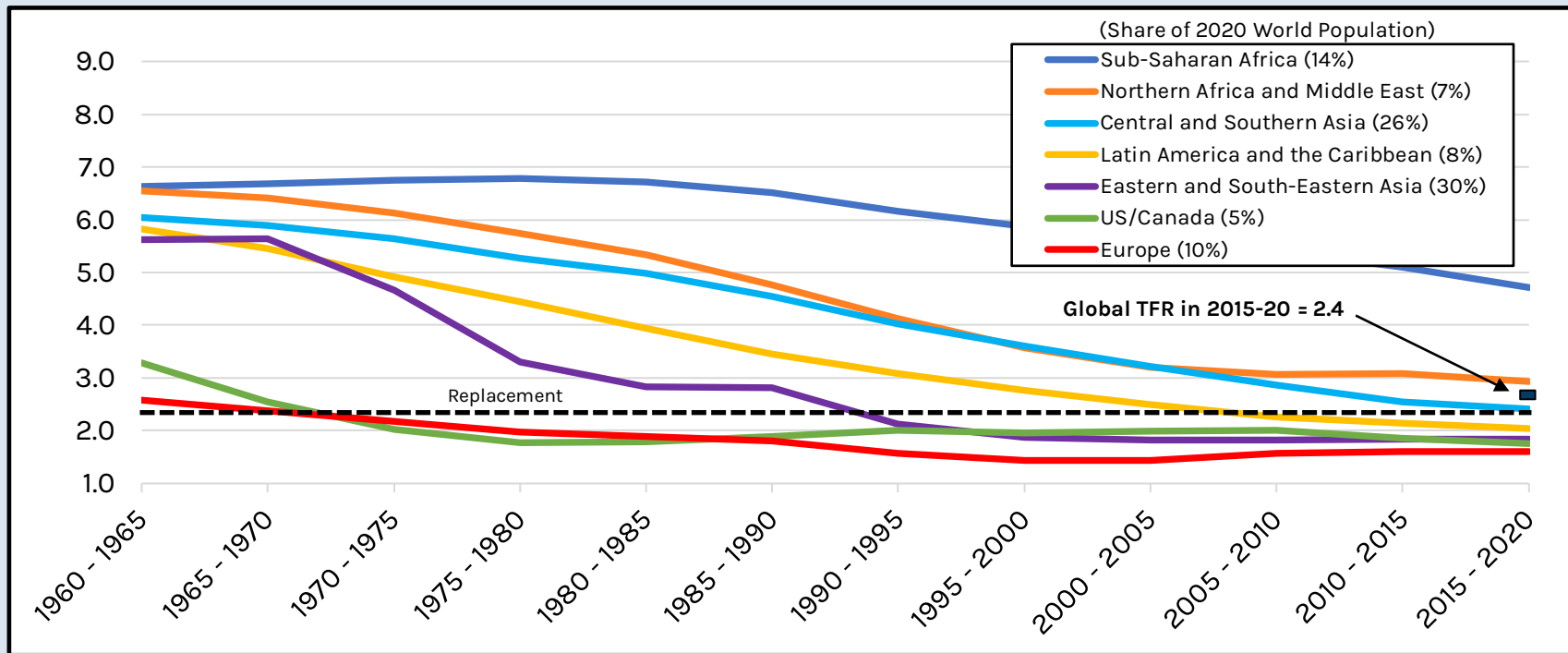


* "Very High Fertility" refers to a TFR above 4.0. "Above Replacement" refers to a TFR between 2.1 and 4.0. "Below Replacement" refers to a TFR of less than 2.1 but at least 1.5. "Very Low Fertility" refers to a TFR of less than 1.5.

FERTILITY COMPARED

6

TFR* for World Regions, 1960-2020

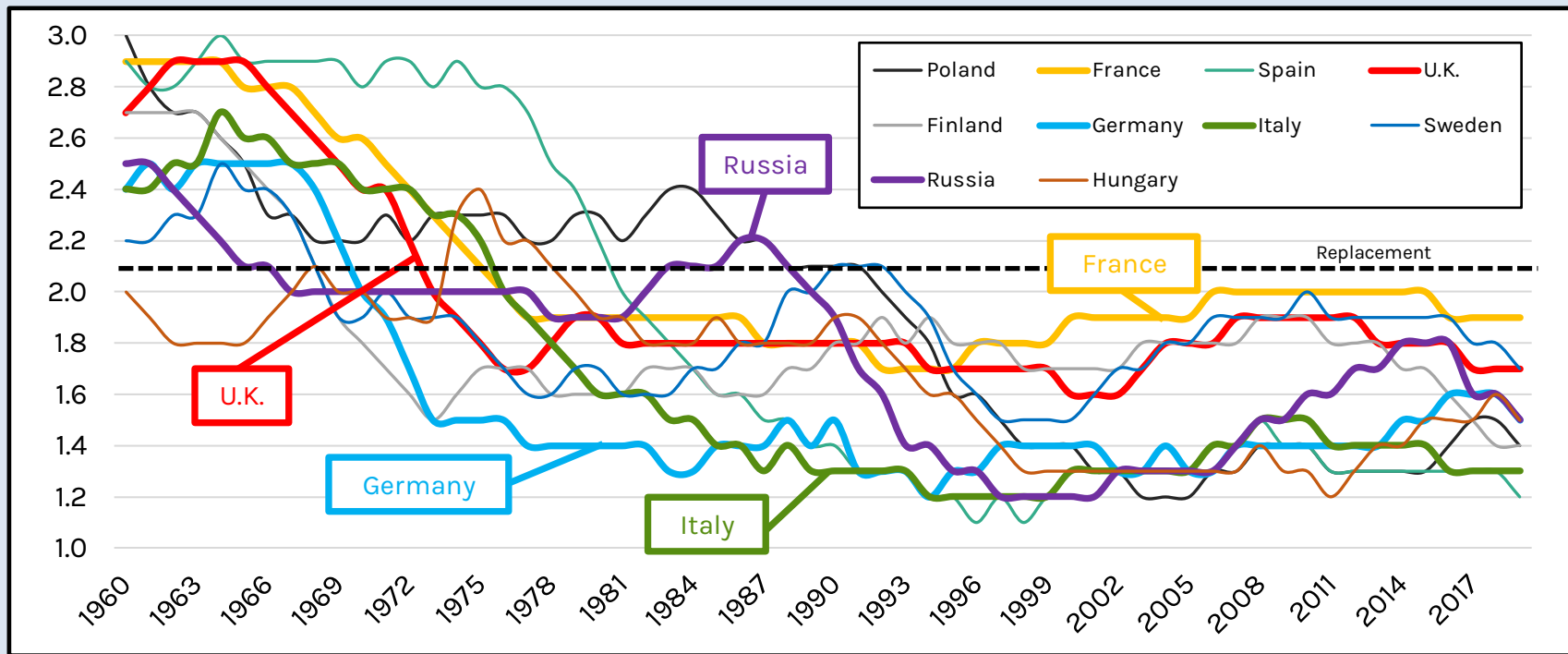


*Rounded to the nearest tenth.

FERTILITY IN EUROPE

7

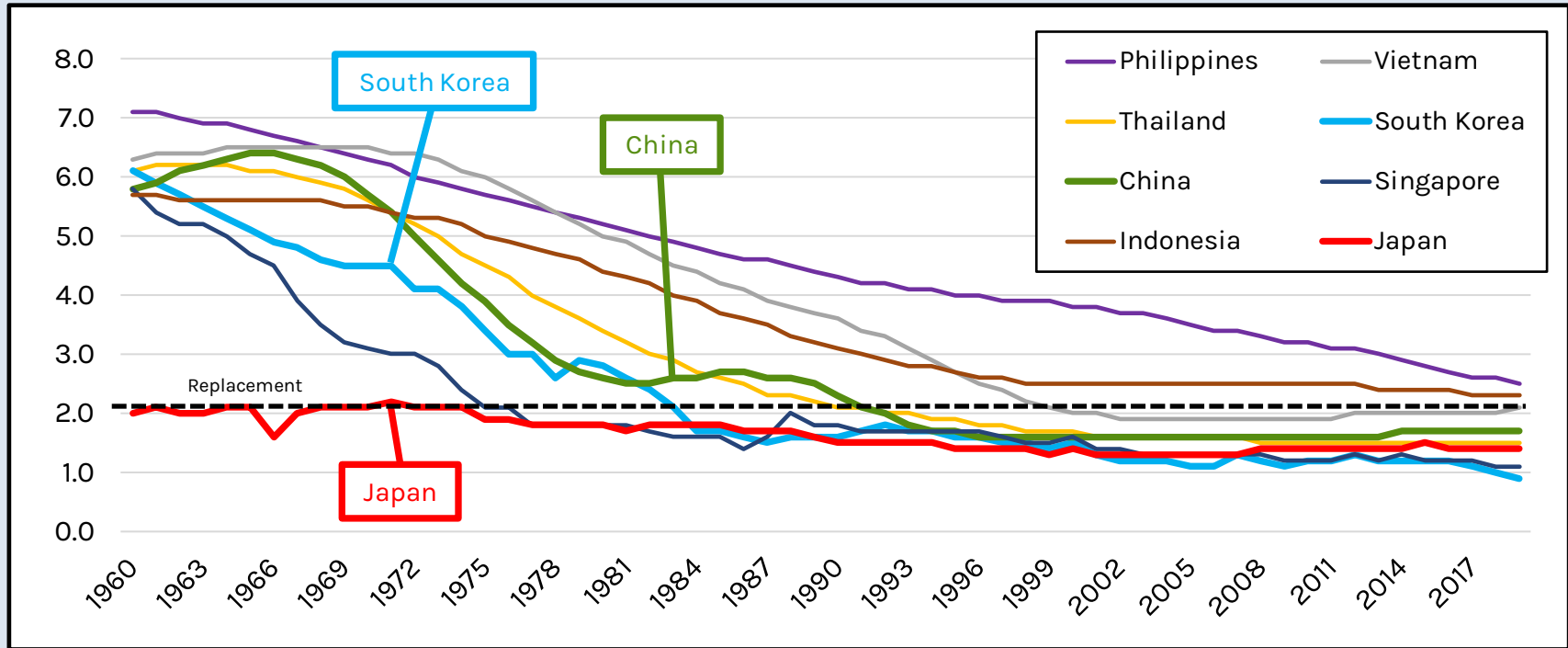
TFR* for Select European Countries, 1960-2019



*Rounded to the nearest tenth

FERTILITY IN EAST ASIA

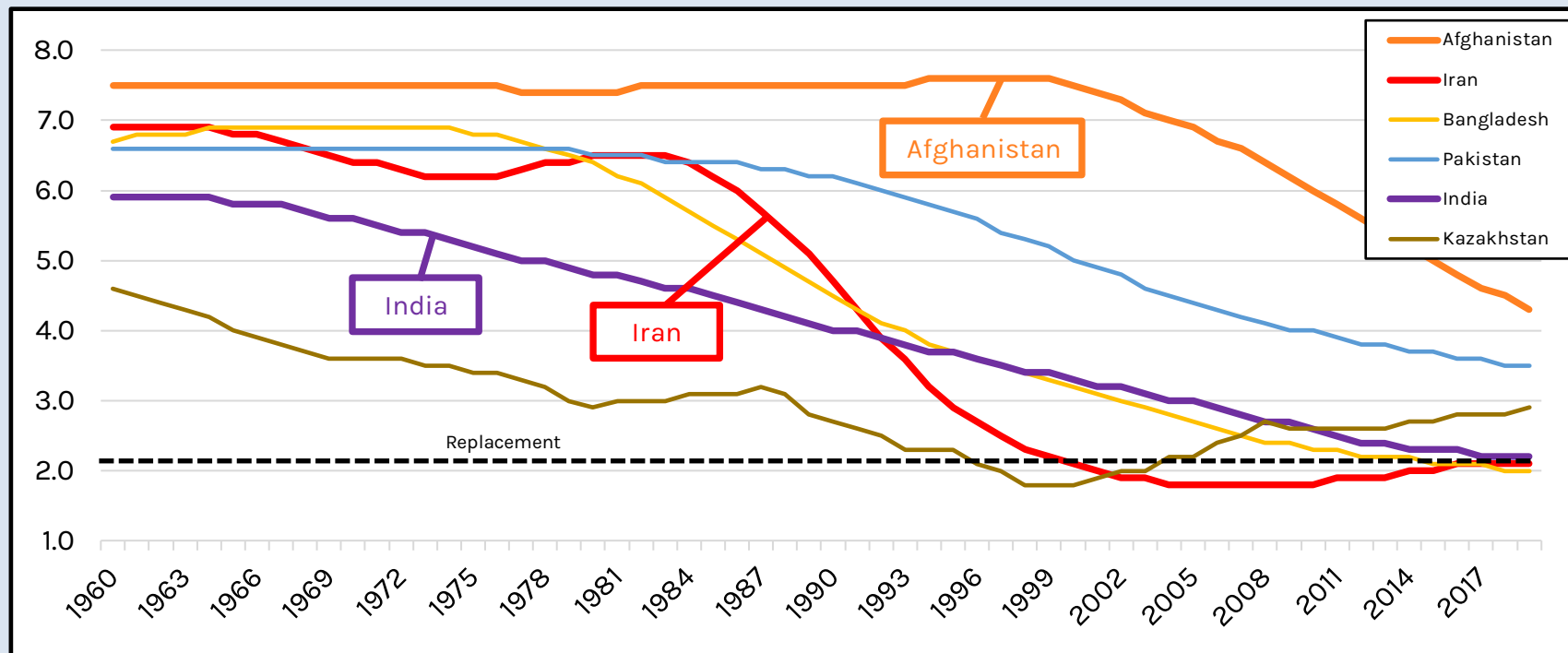
TFR* for Select East Asian Countries, 1960-2019



*Rounded to the nearest tenth

FERTILITY IN CENTRAL AND SOUTHERN ASIA

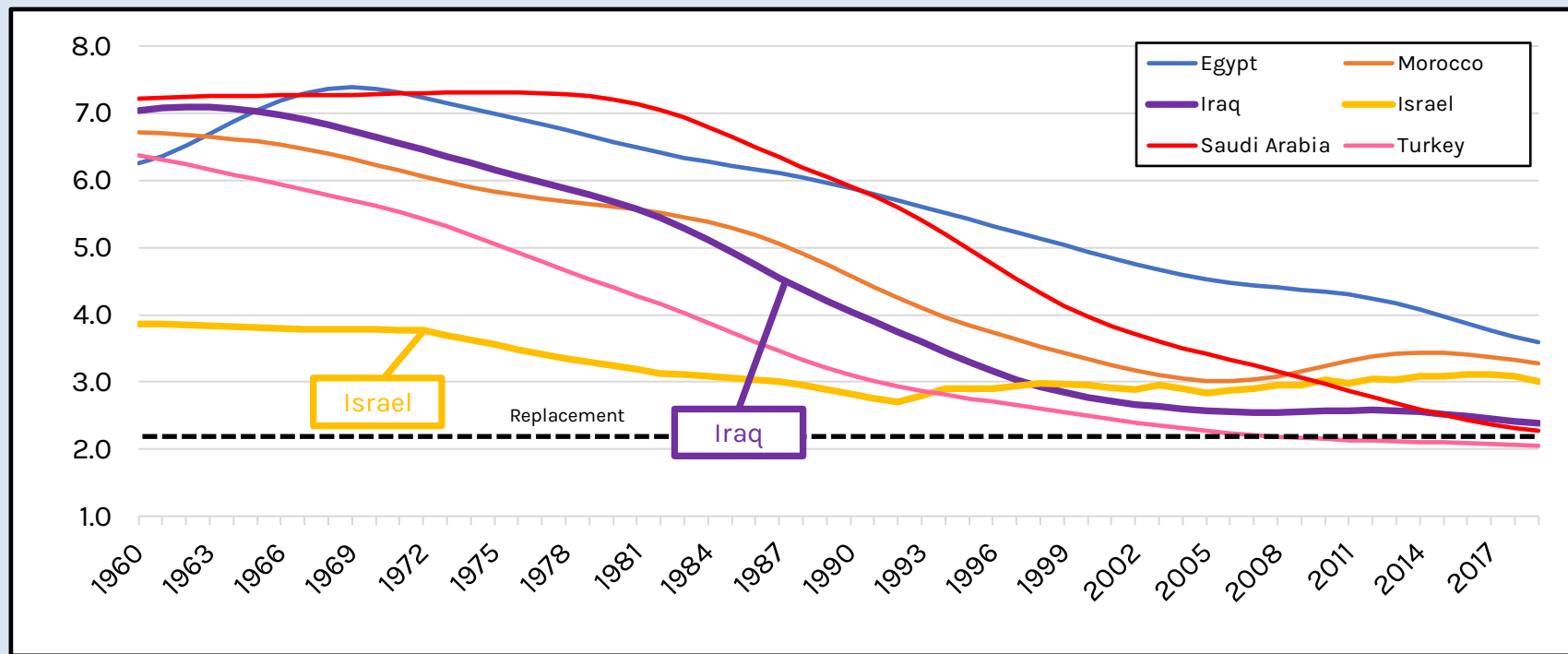
TFR* for Select Central and Southern Asian Countries, 1960-2019



*Rounded to the nearest tenth

FERTILITY IN NORTH AFRICA AND MIDDLE EAST

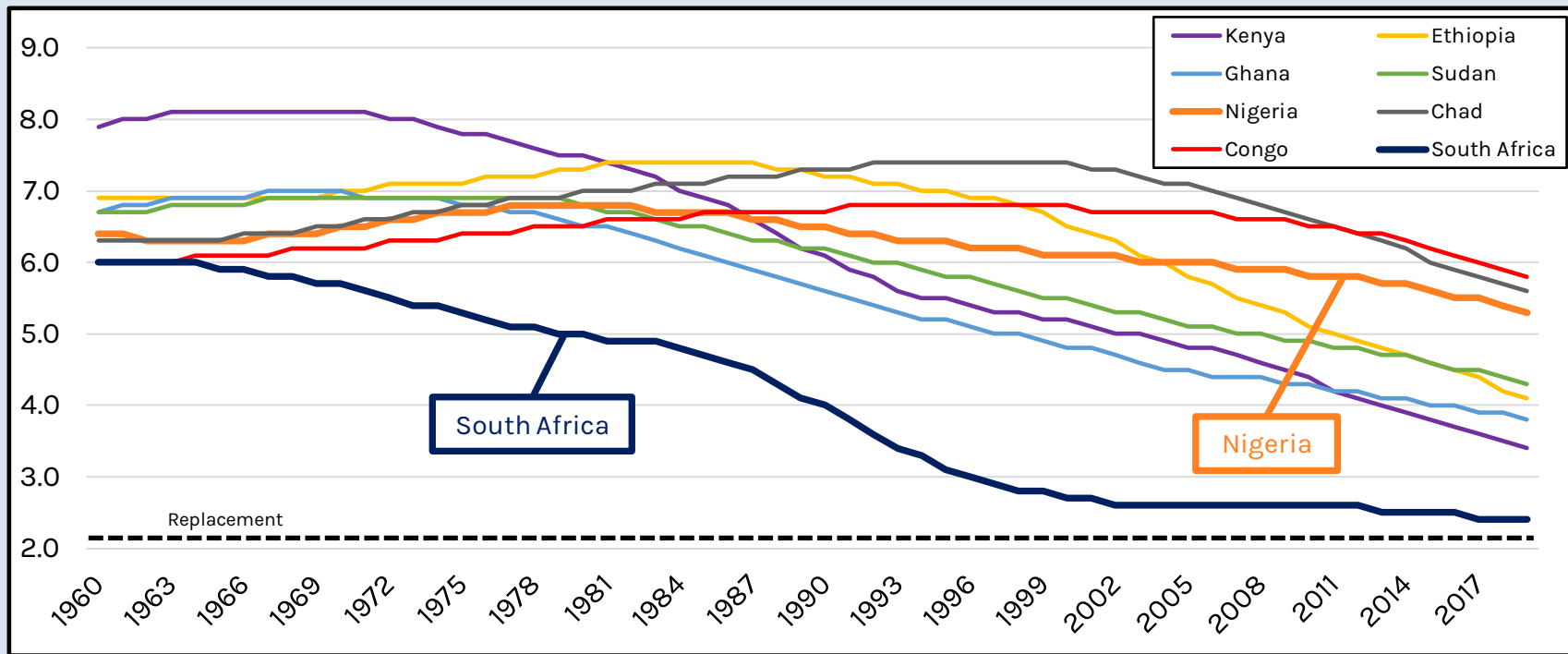
TFR* for Select North African and Middle Eastern Countries, 1960-2019



*Rounded to the nearest tenth

FERTILITY IN SUB-SAHARAN AFRICA

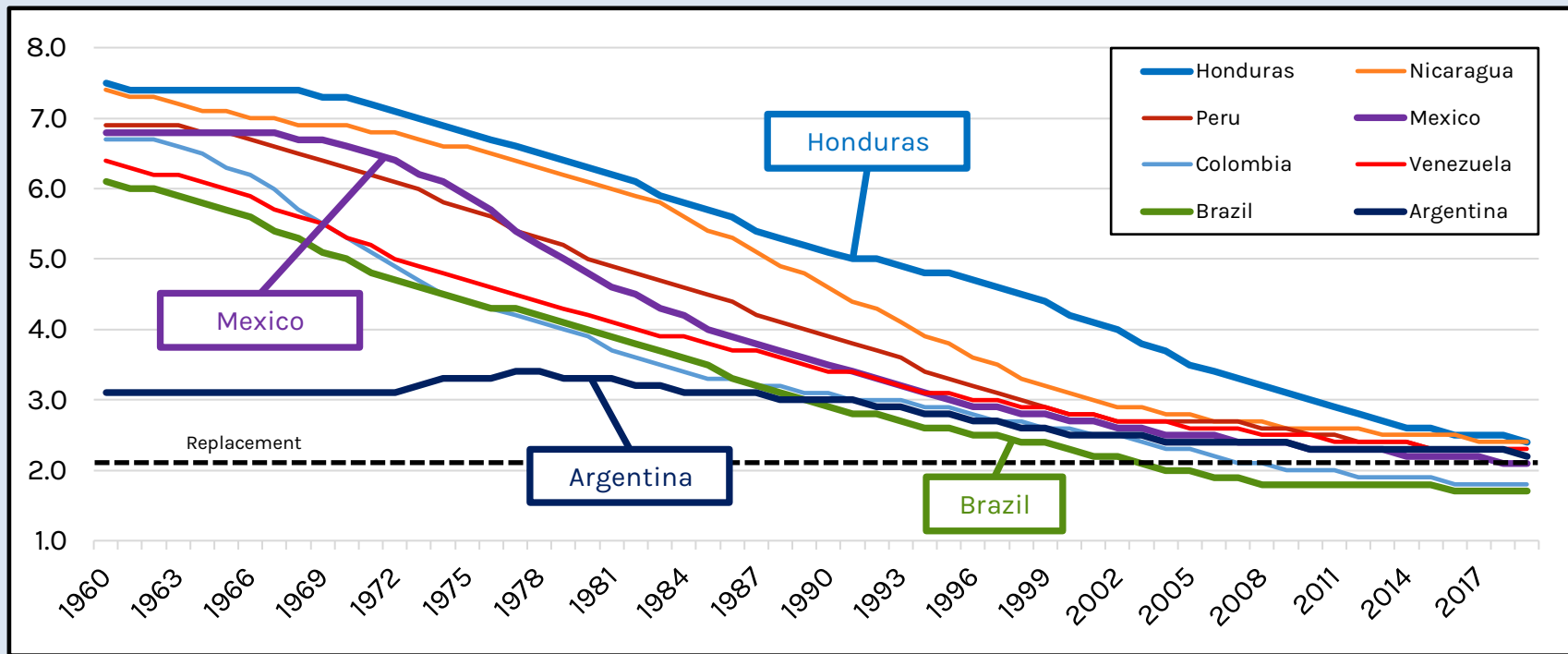
TFR* for Select Sub-Saharan African Countries, 1960-2019



*Rounded to the nearest tenth

FERTILITY IN LATIN AMERICA

TFR* for Select Latin American Countries, 1960-2019



*Rounded to the nearest tenth

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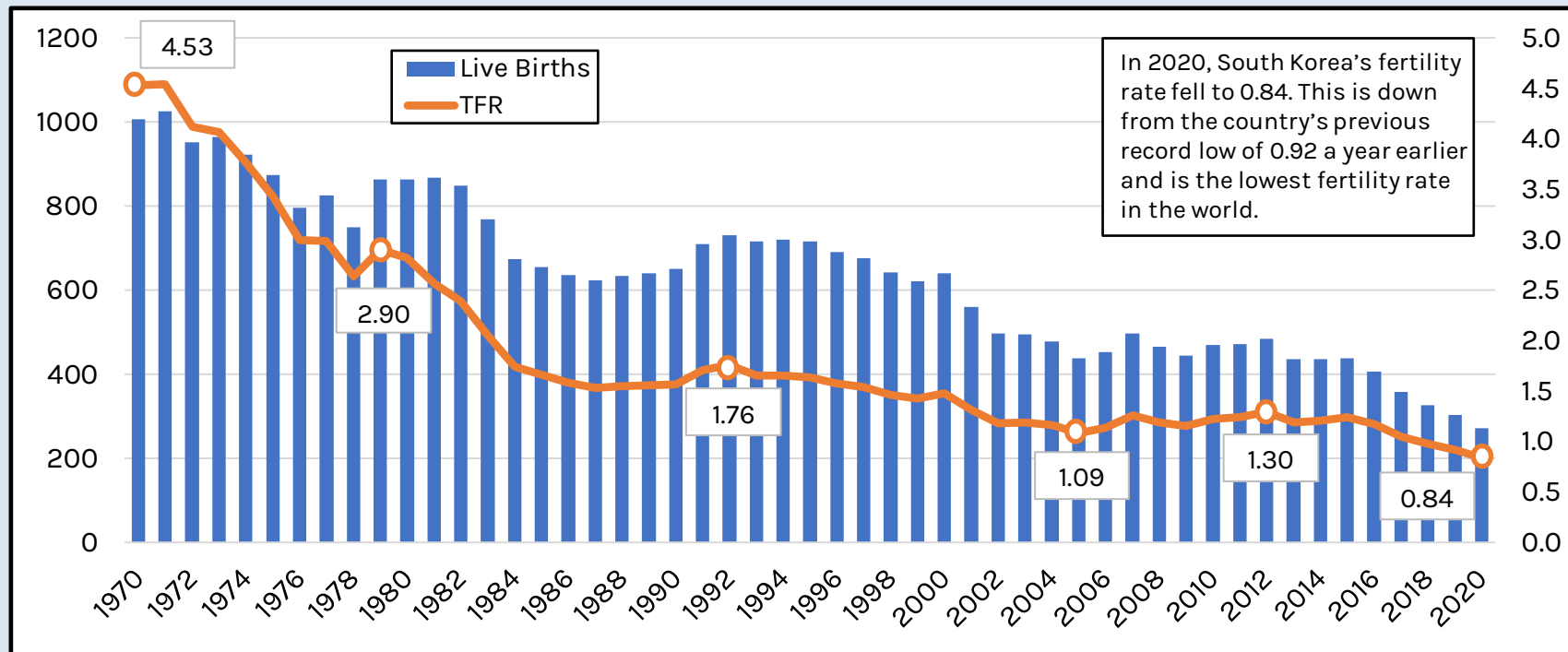
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SOUTH KOREA KEEPS BREAKING RECORDS

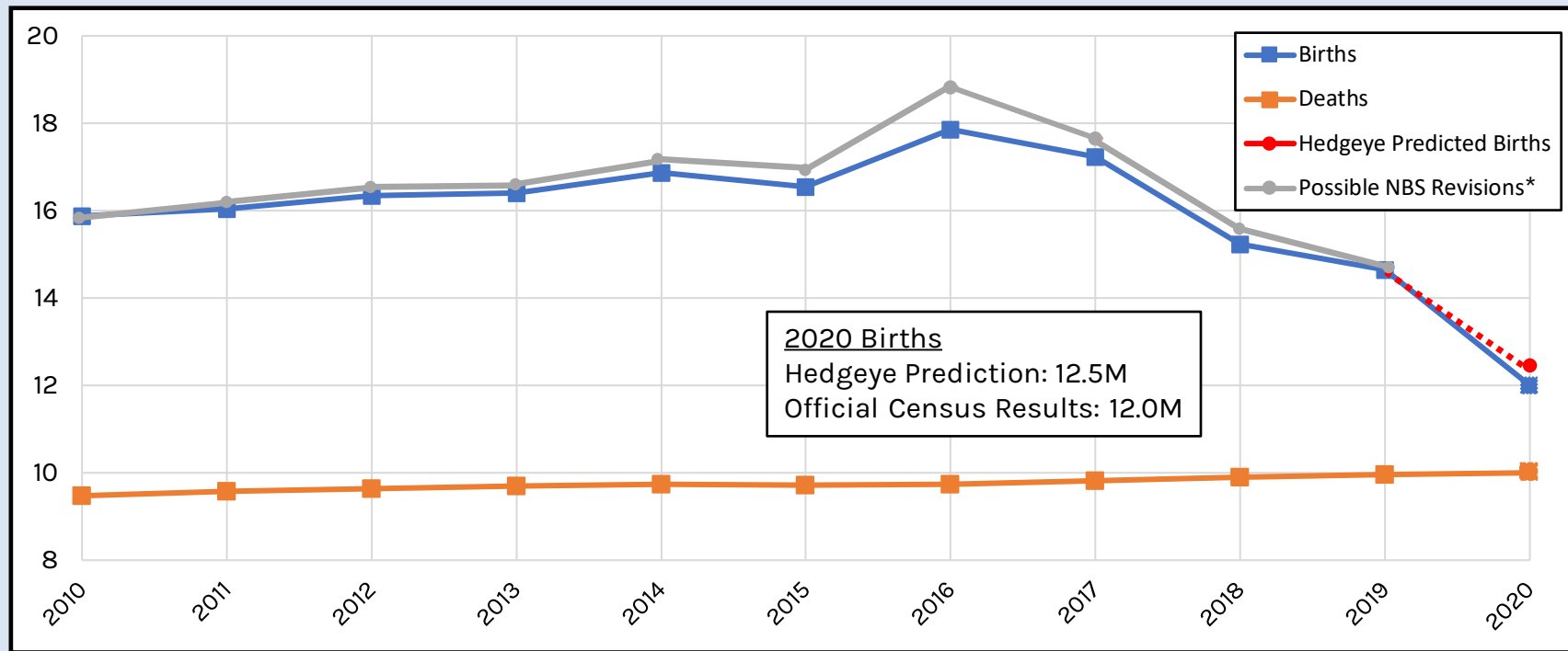
South Korea Live Births (in thousands) and TFR, 1970-2020*



* Preliminary numbers for 2020

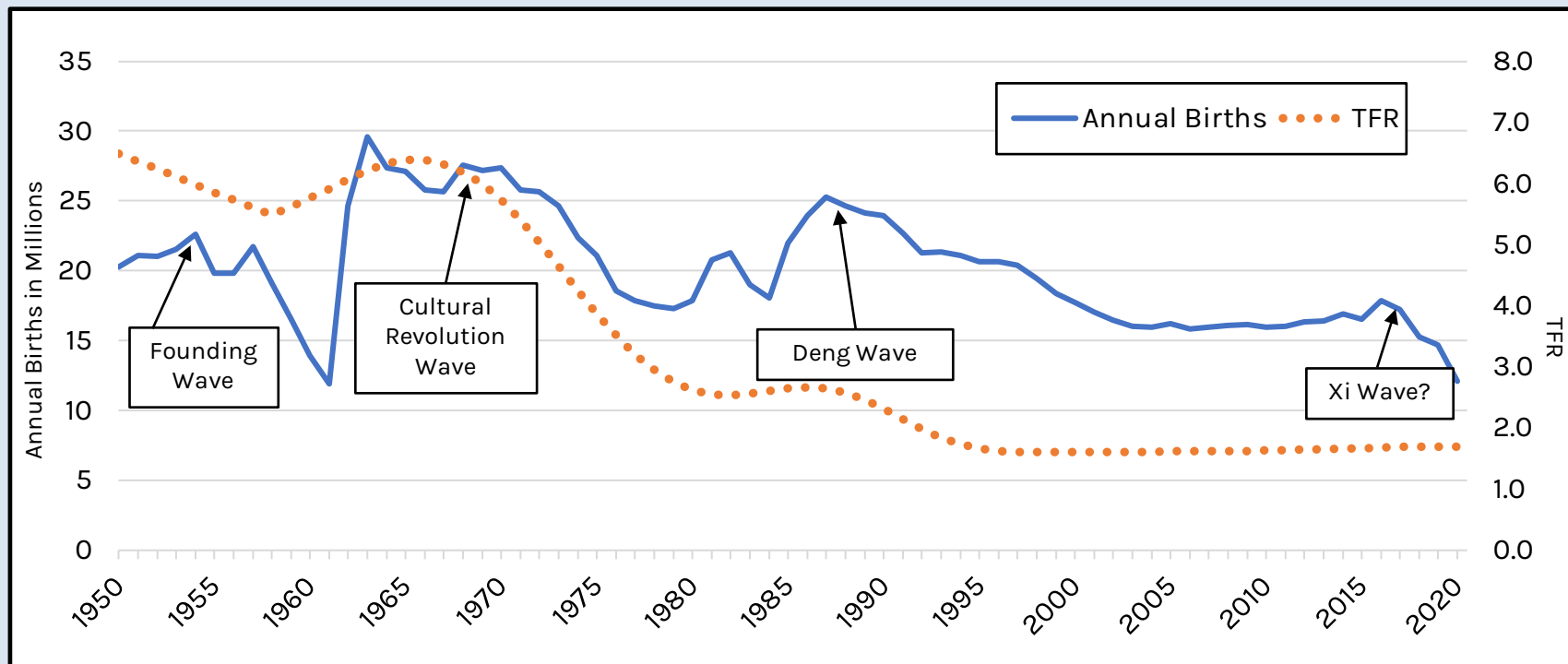
CHINA'S ANNUAL BIRTHS TUMBLE

China's Annual Births and Deaths in Millions, 2010-2020

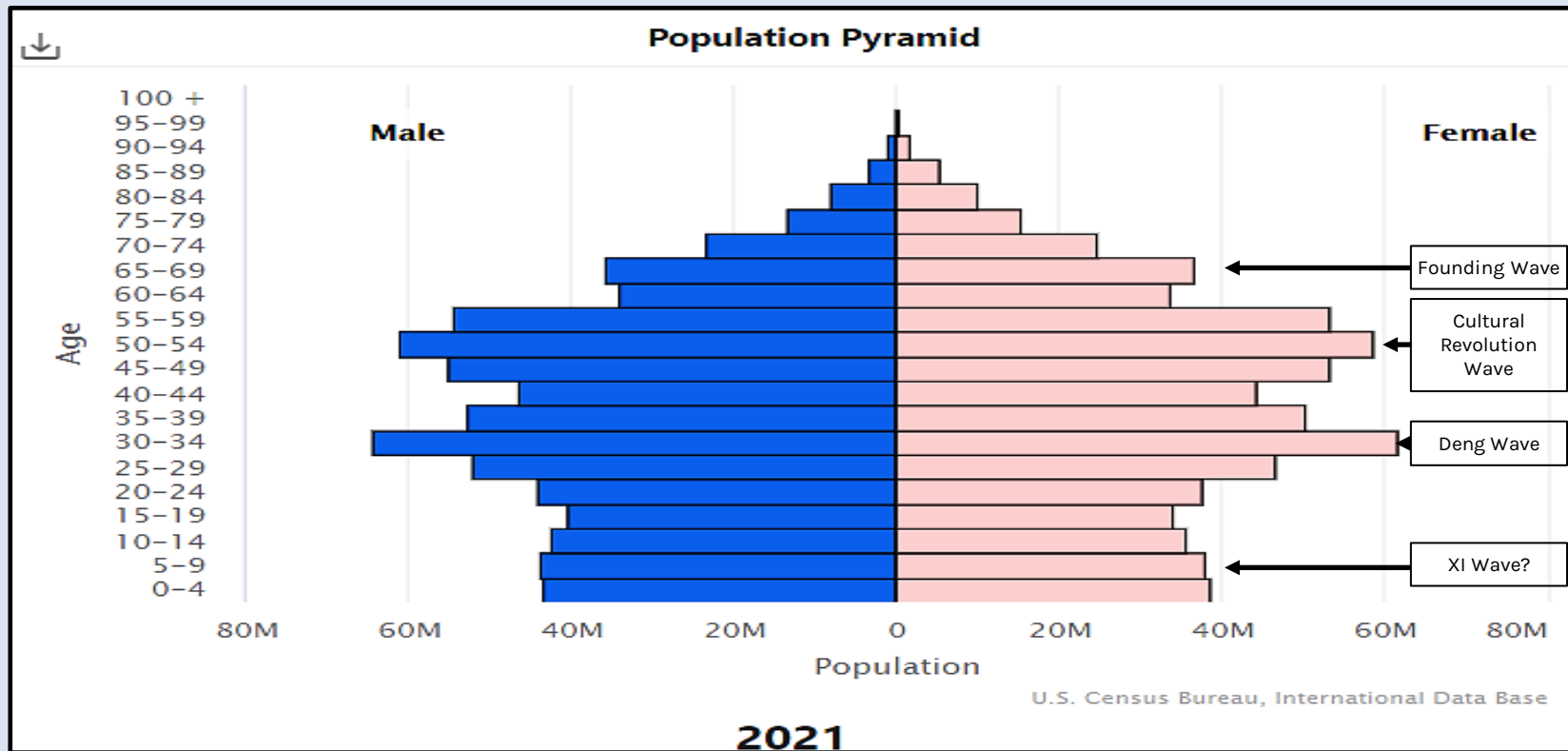


*2020 birth numbers according to 2020 Census. Earlier annual births from annual estimates that will be revised.

China's Annual Births in Millions and TFR, 1950-2020

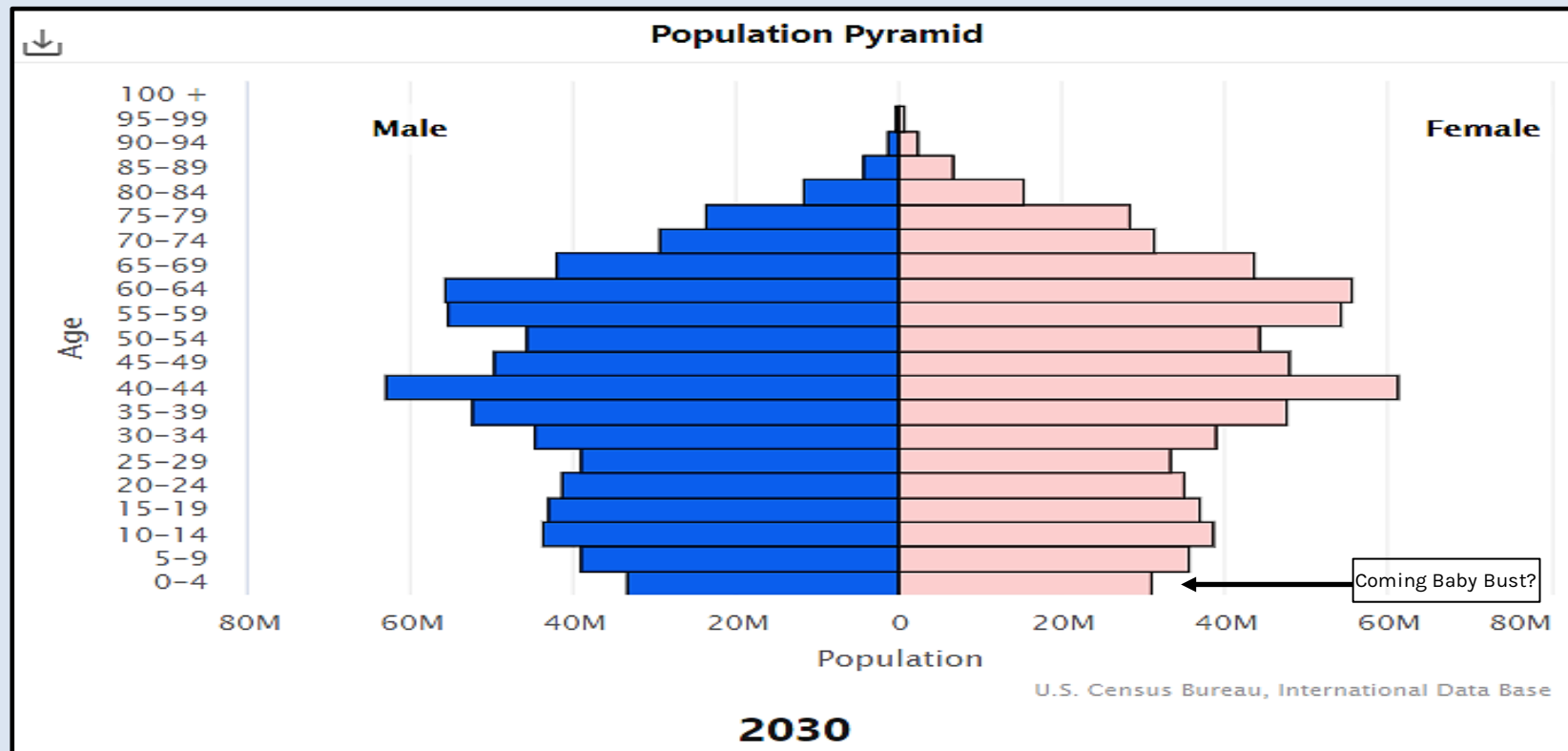


XI BABY BOOM ALREADY OVER?



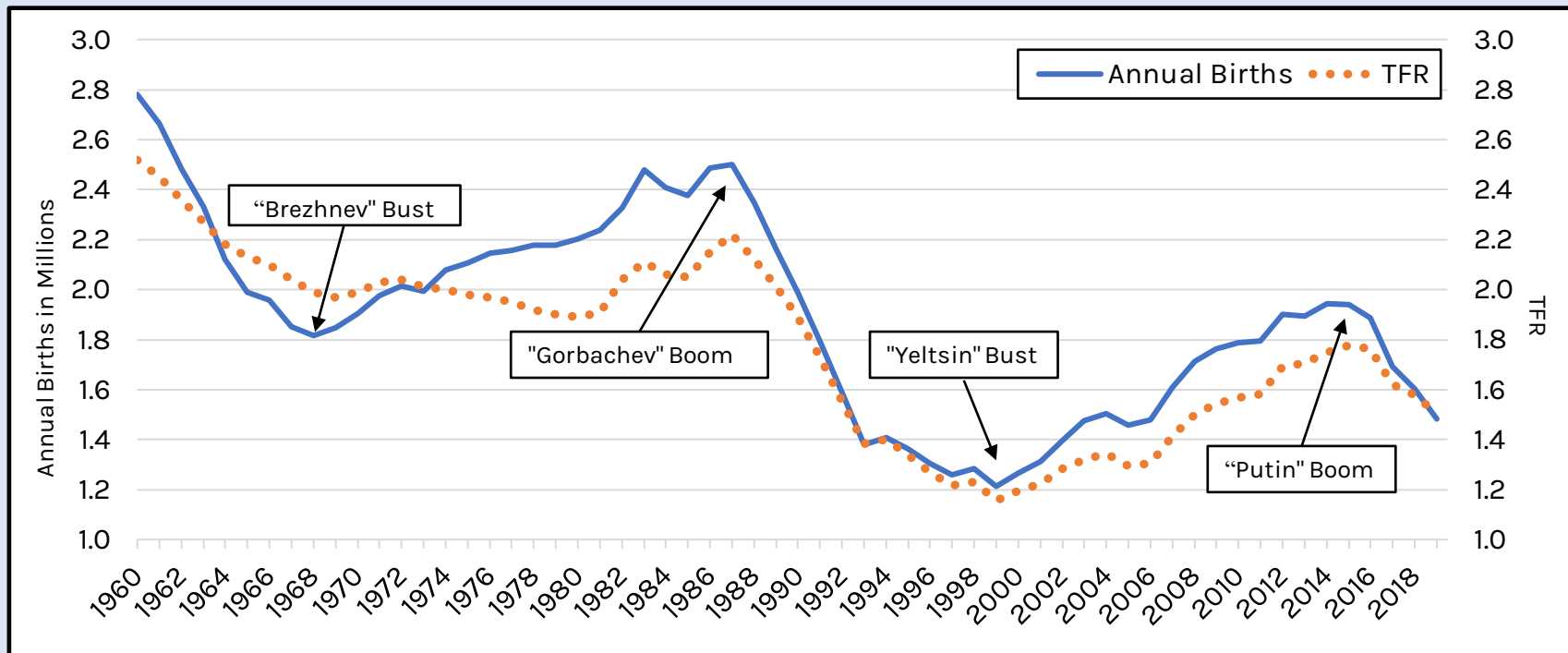
BABY BUST LOOMS

18



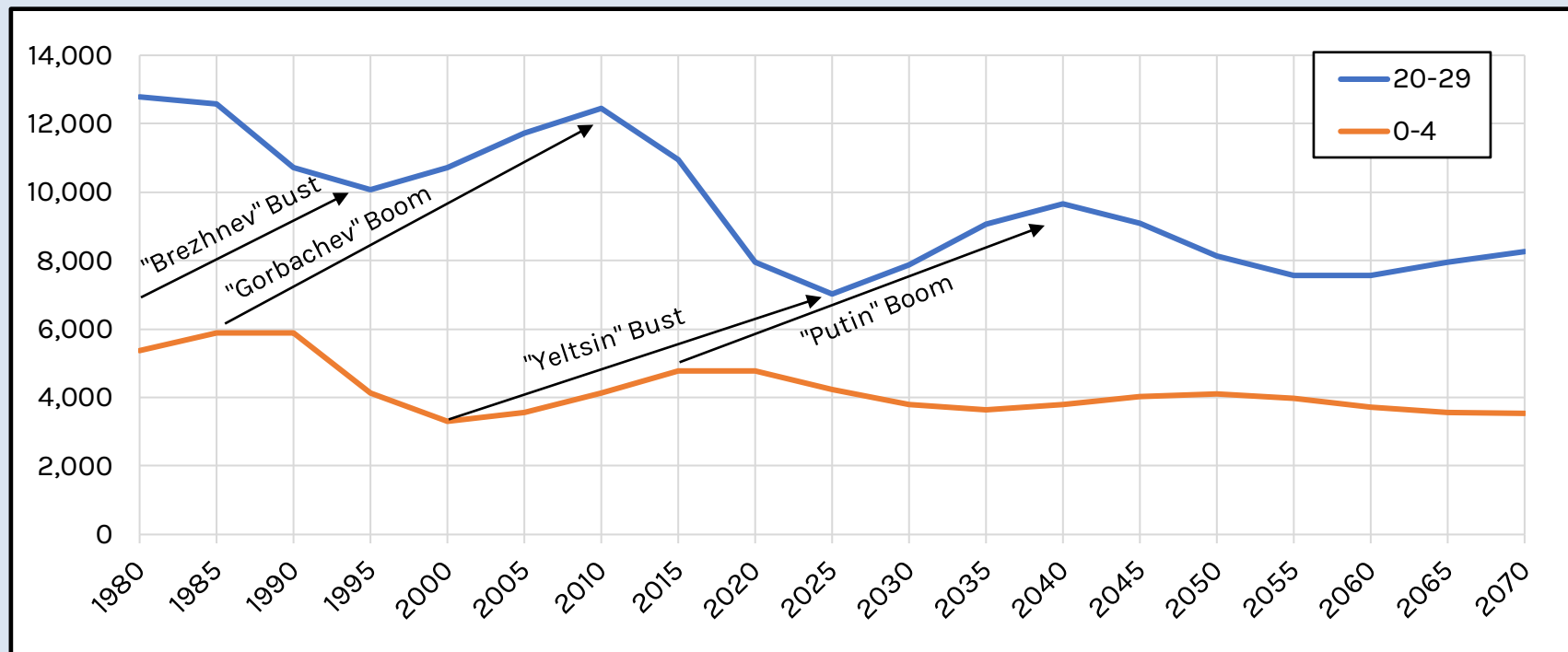
RUSSIA'S BABY BOOMS AND BUSTS

Russia's Annual Births in Millions and TFR, 1950-2020



WILL FERTILITY WEAKEN RUSSIA'S MILITARY?

Russian Male Population, Ages 0-4 and 20-29 (in thousands)



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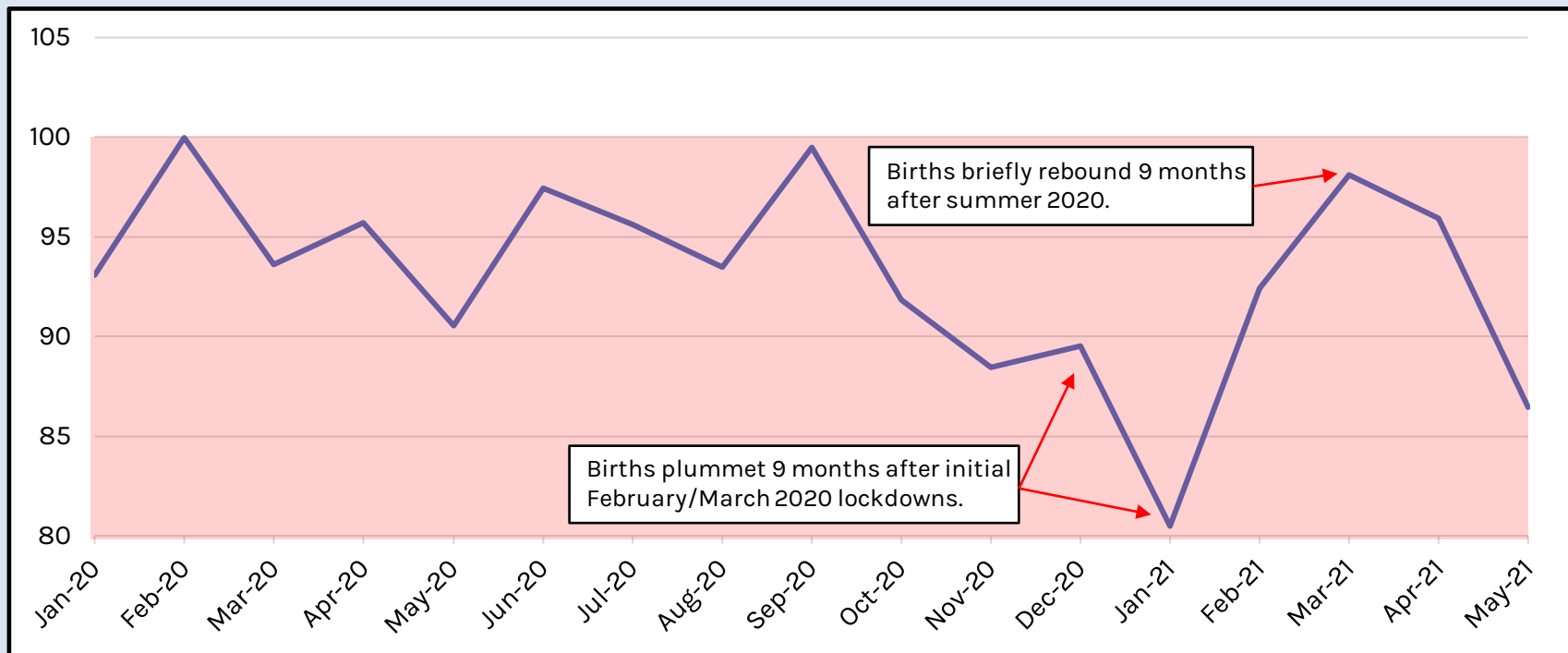
☐ **Population Projections**

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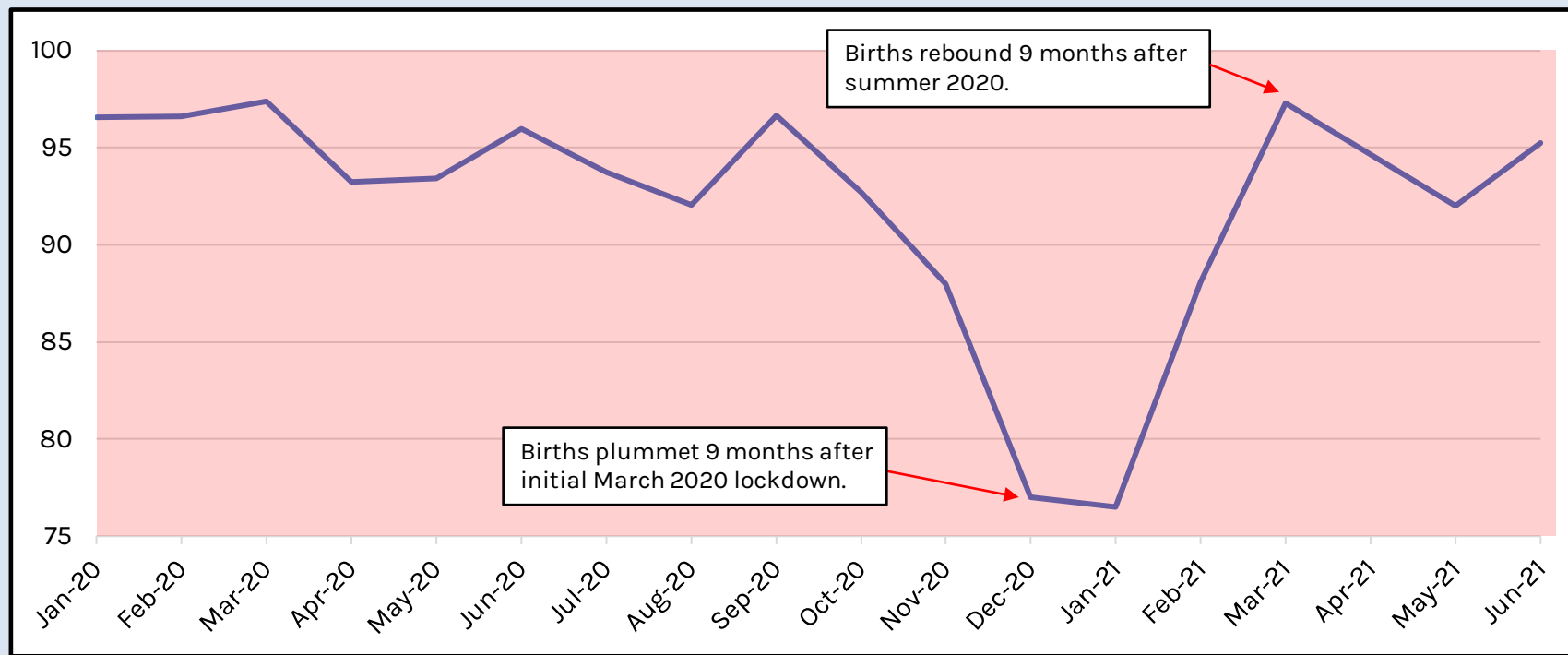
PANDEMIC BABY BUST

- When Covid-19 first hit, some media outlets predicted that all that extra time at home might lead to a baby boom. But instead, we've seen the opposite.
- In multiple high-income countries, birthrates declined sharply nine months after stay-at-home orders went into effect, beginning in November 2020.
- Declines were especially strong in southern Europe: Births in Italy, Spain, and Portugal fell an average of 6% to 10% YoY between November 2020 and March 2021.
- In some countries (e.g. Spain, Italy, and France), birthrates began to climb again in March 2021, referring to babies conceived in June 2020. For these countries, summer 2020 was when the first wave of the pandemic subsided. But these rebounds did not last: Births dipped again from April to June 2021.
- Although the countries that initially saw sharp birthrate declines have since seen births rebound from their lowest point, few have returned to pre-pandemic level birthrates.

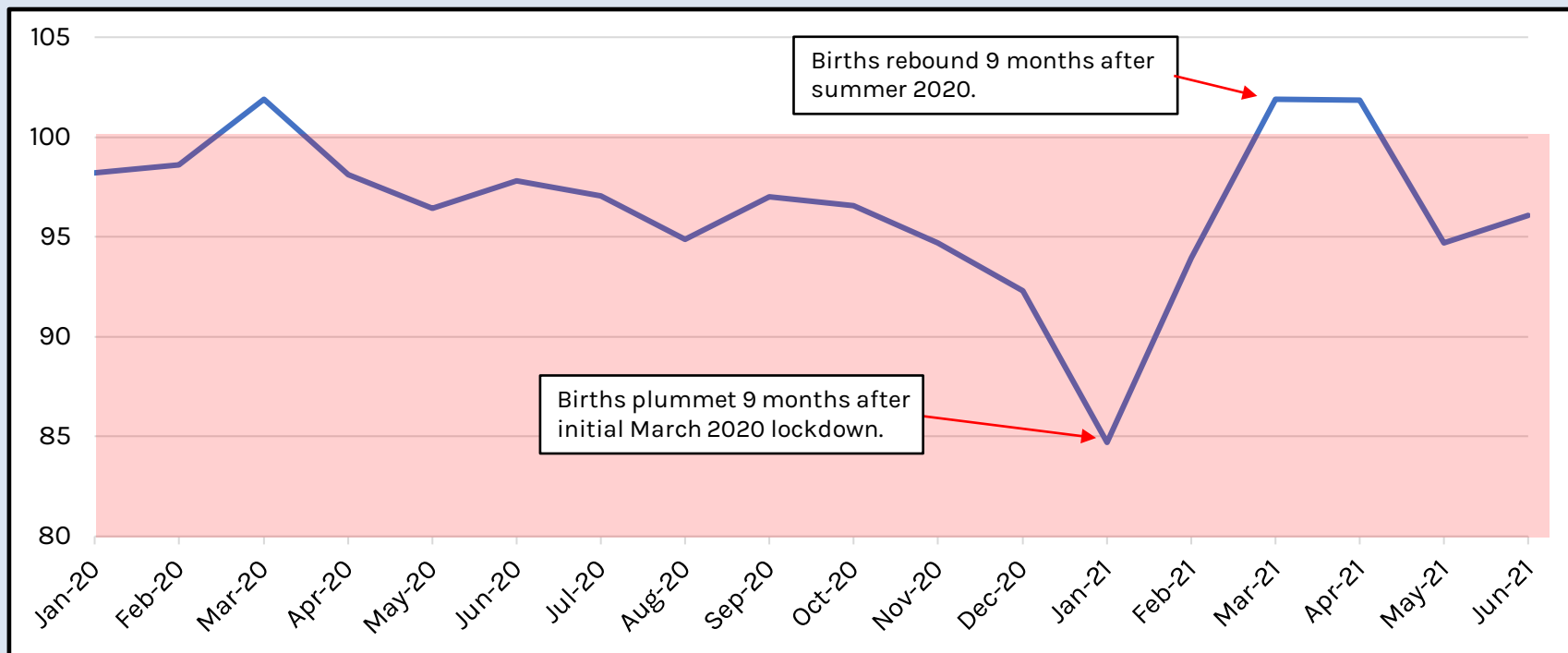
Italy: Monthly Births Index, Jan 2020-Jun 2021 (100=YoY Over Identical Months in 2018/2019 AVG)



Spain: Monthly Births Index, Jan 2020-Jun 2021 (100=YoY Over Identical Months in 2018/2019 AVG)

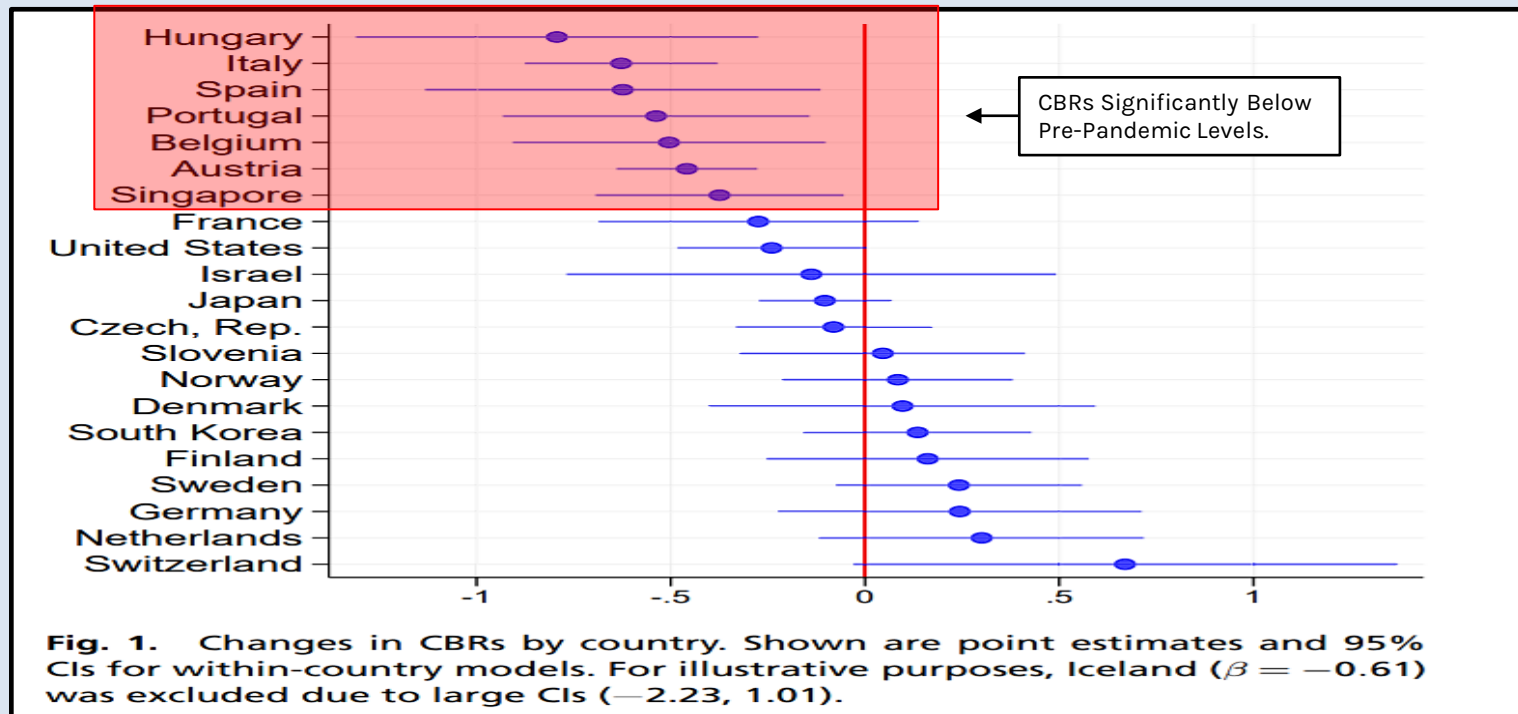


France: Monthly Births Index, Jan 2020-Jun 2021 (100=YoY Over Identical Months in 2018/2019 AVG)



PANDEMIC EFFECTS ON BIRTHS

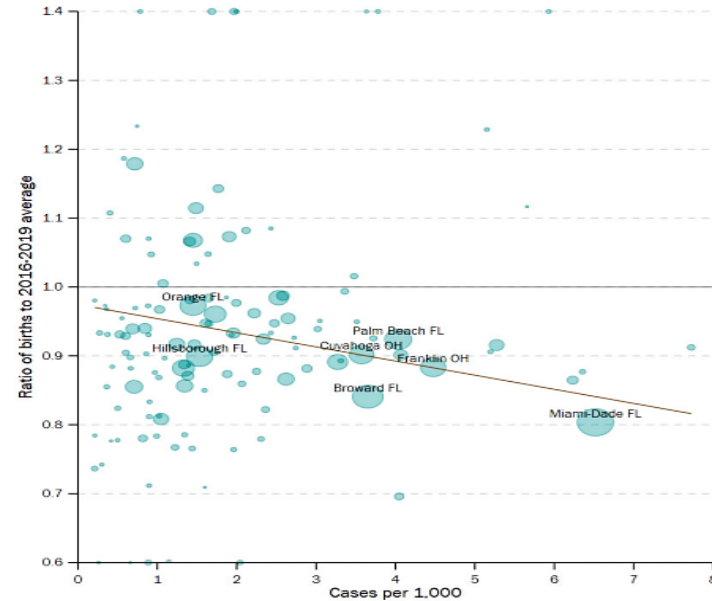
YoY Difference in Mean Monthly Crude Birth Rates, by Country (Pre-Pandemic* vs. During Pandemic**)



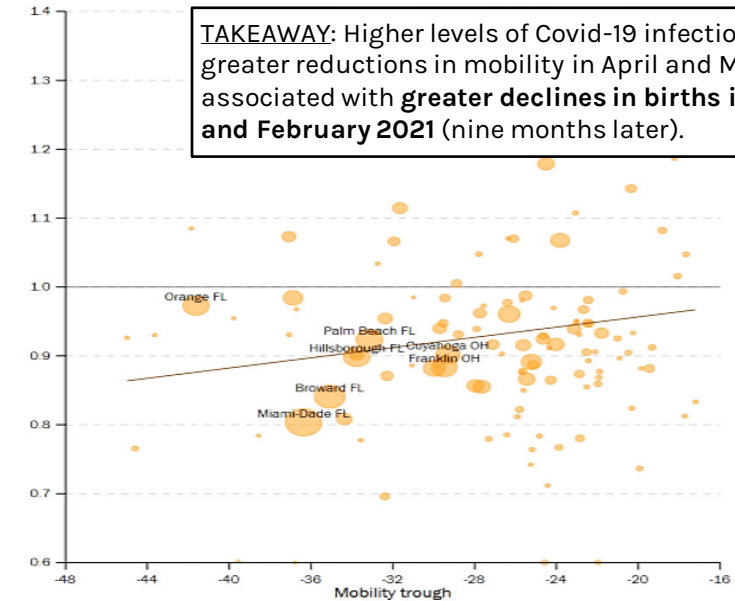
*Pre-Pandemic: January 2016–October 2020. **During Pandemic: November 2020–February 2021

US BIRTHS AFFECTED BY C19 AND MOBILITY

A. COVID-19 cases per capita



B. Mobility reductions

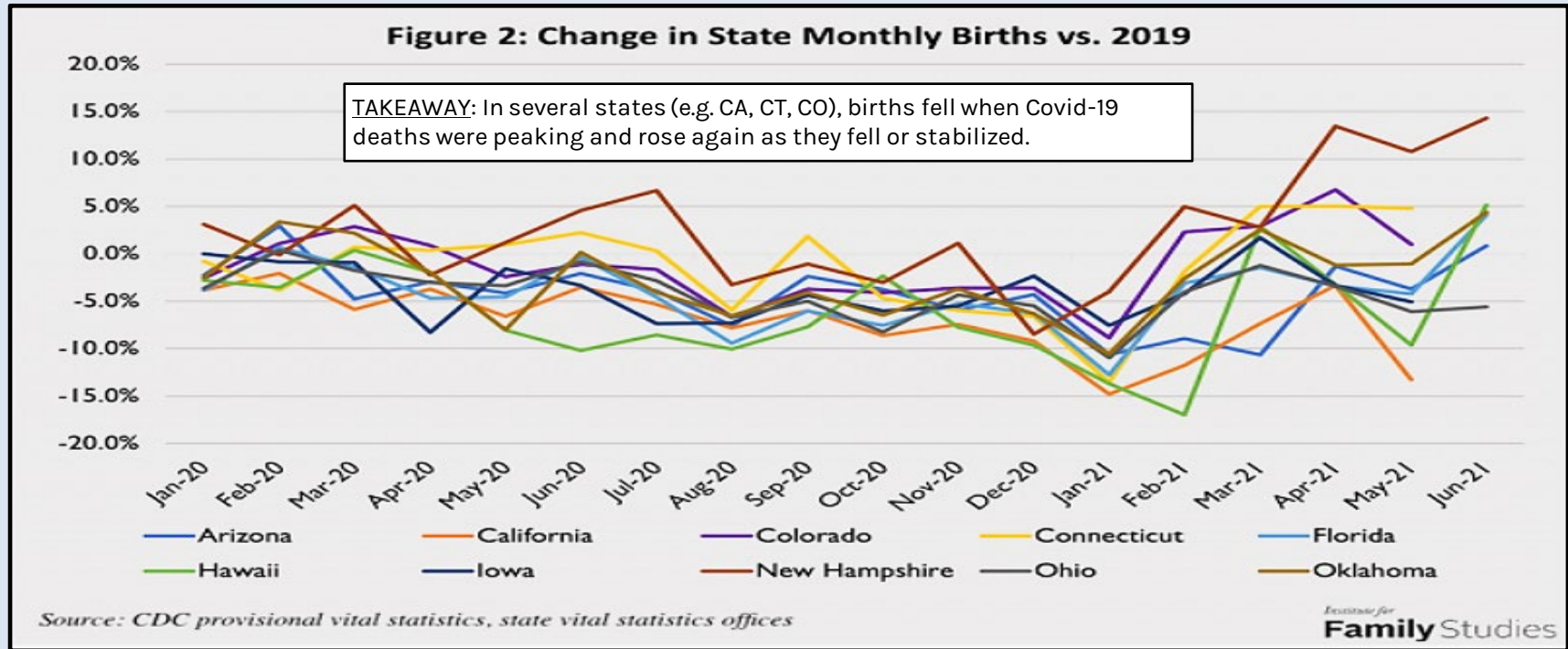


TAKEAWAY: Higher levels of Covid-19 infections, as well as greater reductions in mobility in April and May 2020 are associated with **greater declines in births in January and February 2021** (nine months later).

Figure 6. Ratio of births to 2016-2019 average and (A) COVID-19 cases per capita and (B) mobility reductions. With linear fits weighted by population. Points are scaled to population size. Counties with population >1 million are labeled.

US REBOUND?

Rate of Change in 2020 Monthly Births vs. 2019 For Select States



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“BABY BONUSES” AROUND

Recently Instituted Pronatalist Policies by Country

Policy	Participating Countries
“Baby Bonuses”	Estonia, France, Japan, Poland, Russia, Singapore
“Baby Bonuses” Plus Monthly Stipends	South Korea
Tax Breaks	China, Hungary, Russia, Singapore, United States
Subsidized Child Care	Belgium, China, France, Germany, Singapore
Enhanced Family Leave	Czech Republic, Singapore
State-Sponsored Matchmaking	Iran, Japan
Civic Marketing and Awards	Denmark, Hungary, Italy, Russia, Singapore
Other Perks*	Russia, Singapore
Relaxing Birth Restrictions	China

* Includes miscellaneous perks such as preferential housing, free school lunch for kids, etc.

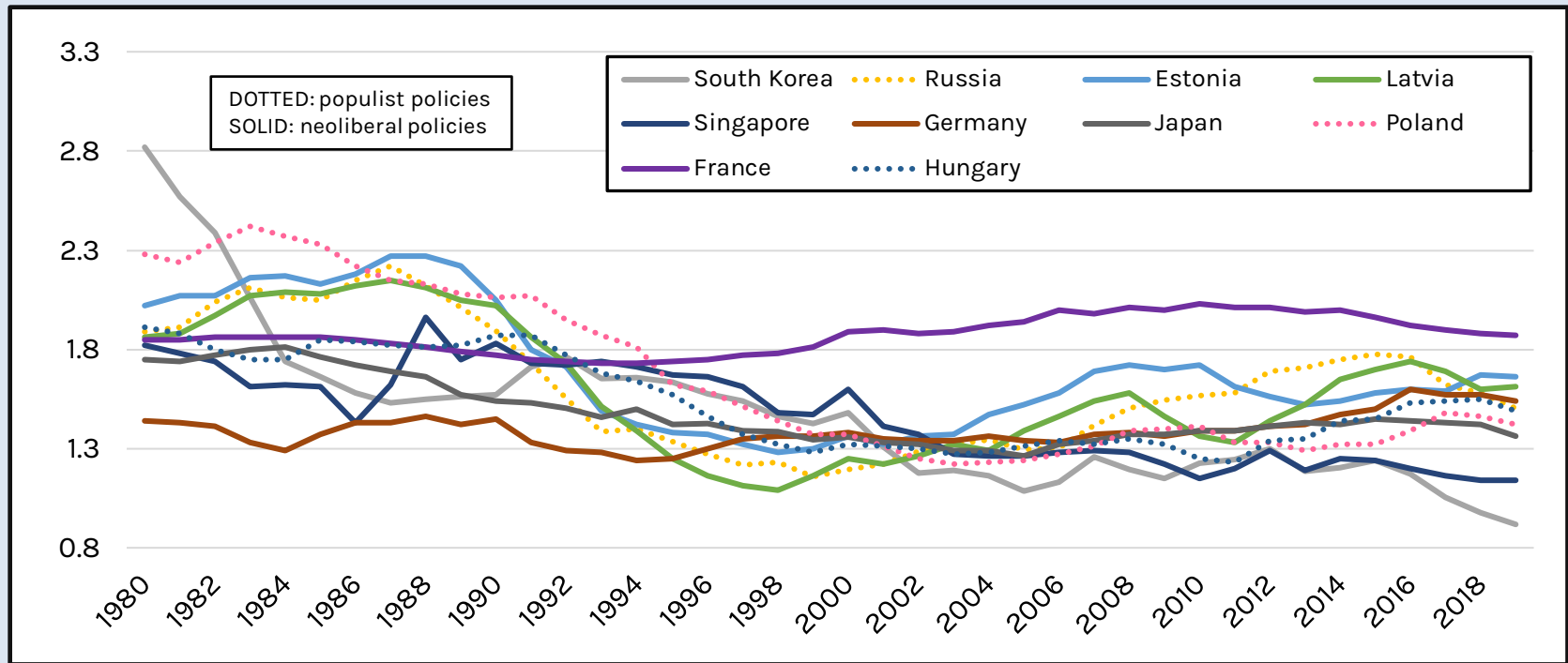
SOURCE: EURACTIV (2011), *Smithsonian* (2012), *Slate* (2013), *The Washington Post* (2014-2021), *BBC* (2015), *The Economist* (2015), *DW News* (2018), *The New York Times* (2018-2021), *The Wall Street Journal* (2018-2021)

BUT DO BABY BONUSES WORK?

- Baby bonuses fall into two “baskets”:
 - **Flexibility:** how much society accepts women as both mothers and workers, and the flexibility of schools and workplaces to accommodate both roles
 - **Public Incentives:** how much the government, in the way it distributes taxes and benefits, reward or punish women who decide to become mothers
- In most liberal democracies, the public incentives focus mainly on spending more on programs that will help mothers in the workforce.
 - Ex: mandatory paid leave, paid childcare, universal public pre-K
- In more autocratic countries, the public incentives focus mainly on programs that will reward mothers whether they work or not.
 - Ex: tax breaks, loan cancellations, direct cash benefits
- But do baby bonuses work? The evidence is mixed.
 - The countries where pronatalist campaigns have worked tend to be doing better economically, and citizens are more likely to have positive expectations for the future. Nations that lean on a nationalistic, values-oriented agenda have also seen some of the largest fertility increases.

FERTILITY IN COUNTRIES W/BABY BONUSES

TFR in Select Countries with Baby Bonuses, 1980-2019



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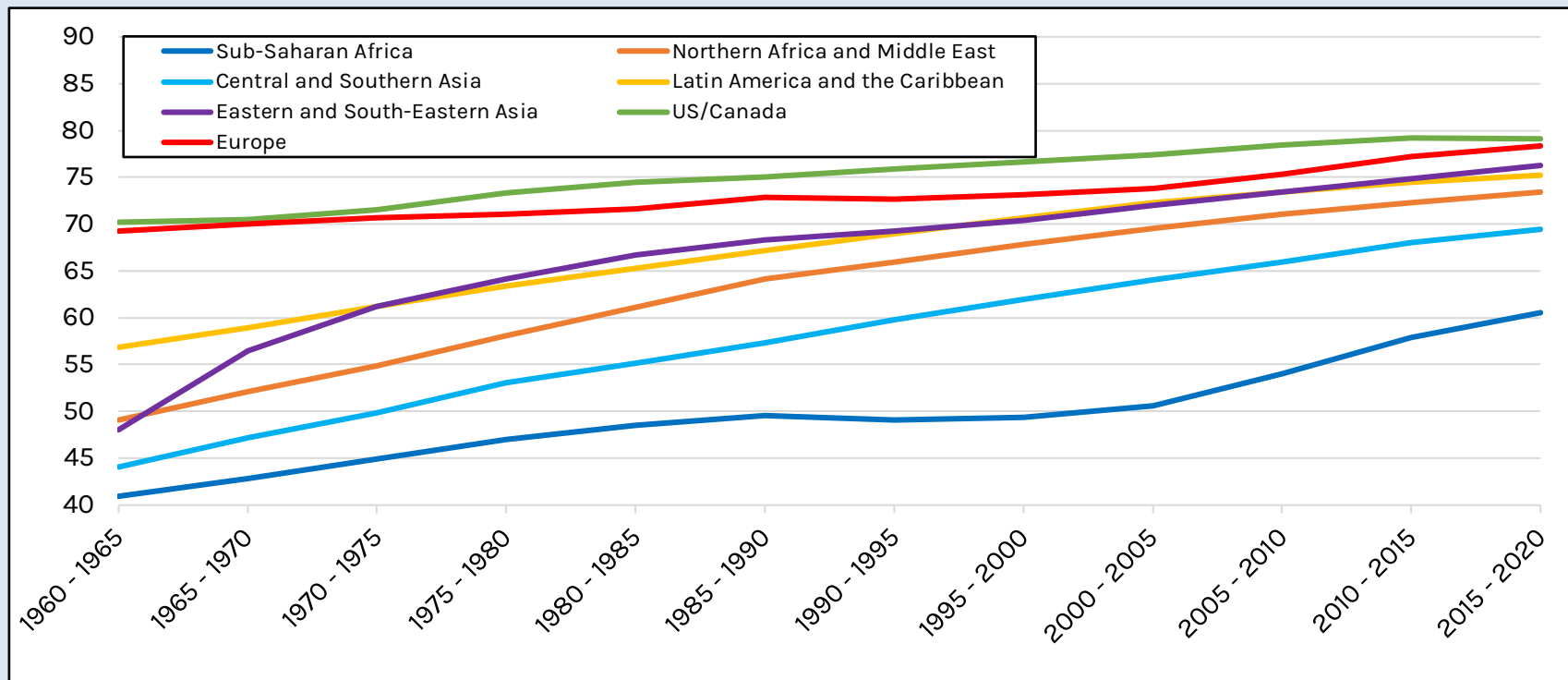
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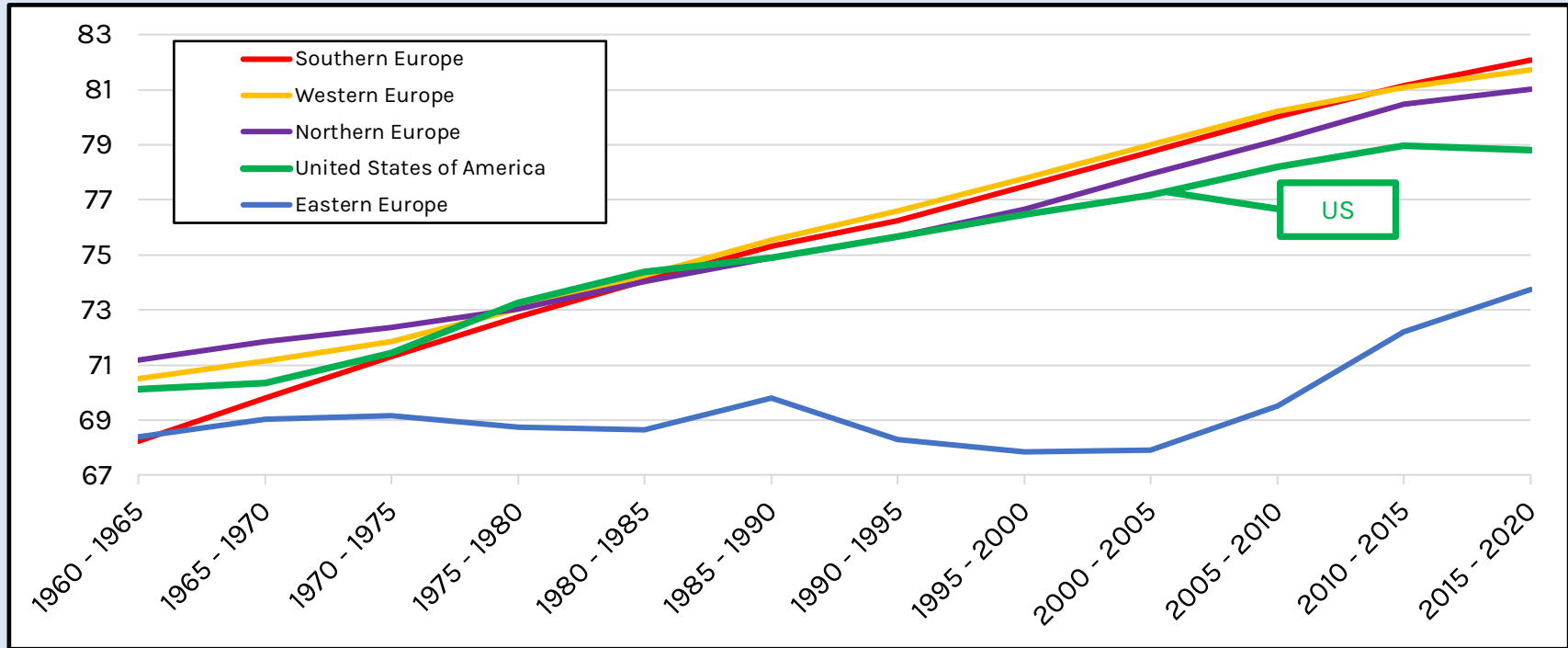
LIFE EXPECTANCY COMPARED

Life Expectancy At Birth for Select Regions



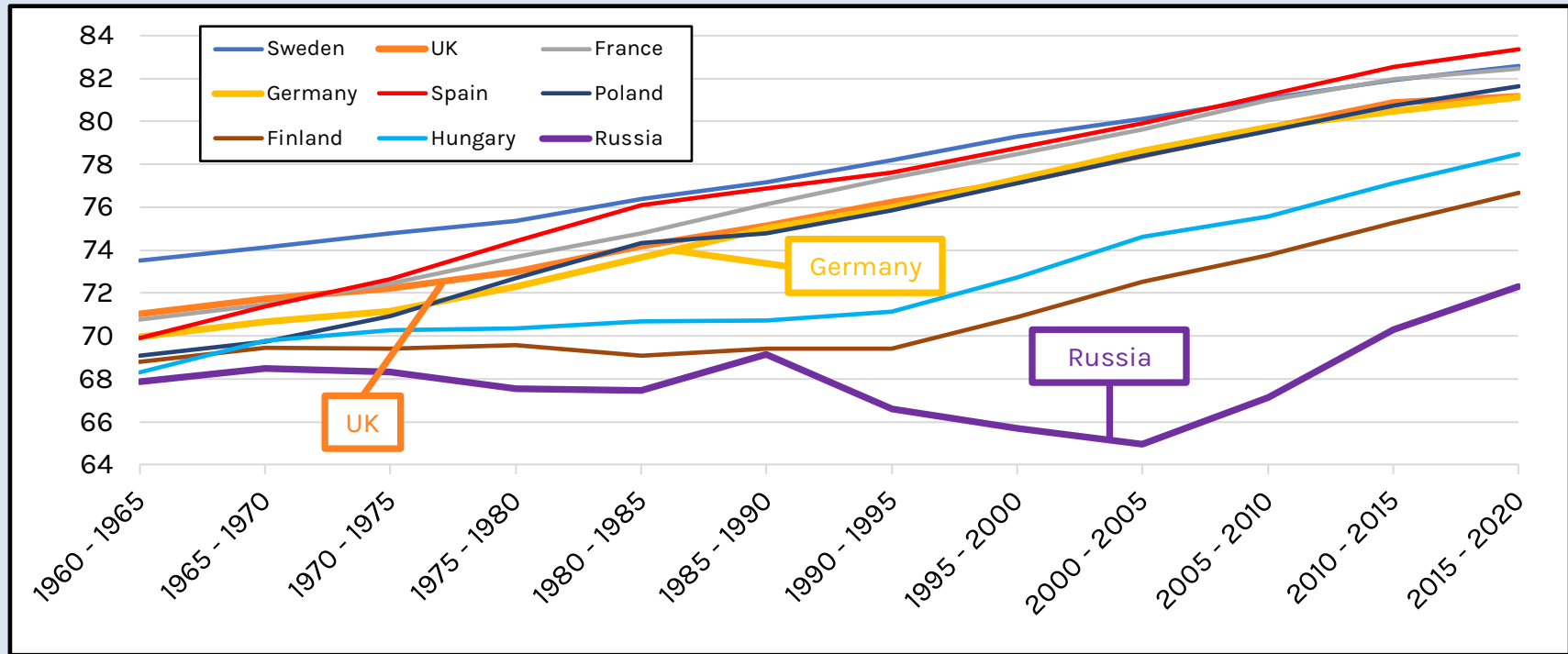
LIFE EXPECTANCY IN EUROPE

Life Expectancy At Birth for Select European Regions + US



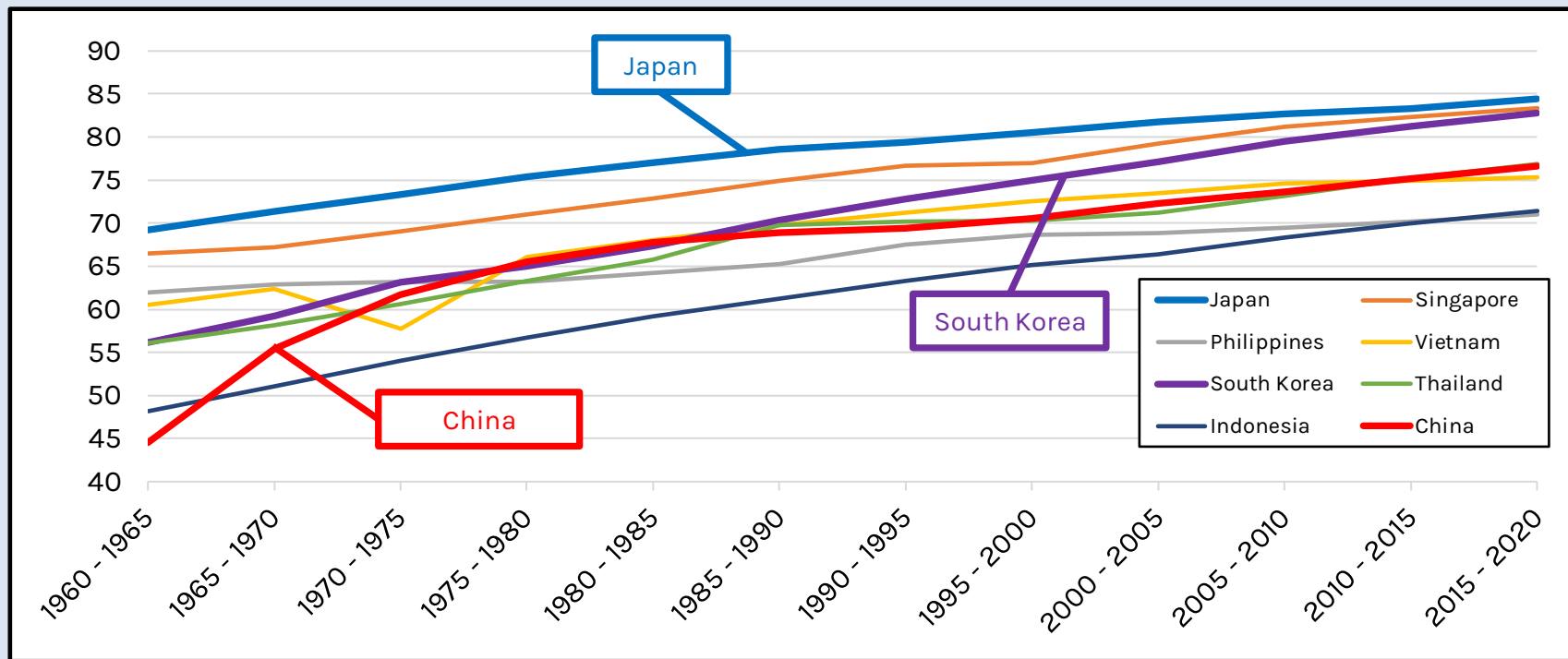
LIFE EXPECTANCY IN EUROPE

Life Expectancy At Birth for Select European Countries



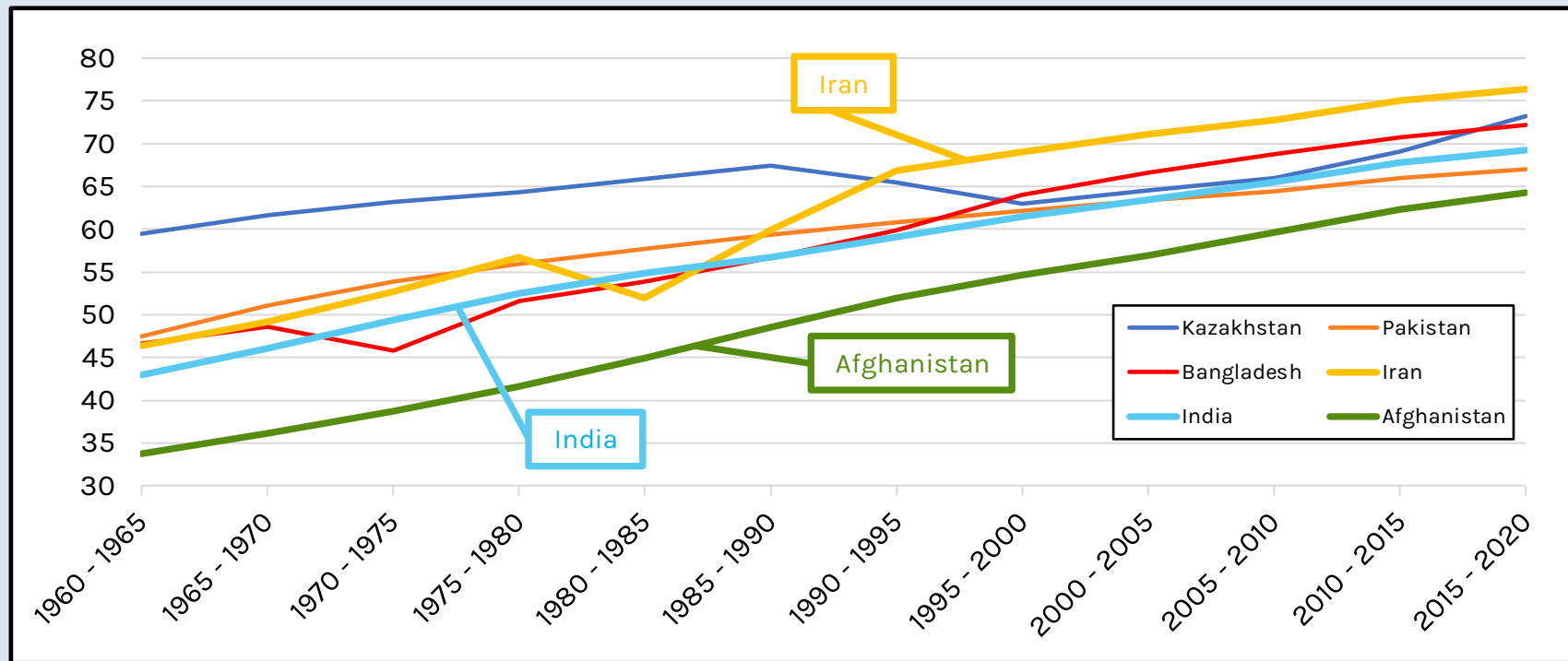
LIFE EXPECTANCY IN EAST AND SOUTHEAST ASIA

Life Expectancy At Birth for Select East and Southeast Asian Countries



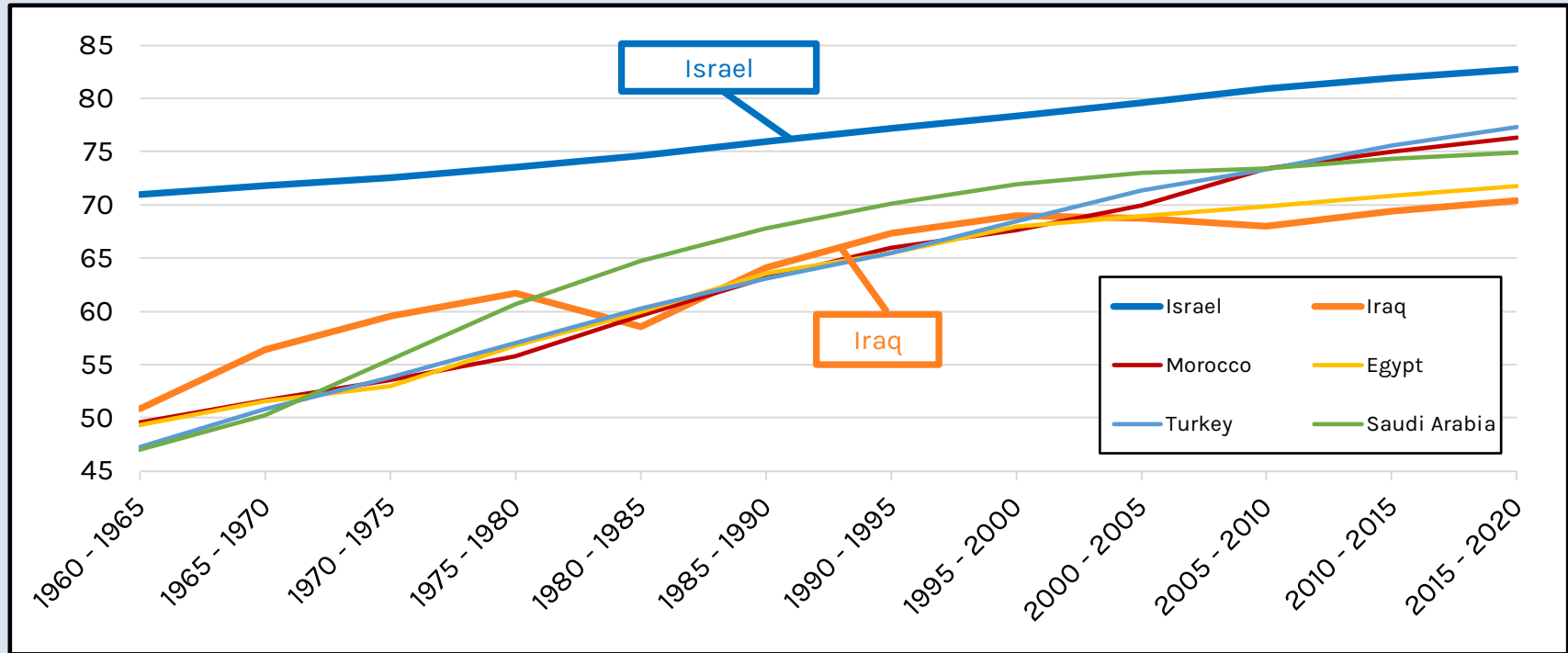
LIFE EXPECTANCY IN CENTRAL AND SOUTHERN ASIA

Life Expectancy At Birth for Select Central and South Asian Countries



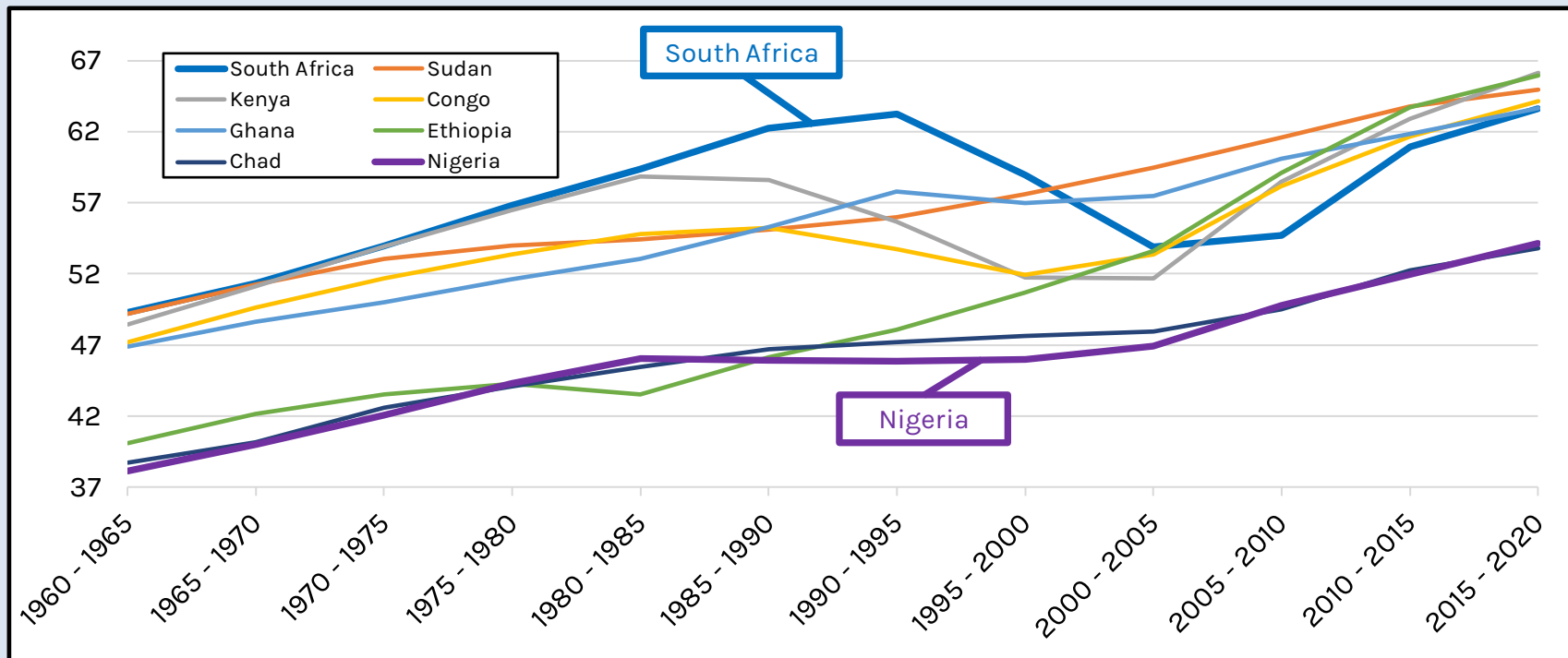
LIFE EXPECTANCY IN N. AFRICA AND MIDDLE EAST

Life Expectancy At Birth for Select North African and Middle Eastern Countries



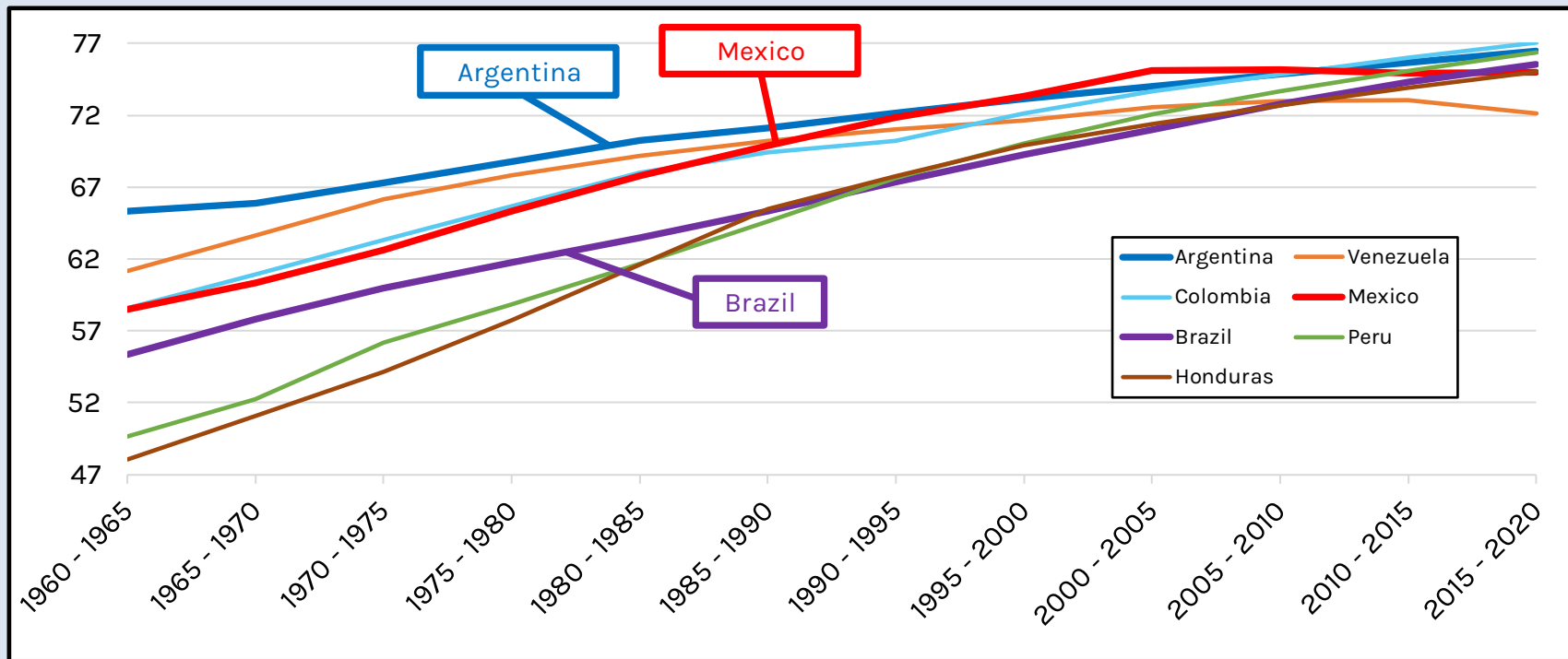
LIFE EXPECTANCY IN SUB-SAHARAN AFRICA

Life Expectancy At Birth for Select Sub-Saharan African Countries



LIFE EXPECTANCY IN LATIN AMERICA

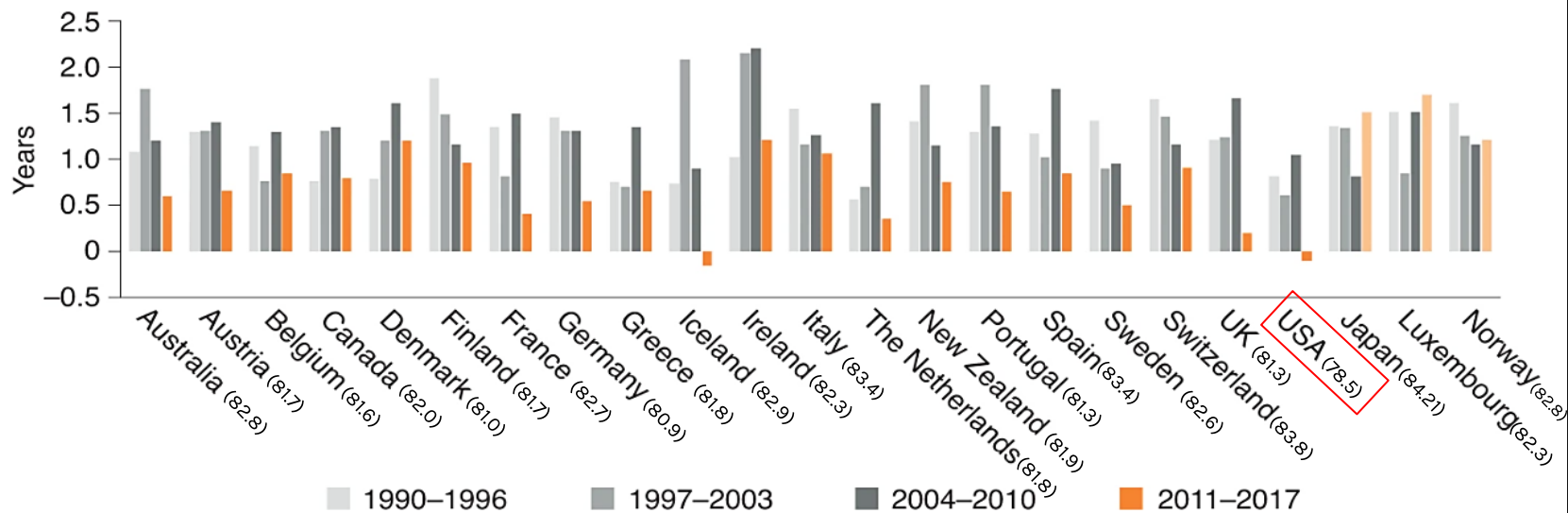
Life Expectancy At Birth for Select Latin American Countries



LIFE EXPECTANCY GAINS FALTER IN OECD

Fig. 1: Gains in life expectancy over four six-year periods, 1990–1996, 1997–2003, 2004–2010 and 2011–2017.

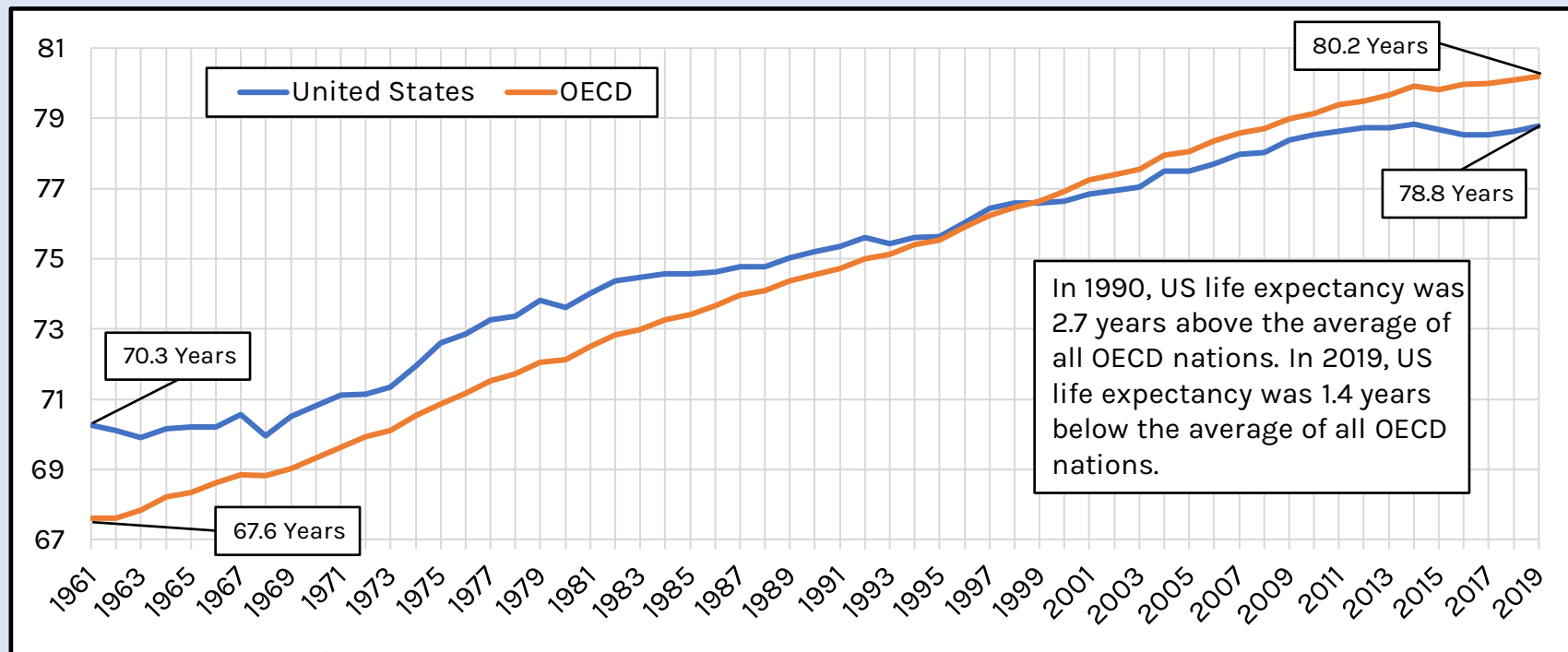
From: Recent trends and increasing differences in life expectancy present opportunities for multidisciplinary research on aging



Dark orange bars indicate lower increases in life expectancy in 2011–2017 than 2004–2010, and light orange bars indicate greater recent increases in life expectancy. Relatively low gains in years of life expectancy from 2011–2017 can be seen in 20 out of 23 OECD countries compared to 2004–2010.

US NOW BELOW OECD

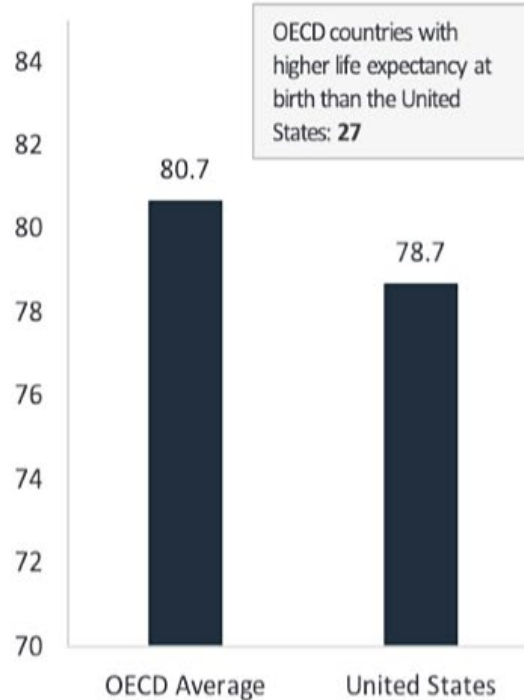
Life Expectancy at Birth for OECD Nations and US, 1961-2019



LIFE EXPECTANCY: OECD VS US

Figure 4

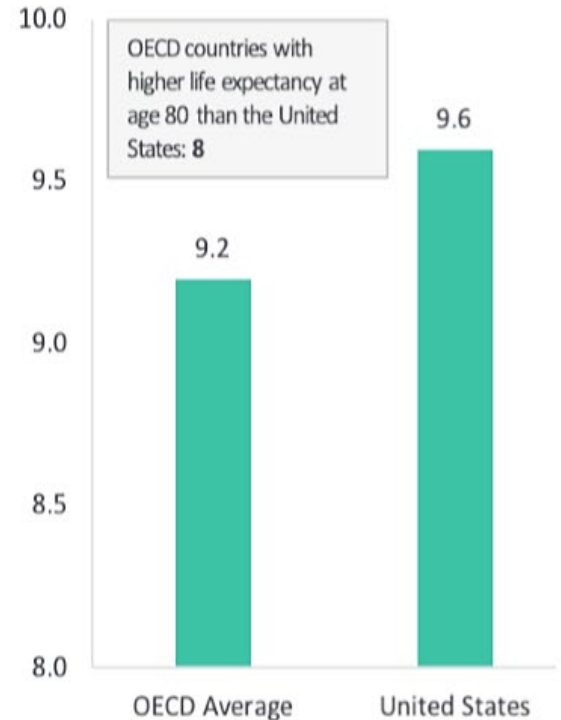
Life Expectancy at Birth



Note: Data are for 2018.
Source: OECD (2019)

Figure 5

Life Expectancy at Age 80

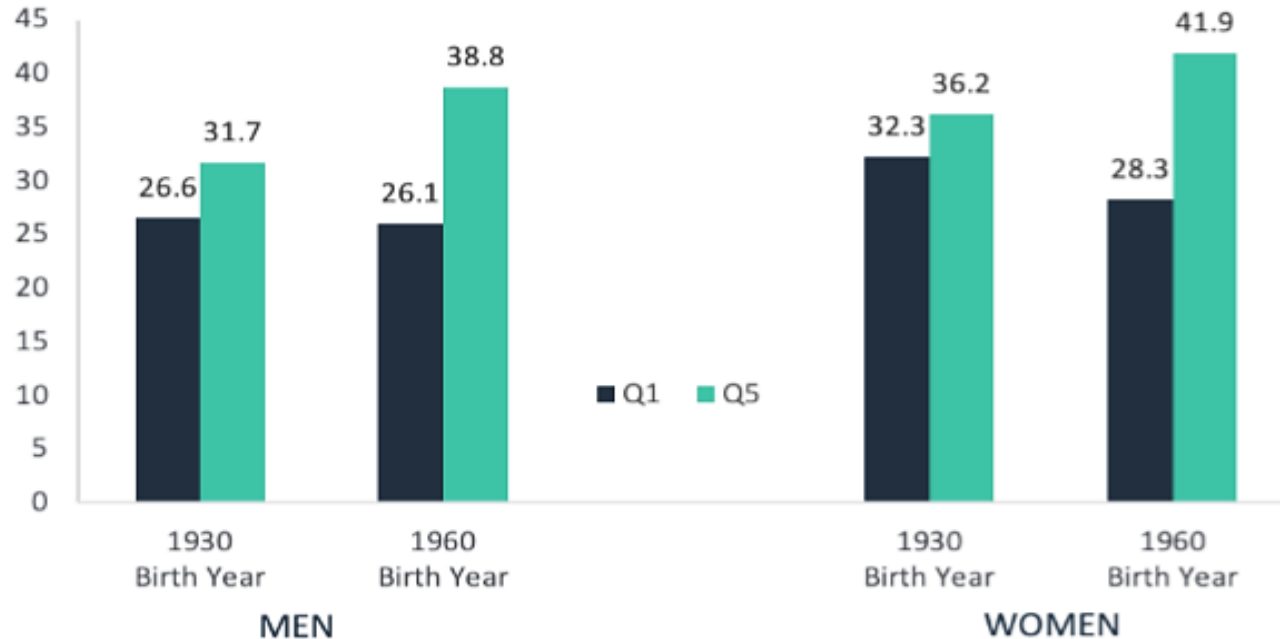


Note: Data are an average for 2015-20.
Source: UN Population Division (2019)

US LIFE EXPECTANCY BY COHORT

Figure 2

**U.S.
Cohort Life
Expectancy
at Age 50,
by Birth
Year, Sex,
and Income
Quintile**



Source: National Academy of Sciences (2015)

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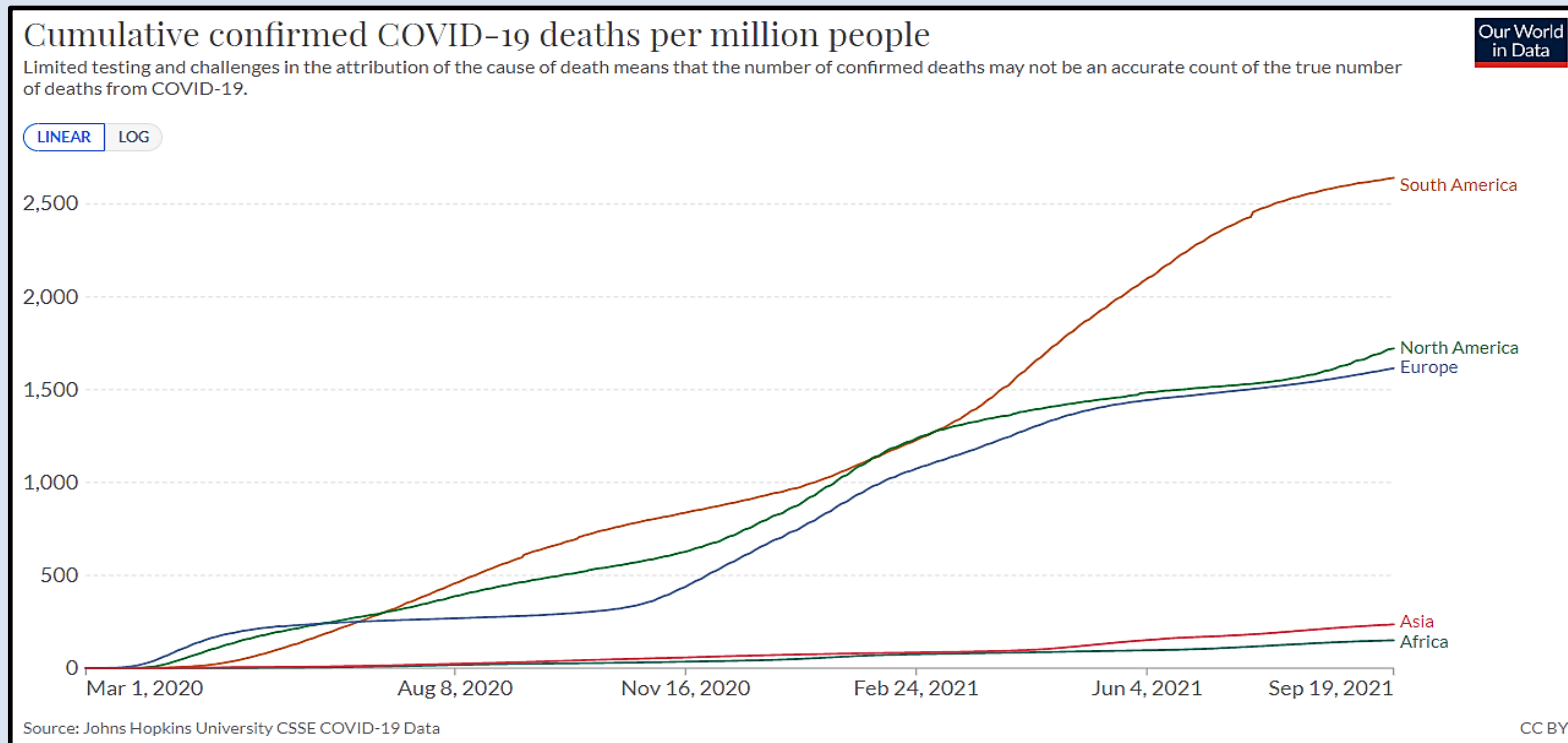
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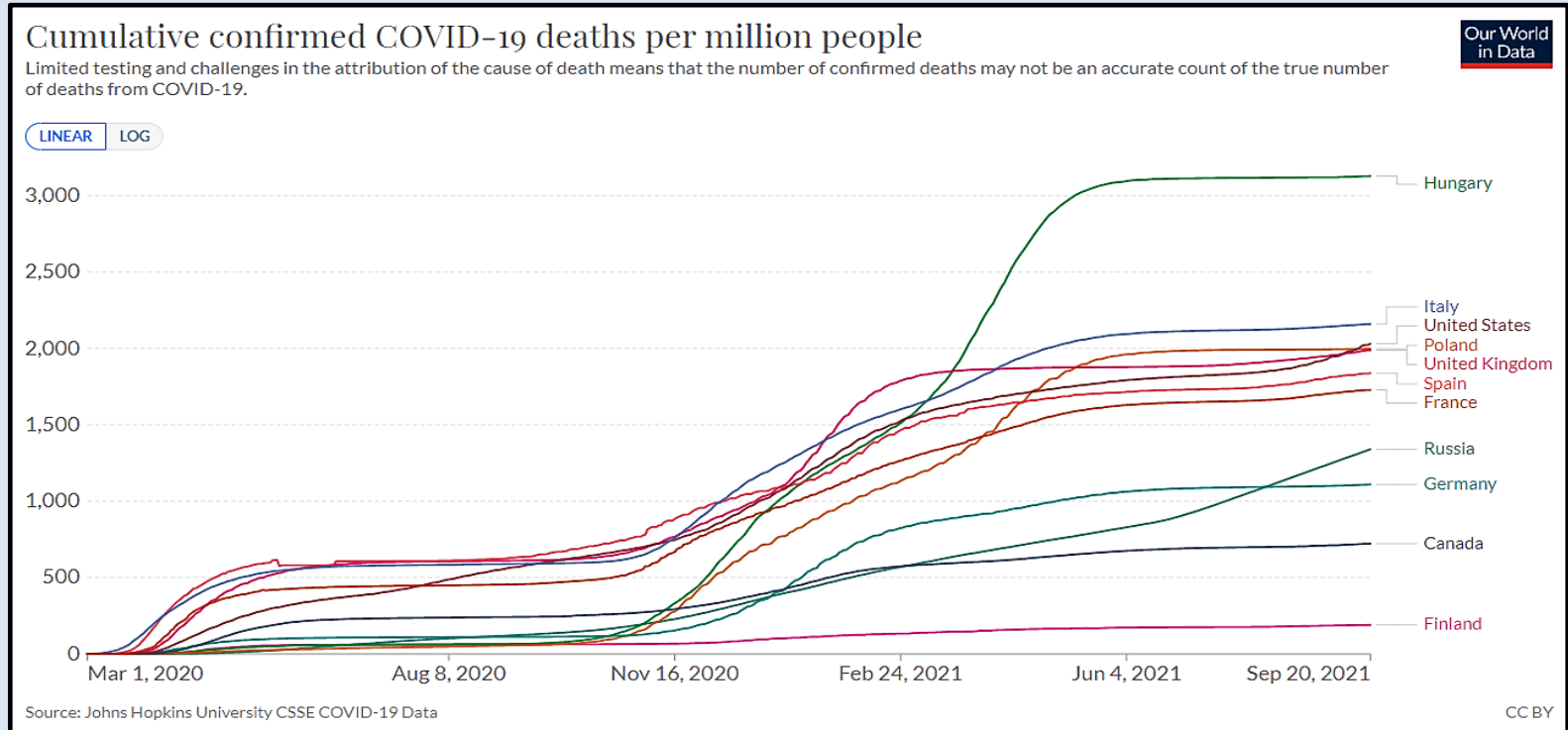
- Working Age Population
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Covid-19 Deaths per Million People in Select Global Regions



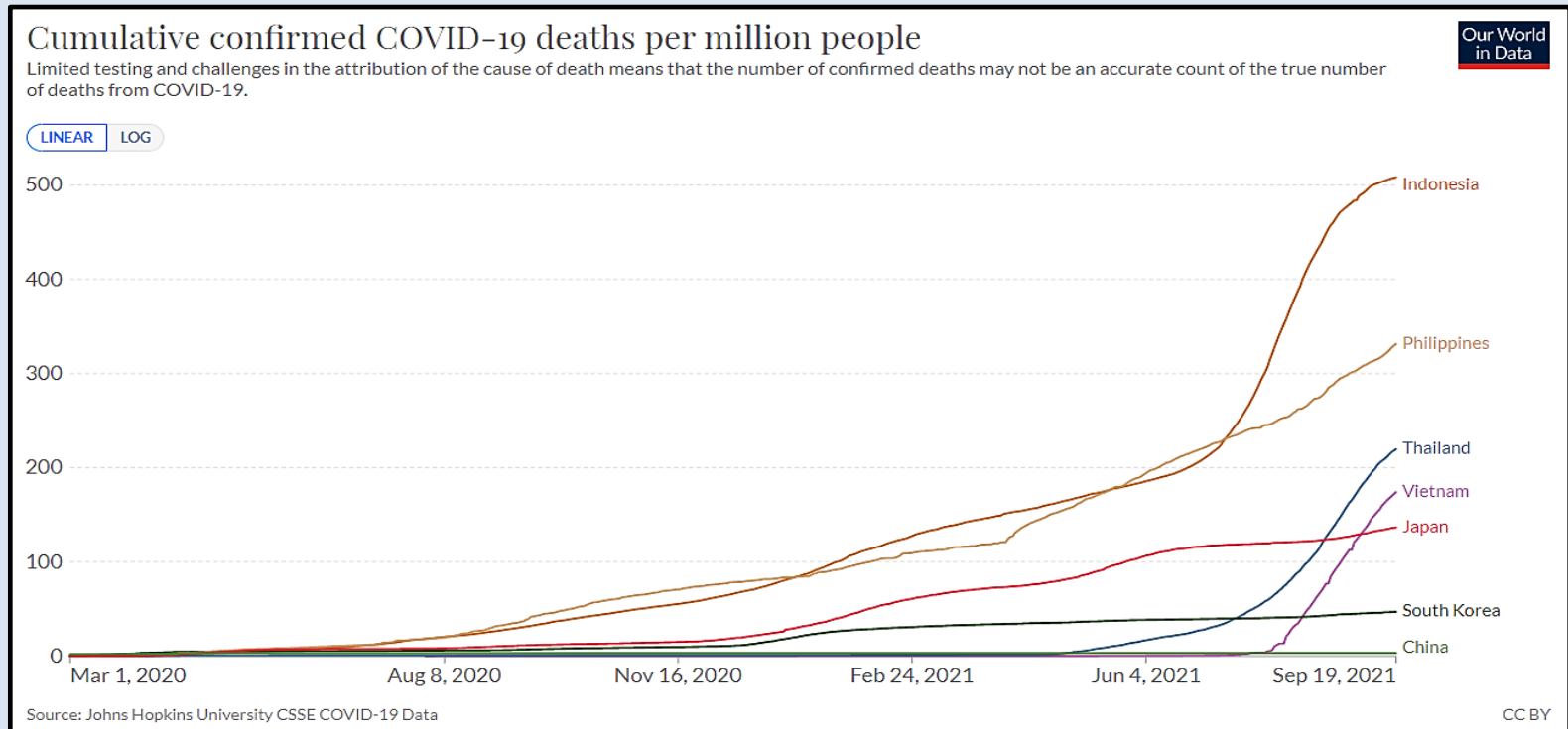
C19 DEATHS IN EUROPE

Covid-19 Deaths per Million People in Select European Countries/US and Canada



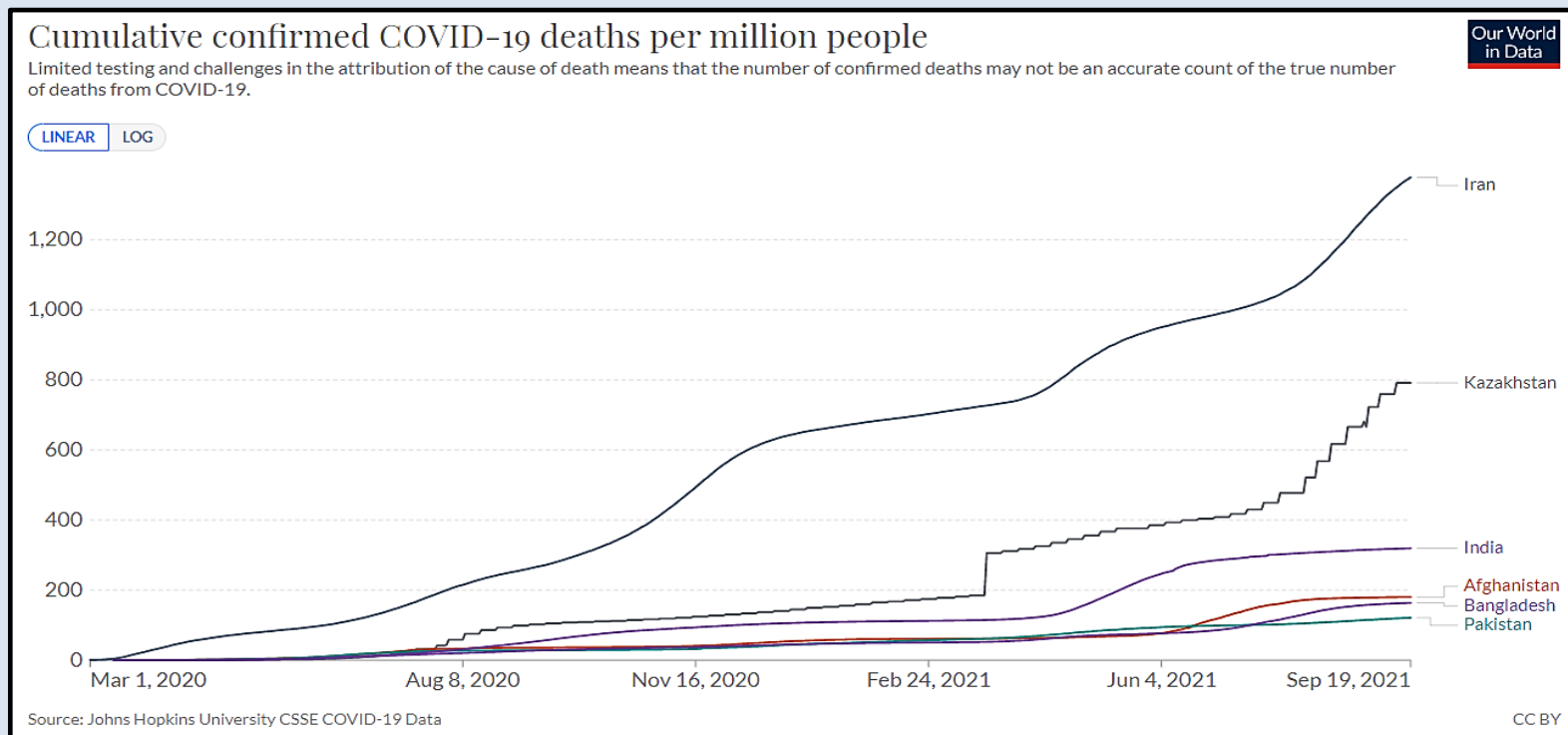
C19 DEATHS IN EAST AND SOUTHEAST ASIA

Covid-19 Deaths per Million People in Select East and Southeast Asian Countries



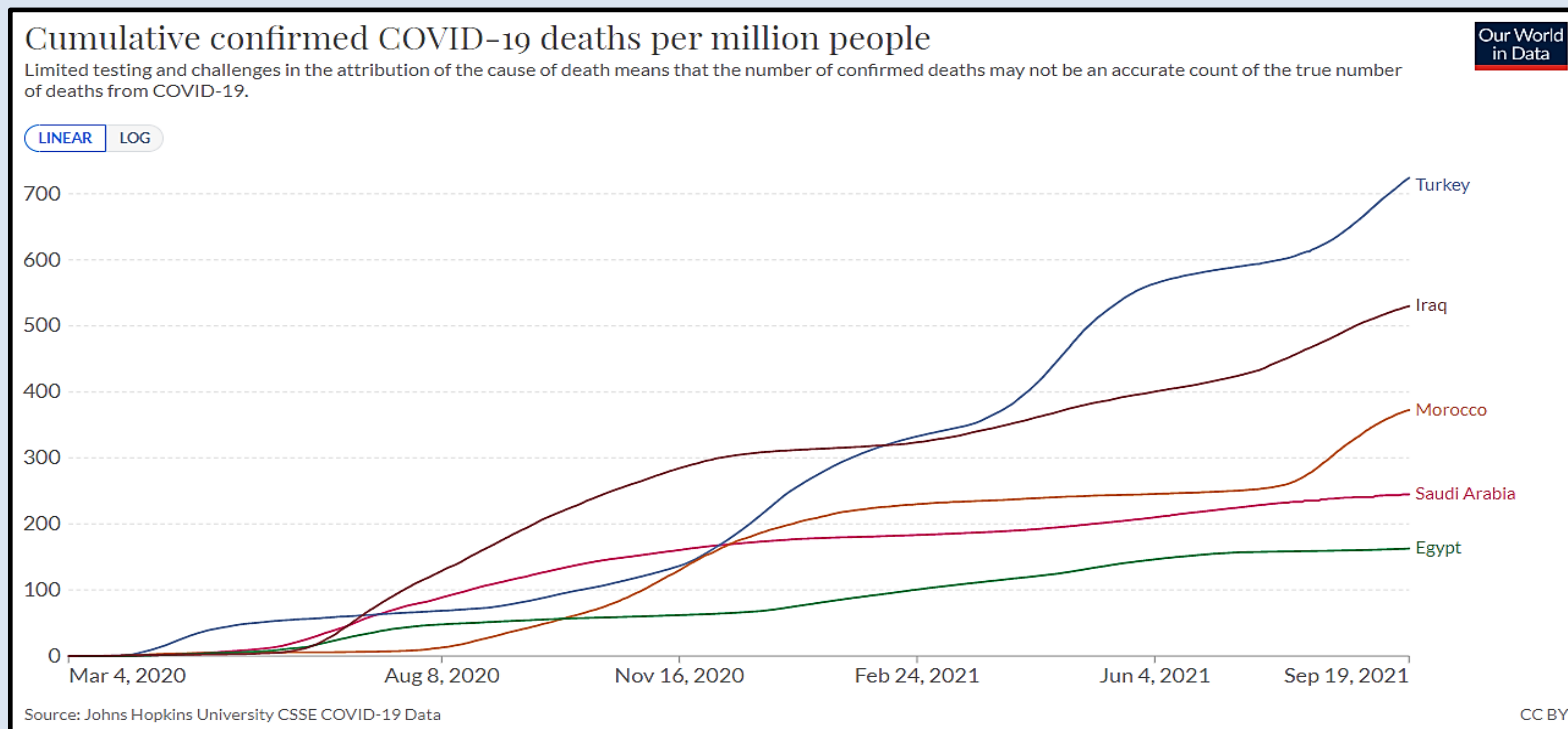
C19 DEATHS IN CENTRAL AND SOUTHERN ASIA

Covid-19 Deaths per Million People in Select Central and Southern Asian Countries



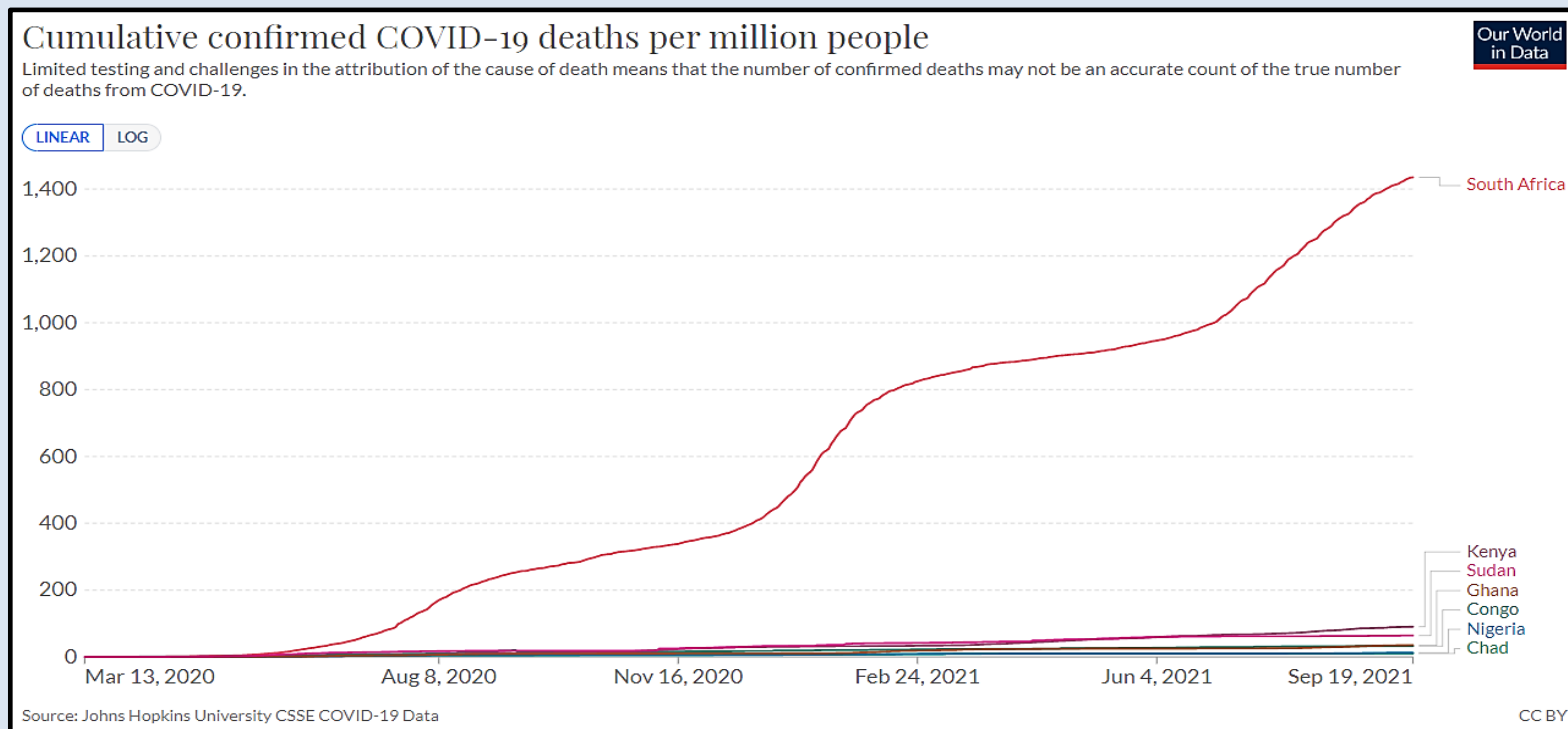
C19 DEATHS IN NORTH AFRICA AND MIDDLE EAST

Covid-19 Deaths per Million People in Select North African and Middle Eastern Countries



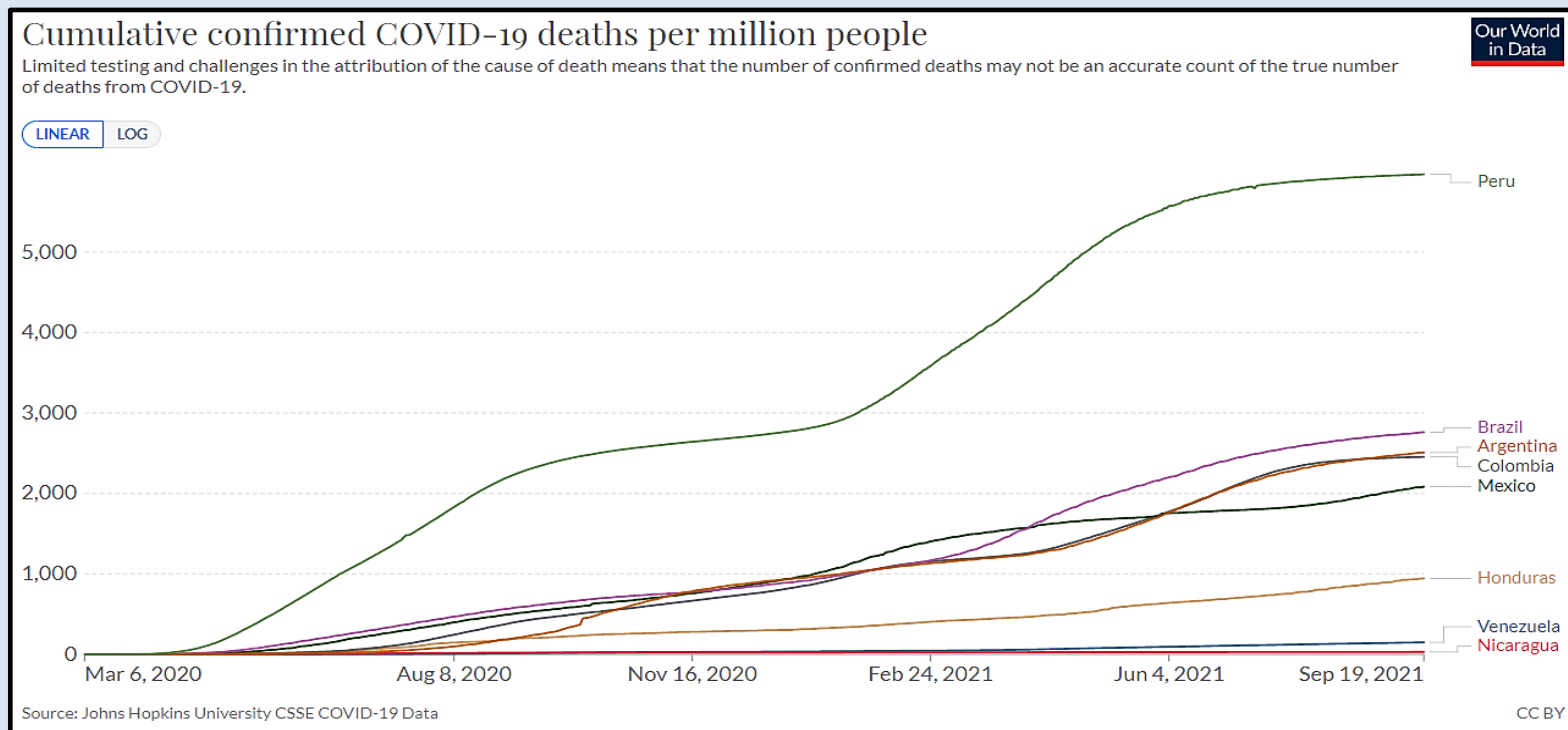
C19 DEATHS IN SUB-SAHARAN AFRICA

Covid-19 Deaths per Million People in Select Sub-Saharan African Countries



C19 DEATHS IN LATIN AMERICA

Covid-19 Deaths per Million People in Select Latin American Countries



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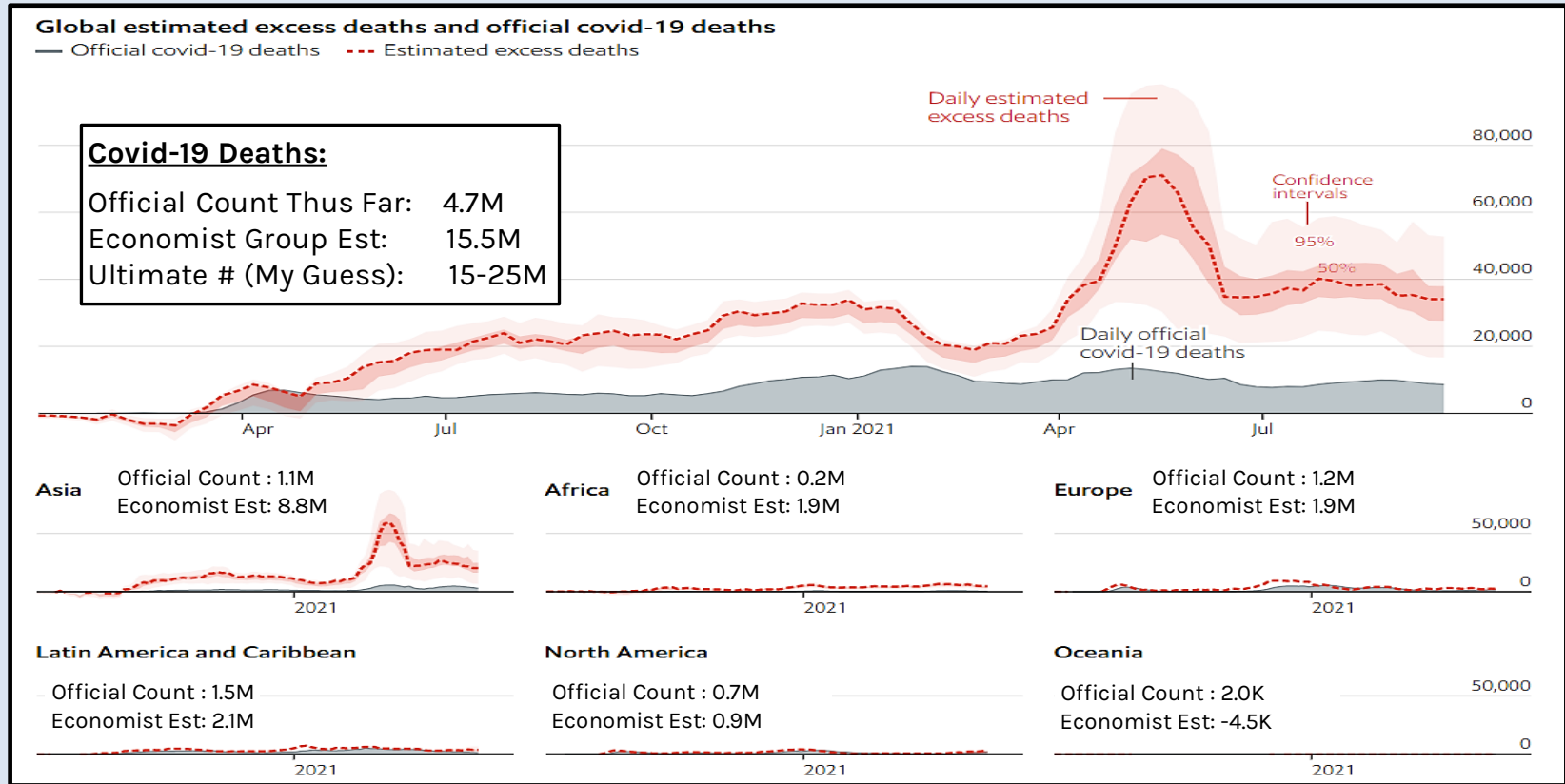
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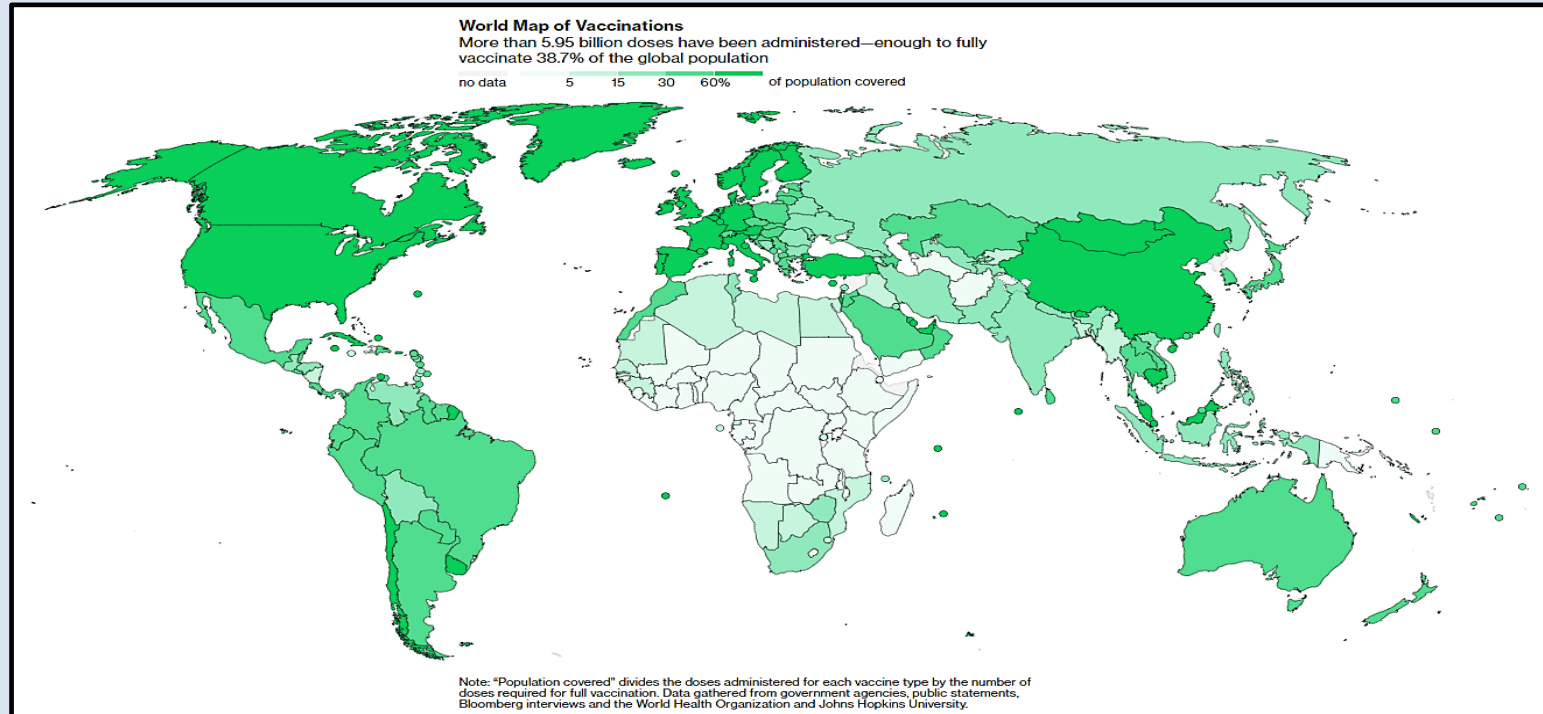
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TRUE GLOBAL COVID-19 DEATH COUNT



GLOBAL C19 VACCINATION RATES

World Map of Vaccination Rates, Sept 20, 2021



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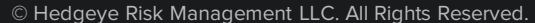
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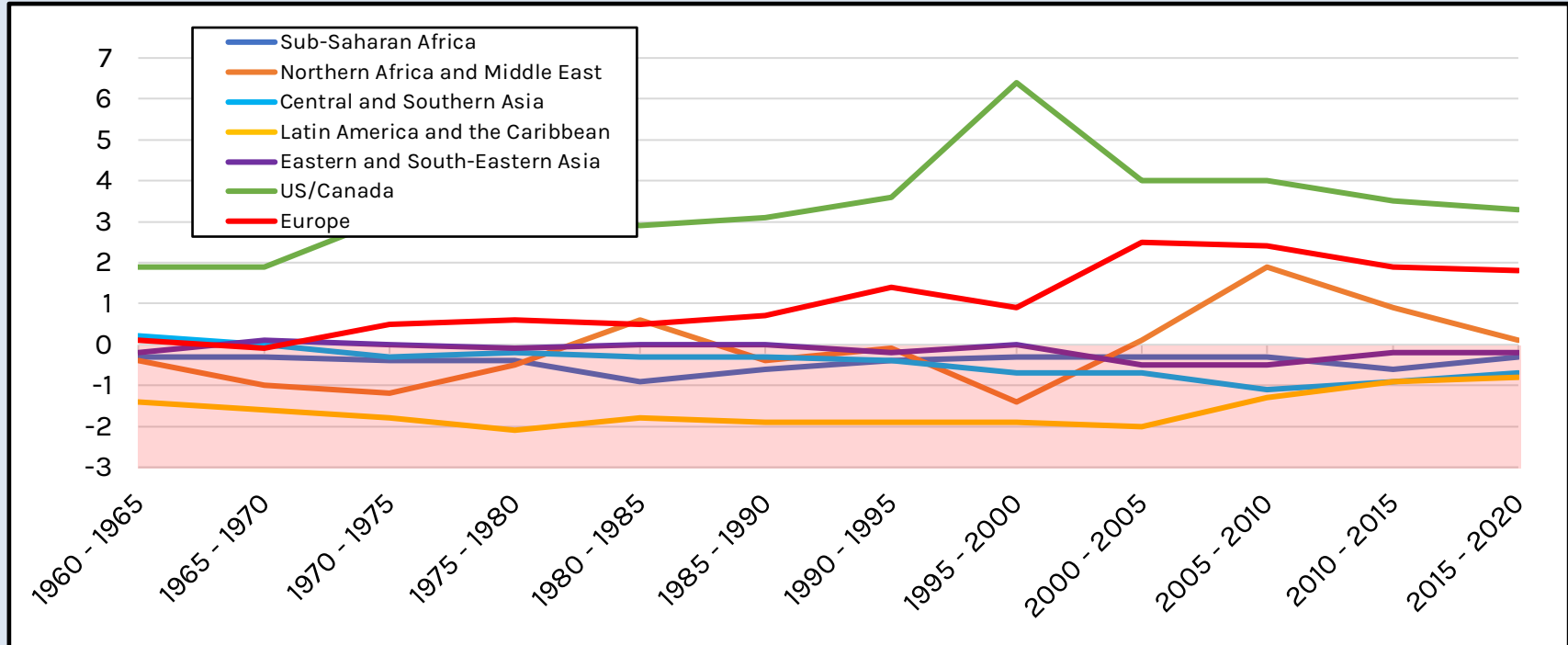
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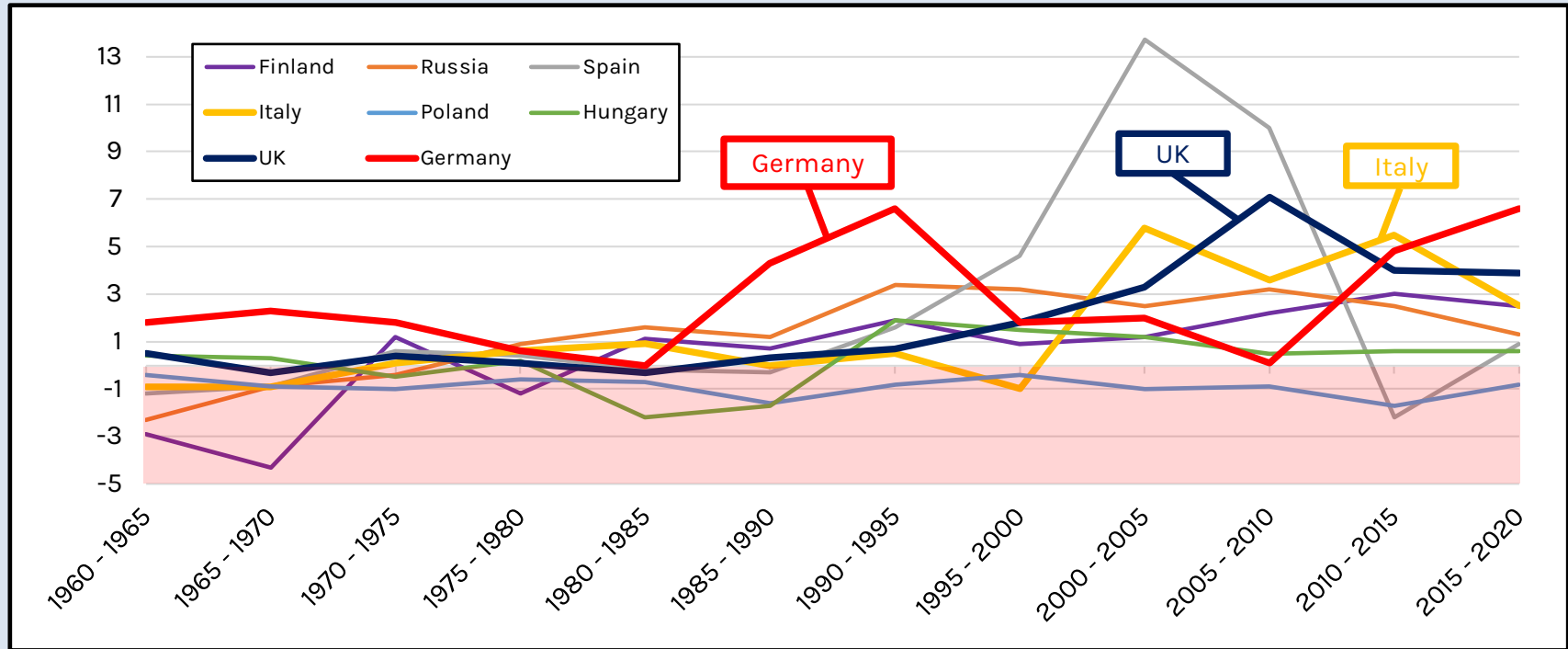
MIGRATION BETWEEN REGIONS

Net Migration Rate (per 1,000 pop) for Select Regions



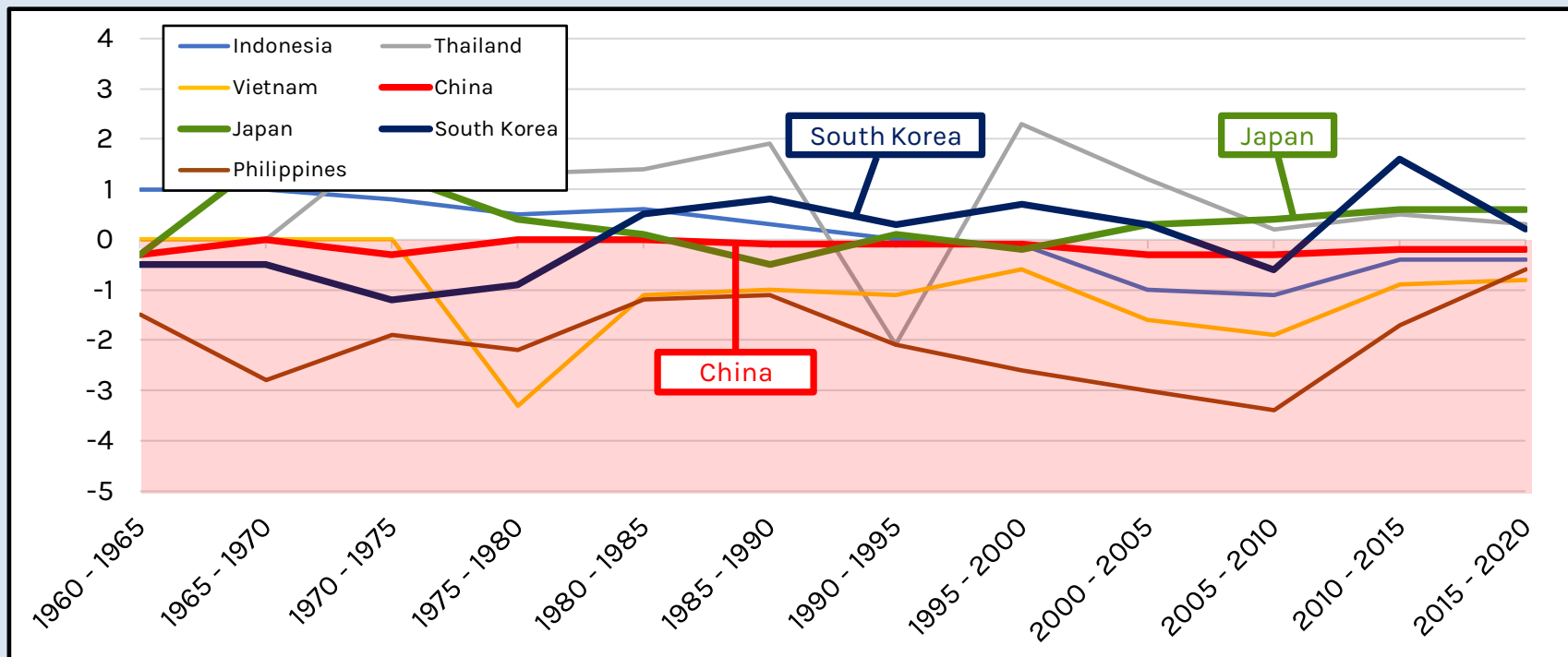
MIGRATION IN EUROPE

Net Migration Rate (per 1,000 pop) for Select European Countries



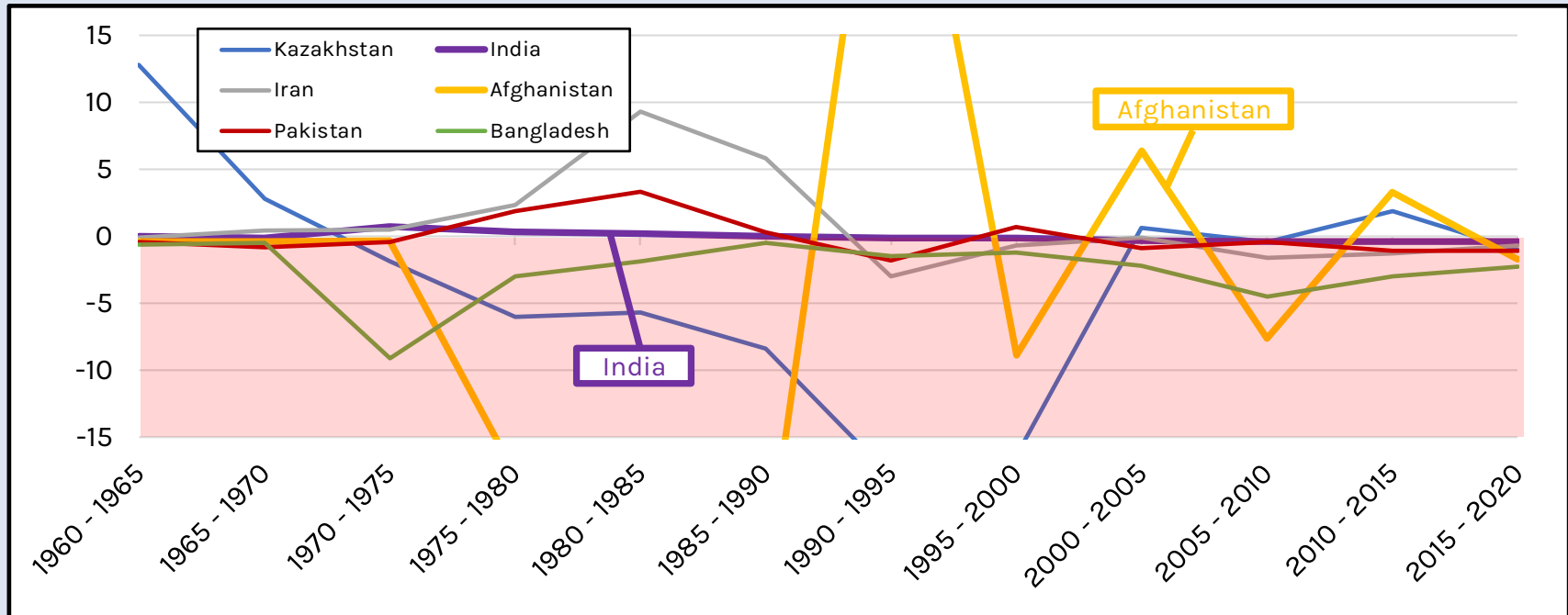
MIGRATION IN EAST AND SOUTHEAST ASIA

Net Migration Rate (per 1,000 pop) for Select East and Southeast Asian Countries



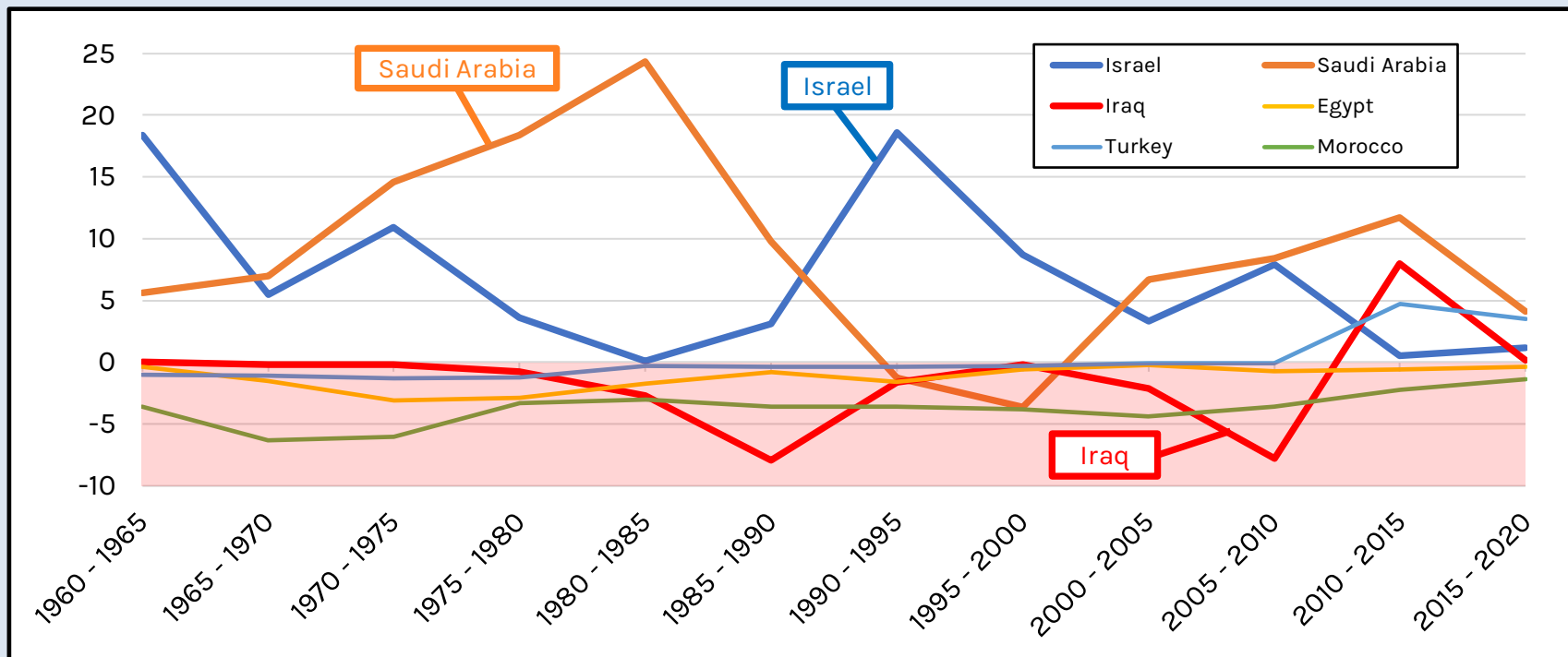
MIGRATION IN CENTRAL AND SOUTHERN ASIA

Net Migration Rate (per 1,000 pop) for Select Central and South Asian Countries



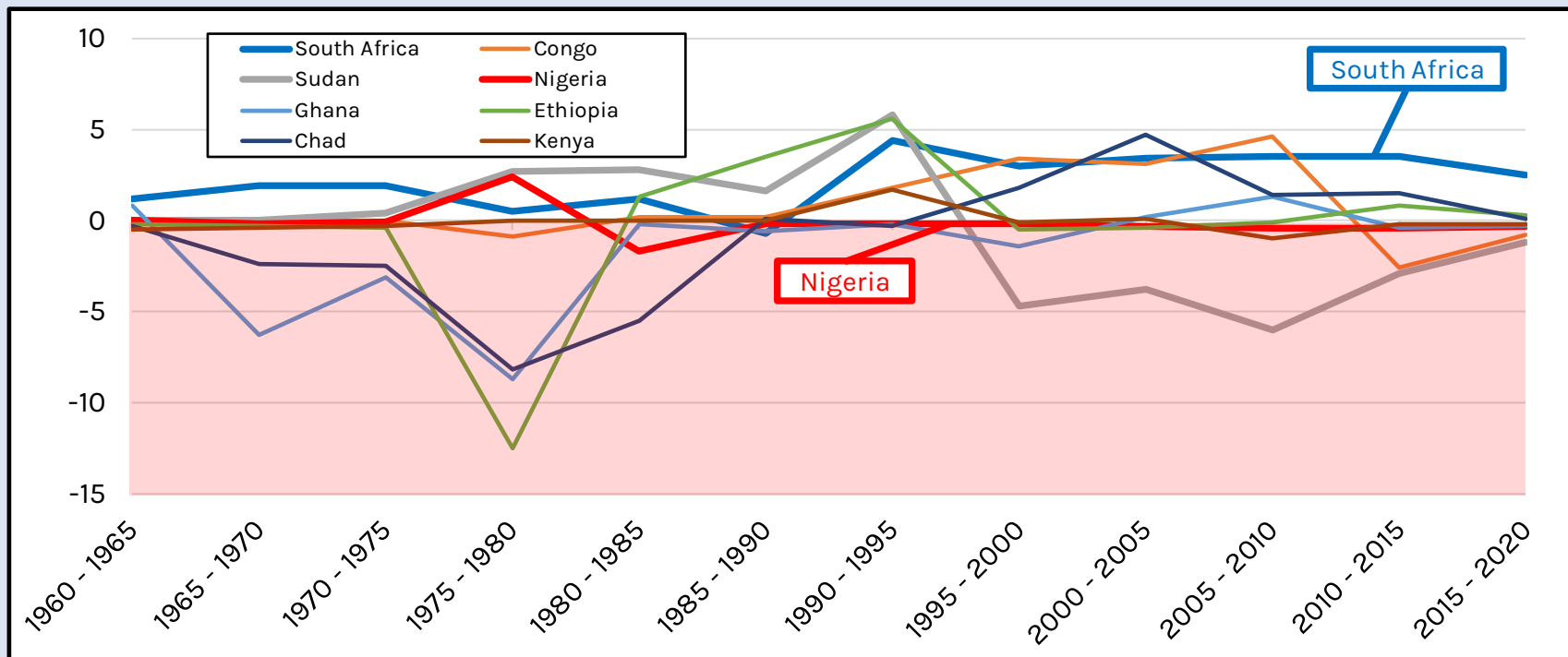
MIGRATION IN NORTH AFRICA AND MIDDLE EAST

Net Migration Rate (per 1,000 pop) for Select North African and Middle Eastern Countries



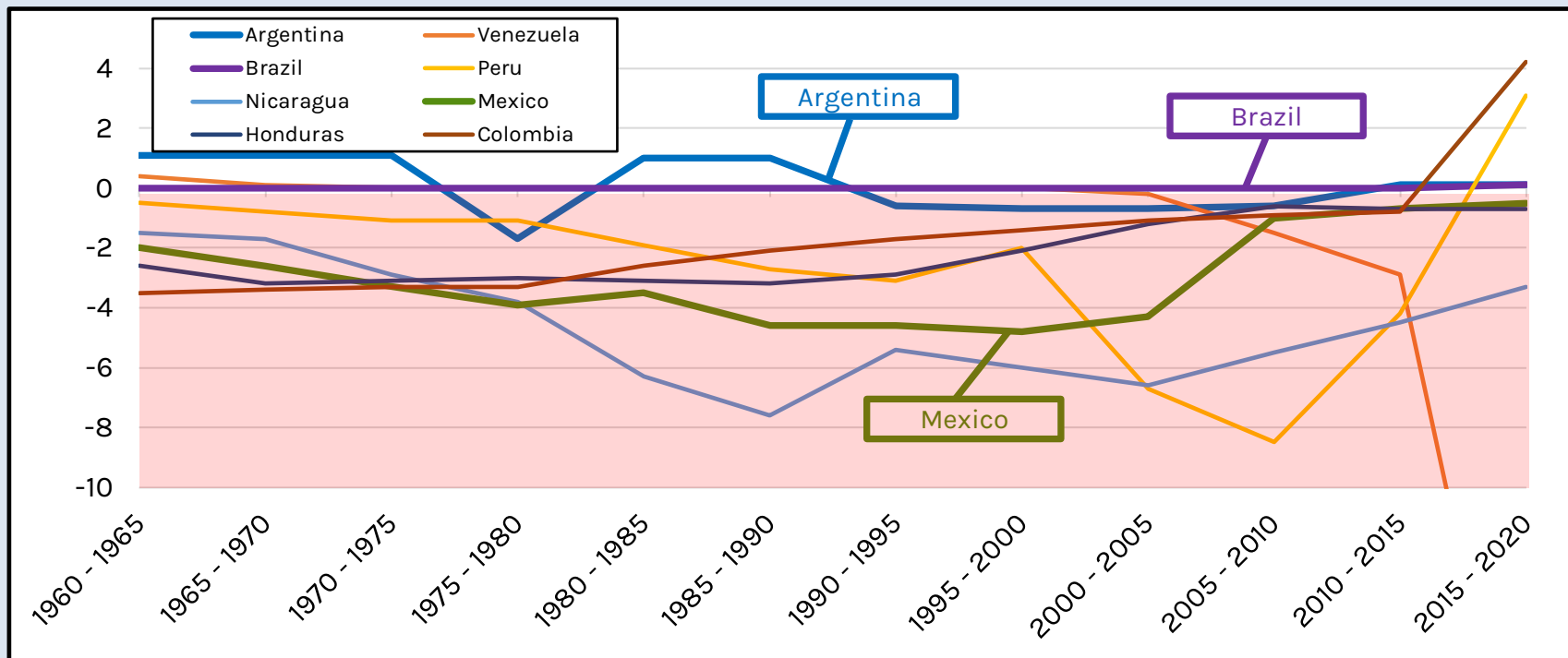
MIGRATION IN SUB-SAHARAN AFRICA

Net Migration Rate (per 1,000 pop) for Select Sub-Saharan African Countries



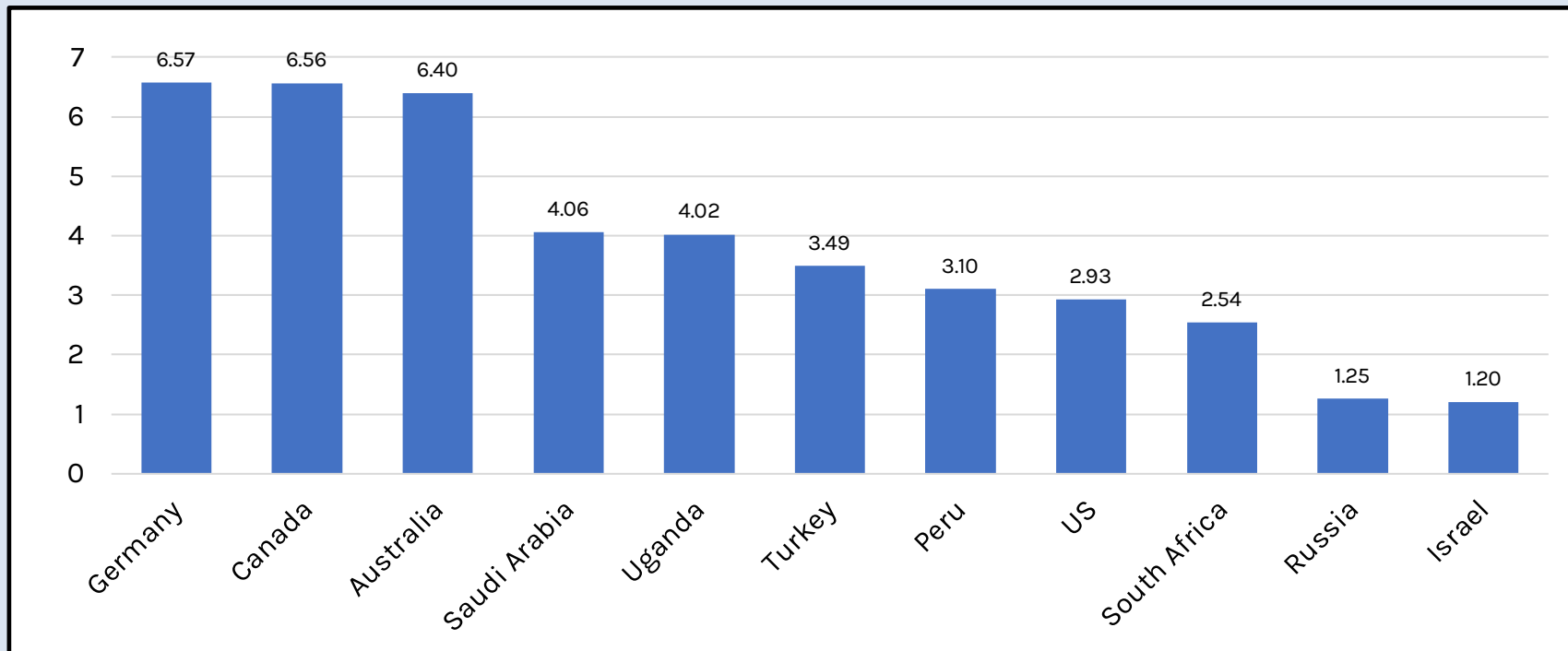
MIGRATION IN LATIN AMERICA

Net Migration Rate (per 1,000 pop) for Select Latin American Countries



MIGRATION TO BIG COUNTRIES

Net Migration Rate (per 1,000 pop)
for Select Big Countries, 2015-2020



DEMOGRAPHY REVIEW: WORLD

☐ **Fertility**

- Global Trends
- Special Issues
- Pandemic Baby Bust
- Policy Measures

☐ **Mortality and Covid-19**

- Life Expectancy
- C19 Comparing Regions
- True C19 Death Count

☐ **Migration**

- Comparing Regions
- Effects of the Pandemic

☐ **Population Projections**

- Working Age Population
- Dependency Ratios
- When Will Global Population Peak?

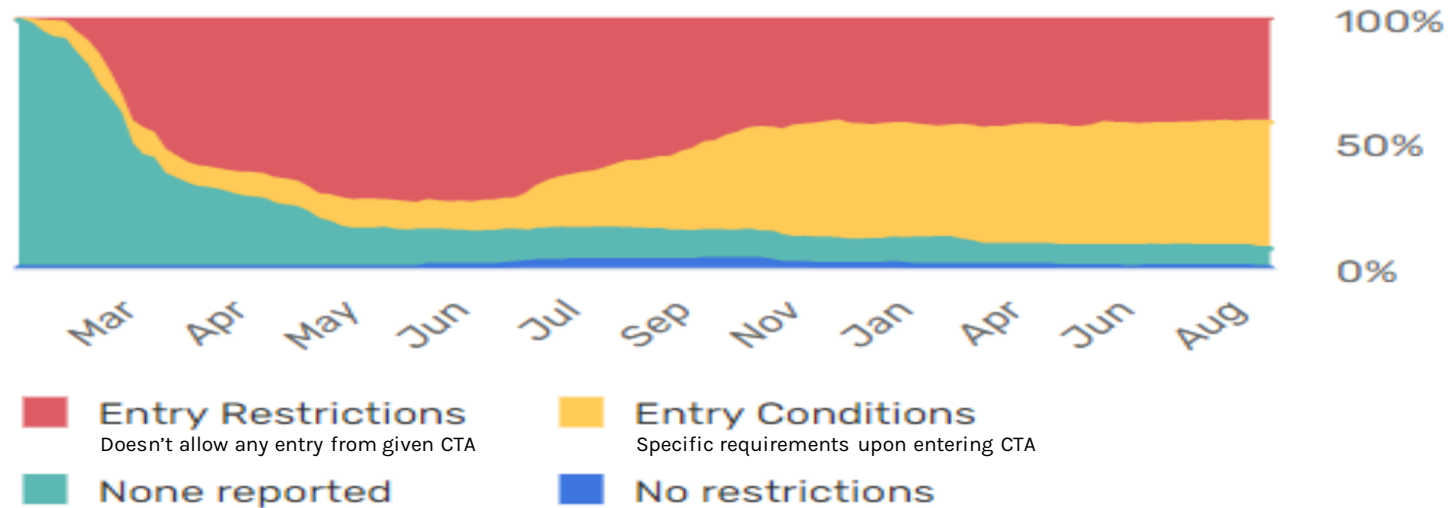
PANDEMIC AIR TRAVEL RESTRICTIONS

Travel Restrictions

March 2020-August 2021 (Global UN Tracker)

Percentage of CTA to CTA to travel restriction imposed by type

Percent of All Countries' Covid-19 Air Travel Rules by Type

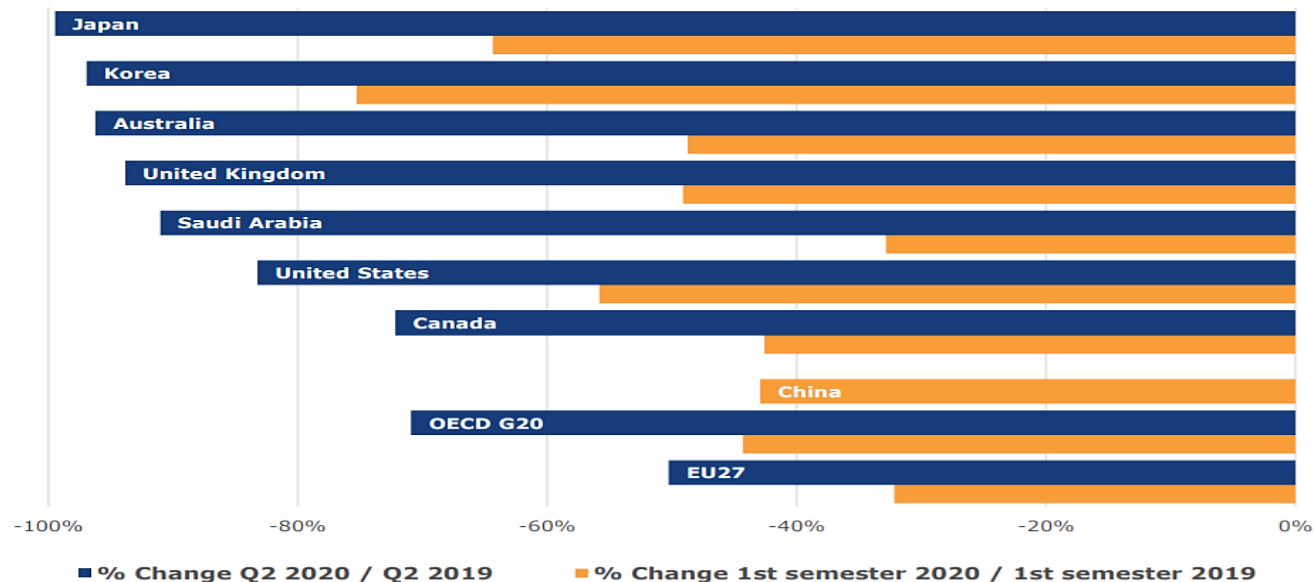


* CTA - Country/Territory/Area

IMMIGRANT PERMITS PLUNGE DUE TO C19

% Change in Number of New Work/Residency Permits Issued Between 1st Semester + Q2 of 2019 and 2020, Select G20 Countries

Figure 3. Change in the number of new permits issues between the first semester of 2019 and 2020 in selected G20 countries



Source: OECD (2020a).

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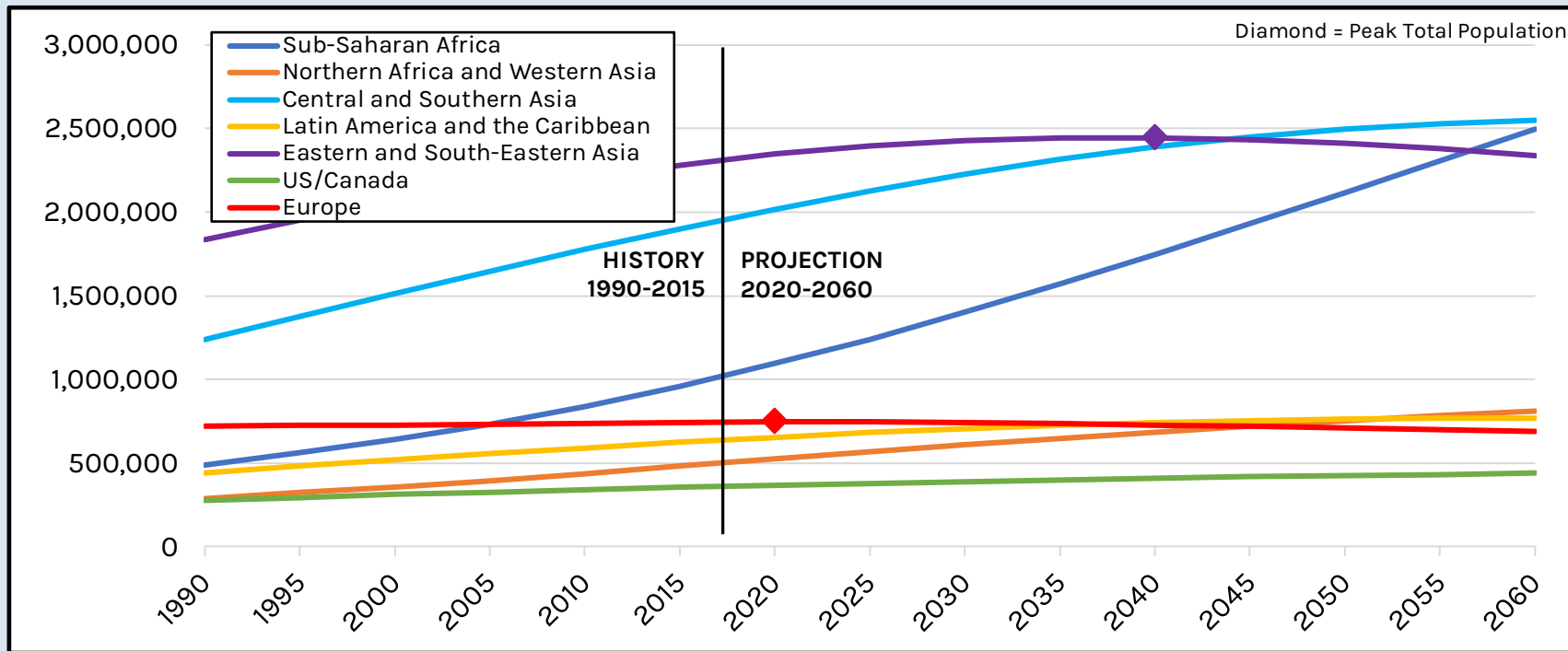
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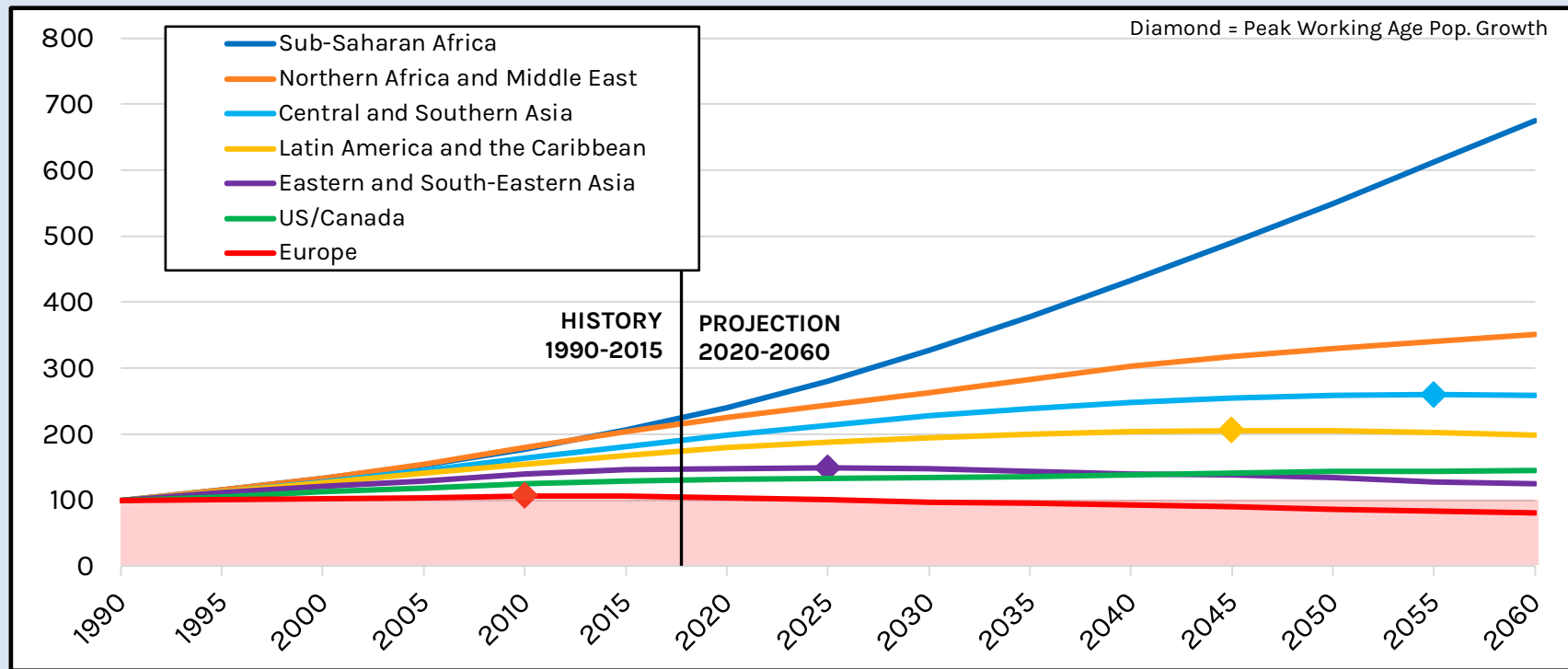
POPULATION PROJECTIONS

Total Population History and Projections for Select Regions (in thousands), 1990-1960



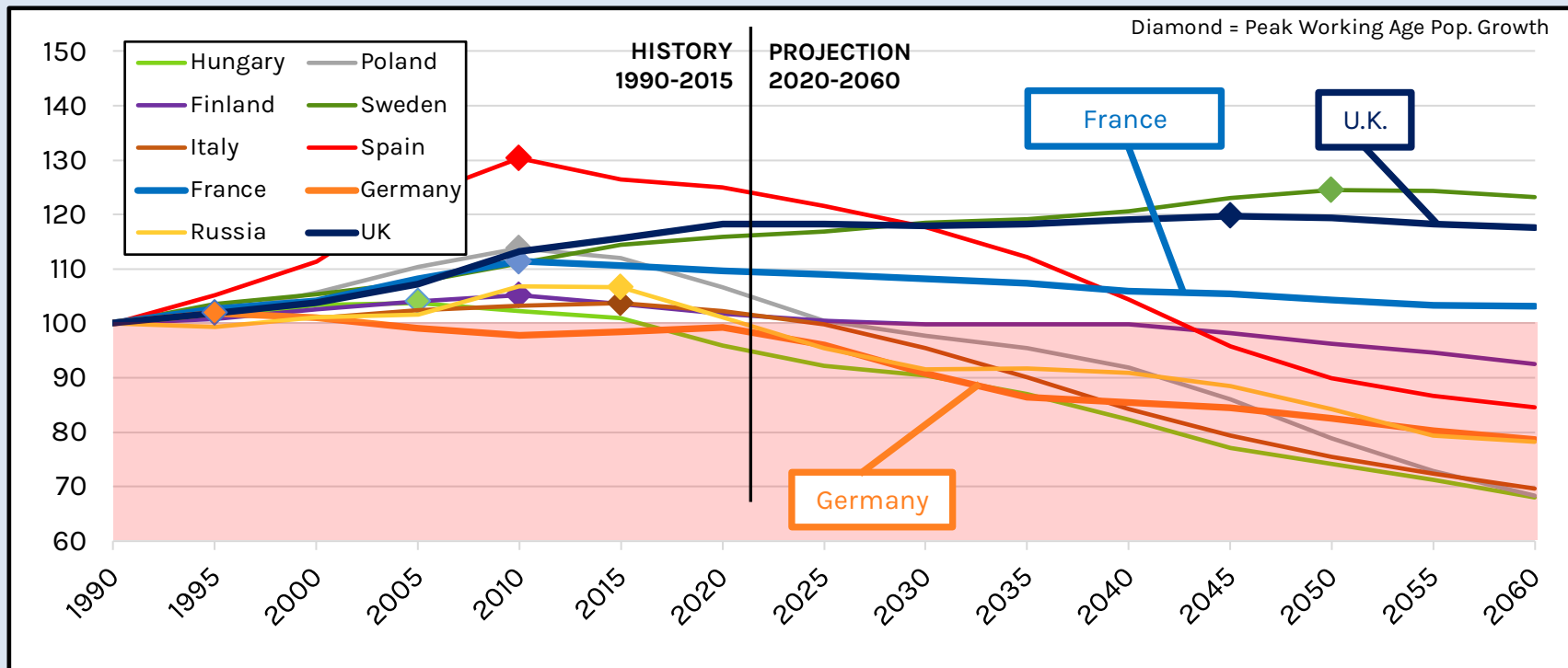
WORKING AGE GROWTH GLOBAL REGIONS

20-64 Pop. Projections: Global Regions (Index: 100 = Year 1990)



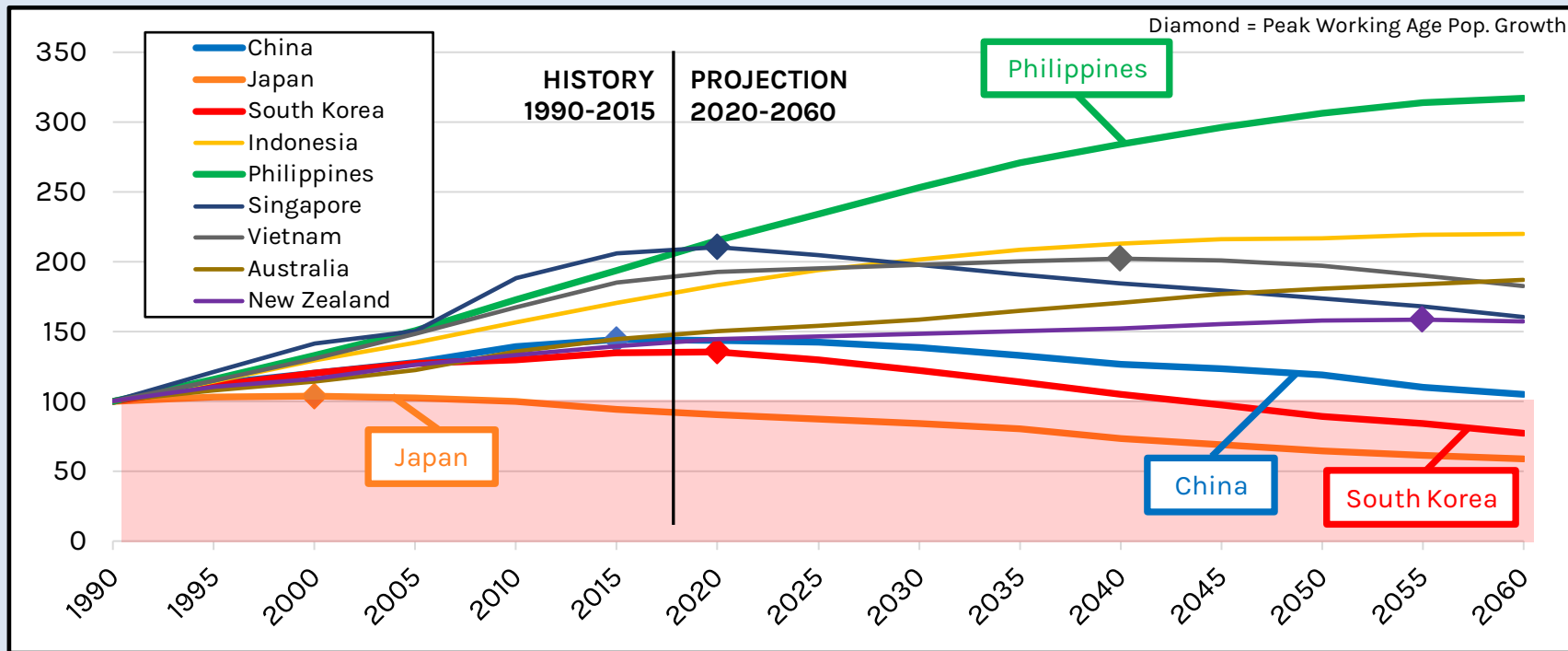
WORKING AGE GROWTH EUROPE

20-64 Pop. Projections: Europe (Index: 100 = Year 1990)



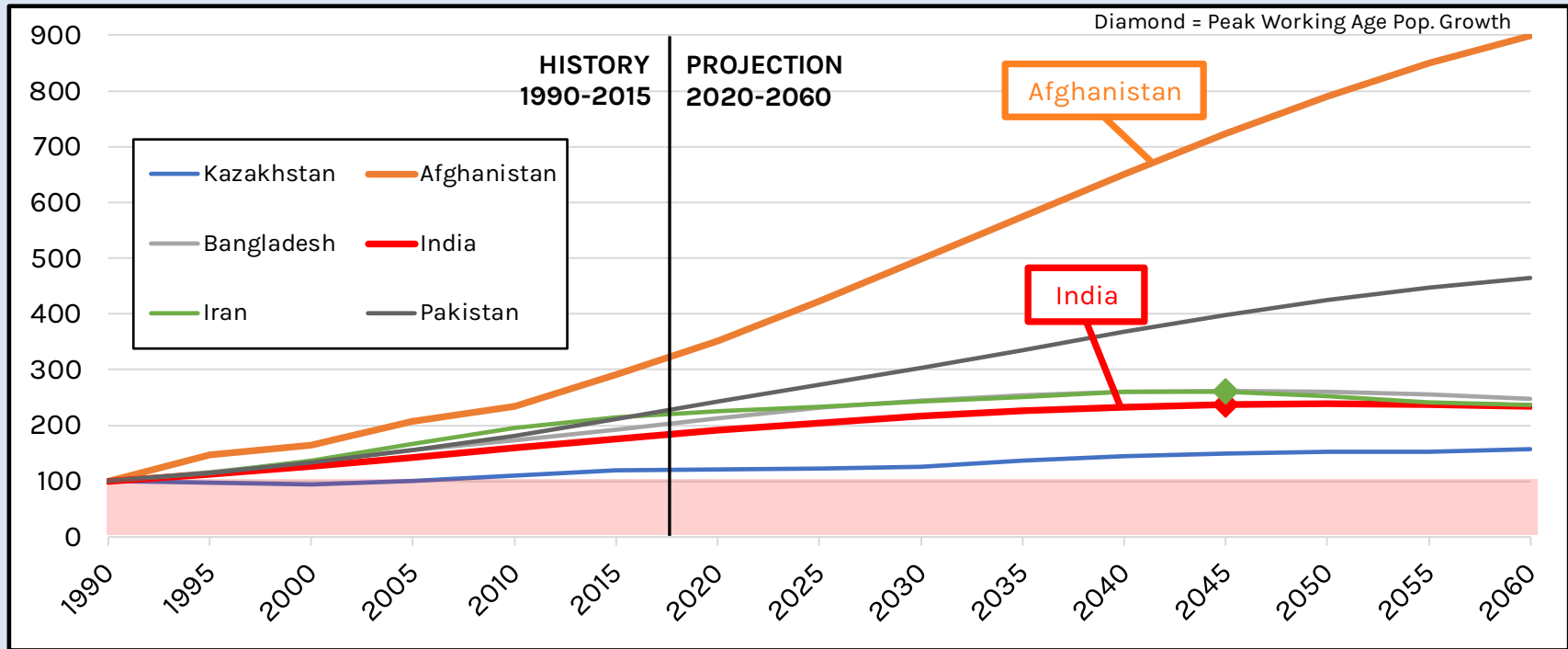
WORKING AGE GROWTH EAST/SOUTHEAST ASIA

20-64 Pop. Projections: East and Southeast Asia (Index: 100 = Year 1990)



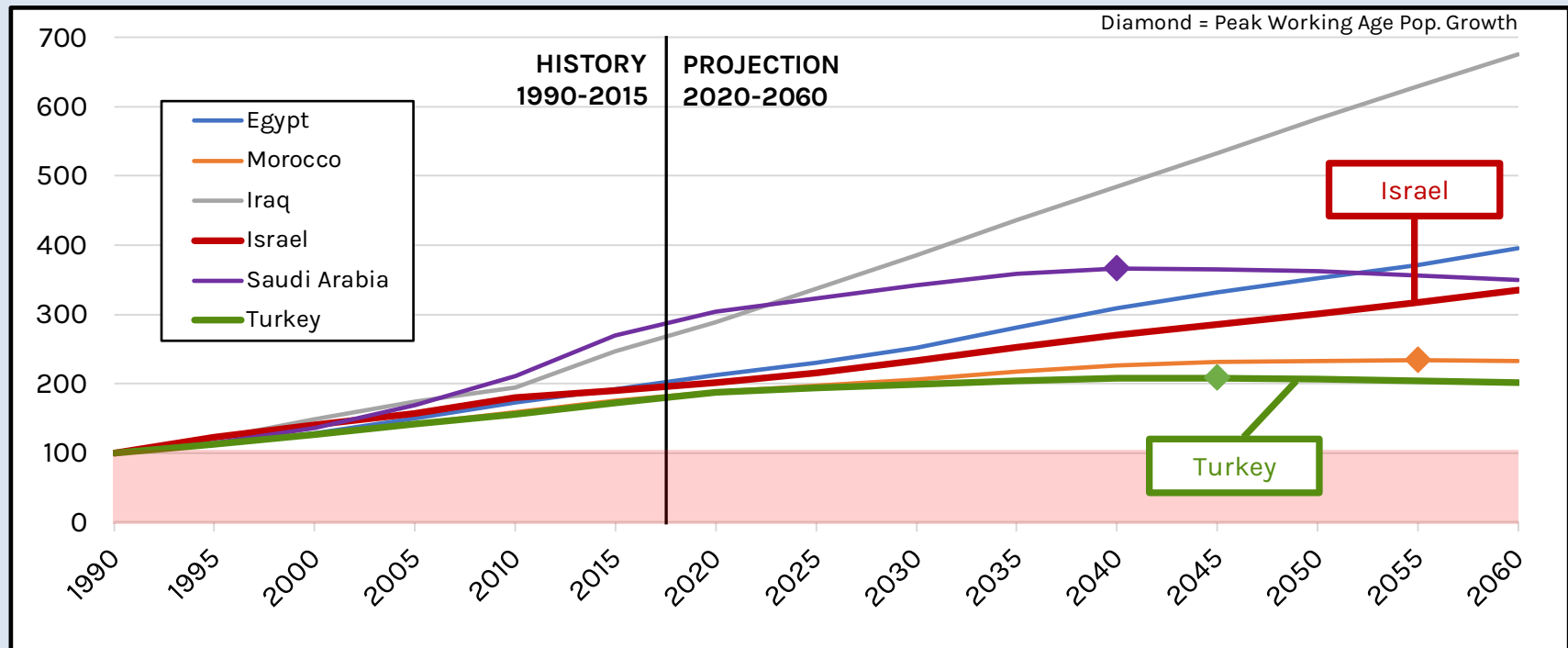
WORKING AGE GROWTH SOUTHERN/CENTRAL ASIA

20-64 Pop. Projections: Southern/Central Asia (Index: 100 = Year 1990)



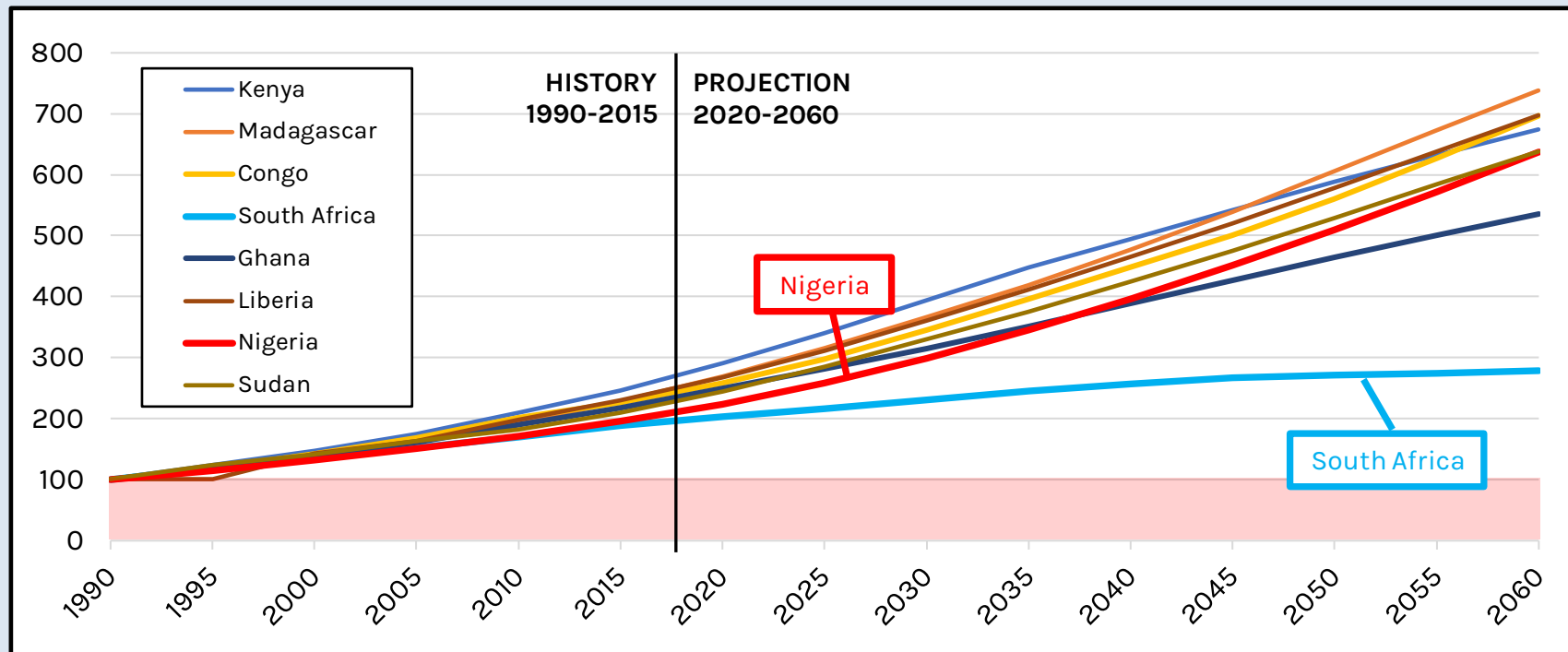
WORKING AGE GROWTH N. AFRICA AND MIDDLE EAST

20-64 Pop. Projections: North Africa and Middle East (Index: 100 = Year 1990)



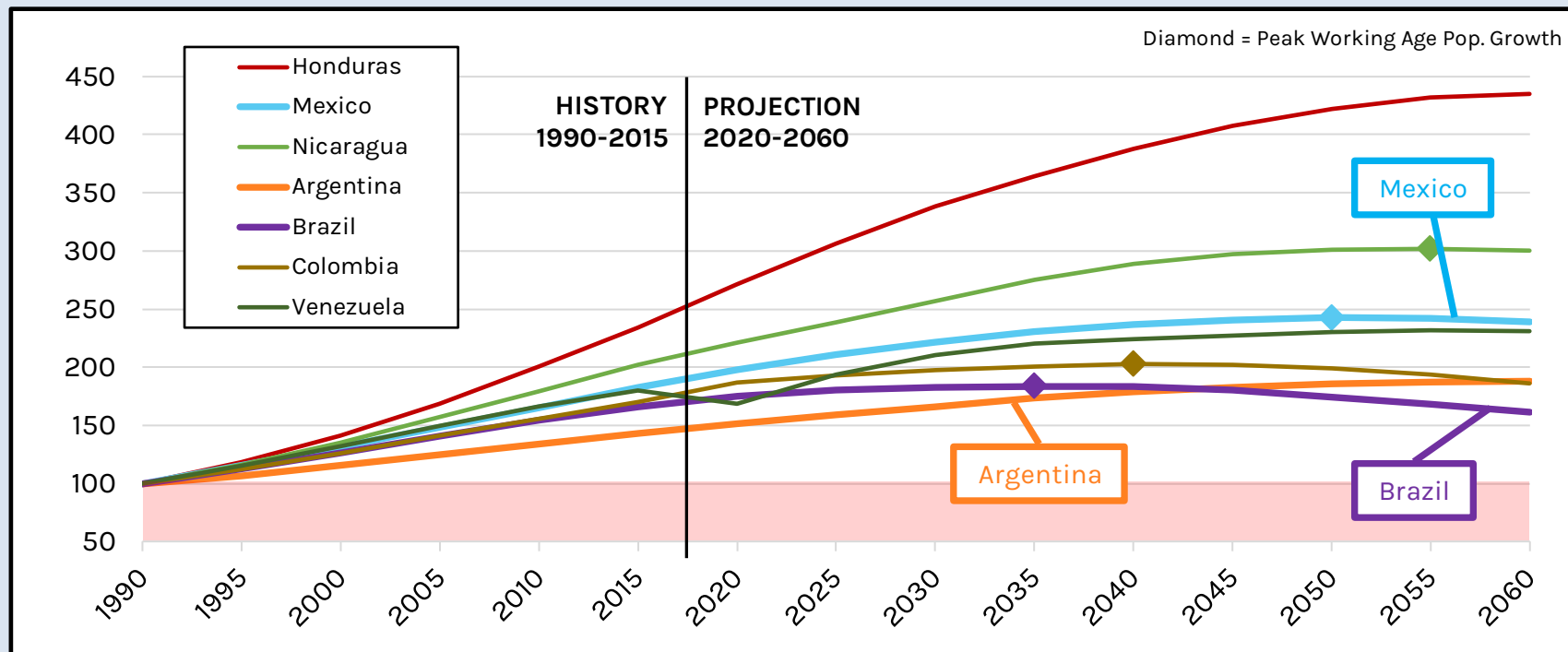
WORKING AGE GROWTH SUB-SAHARAN AFRICA

20-64 Pop. Projections: Sub-Saharan Africa (Index: 100 = Year 1990)



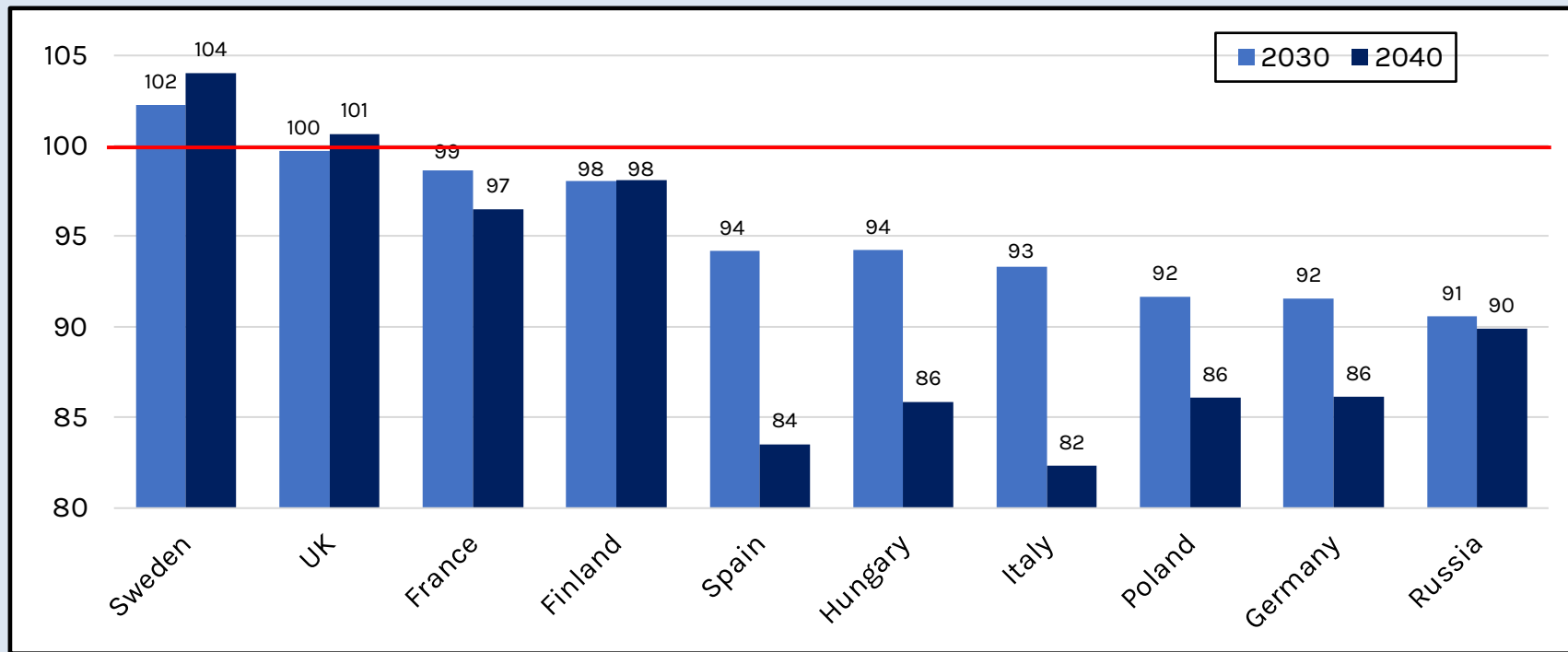
WORKING AGE GROWTH LATIN AMERICA

20-64 Pop. Projections: Latin America (Index: 100 = Year 1990)



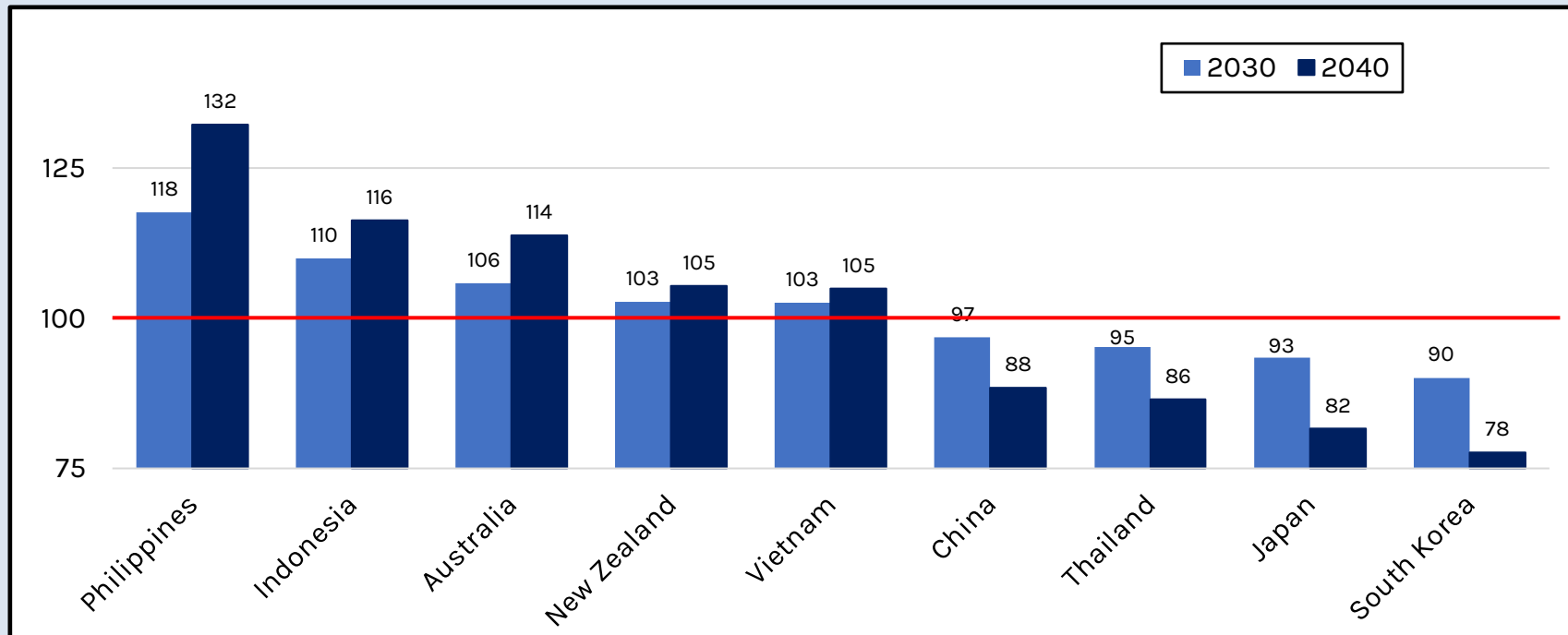
WORKING AGE GROWTH EUROPE

20-64 Pop. Projections for 2030 + 2040:
Europe (Index: 100 = Year 2020)



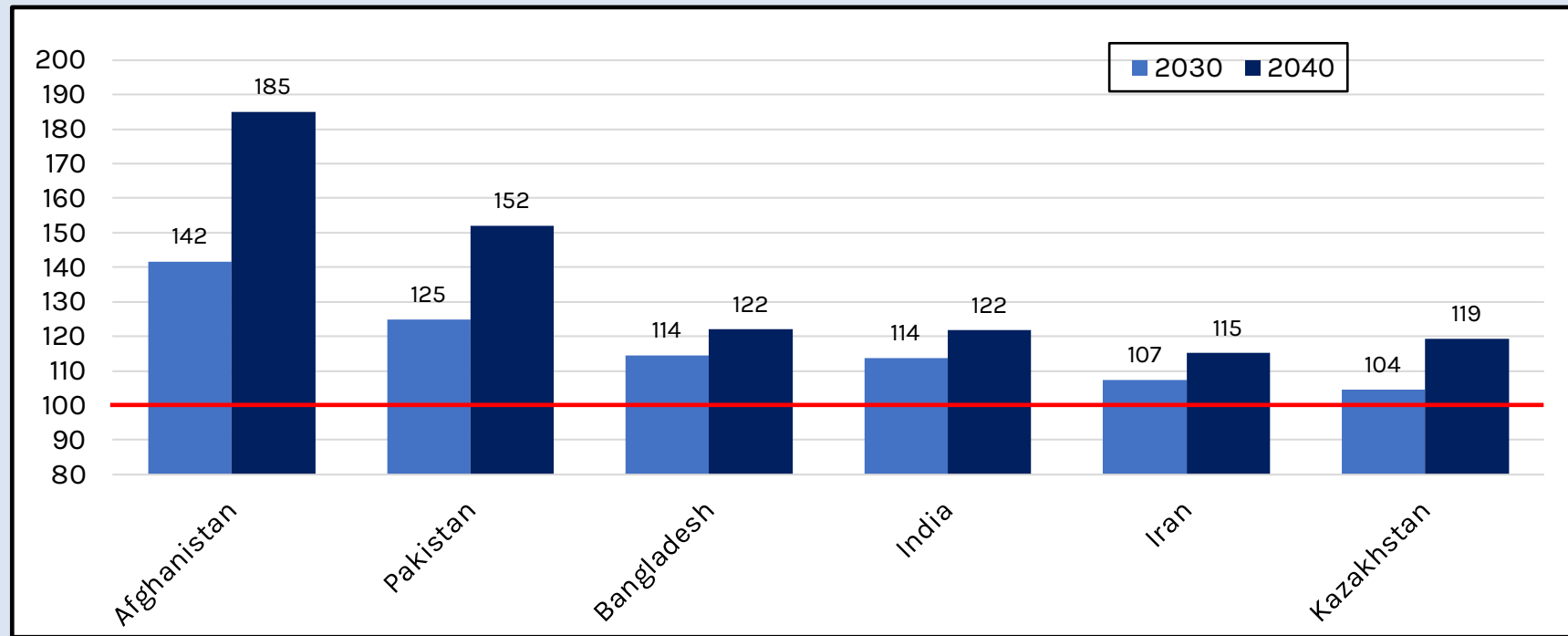
WORKING AGE GROWTH EAST/SOUTHEAST ASIA

**20-64 Pop. Projections 2030 + 2040:
East and Southeast Asia (Index: 100 = Year 2020)**



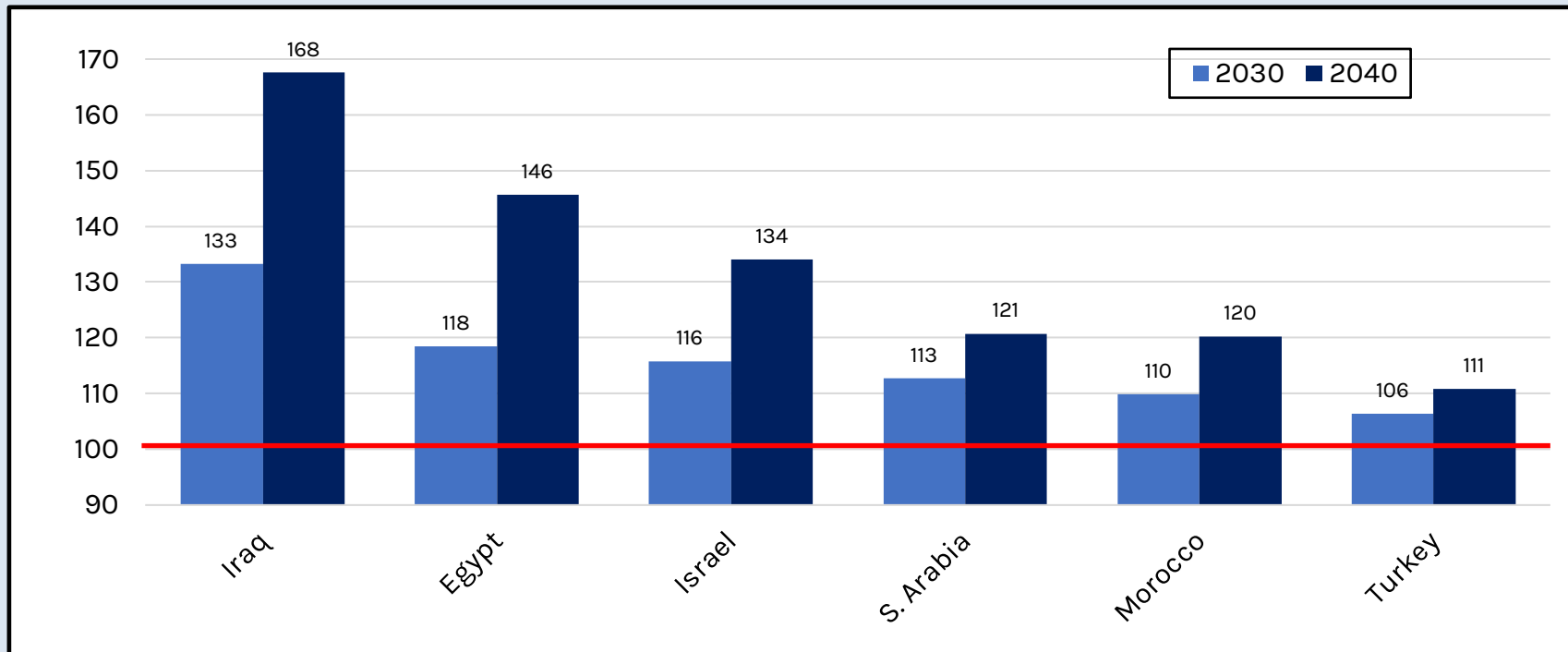
WORKING AGE GROWTH CENTRAL/SOUTH ASIA

**20-64 Pop. Projections 2030 + 2040 :
Southern and Central Asia (Index: 100 = Year 2020)**



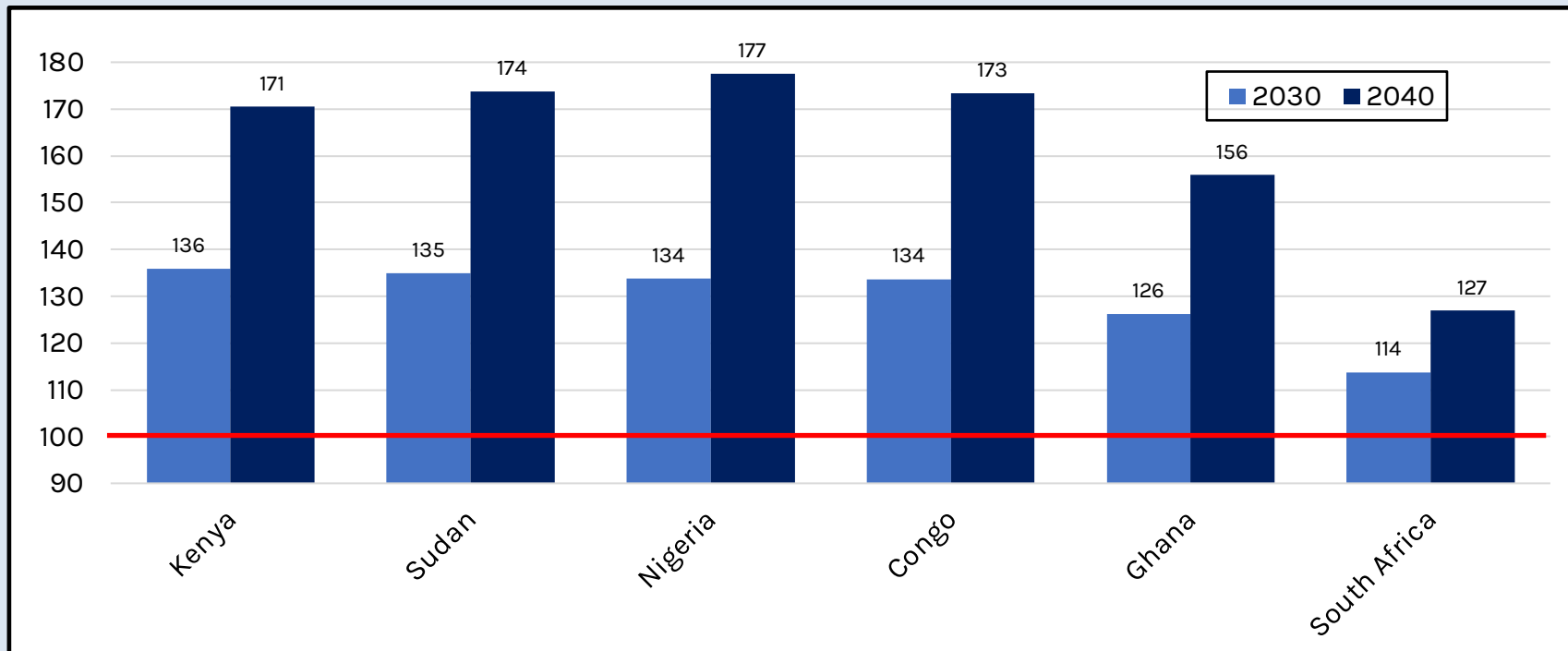
WORKING AGE GROWTH NORTH AFRICA/MID. EAST

**20-64 Pop. Projections 2030 + 2040:
North Africa and Middle East (Index: 100 = Year 2020)**



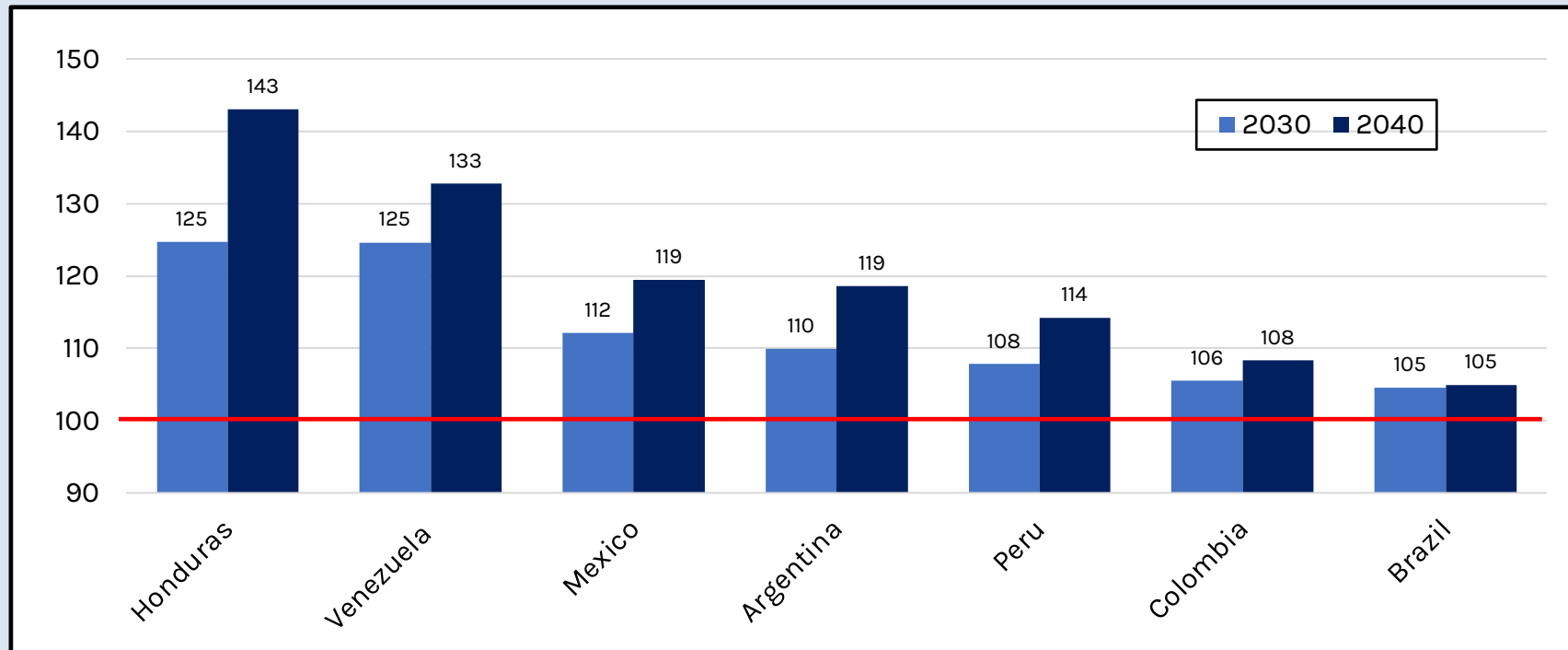
WORKING AGE GROWTH SUB-SAHARAN AFRICA

**20-64 Pop. Projections 2030 + 2040:
Sub-Saharan Africa (Index: 100 = Year 2020)**



WORKING AGE GROWTH LATIN AMERICA

**20-64 Pop. Projections 2030 + 2040:
Latin America (Index: 100 = Year 2020)**



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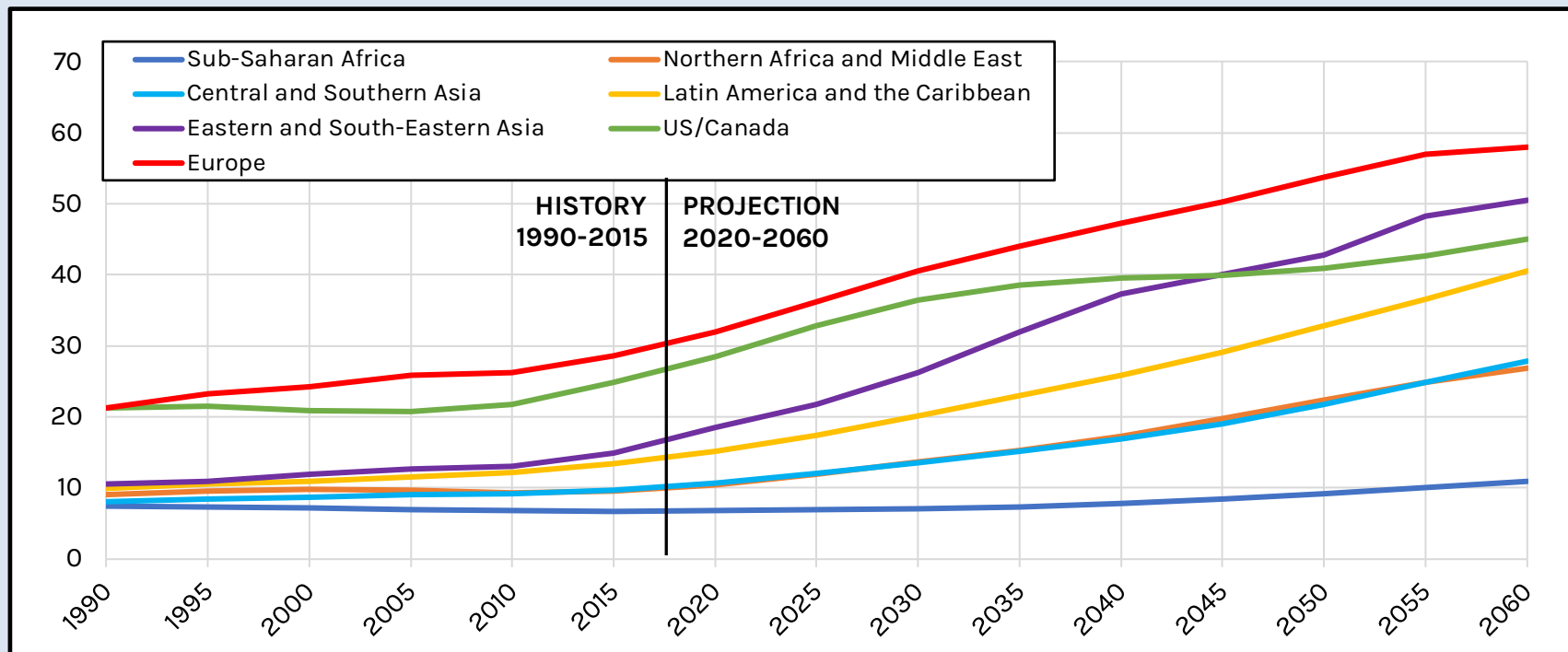
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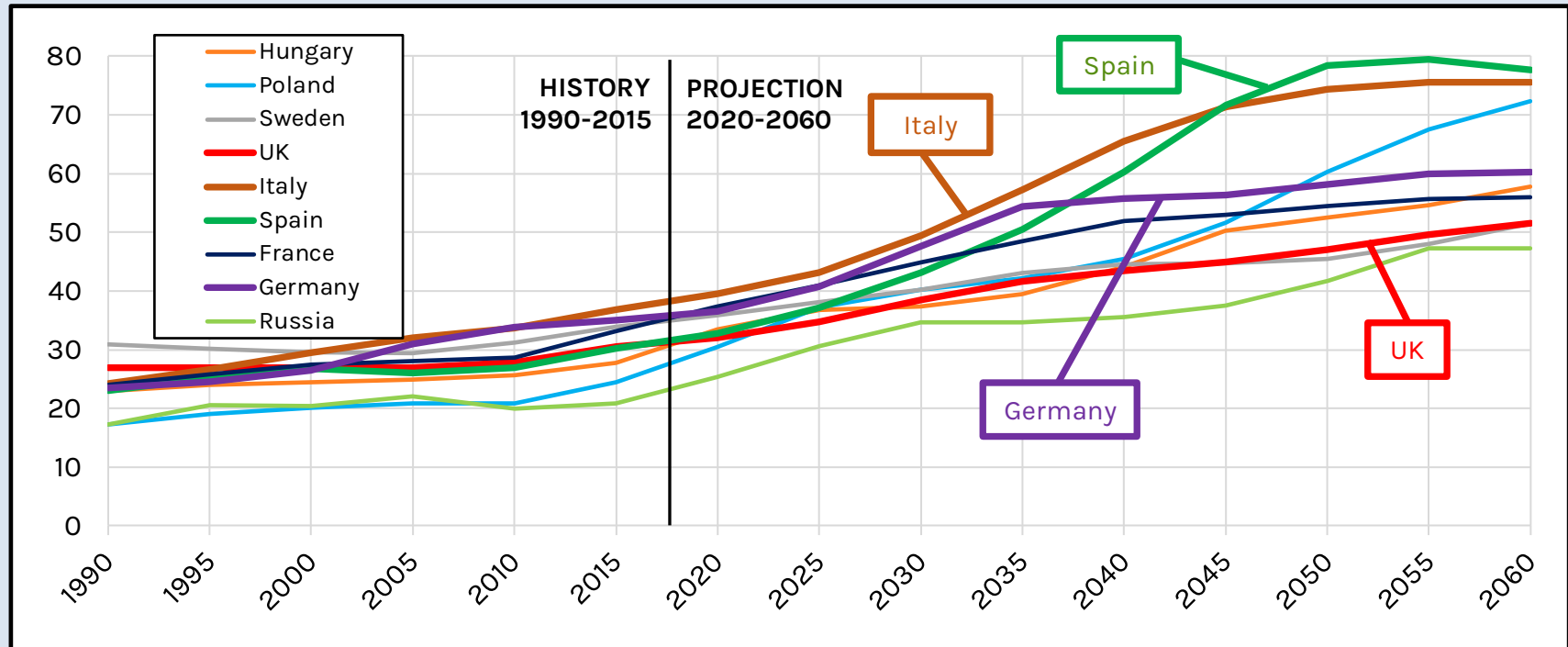
OLD-AGE DEPENDENCY RATIO: REGIONAL

Population Aged 65+ per 100 Pop Age 15-64: Global Regions



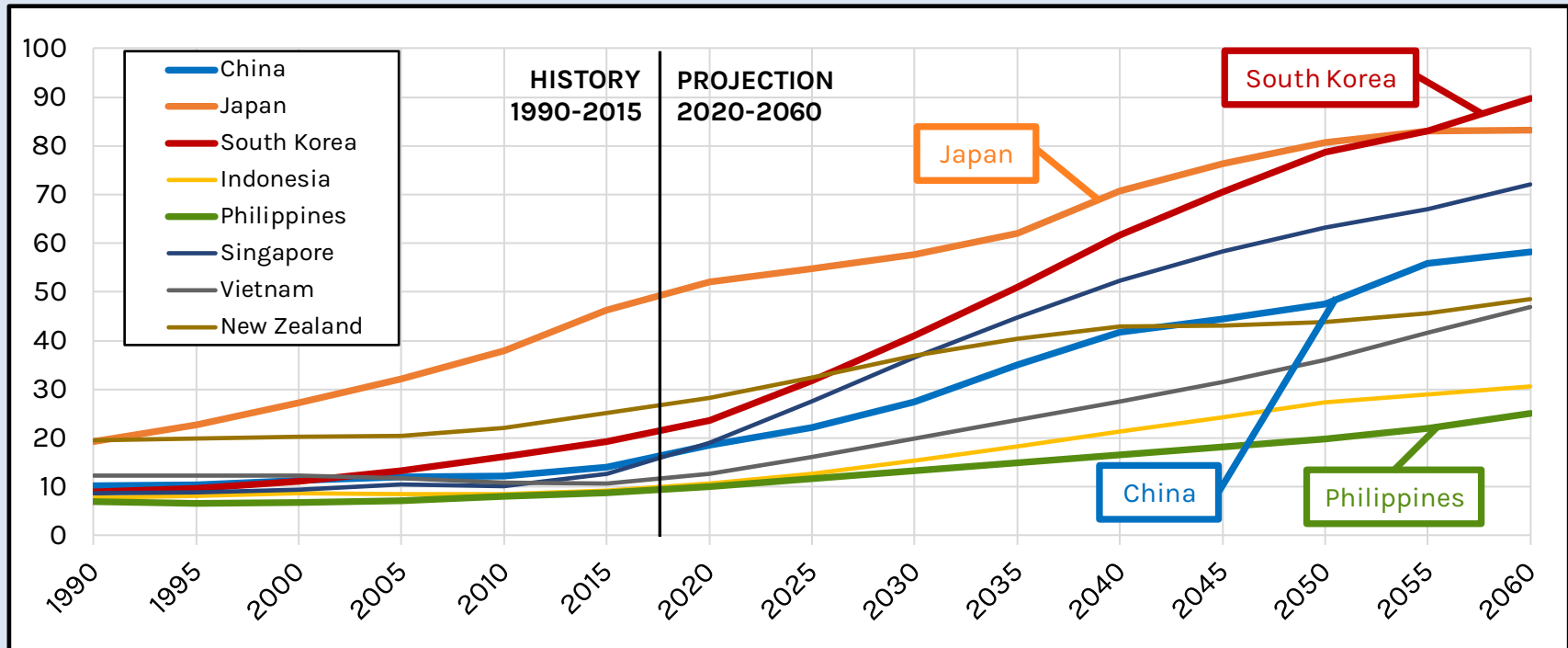
OLD-AGE DEPENDENCY RATIO: EUROPE

Population Aged 65+
per 100 Pop Age 15-64 : Select European Countries



OLD-AGE DEPENDENCY RATIO: EAST ASIA

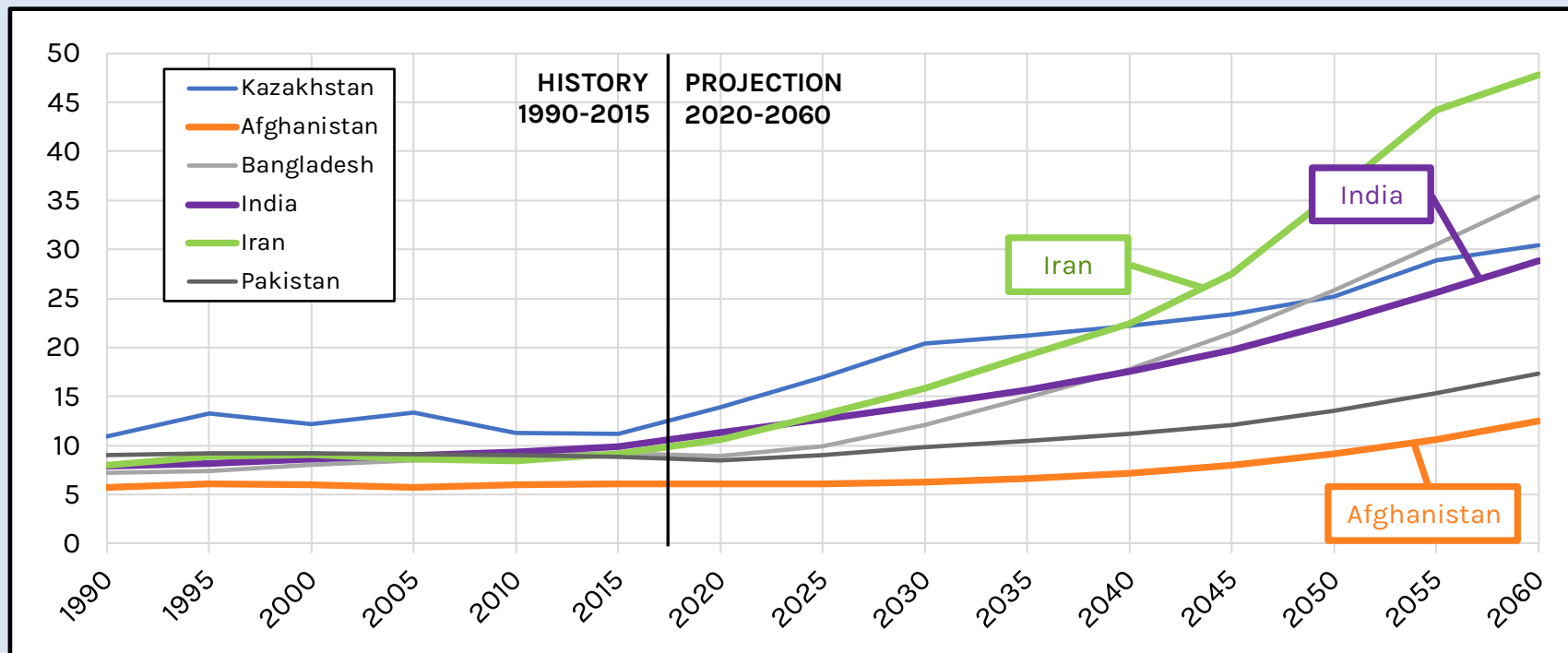
Population Aged 65+
per 100 Pop Age 15-64 : Select East Asian Countries



OLD-AGE DEPENDENCY RATIO: CENTRAL & S. ASIA

Population Aged 65+

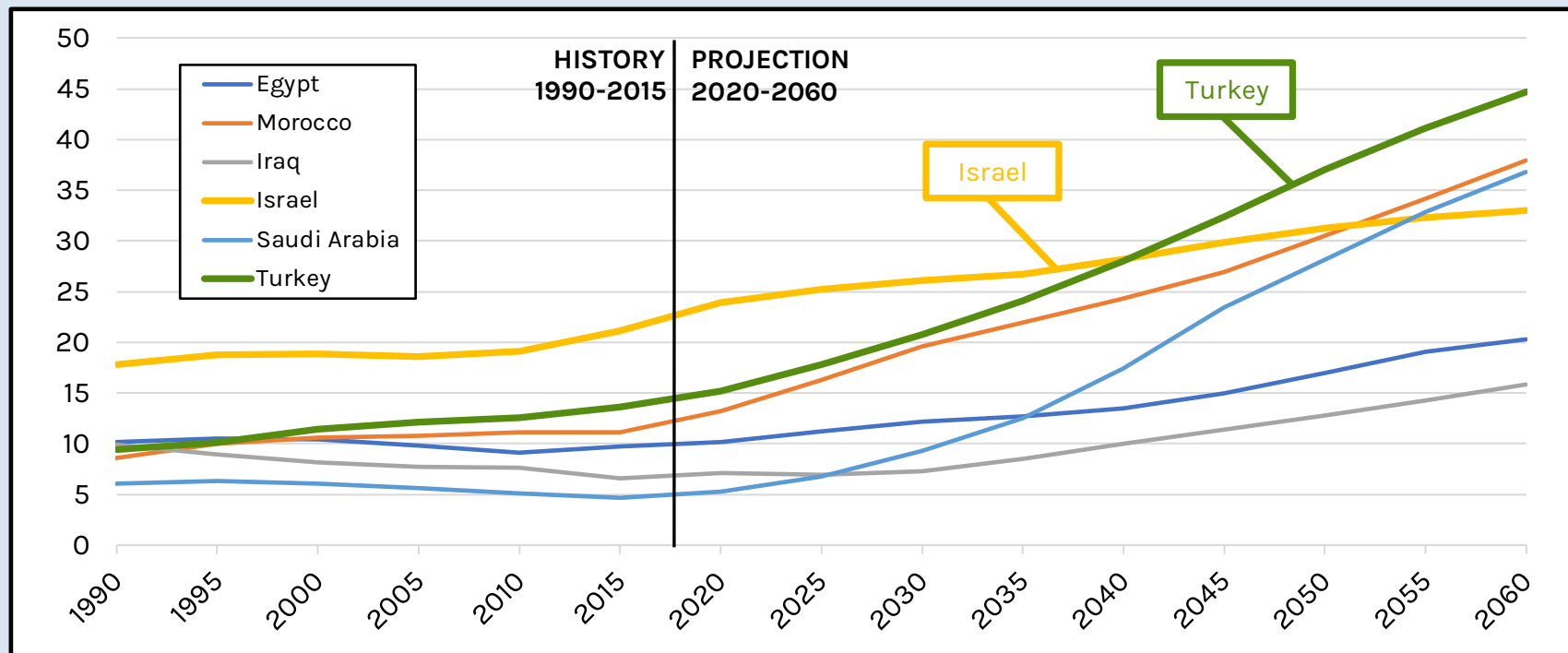
per 100 Pop Age 15-64 : Select Central and Southern Asian Countries



OLD-AGE DEPENDENCY RATIO: N. AFRICA + M. EAST

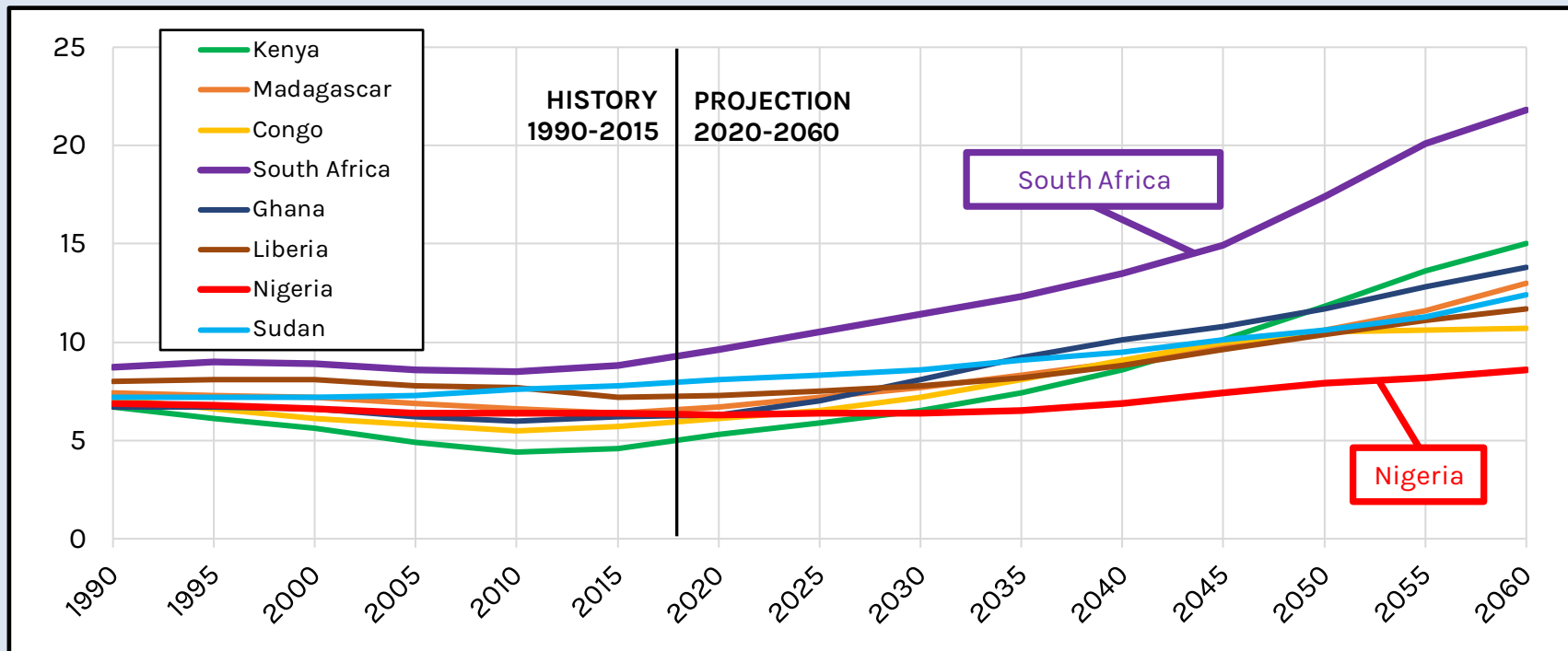
90

Population Aged 65+ per 100 Pop Age 15-64 :
Select North African and Middle Eastern Countries



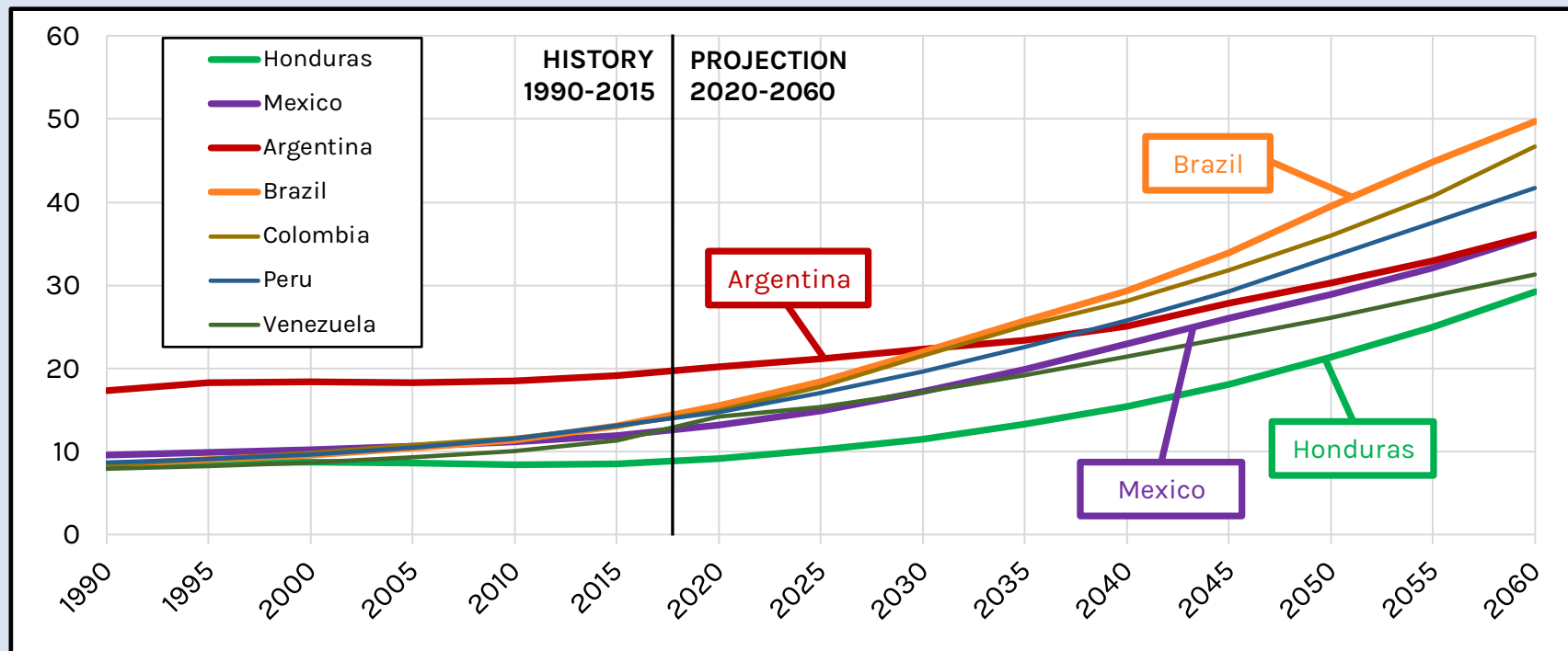
OLD-AGE DEPENDENCY RATIO: S. AFRICA

Population Aged 65+
per 100 Pop Age 15-64 : Select Sub-Saharan African Countries



OLD-AGE DEPENDENCY RATIO: LATIN AMERICA

Population Aged 65+
per 100 Pop Age 15-64 : Select Latin American Countries



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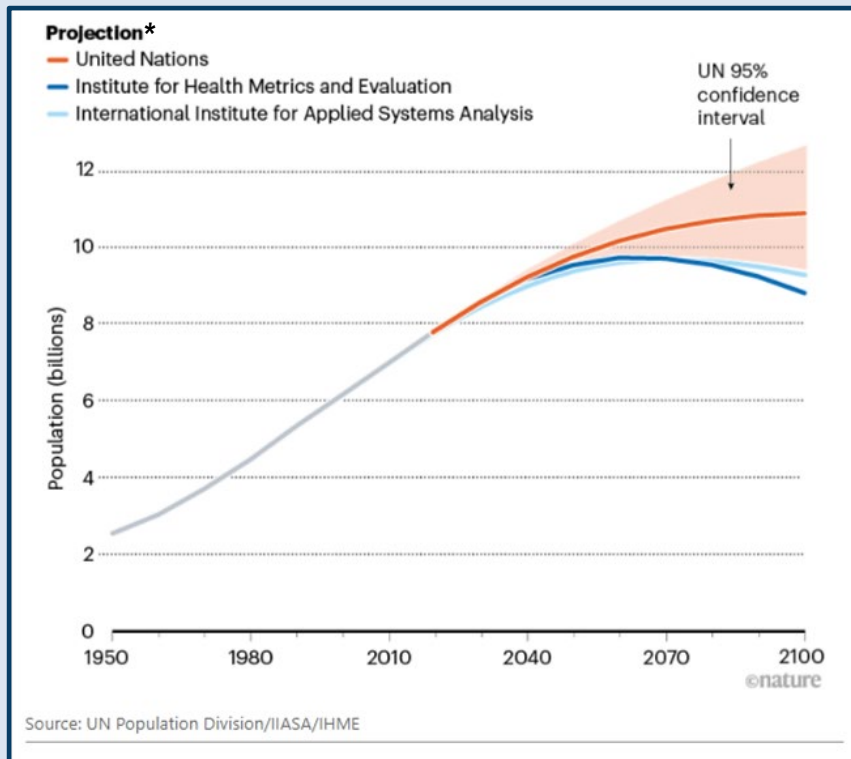
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WHEN WILL GLOBAL POPULATION PEAK?



Institution	Projected Year When Population Peaks	Projected Peak Population
UN Population Division (UNPD) ¹	2100	10.8 billion
International Institute for Applied Systems Analysis (IIASA) ²	2080	9.8 billion
Institute for Health Metrics and Evaluation (IHME) ³	2064	9.73 billion

SOURCES: *David Adam, "How Far Will Global Population Rise? Researchers Can't Agree" (*Nature*; Sept 21, 2021)

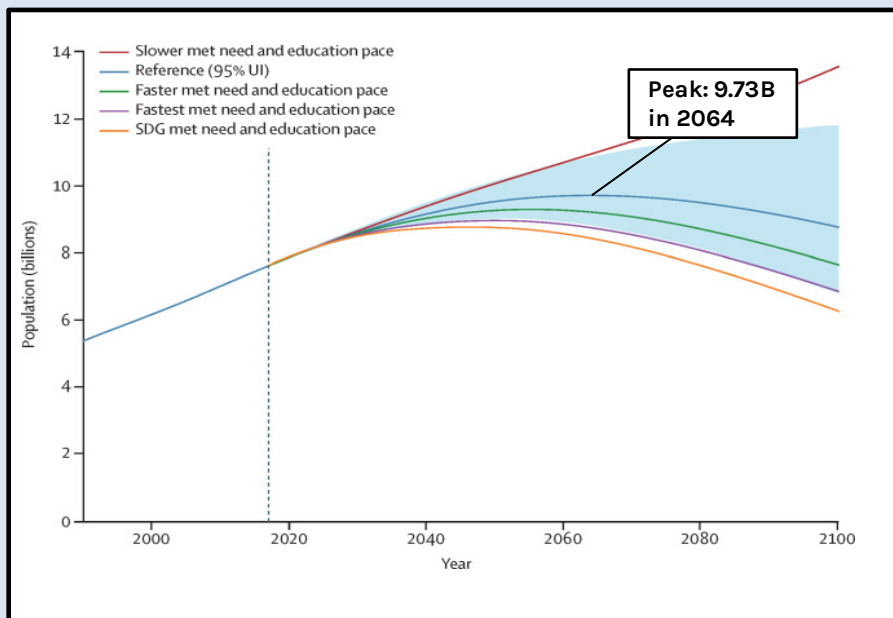
¹United Nations Department of Economic and Social Affairs, "World Population Prospects: Highlights" (2019)

²Wolfgang Lutz, et al. "Demographic and human capital scenarios for the 21st century: 2018 assessment for 201 countries" (European Commission Joint Research Centre, 2018)

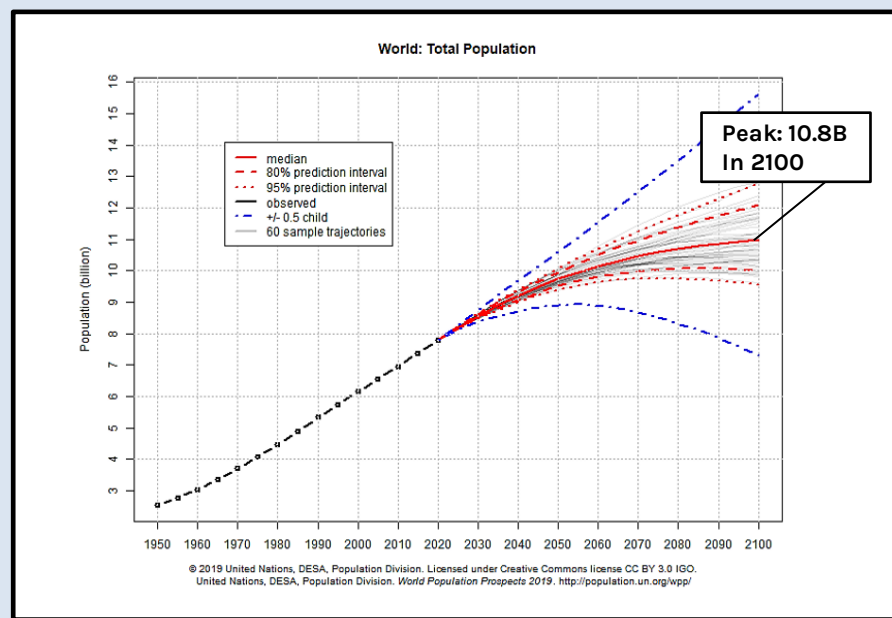
³Christopher J.L. Murray, et al. "Fertility, mortality, migration, and population scenarios for 195 countries and territories..." (*The Lancet*, Oct 2020)

WHEN WILL GLOBAL POPULATION PEAK?

IHME Projections¹



UNPD Projections²



SOURCES:

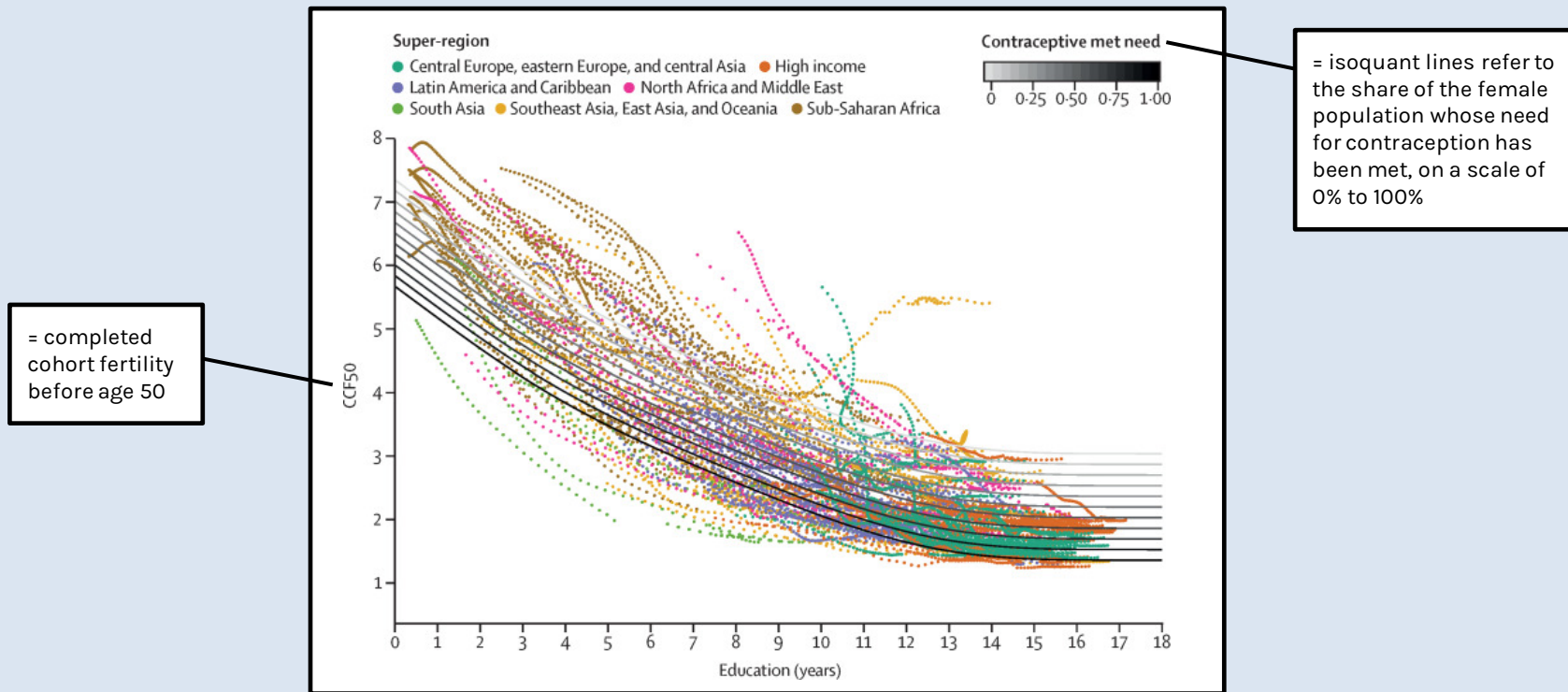
¹Christopher J.L. Murray, et al. "Fertility, mortality, migration, and population scenarios for 195 countries and territories..." (*The Lancet*, Oct 2020)

²United Nations Department of Economic and Social Affairs, "World Population Prospects: Highlights" (2019)

WHY DO THESE ESTIMATES DIFFER?

- The UNPD forecast is generally considered the gold standard among demographers. But some argue that they ignore the long-term social and cultural forces that are driving down fertility.
- The UNPD expects that some of today's very low-fertility societies (e.g. in Europe and East Asia) will see rising TFRs over the next several decades and gravitate back up to replacement rate.
- The IIASA and IHME disagree with this take. They see no reason to expect a TFR reversal in any society. They also expect fertility to decelerate as female educational attainment continues to advance.
- In 2020, a major study from the IHME (published in *The Lancet*) presented a new forecast based on this POV. The researchers tied each society's TFR to two critical variables:
 - average years of educational attainment
 - availability of female contraception expressed as a ratio to the number of women who express a desire to limit their family size
- The authors found a *very high correlation* between these two variables on the one hand and completed female fertility on the other. Their projections are tilted toward lower fertility and lower population growth almost everywhere.

FEMALE EDUCATION AND FERTILITY

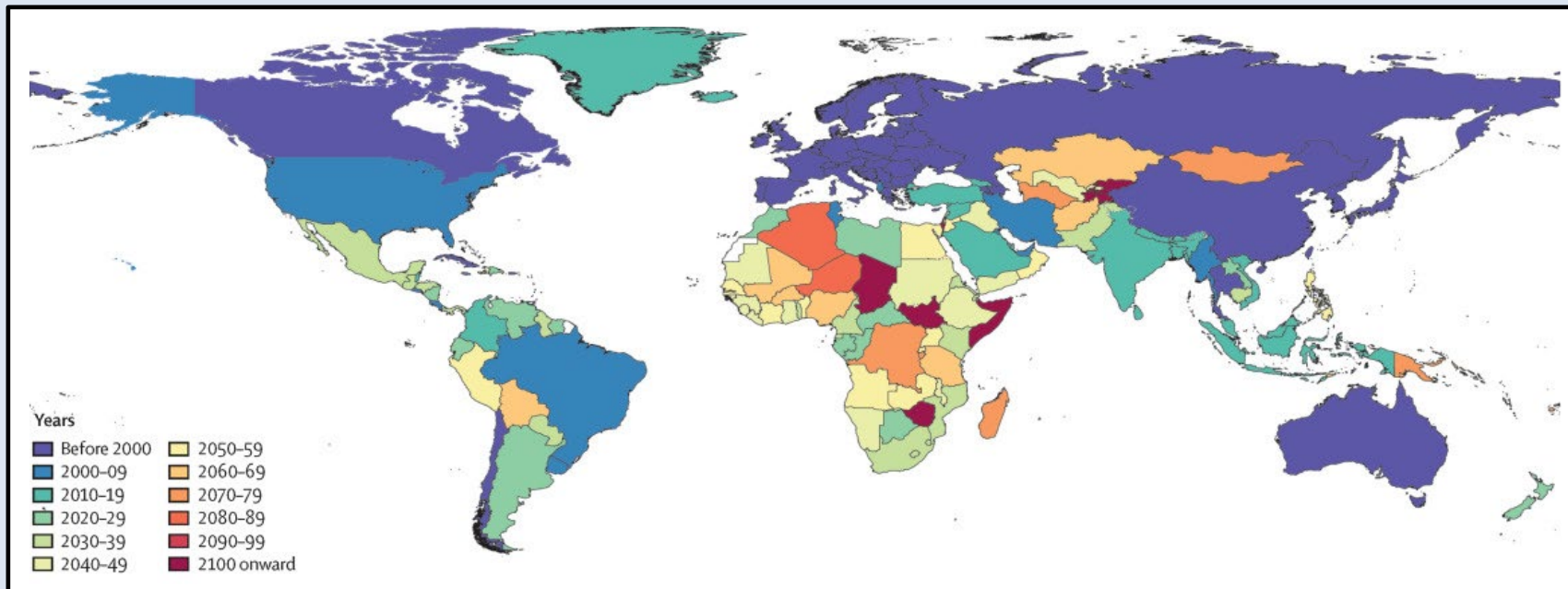


SOURCE: Christopher J.L. Murray, et al. "Fertility, mortality, migration, and population scenarios for 195 countries and territories..." (*The Lancet*, Oct 2020)

NOTES: CCF50-fitted trends are presented as a function of education across varying levels of contraceptive met need. Each point represents a single location-year of past data, and they are colored by GBD 2017 super-regions. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

TFR ALREADY LESS THAN 2.1 IN MOST OF WORLD

Estimated Year When Net TFR Falls Below Replacement Level



SOURCE: Christopher J.L. Murray, et al. "Fertility, mortality, migration, and population scenarios for 195 countries and territories..." (*The Lancet*, Oct 2020)

NOTES: Replacement is defined as a net reproduction rate of 1. Past estimates are calculated on the basis of GBD 2017 estimates and future estimates are calculated from the reference forecast. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

FINAL THOUGHTS

- The IHME predicts that global population will peak *nearly four decades earlier* than the UNPD does (2064 vs. 2100).
- Overall, I have mixed feelings about their projections.
- **AGREEMENT**: Fertility rates are not likely to gravitate toward replacement in the long run. If current social and cultural trends continue on autopilot, global population is likely to decline a lot more than the UNPD projects.
- **DISAGREEMENT**: The researchers believe they have found a stable recent relationship linking fertility to education and contraception. But how can they know if this relationship will remain stable in future decades? What about the impact of nationalism, war, depression, advanced technologies, etc...?
- **DISAGREEMENT**: The IHME model does not check its living-standard projections against economic plausibility. Even assuming falling fertility, the economy of Nigeria--based mostly on subsistence agriculture--is someday supposed to support a population nearly double the size of the European Union. Not likely.
- Further reading:
 - *Empty Planet: The Shock of Global Population Decline*, by Darrell Bricker and John Ibbitson (2019)
 - *The Human Tide: How Population Shaped the Modern World*, by Paul Moreland (2019)