Demography as Strategic Foresight

Richard Cincotta
rcincotta@stimson.org

Woodrow Wilson Global Fellow
Dir., Global Political Demography Program,
The Stimson Center

AFSG, Crystal City
Presented: March 7, 2019

Objectives:

1. Provide quick background on the *age-structural theory of state behavior*.

2. Review its 5 basic statistical relationships in *"age-structural time"*.

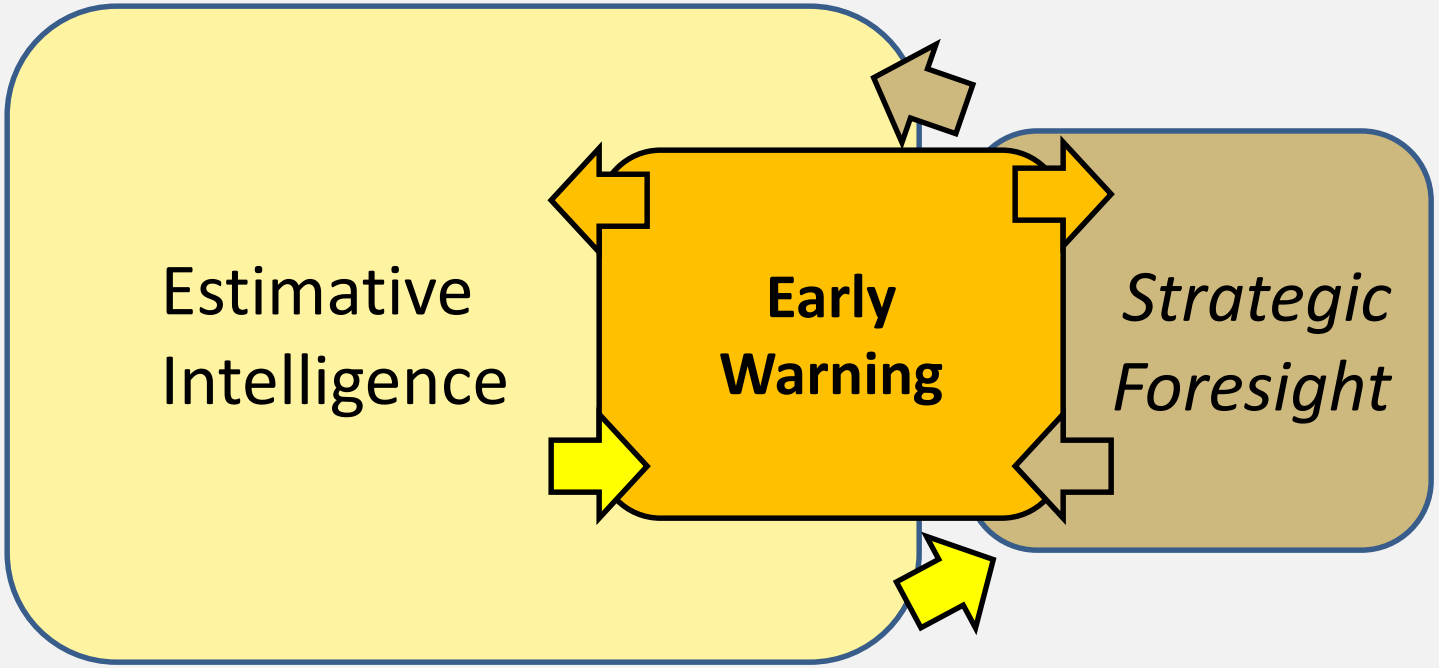
3. Review its potential for statistical forecasting.

4. *If there is time*, review its 10 fundamental "rules".

Background: Origins of age-structural theory

The Anticipatory Fields of Intelligence

(Estimative, Early Warning, Foresight)



Adapted from: J.M. Schmidt, 2015

Features:

- Reductionist: Focuses on a fundamental relationship and builds up; appears unconcerned with causality.

- Core of the model is demographic: relies on estimates and projections by the UN Population Division (alternatively, the US Census Bureau, International Program Center).

- Relies heavily on the scientific method: Models generated by age-structural modeling (logistic regression in the age-structural domain), and then tested, modified, retested.

Key Points

- Age structural transition: transition from youthful to more mature age structures (the *Global Trends* four phases).

- Age-structural domain (*age-structural time* vs. chronological time).

- Age-structural theory of state behavior (generating social, economic, and political expectations at various stages of the age-structural domain).

- Age-structural theory is a scientific program (testable statistical expectations) which differentiates it from explanatory narratives that are untestable.

- Ideology (politico-secular as well as politico-religious) can over-power the expectations associated with demography. Some strong religious ideologies manipulate fertility (and therefore, age structure).

Background: Elements of age-structural theory and their audience

- **Statistical Element**: Generating continuous age-structural functions associated with transitions/events. (driven by the computational and non-computational elements).

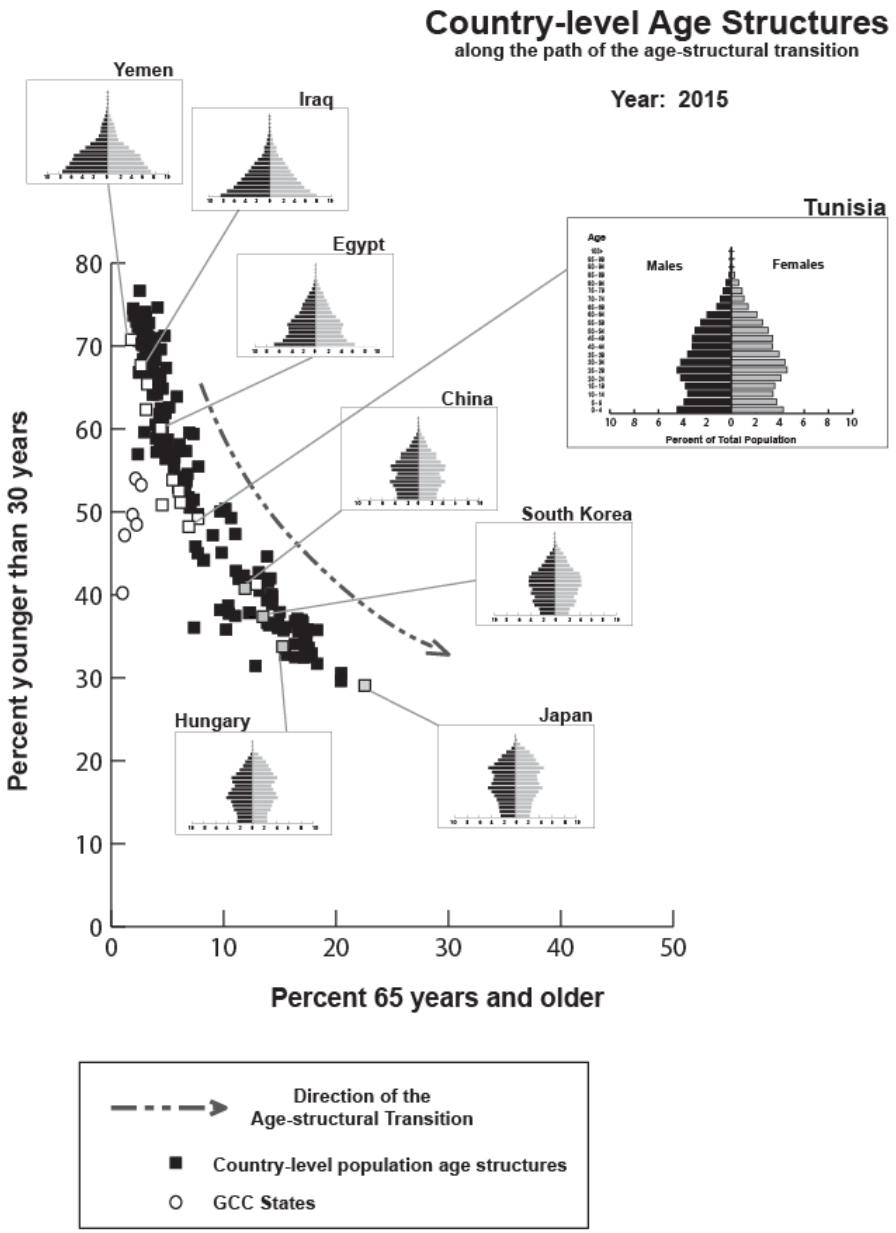
- **Computational Element**: Generating tests of theory and forecasts (checking the statistical and non-computational elements).

- **Non-computational Element**: Generating fundamental expectations for analysts, "the 10 Rules." Separating which countries perform as expected from those that are "behaving unexpectedly" (checking the statistical and computational elements).

The Age-structural Transition

2015

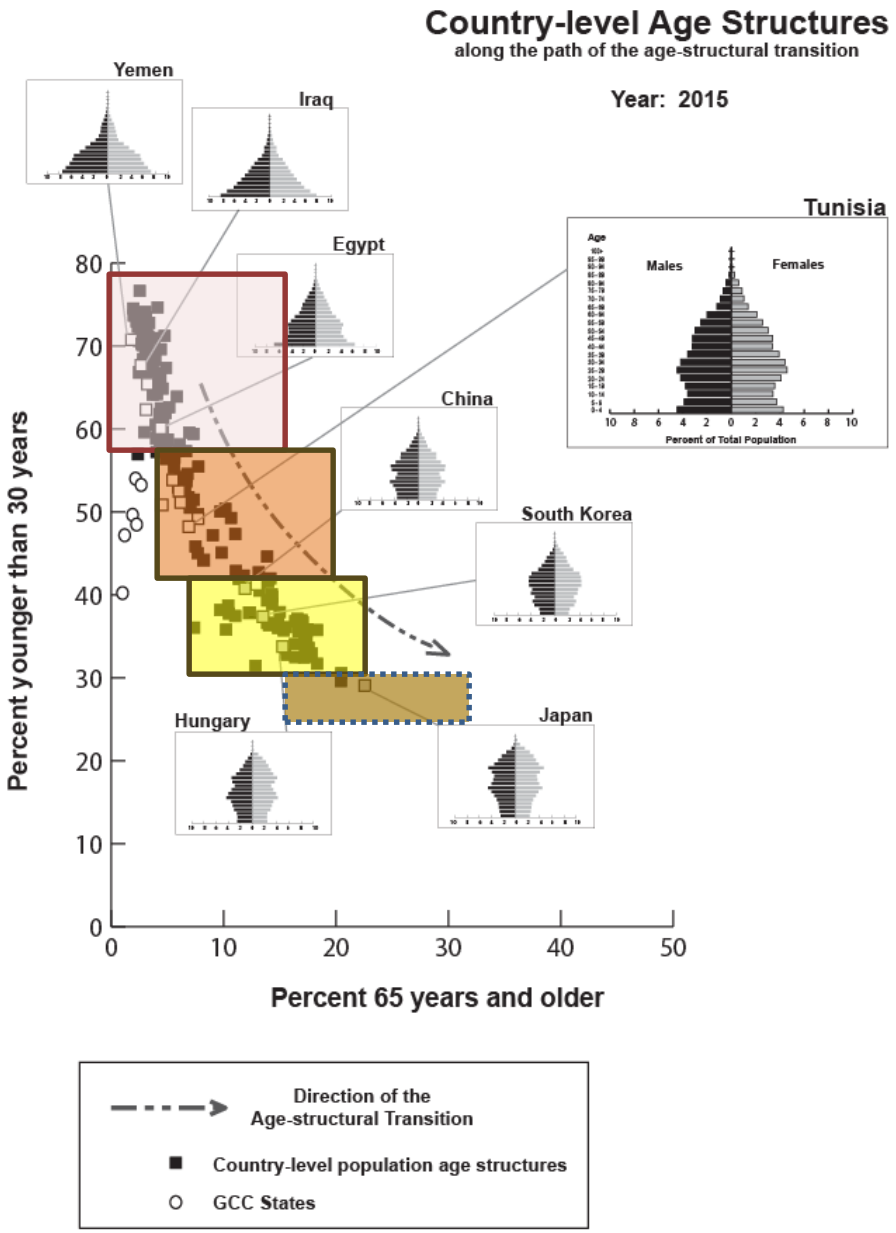
Data: UN Population Division, 2015 Rev.



The Age-structural Transition

2015

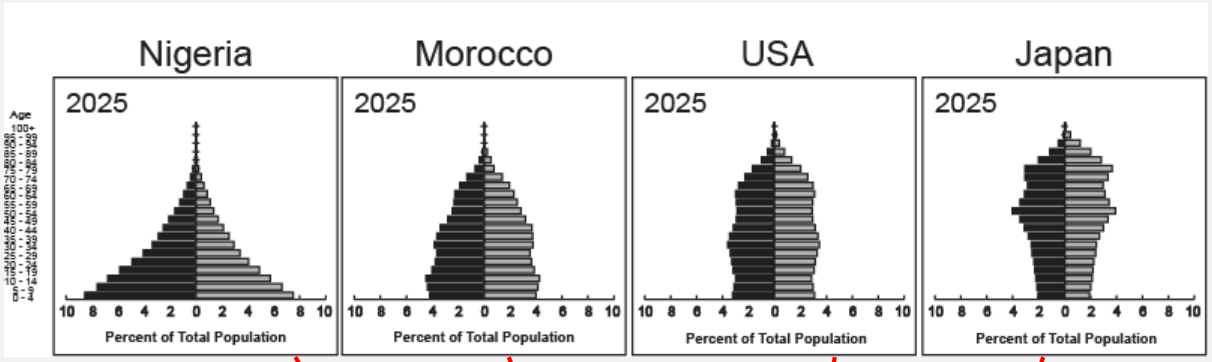
Data: UN Population Division, 2017 Rev.

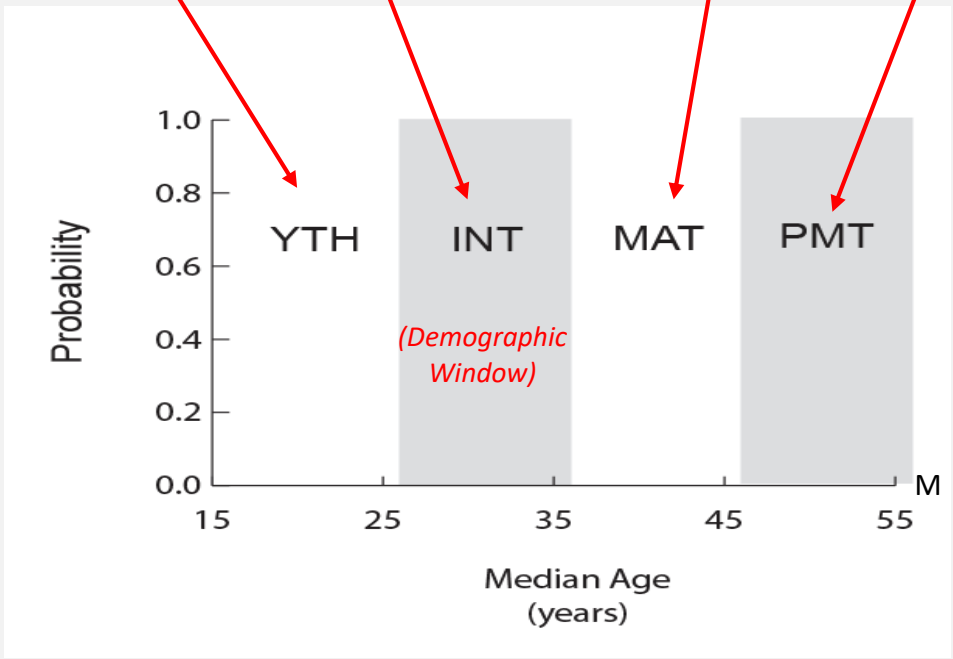


4 Phases of the Age-structural Transition

Median age (in years)

- Youthful ≤ 25.5
- Intermediate 25.6 to 35.5
- Mature 35.6 to 45.5
- Post-mature ≥ 45.6





Age-structural Timeline (M)

Age-structural Transition

NIC's Four Age-structural Phases

- Youthful (YTH): rapid growth among children, adolescents, young adults; low levels of human capital and institutional capacity (typically low legitimacy). Difficult to generate legitimacy from institutions (because of the large load on them, and low levels of human capital)

- Intermediate (INT): *The demographic window*; low levels of dependency; rapidly increasing human capital and institutional capacity (typically gains in legitimacy).

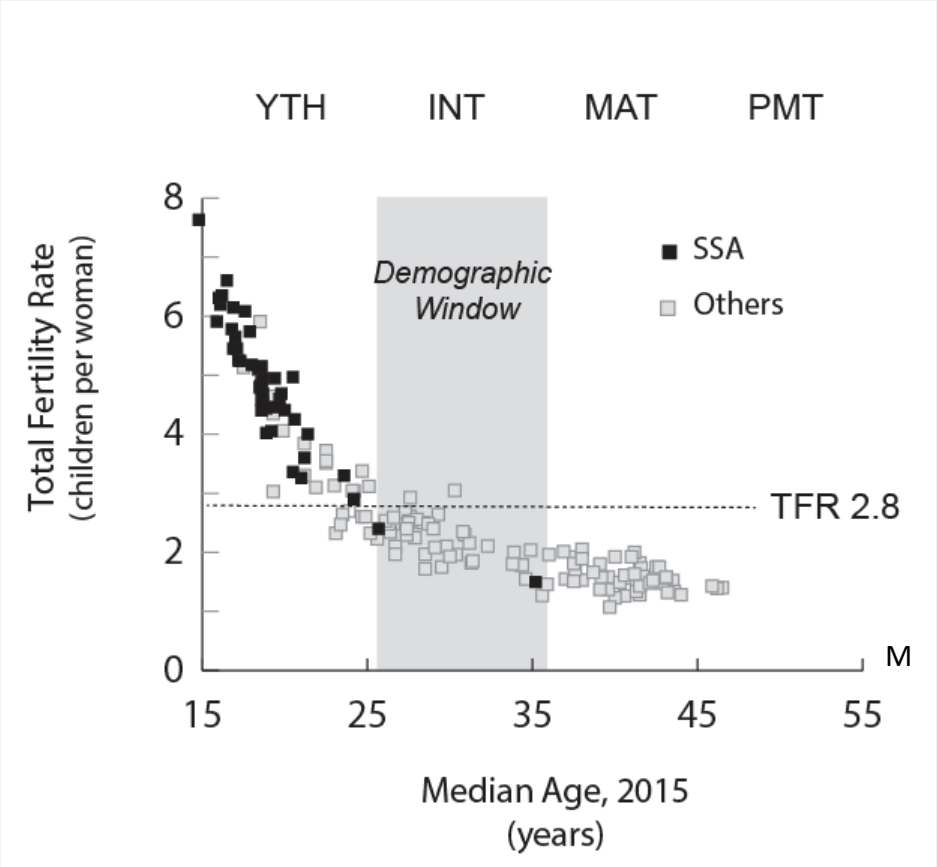
- Mature (MAT): fading of the demographic advantages; society and economy directed by the institution and capacity generated during the window. Need to be preparing institutions/society for the next phase.

- Post-mature (PMT): challenges from large proportion of seniors in adult population; declining workforce size (maybe); unprepared institutions (?); ethnic shifts due to immigration (?).

Phase	Institutional Capacity	Performance
Youthful (YTH)	Weak	Low or Lower-middle
Intermediate (INT)	Upwardly mobile	Lower Middle → Upper Middle
Mature (MAT)	Depends on INT institution building	Upper Middle or High
Post-mature (PMT)	Depends on MAT performance	**???**

Sub-Saharan Africa and the Demographic Window

TFR, 2010-15 vs. Median Age, 2015

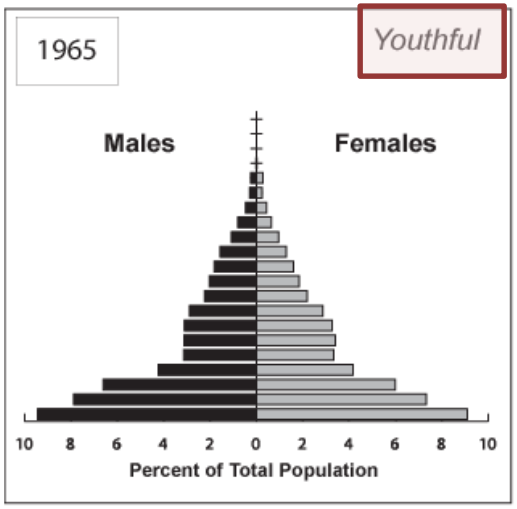


Age-structural
Transition

Exceptional factors:

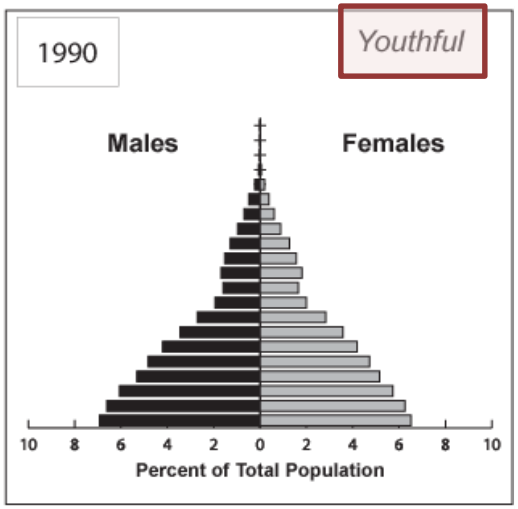
- States with populations less 5.0 million (small-population states [SPS])
- States that are reliant on oil and/or mineral wealth (rents >15% of GDP, resource reliant states [RRS])
- Single-party regimes (ideological political monopolies [IPM]).
- States that are a composite of demographically dissimilar nations [DDN] (large gaps in fertility, growth, age-related mortality, age structure, net migration).

Tunisia



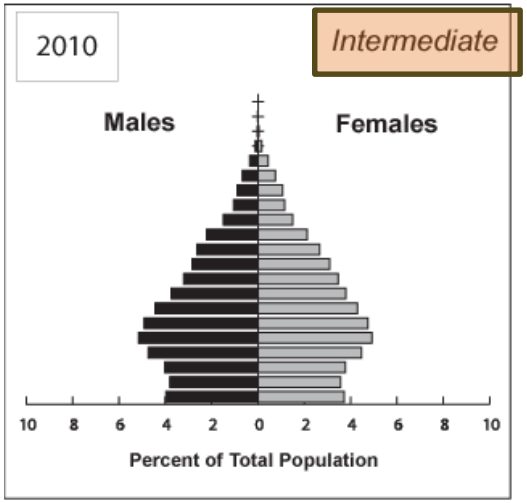
Median age, 17.1

Pop: 4.5 million



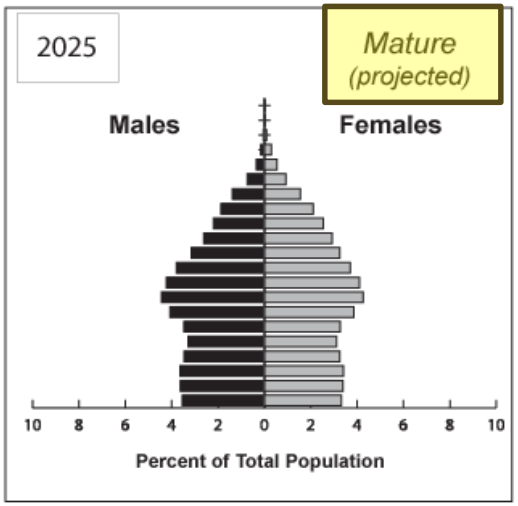
Median age, 20.9

Pop.: 8.2 million



Median age, 29.0

Pop.: 10.6 million

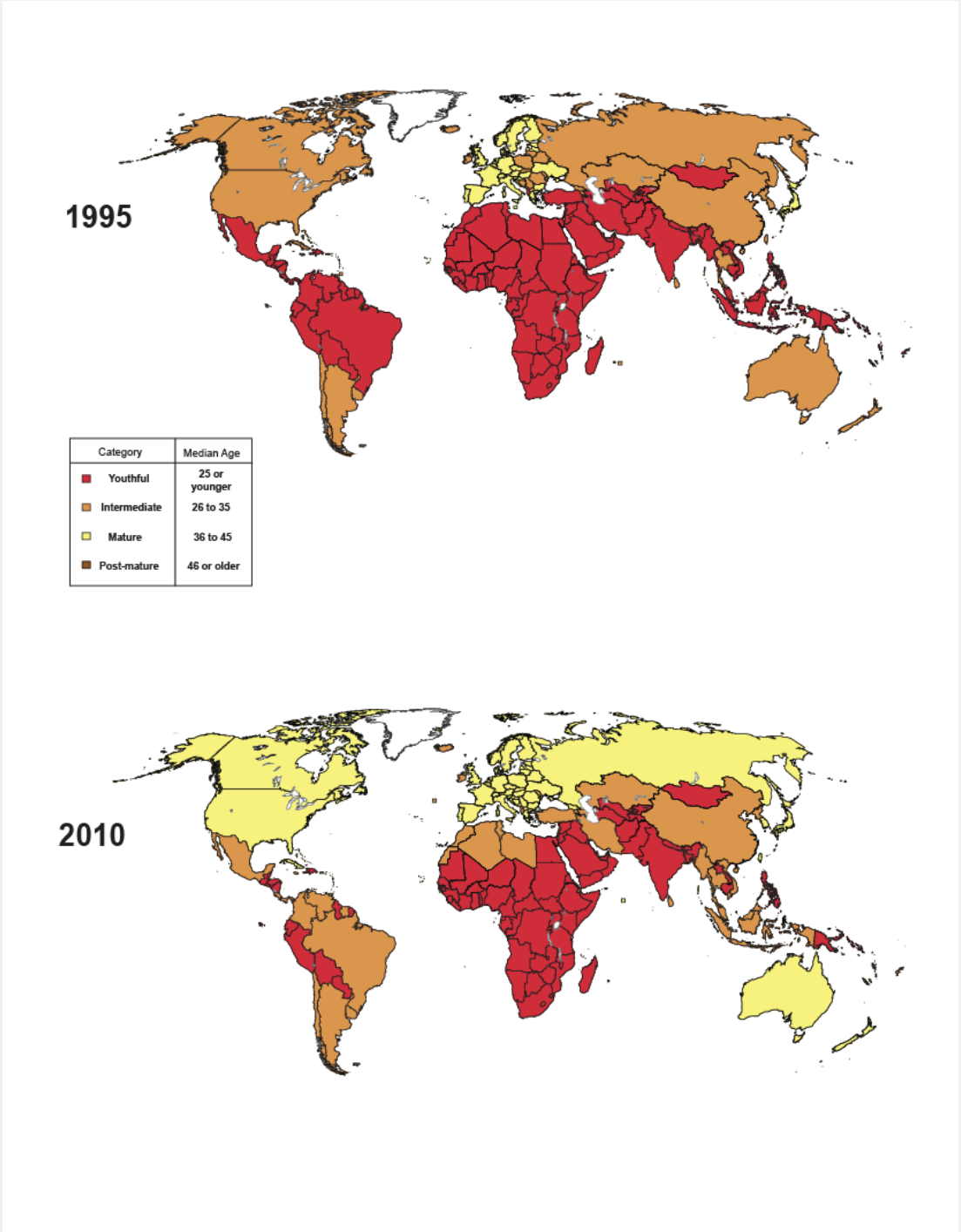


Median age, 35.6

Pop.: 12.3 million

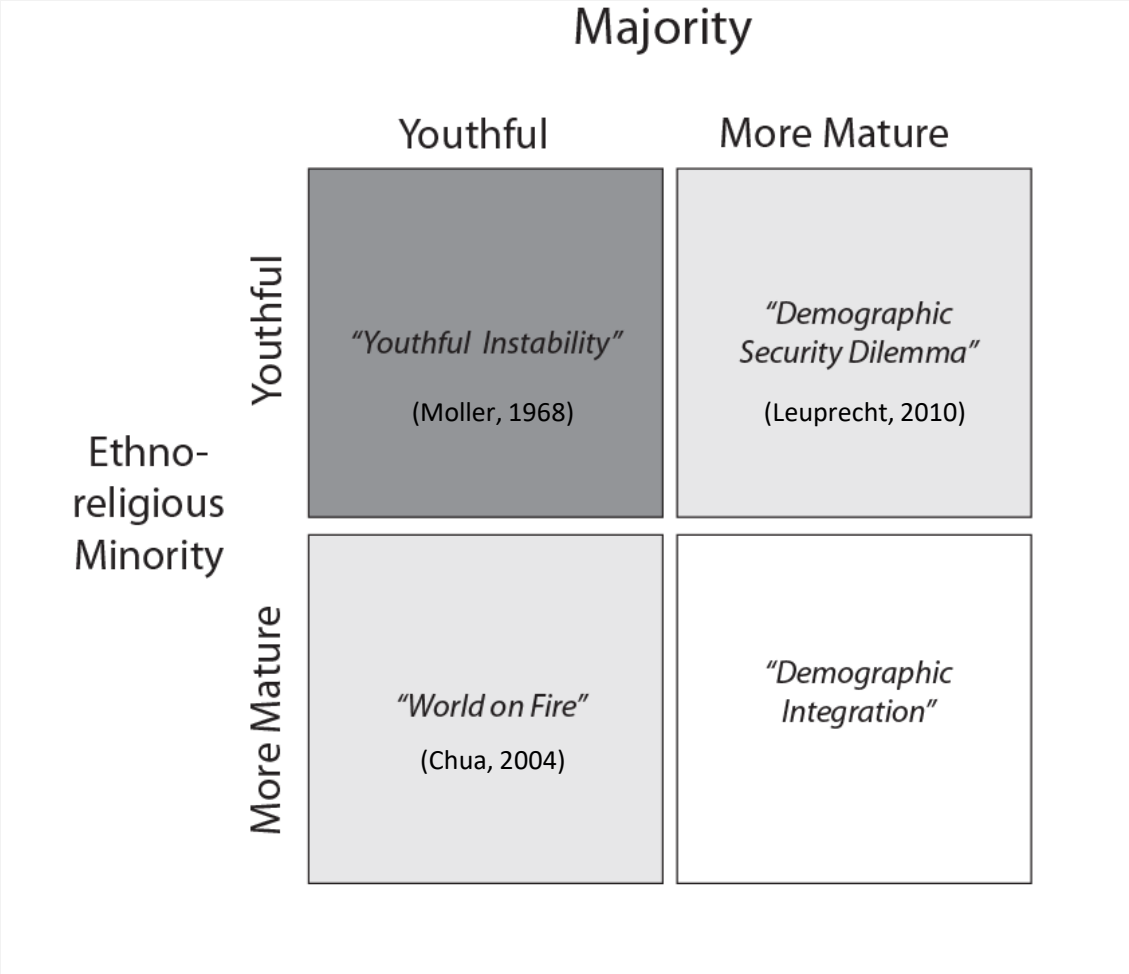
Data: UN Population Div., 2015 Rev.

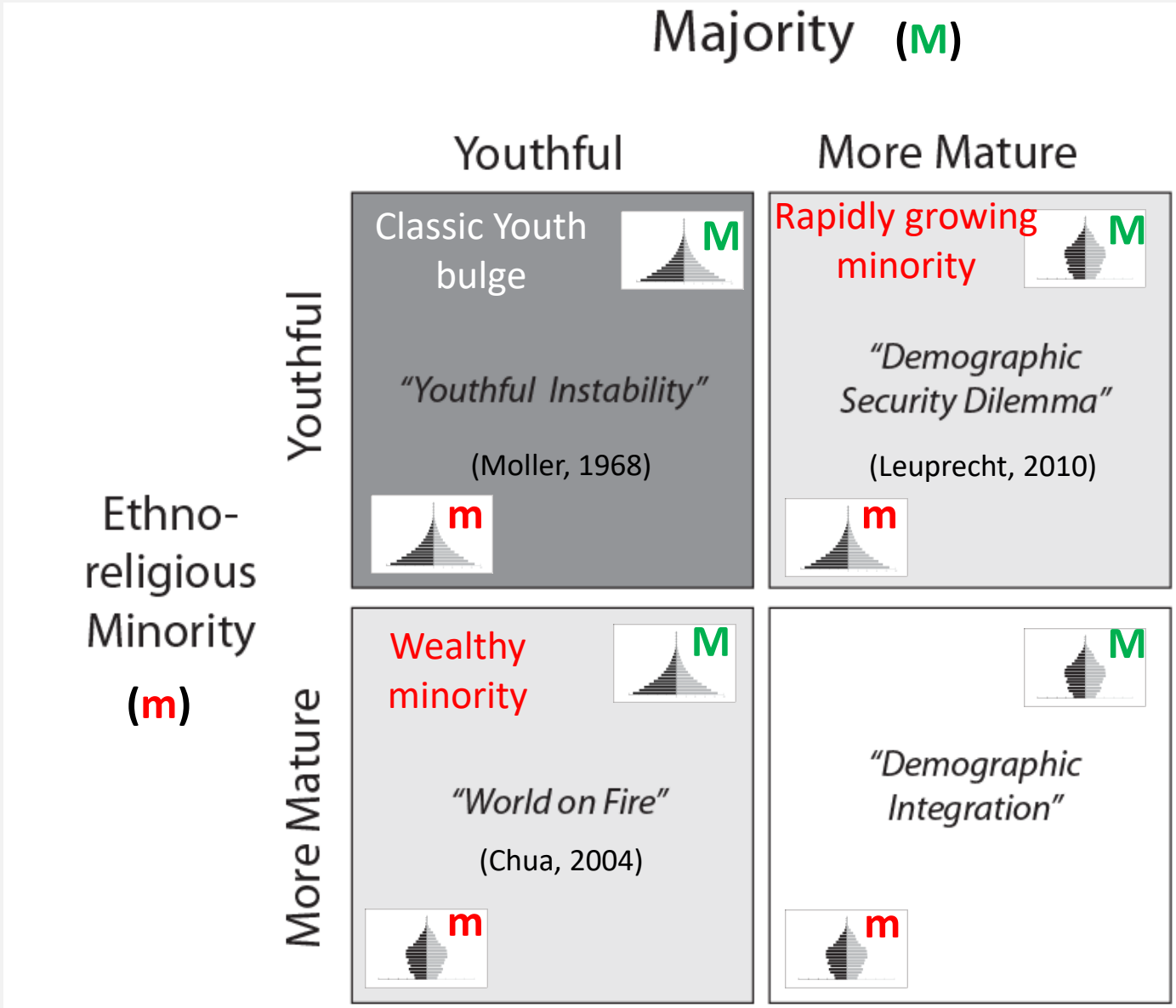
Age-structural Change
1995 to 2010

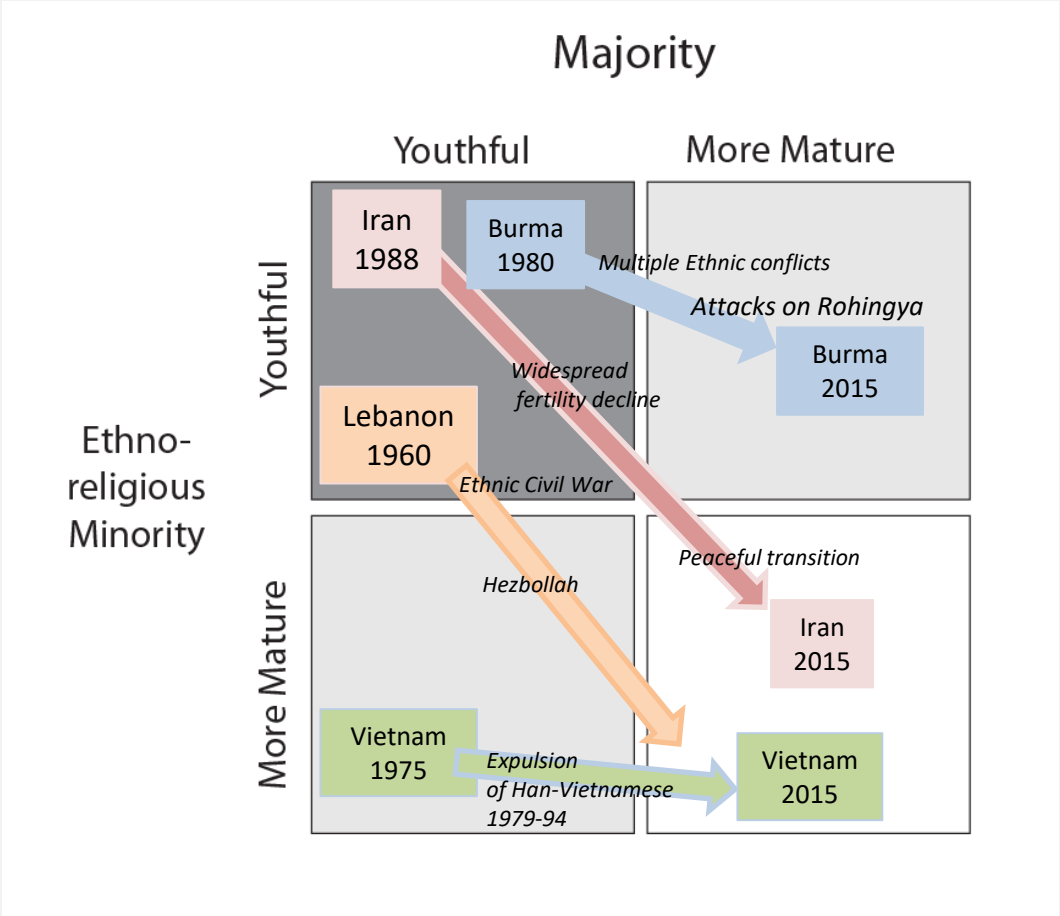


Sub-state Model

Sub-state age-structural model



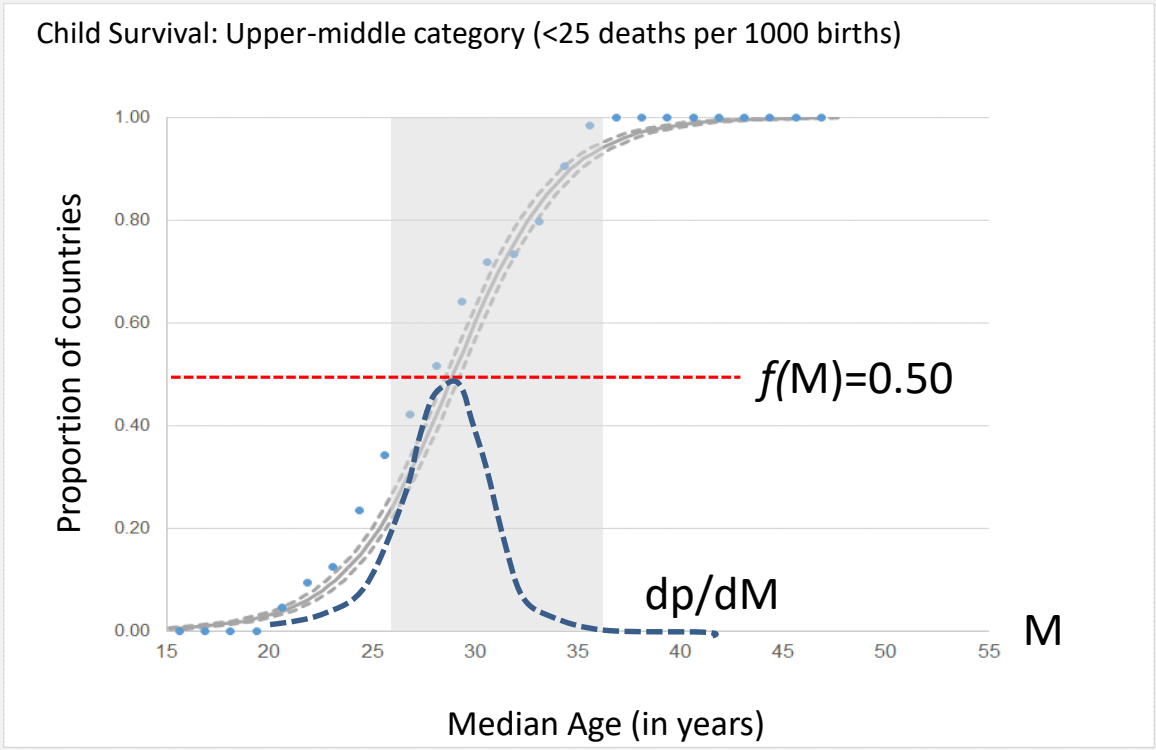

Majority (M)
Youthful
More Mature
Ethno-religious Minority (m)
Youthful
More Mature
Classic Youth bulge
M
"Youthful Instability"
(Moller, 1968)
m
Rapidly growing minority
M
"Demographic Security Dilemma"
(Leuprecht, 2010)
m
Wealthy minority
M
"World on Fire"
(Chua, 2004)
m
M
"Demographic Integration"
m


Majority
Youthful
More Mature
Ethno-religious Minority
Youthful
More Mature
Iran 1988
Burma 1980
Multiple Ethnic conflicts
Attacks on Rohingya
Burma 2015
Widespread fertility decline
Lebanon 1960
Ethnic Civil War
Peaceful transition
Hezbollah
Iran 2015
Vietnam 1975
Expulsion of Han-Vietnamese 1979-94
Vietnam 2015

Methods: Age-structural Modeling

Building Cumulative Distribution Functions

YTH INT MAT PMT



Age-structural Transition

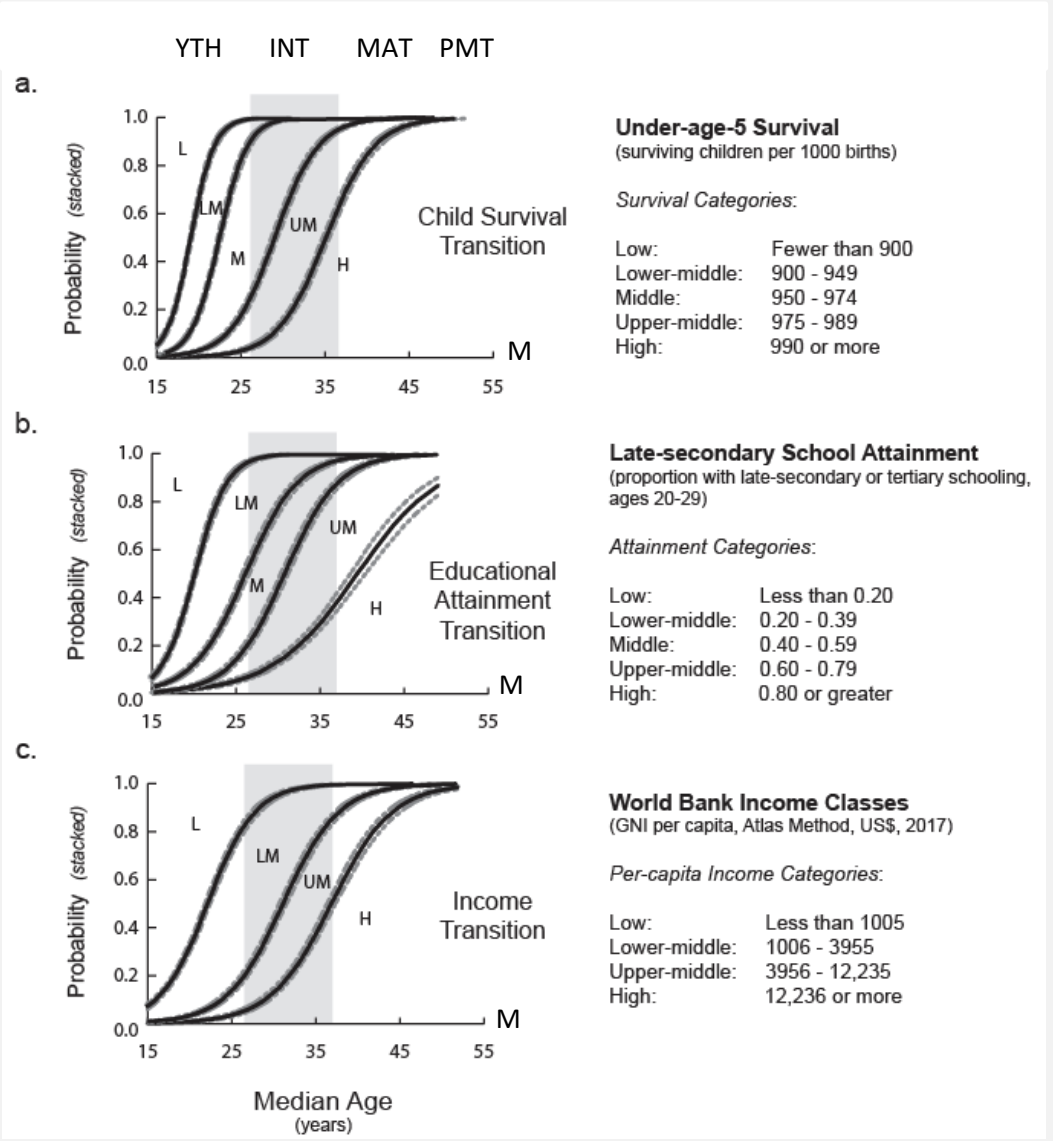
Age Structure & Development

Transitions in:

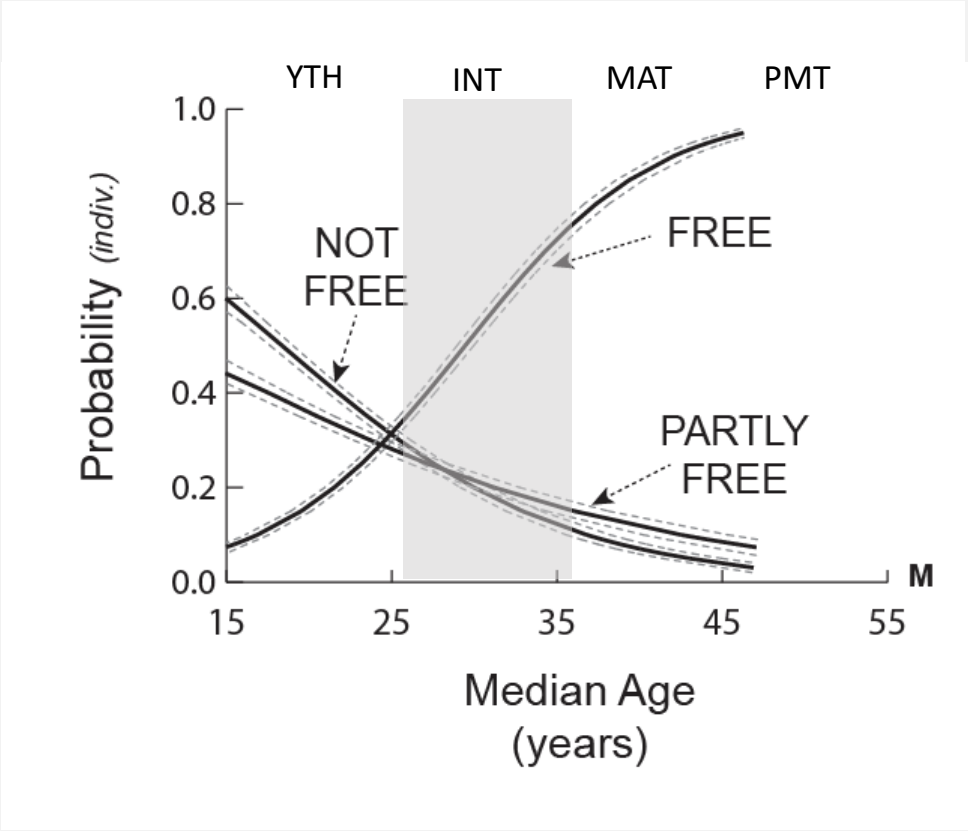
Child survival (UN Pop. Div./WHO)

Late-secondary educational attainment (IIASA/VID)

Per-capita income (World Bank, WDI)



Political Liberalization Transition

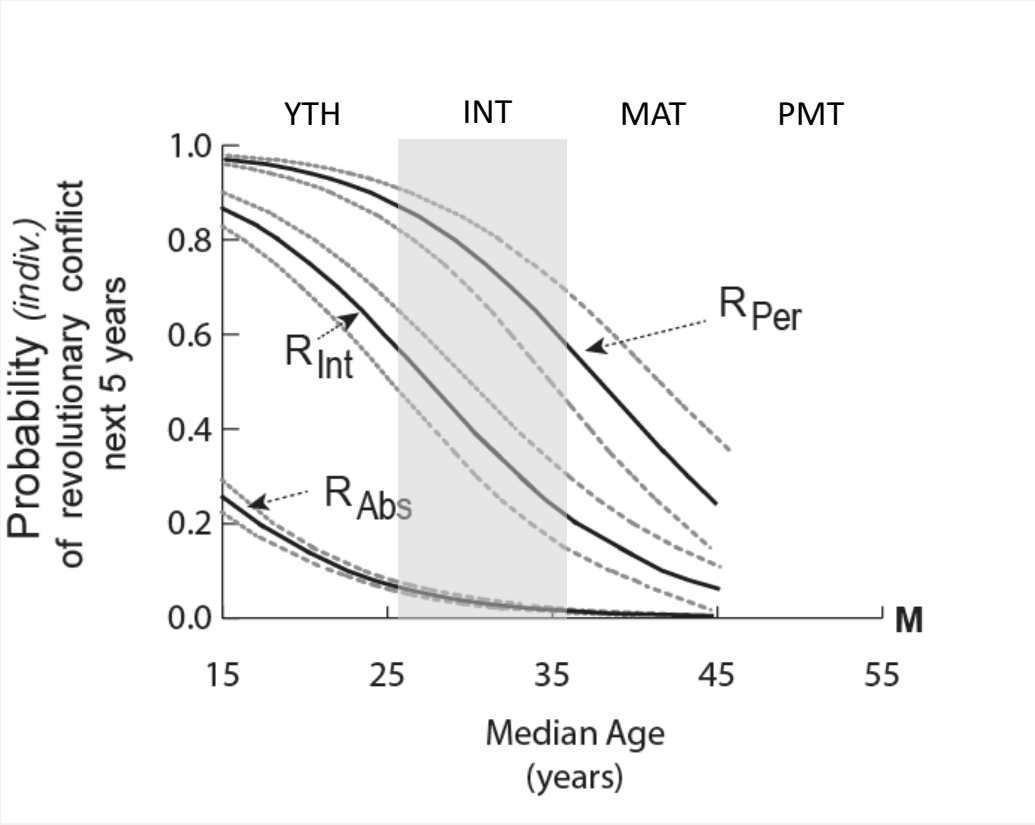


Freedom House freedom status categories, published annually by Freedom House, based on the average of their political rights (PR) and civil liberties (CL) scores (average is called the freedom score).

FREE:	Freedom Scores 2.5 to 1.0
PARTLY FREE:	Freedom Scores 5.0 to 3.0
NOT FREE:	Freedom Scores 7.0 to 5.5

Data: Freedom House (2018), UNPD (2017)

Political Stability Transition



UCDP/PRIO Armed Conflict Database, intra-state, government-focused conflicts (>25 battle-related deaths per year, where the state is one of the armed parties)

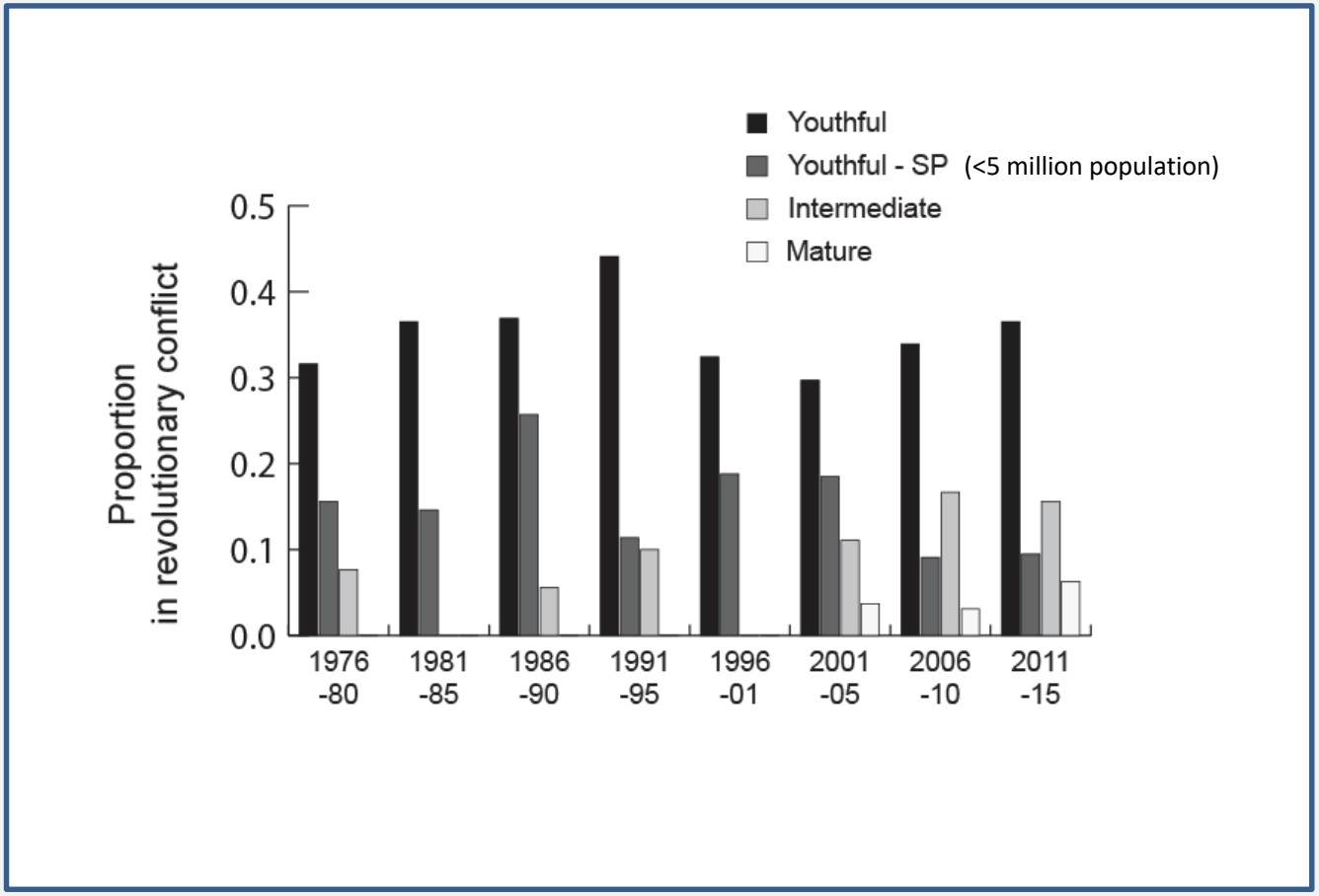
Note: Not a separatist (territorial) conflict.

Conflict History Classes (same type of conflict during prior 4-year)

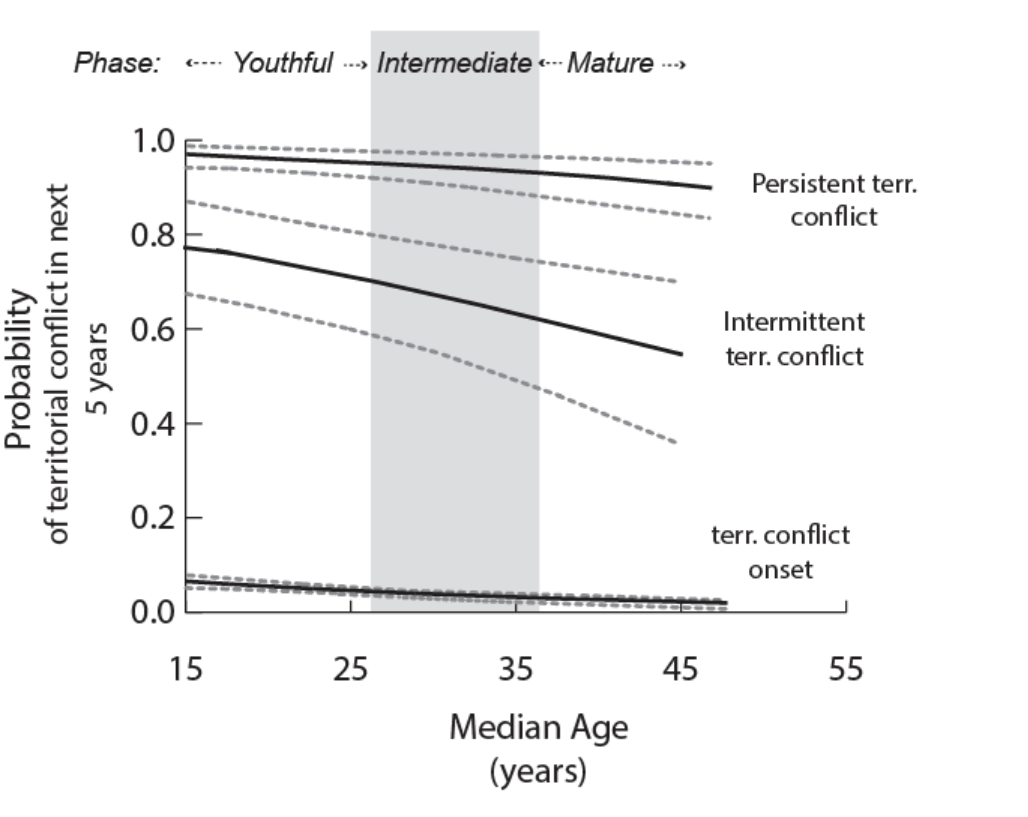
R_{Abs}: 0 years of conflict (absence)
R_{Int}: 1 or 2 years of conflict (intermittence)
R_{Per}: 3 or 4 years of conflict (persistence)

Data: UCDP/PRIO (2017), UNPD (2017)

Revolutionary Conflict: empirical evidence



Territorial (ethnic separatist) Conflicts: Theory



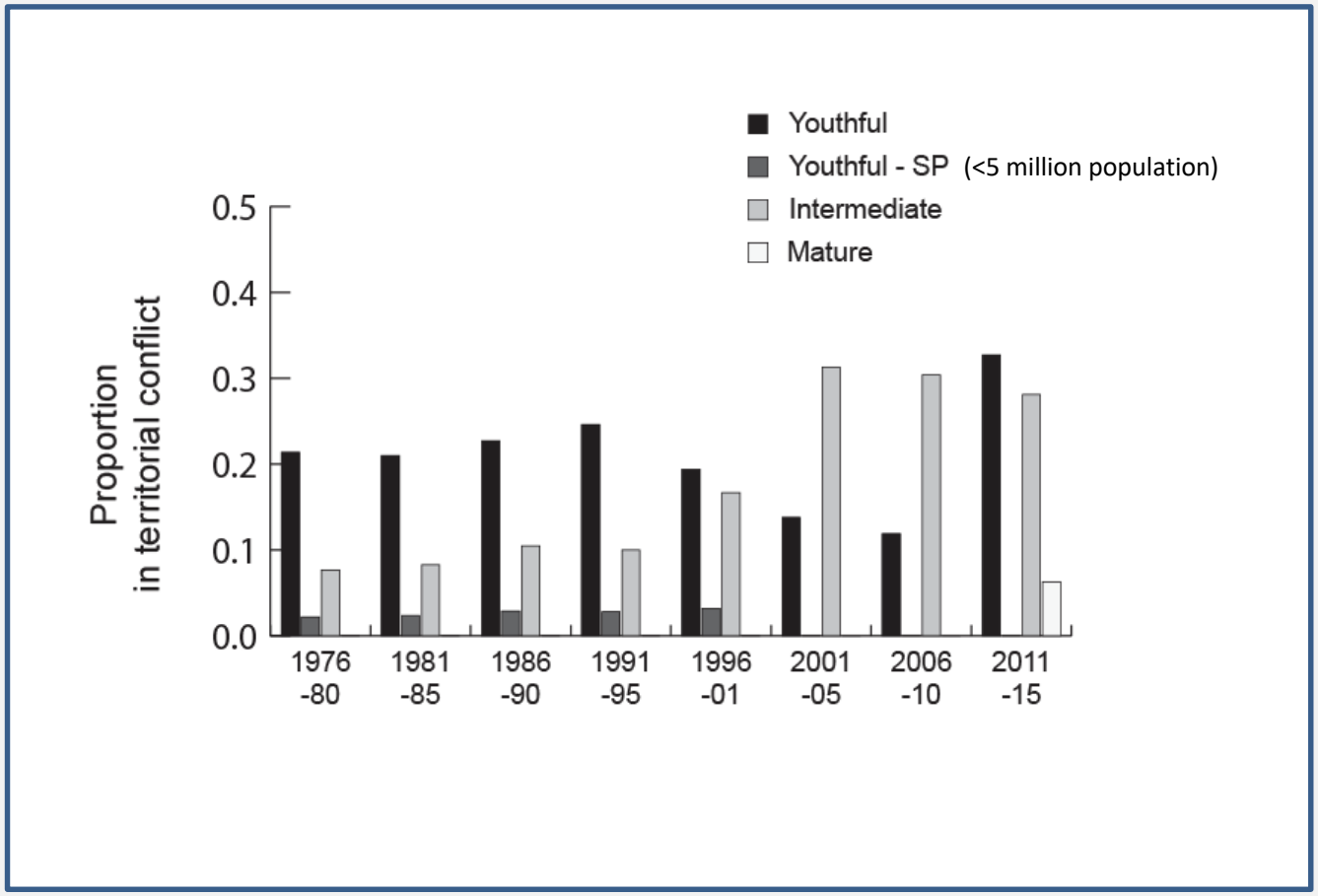
4-year conflict history types

_____

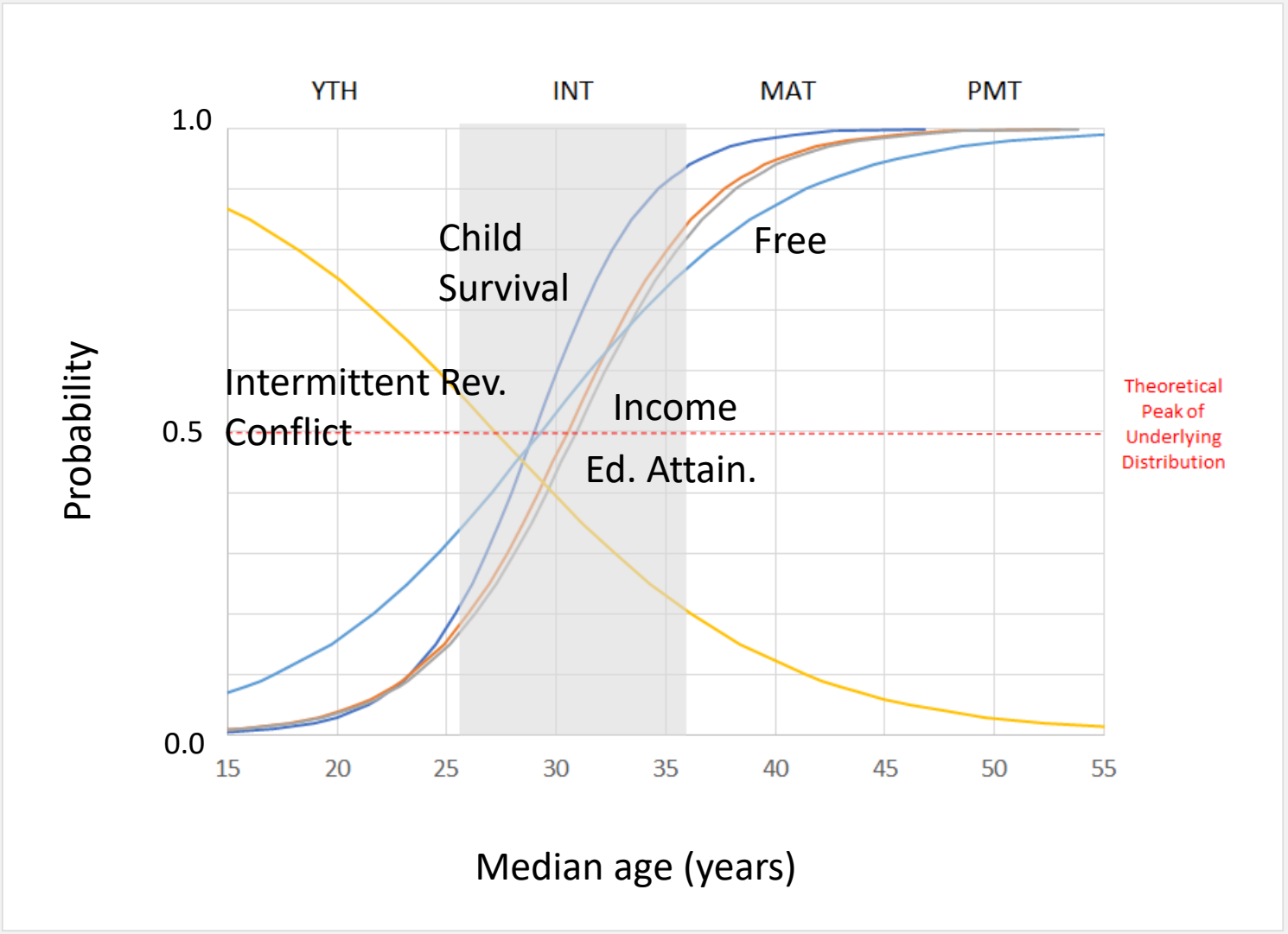
Onset: 0 conflict yrs.
Intermittent: 1 or 2 conflict yrs.
Persistent: 3 or 4 conflict yrs.

Cincotta, in press

Territorial Conflict: empirical evidence



Demographic Window: Upper-Middle$_{50}$



Products: Forecasts and related materials

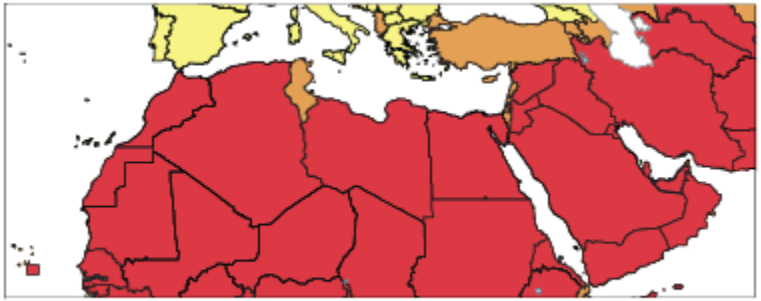
Issues:

- Working in age-structural time (an advantage). Coming up with a narrative (a disadvantage).

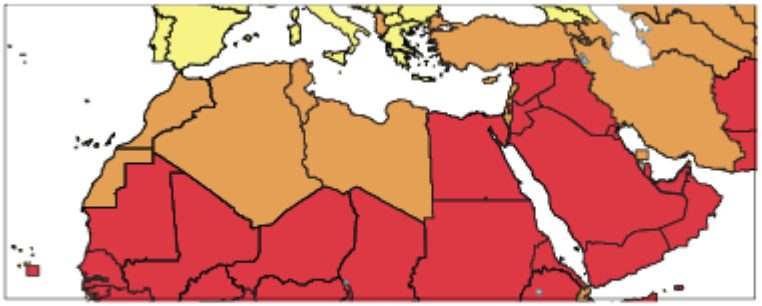
- Law of small numbers: statistical issue; regions more effective than individual states.

- Other factors: Regimes; ideologies; separatist conflicts (and other sub-state issues); neighborhood influences.

- Models naïve to sub-state data: Missing sub-state demography and other sub-state data.



2005



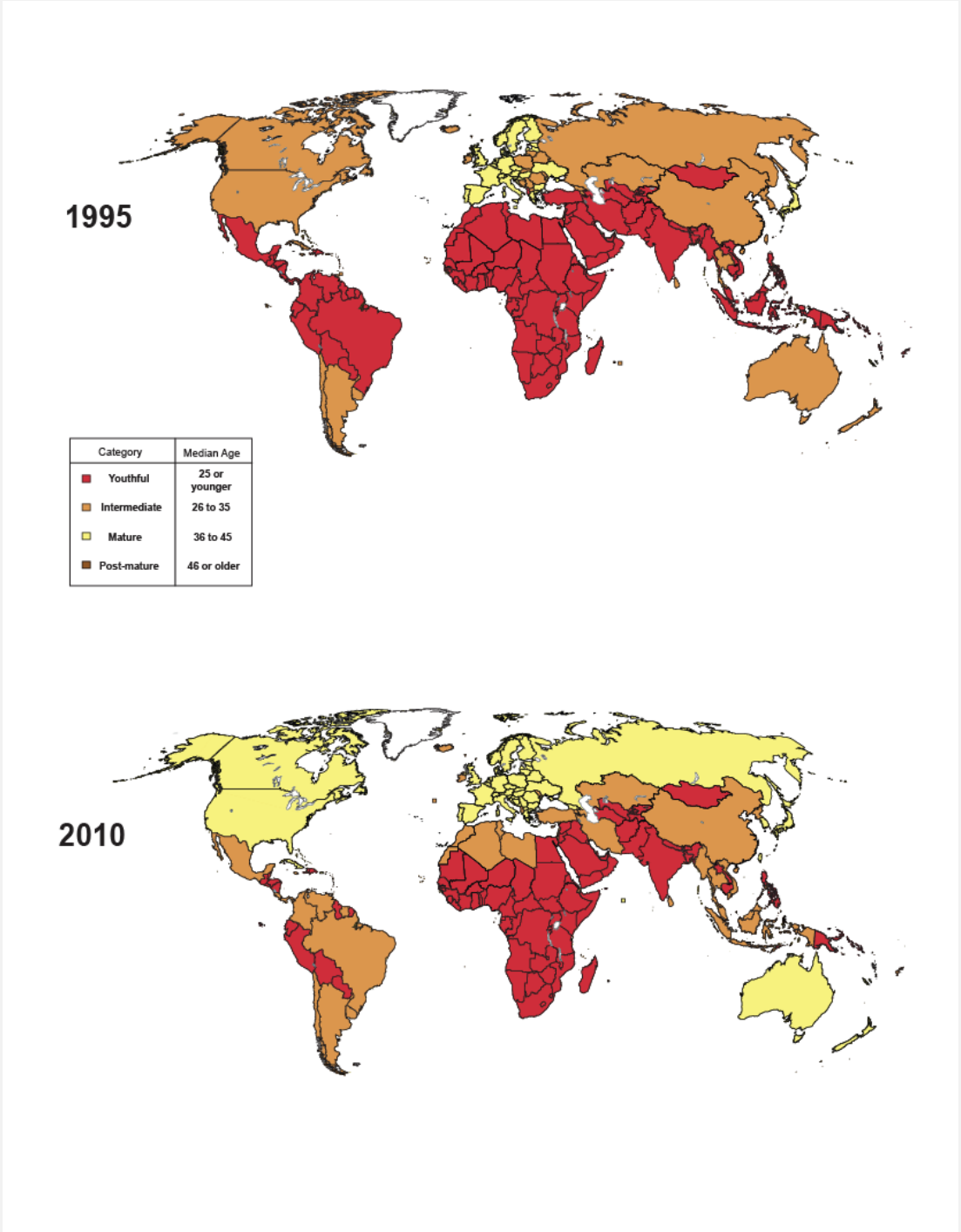
2015

Category	Median Age
Youthful	Younger than 26
Intermediate	26 to 35
Mature	36 to 45
Post-mature	46 or older

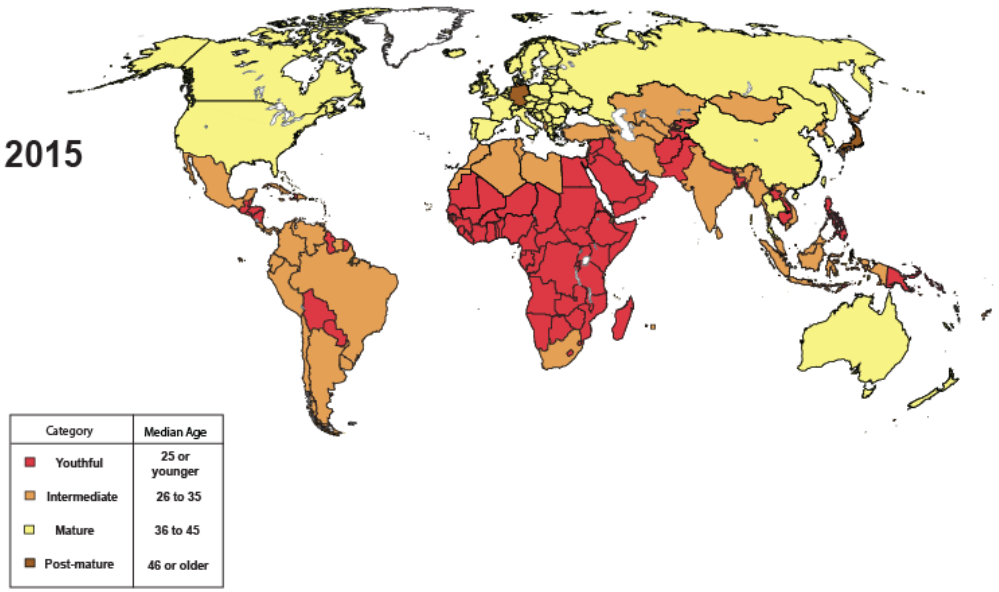
Cincotta, *2015 (updated)*

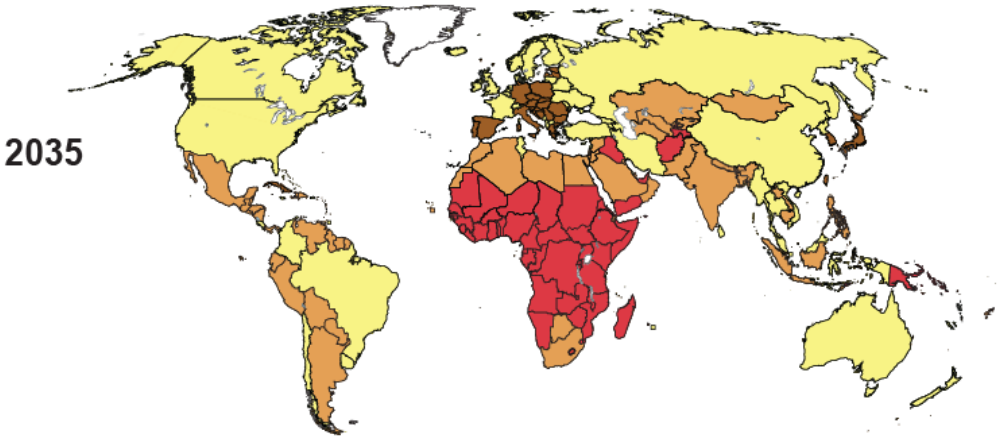
Data: UN Population Div., 2015

Age-structural Change
1995 to 2010



Age-structural Change
2015 to 2035





Data: UN Population Div., 2015

Cincotta, 2015 *(updated)*

Middle East – North Africa 2017

Intra-state Conflicts: 2016 (UCDP/PRIO)

FREE
PARTLY FREE
NOT FREE

Highly Ideological Political Monopoly

Led by Revolutionary

Led by Charismatic Reformer

Median age, 29 years ($FREE_{50}$)

Median age, 26 years

Summary of Model Expectations

(1) STATE (MENA)	(2) Freedom Score 2017	(3) Prob. of FREE, 2018	(4) $Free_{50}$ (year)
Cyprus	1.0	0.79	1984 (Free since 1986)
Tunisia	2.5	0.64	2010 (Free 2015)
Iran	6.0	0.61	2014
Turkey	5.5	0.59	2013
Israel	2.0	0.57	2006 (Free before 1972)
Lebanon	5.0	0.56	2016
Morocco	5.0	0.50	2019
Algeria	5.5	0.48	2020
Libya	6.5	0.47	2020
Bahrain *	6.5	0.45	2023
Saudi Arabia *	7.0	0.34	2026
Egypt	6.0	0.34	>2040
Jordan	5.0	0.25	2035-40
Oman *	5.5	0.25	>2040
Qatar *	5.5	0.21	>2040
Kuwait *	5.0	0.20	>2040
Syria	7.0	0.20	2035-40
Yemen	6.5	0.16	>2040
Iraq	5.5	0.16	>2040
UAE *	6.0	0.14	>2040

MATURE

INTERMEDIATE

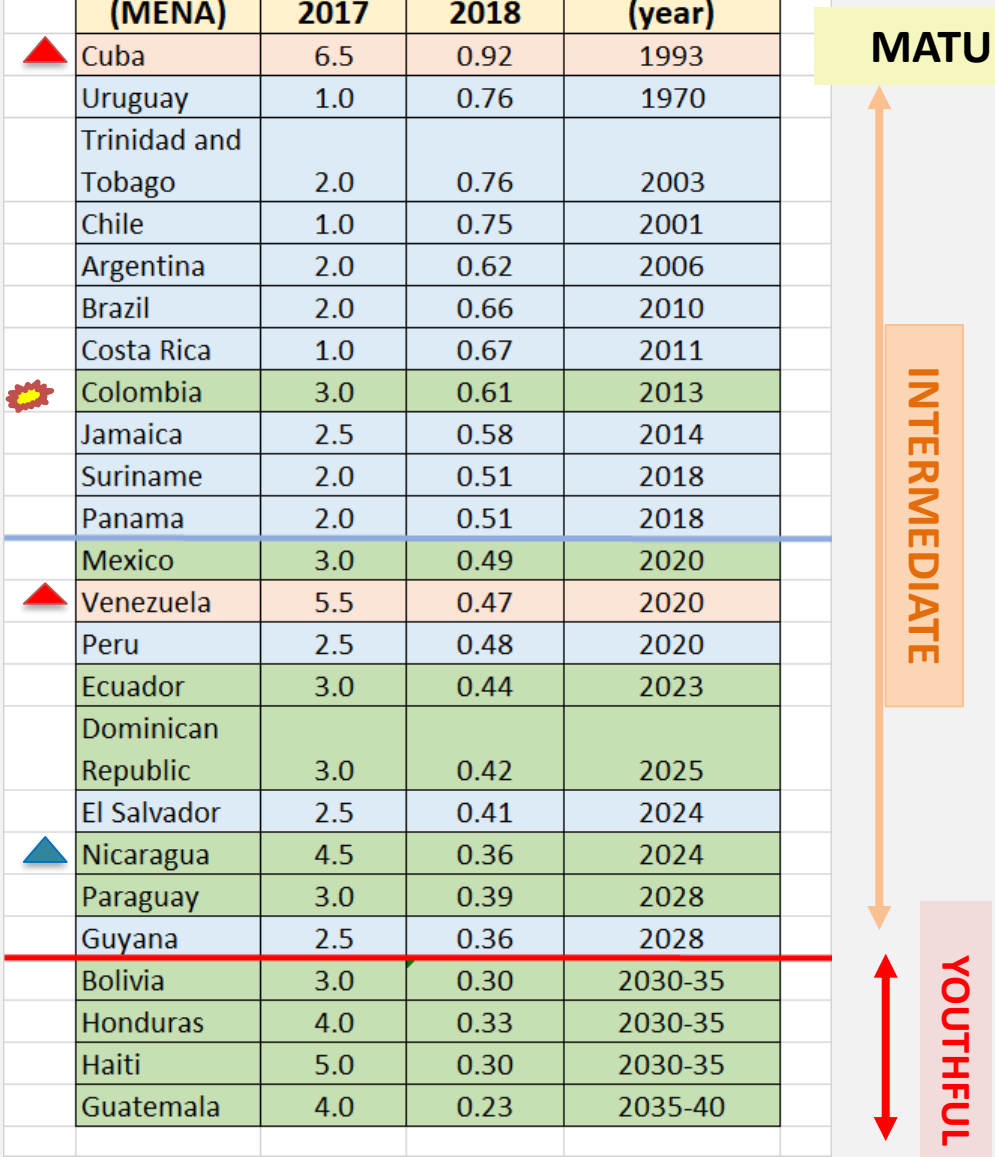
YOUTHFUL

Latin America & Caribbean 2017

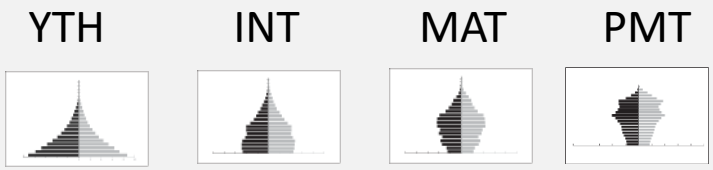
Intra-state Conflicts: 2016 (UCDP/PRIO)

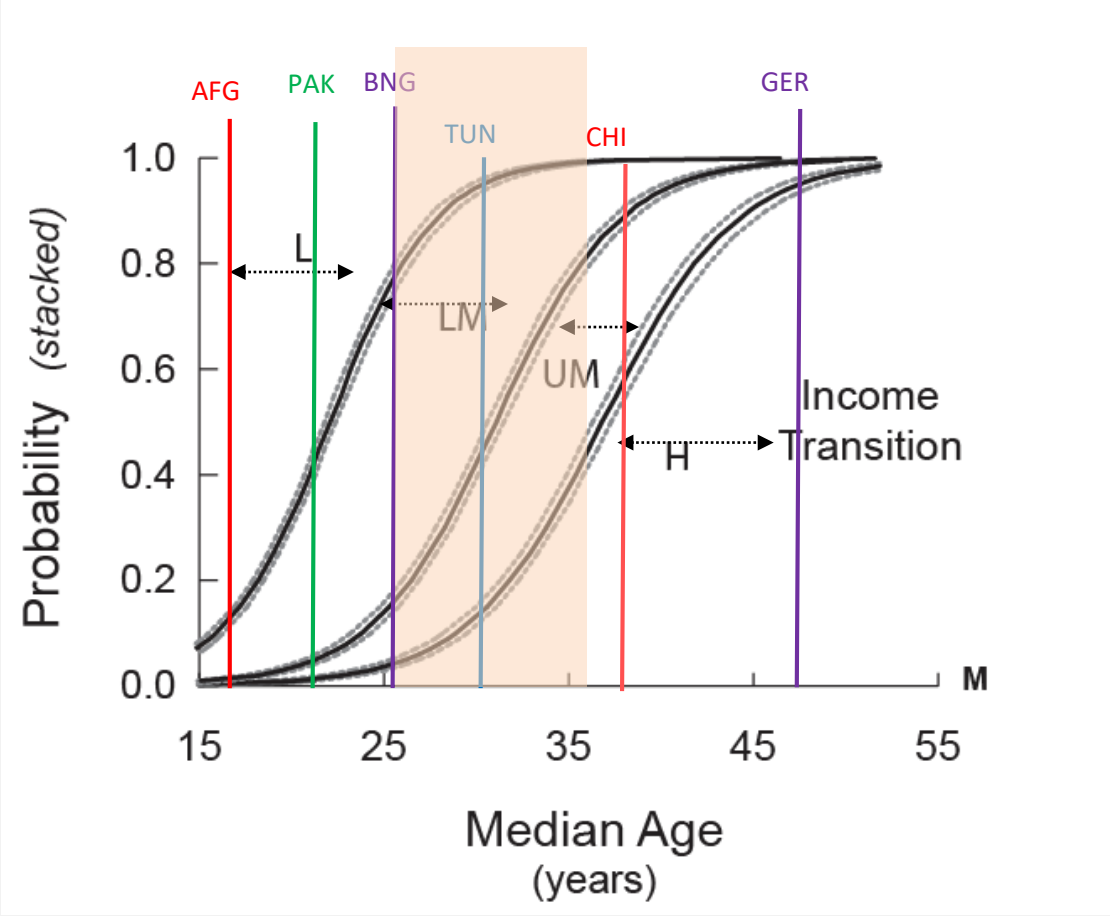
Summary of Model Expectations

(1) STATE (MENA)	(2) Freedom Score 2017	(3) Prob. of FREE, 2018	(4) $Free_{50}$ (year)
Cuba	6.5	0.92	1993
Uruguay	1.0	0.76	1970
Trinidad and Tobago	2.0	0.76	2003
Chile	1.0	0.75	2001
Argentina	2.0	0.62	2006
Brazil	2.0	0.66	2010
Costa Rica	1.0	0.67	2011
Colombia	3.0	0.61	2013
Jamaica	2.5	0.58	2014
Suriname	2.0	0.51	2018
Panama	2.0	0.51	2018
Mexico	3.0	0.49	2020
Venezuela	5.5	0.47	2020
Peru	2.5	0.48	2020
Ecuador	3.0	0.44	2023
Dominican Republic	3.0	0.42	2025
El Salvador	2.5	0.41	2024
Nicaragua	4.5	0.36	2024
Paraguay	3.0	0.39	2028
Guyana	2.5	0.36	2028
Bolivia	3.0	0.30	2030-35
Honduras	4.0	0.33	2030-35
Haiti	5.0	0.30	2030-35
Guatemala	4.0	0.23	2035-40

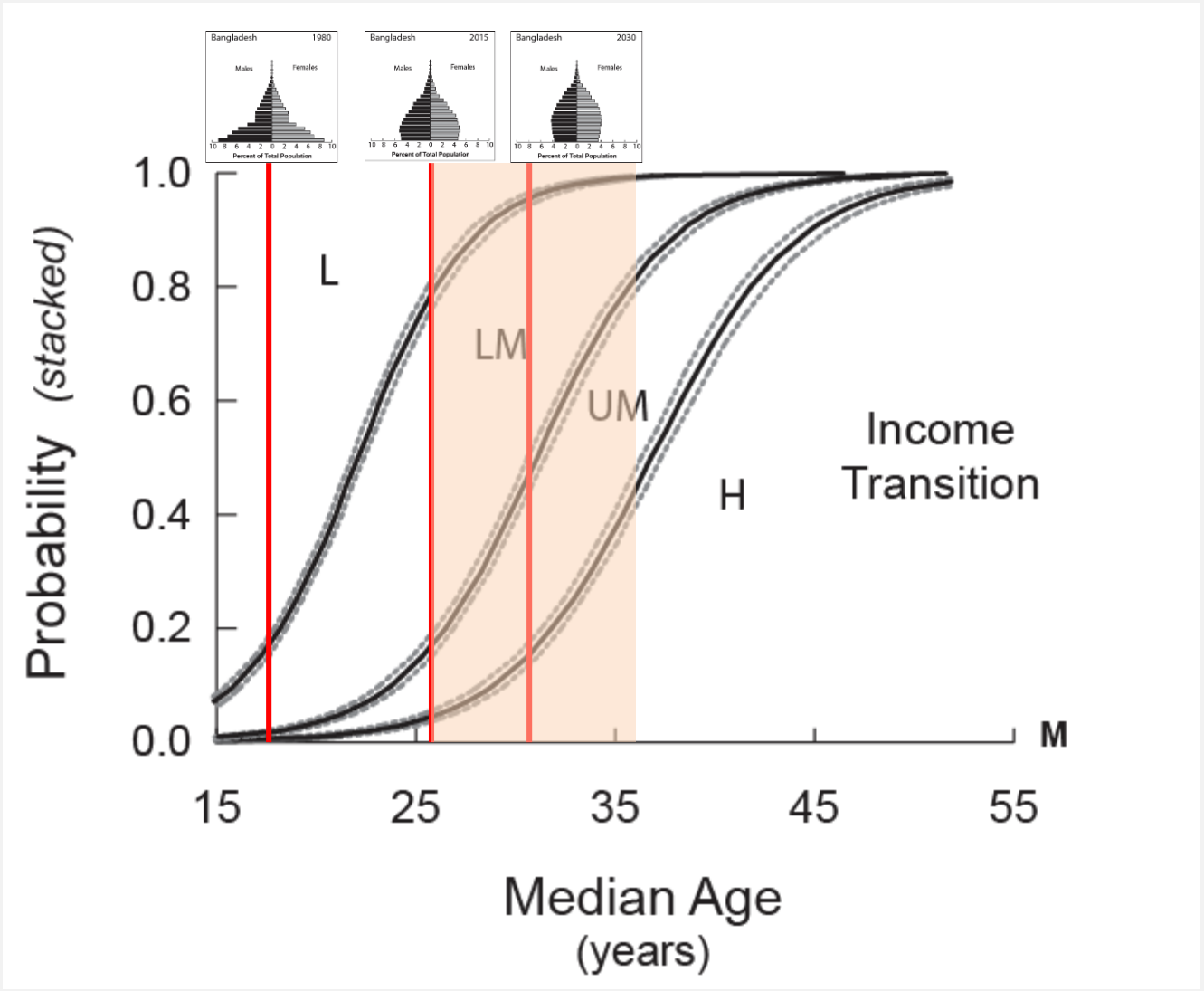


World Bank Income Classes





1980 2015 2030



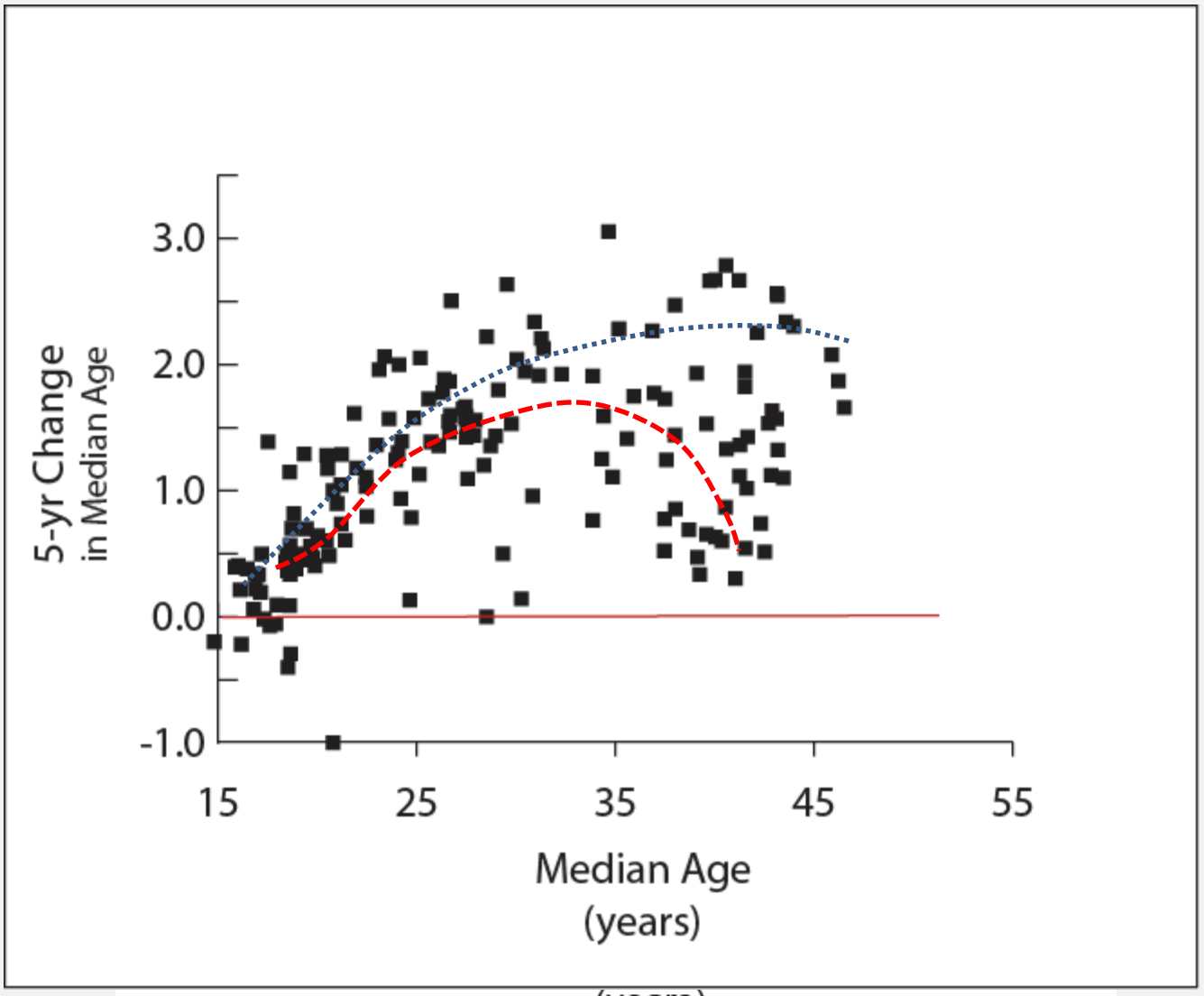
Bangladesh: Income, 1980, 2015, 2030

Most expected category

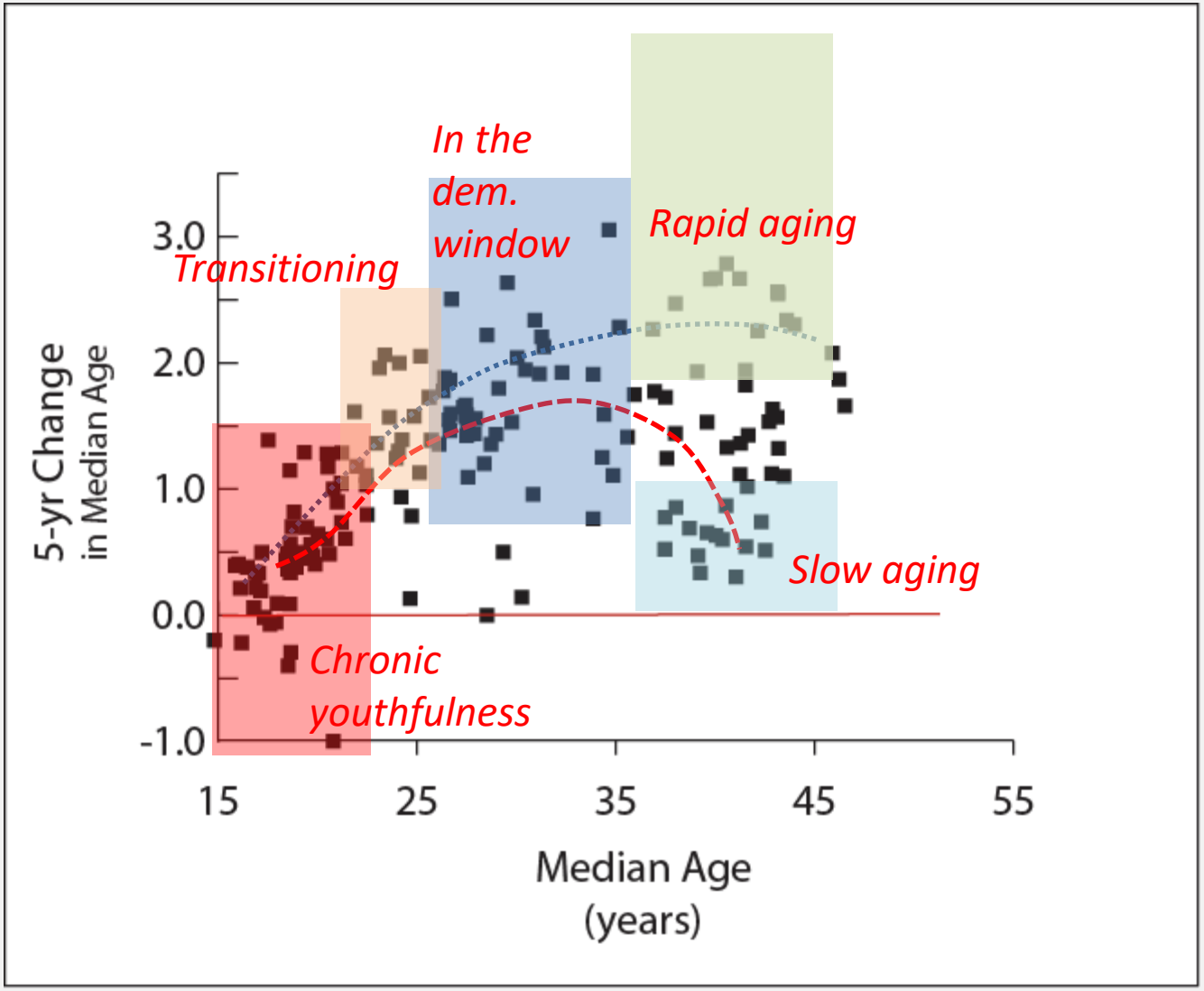
Second-most expected category

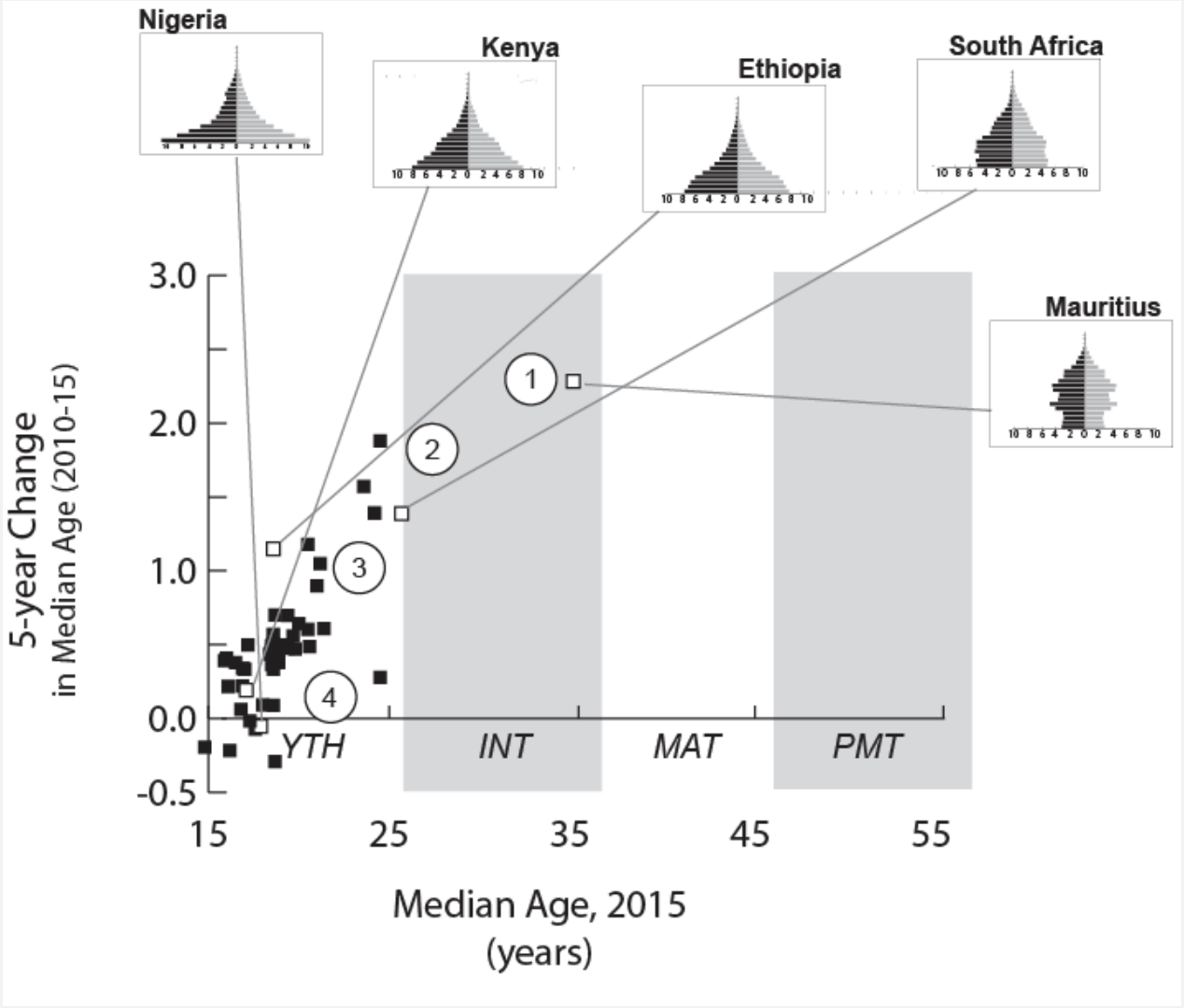
			Observed Values			Age-structural Model, Statistical Expectations				
Transition	*Indicator*	*Year*	Median Age	Indicator Value	Category Recorded	Low	Lower-Middle	Middle	Upper-Middle	High
Per-capita Income	GNI/capita, WB Atlas Method	1980	17.3	230	LOW	0.82	0.16	---	0.02	0.00
Per-capita Income	GNI/capita, WB Atlas Method	2015	25.6	1190	Lower-Middle	0.20	0.76	---	0.04	0.00
Per-capita Income	GNI/capita, WB Atlas Method	2030 (UN medium projection)	33.7	?	?	0.01	0.26	---	0.40	0.34

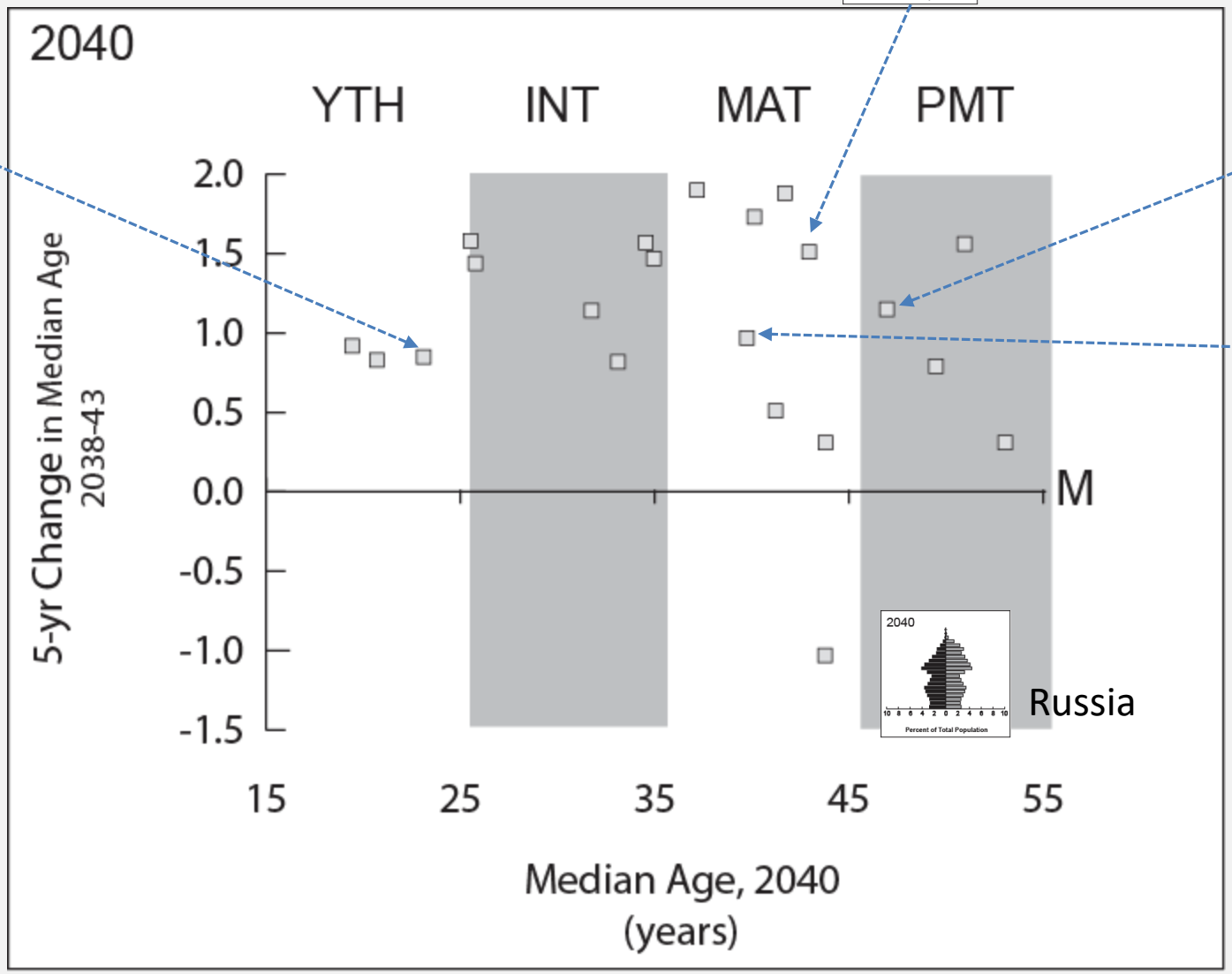
World Bank Income Classes, 2017

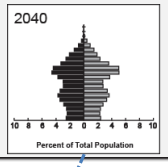


(years)


In the dem. window
Rapid aging
Transitioning
Slow aging
Chronic youthfulness
5-yr Change in Median Age
3.0
2.0
1.0
0.0
-1.0
15
25
35
45
55
Median Age (years)

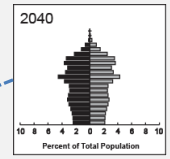

Nigeria
Kenya
Ethiopia
South Africa
Mauritius
3.0
2.0
1.0
0.0
-0.5
5-year Change
in Median Age (2010-15)
1
2
3
4
YTH
INT
MAT
PMT
15
25
35
45
55
Median Age, 2015
(years)

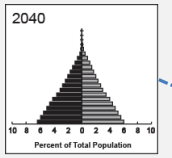




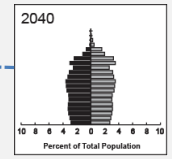
Iran

China



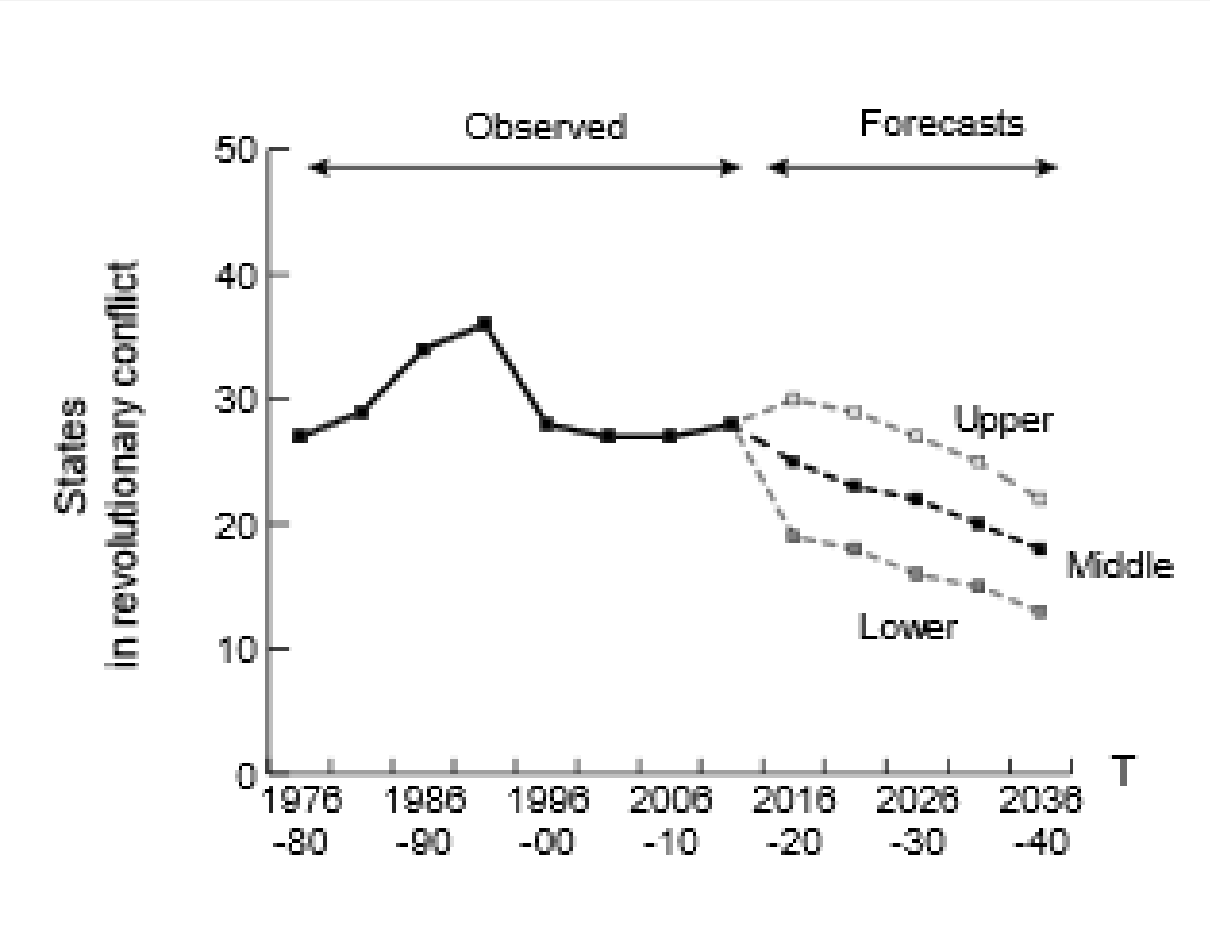


Iraq



N. Korea

Russia


Observed
Forecasts
50
40
30
20
10
0
States
in revolutionary conflict
Upper
Middle
Lower
T
1976
-80
1986
-90
1996
-00
2006
-10
2016
-20
2026
-30
2036
-40

Revolutionary Conflict, by region: Expected, observed & forecasts

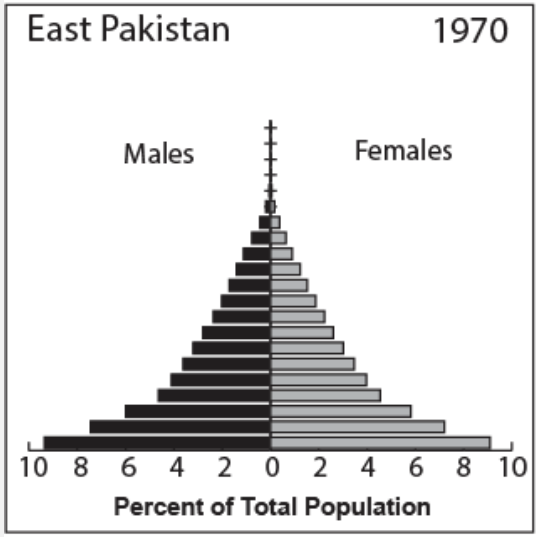
Table 4. Five-year expected and observed regional counts of states in revolutionary conflict.

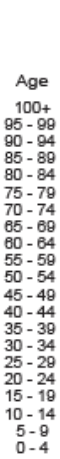
	1991-95		2011-15		2031-35 (forecast)		
Regions	*Expected*	*Observed*	*Expected*	*Observed*	*Lower*	*Middle*	*Upper*
East Asia, India, Pacific	5	4	3	2	1	2	3
Europe	2	1	1	1	1	1	1
Middle East, N. Africa, Central Asia	7	11	6	9	2	3	4
North & South America	6	7	4	2	1	2	3
South & East Africa	6	9	6	7	5	6	7
West & Central Africa	5	4	6	7	6	7	8

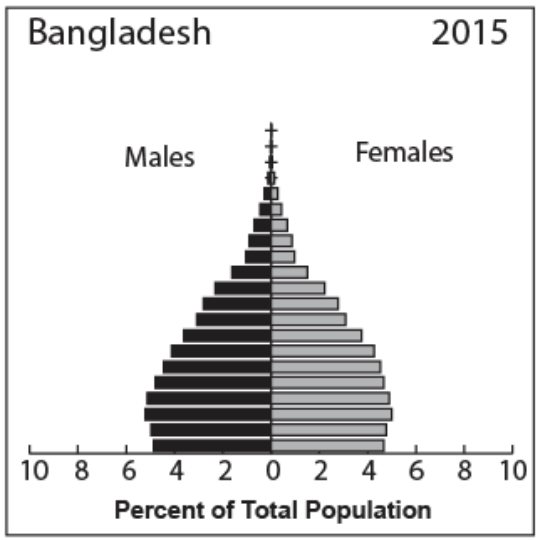
Cincotta, in press

45 years

YTH

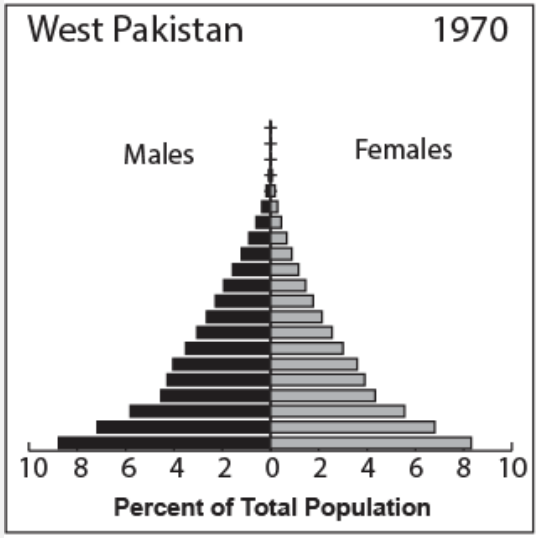


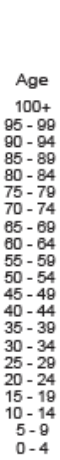


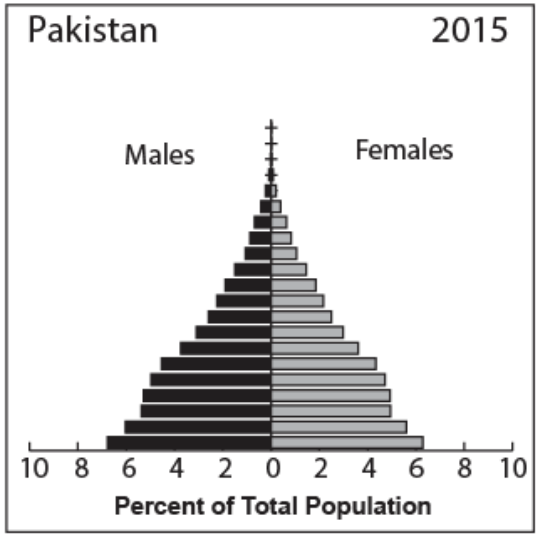


INT

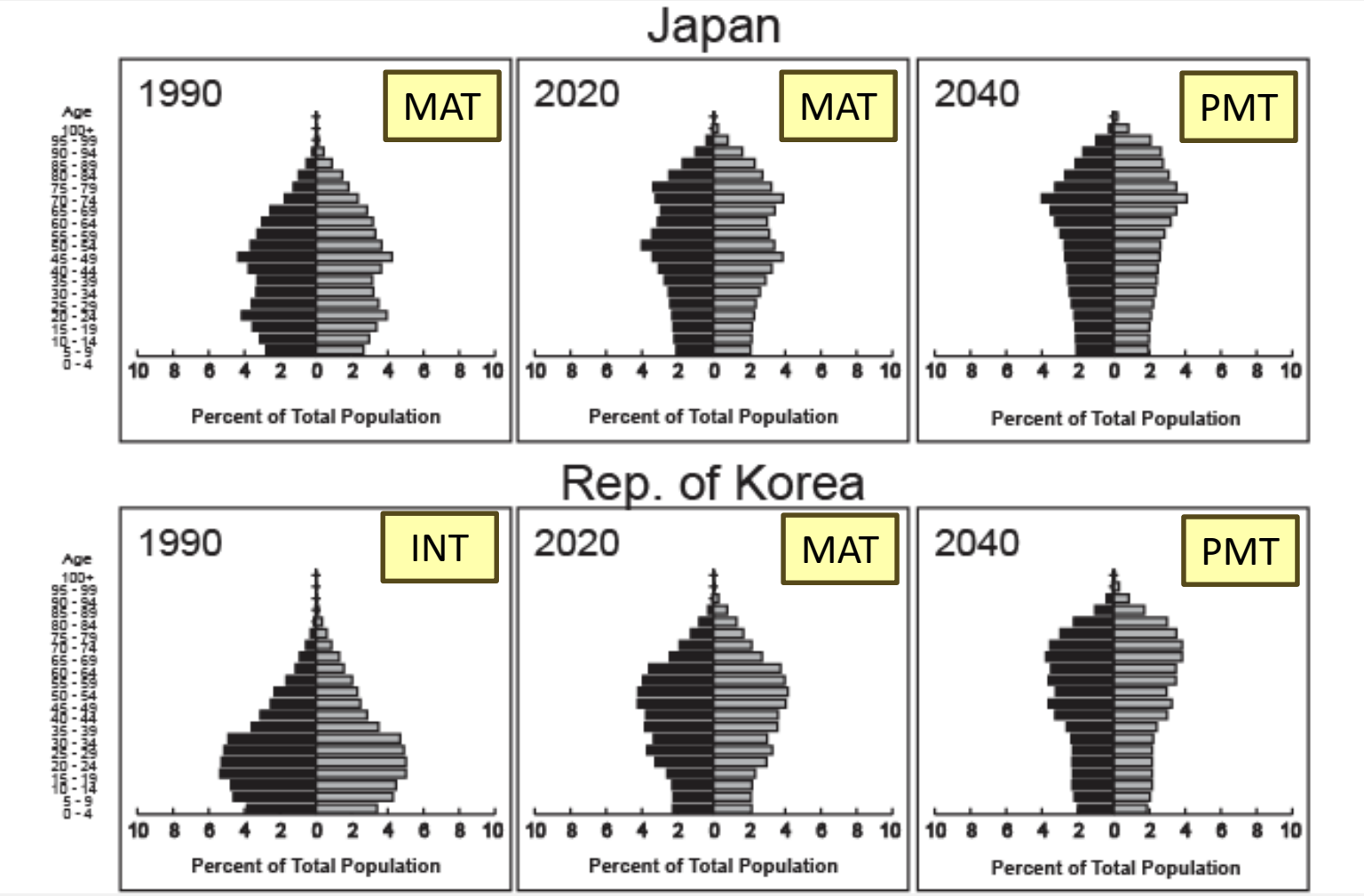
YTH

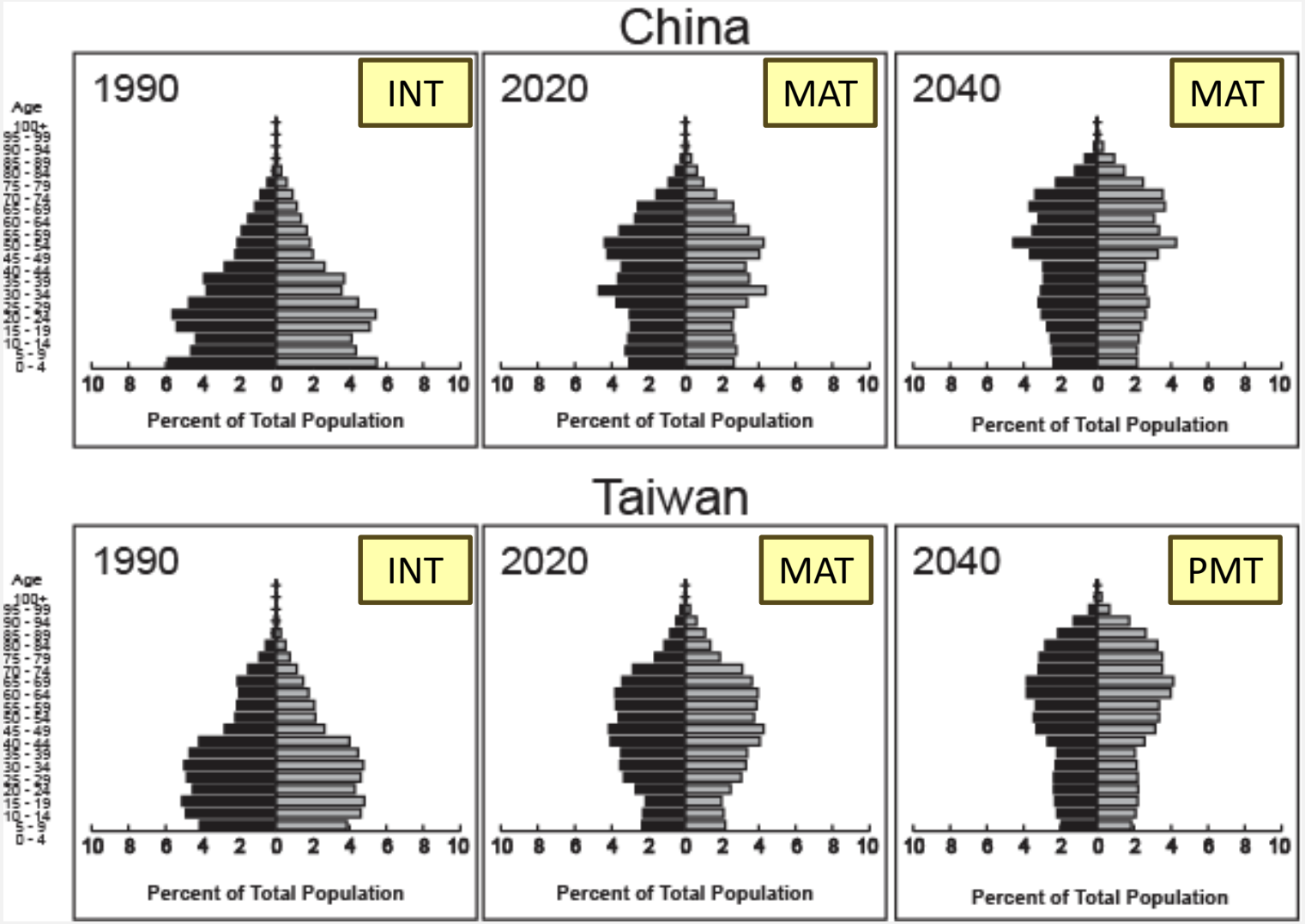


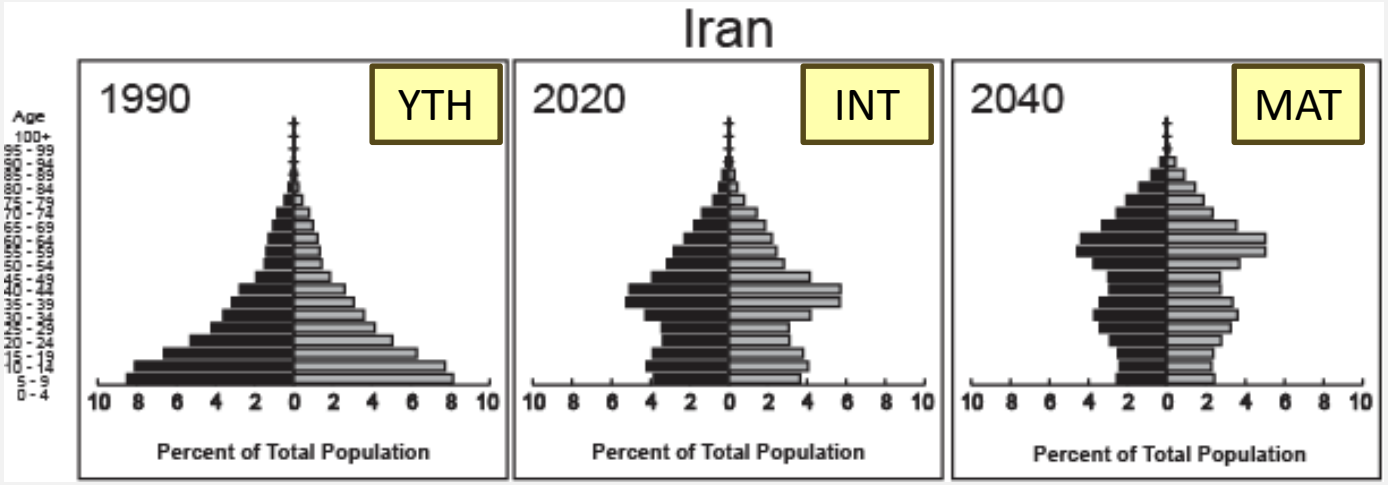


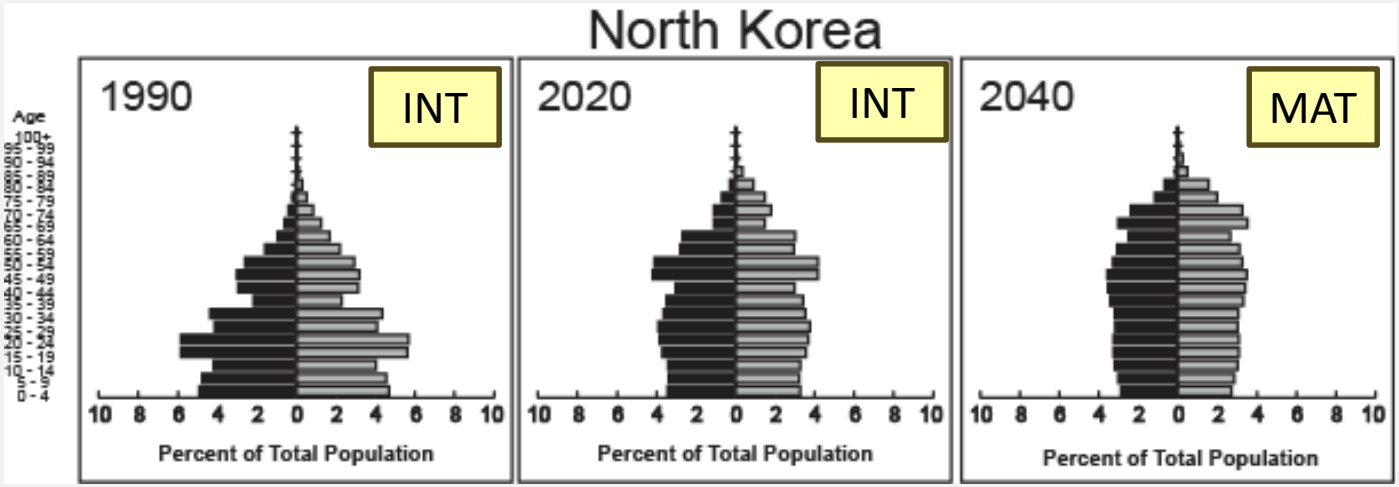


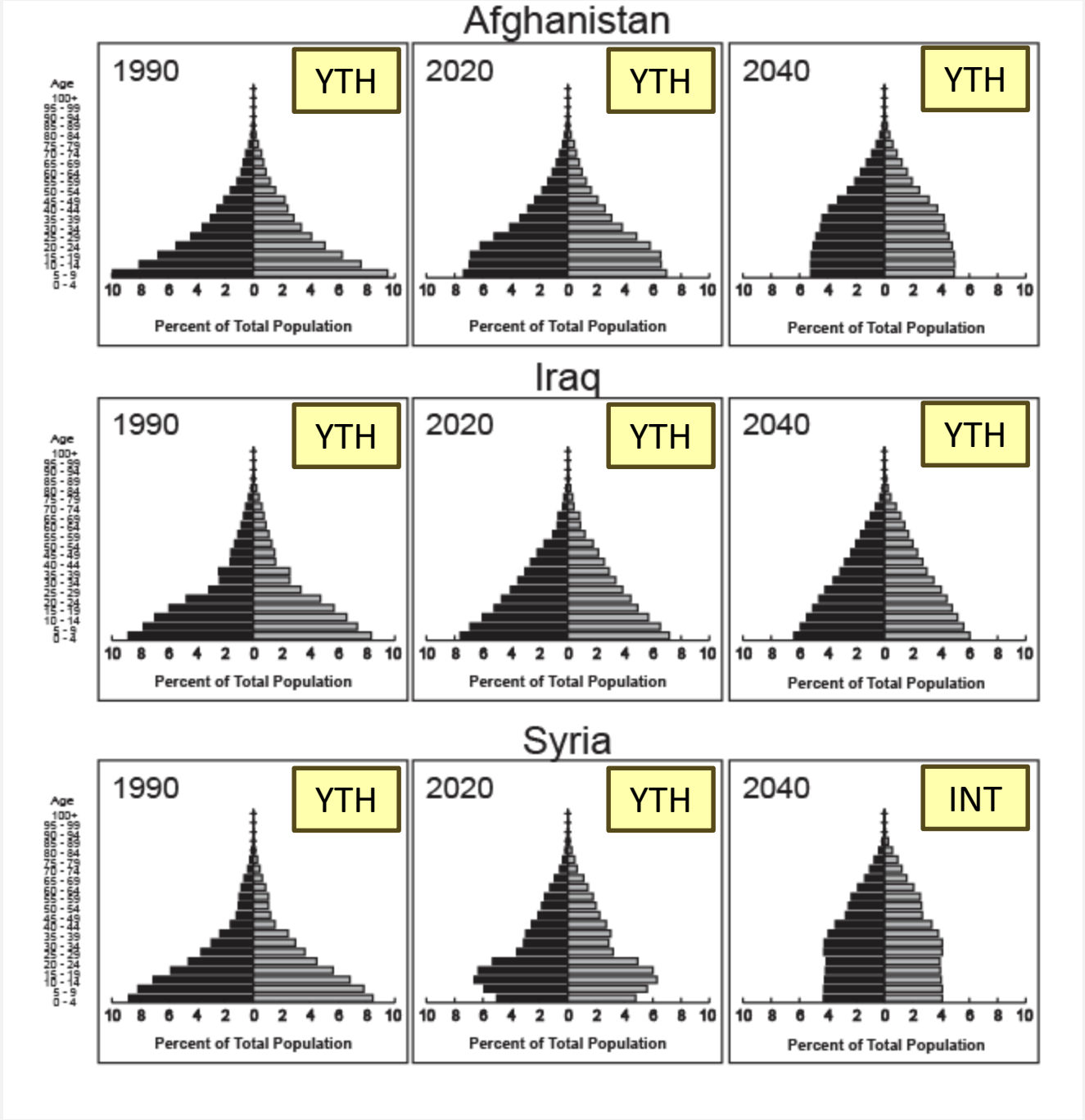
YTH

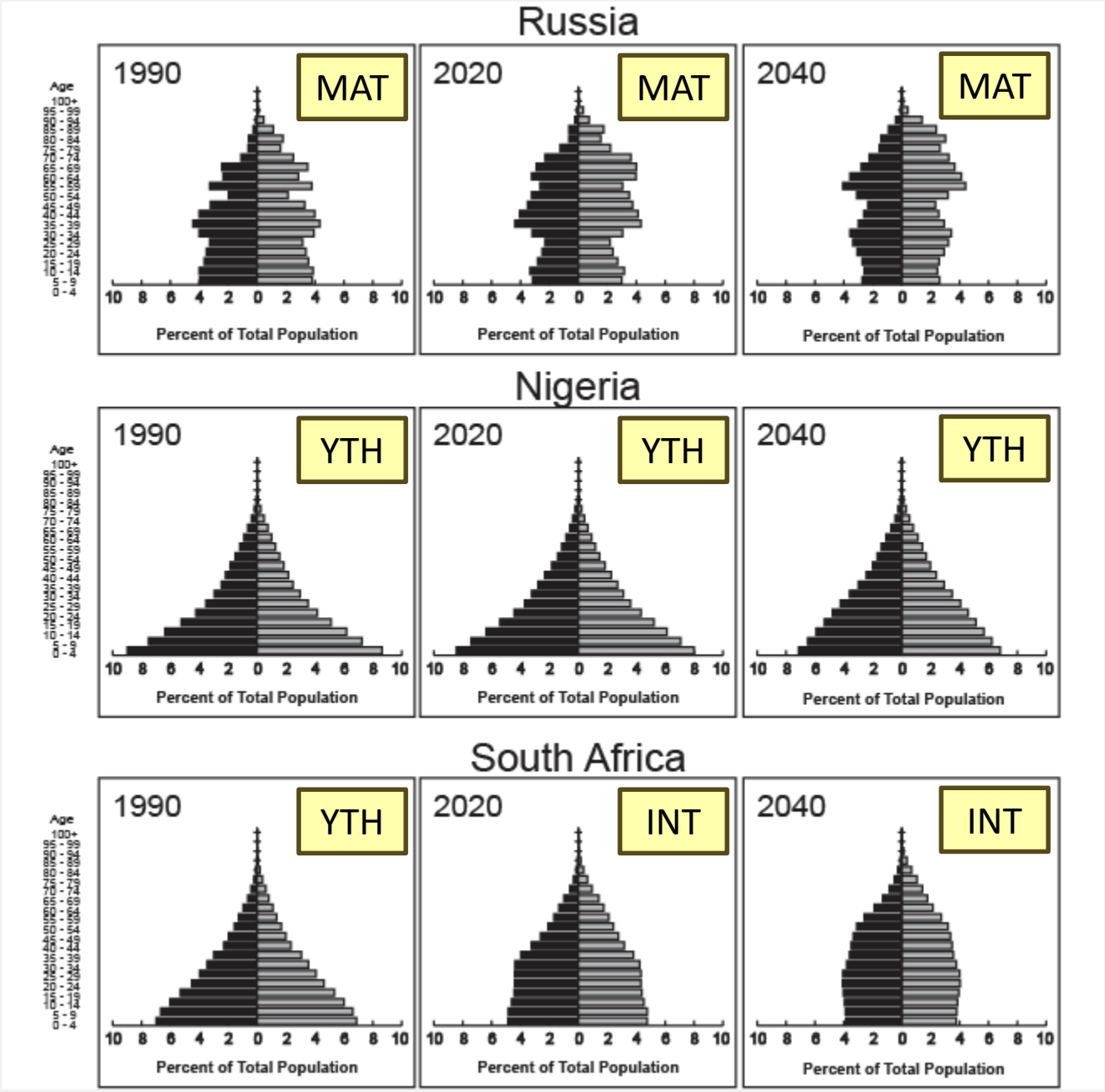

Japan
1990
MAT
2020
MAT
2040
PMT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population
Rep. of Korea
1990
INT
2020
MAT
2040
PMT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population


China
1990
INT
2020
MAT
2040
MAT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population
Taiwan
1990
INT
2020
MAT
2040
PMT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population


Iran
1990
YTH
2020
INT
2040
MAT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population


North Korea
1990
INT
2020
INT
2040
MAT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population


Afghanistan
1990
YTH
2020
YTH
2040
YTH
Iraq
1990
YTH
2020
YTH
2040
YTH
Syria
1990
YTH
2020
YTH
2040
INT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population


Russia
1990
MAT
2020
MAT
2040
MAT
Nigeria
1990
YTH
2020
YTH
2040
YTH
South Africa
1990
YTH
2020
INT
2040
INT
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10 8 6 4 2 0 2 4 6 8 10
Percent of Total Population

Statistical facts & working hypotheses

(helpful)

Eight Rules of Political Demography (1 through 4)

1. **Expect states at the top of the list**, the most age-structurally mature, to experience the best chance of being a liberal democracy – that is, to be assessed as FREE in Freedom House's annual Freedom in the World global survey (most analysts consider FREE status to be synonymous with liberal democracy).

2. Expect states that have a youthful age structure (below a median age of 25.5 years) to be the least likely to be assessed as FREE and the most likely to be engaged in intra-state conflict of either low or high intensity, as measured by the Uppsala Conflict Data Program.

3. Where a revolution occurs in a state with a youthful population, expect either the authoritarian regime to remain in power or to be replaced by another authoritarian regime (typically NOT FREE or low-level PARTLY FREE, as measured by Freedom House).

4. Expect states that achieve FREE while youthful to lose this rating within a decade. There is a long history of this effect; Mali is a recent example.

Eight Rules of Political Demography (5 through 8)

5. Expect states with a population of less than 5 million to be the most likely to break rules 1, 2, 3, and 4 (see the UN Population Division for population data).

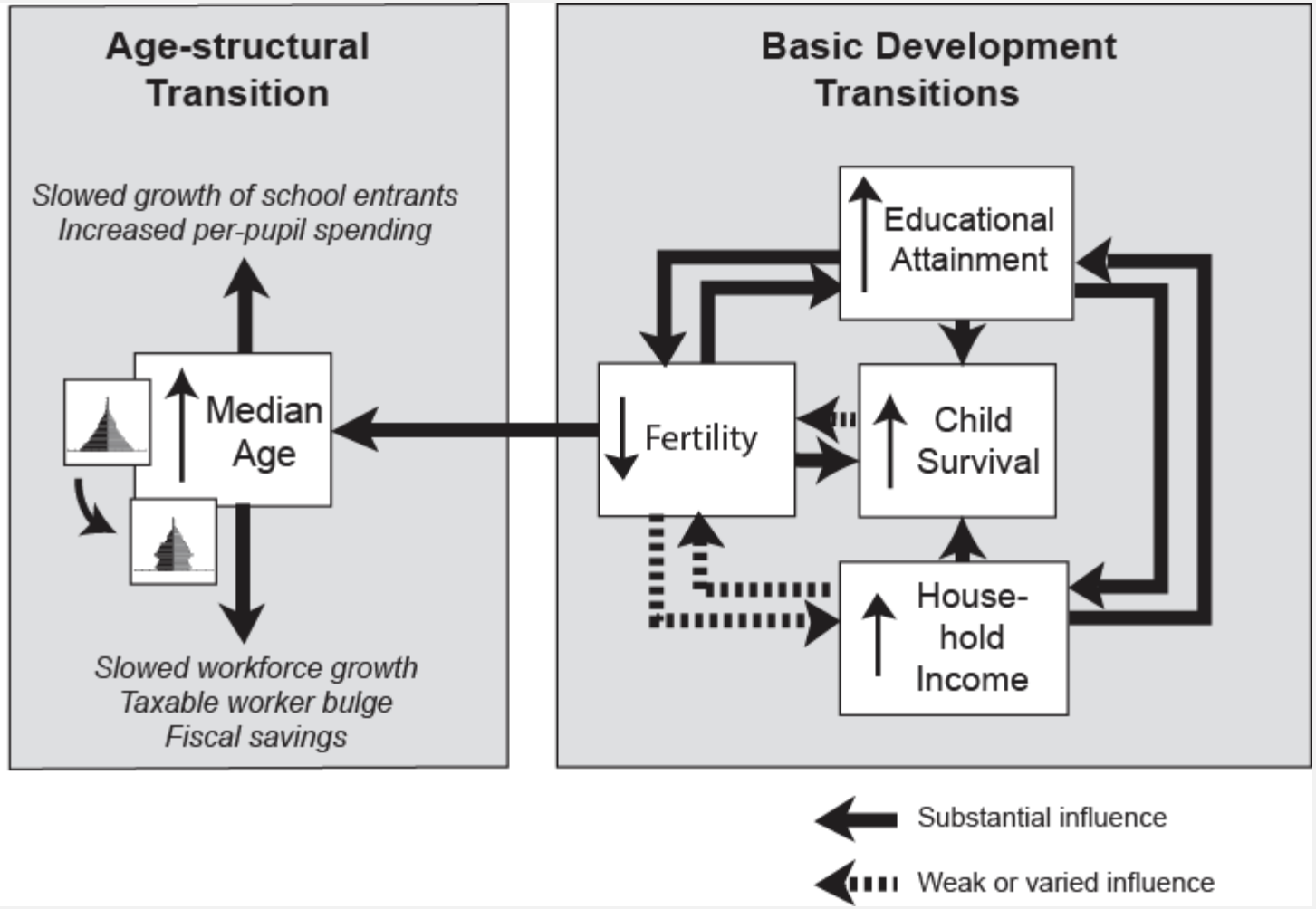
6. Expect states that are ruled by an ideological single-party regime or another type of ideological political monopoly – for example, Iran's theocracy – to mature without liberalization. China and North Korea are other prominent examples, and so far, have had no successional issues.

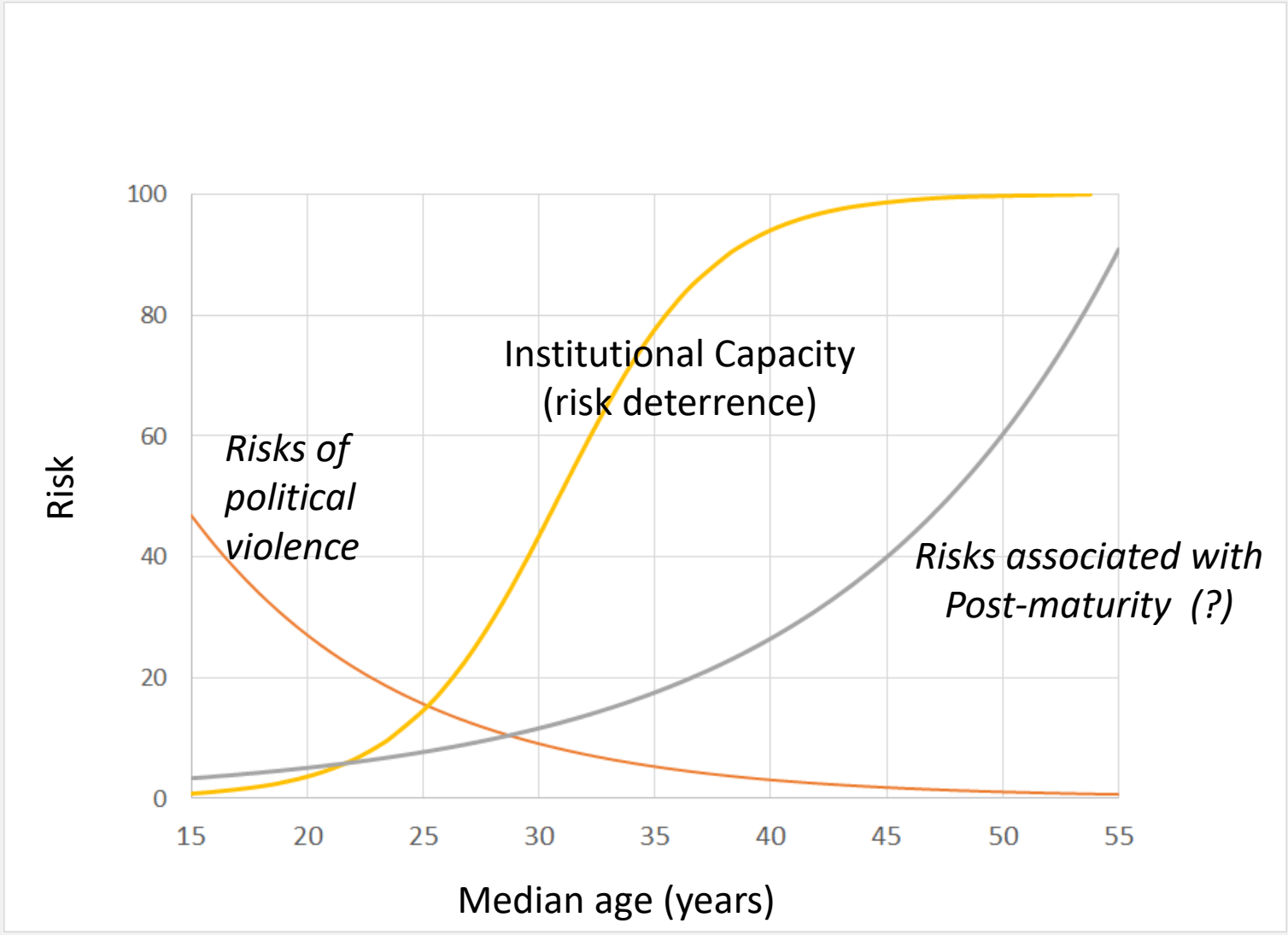
7. Expect states led by a revolutionary leader (Cuba under Castro, Venezuela under Chavez) or a charismatic reformer (Russia under Putin, Turkey under Erdogan, Singapore under Lee Kwan Yu) to resist attaining FREE. Expect these regimes to have successional problems.

8. Expect a state ruled by a military junta/ruler or absolute monarch to yield to a more democratic regime before the population attains a mature age-structure (before a median age of 35.5 years).

Causal narratives (optional)

Why does median age predict development?




100
80
60
40
20
0
Risk
15
20
25
30
35
40
45
50
55
Median age (years)
Institutional Capacity
(risk deterrence)
Risks of
political
violence
Risks associated with
Post-maturity (?)

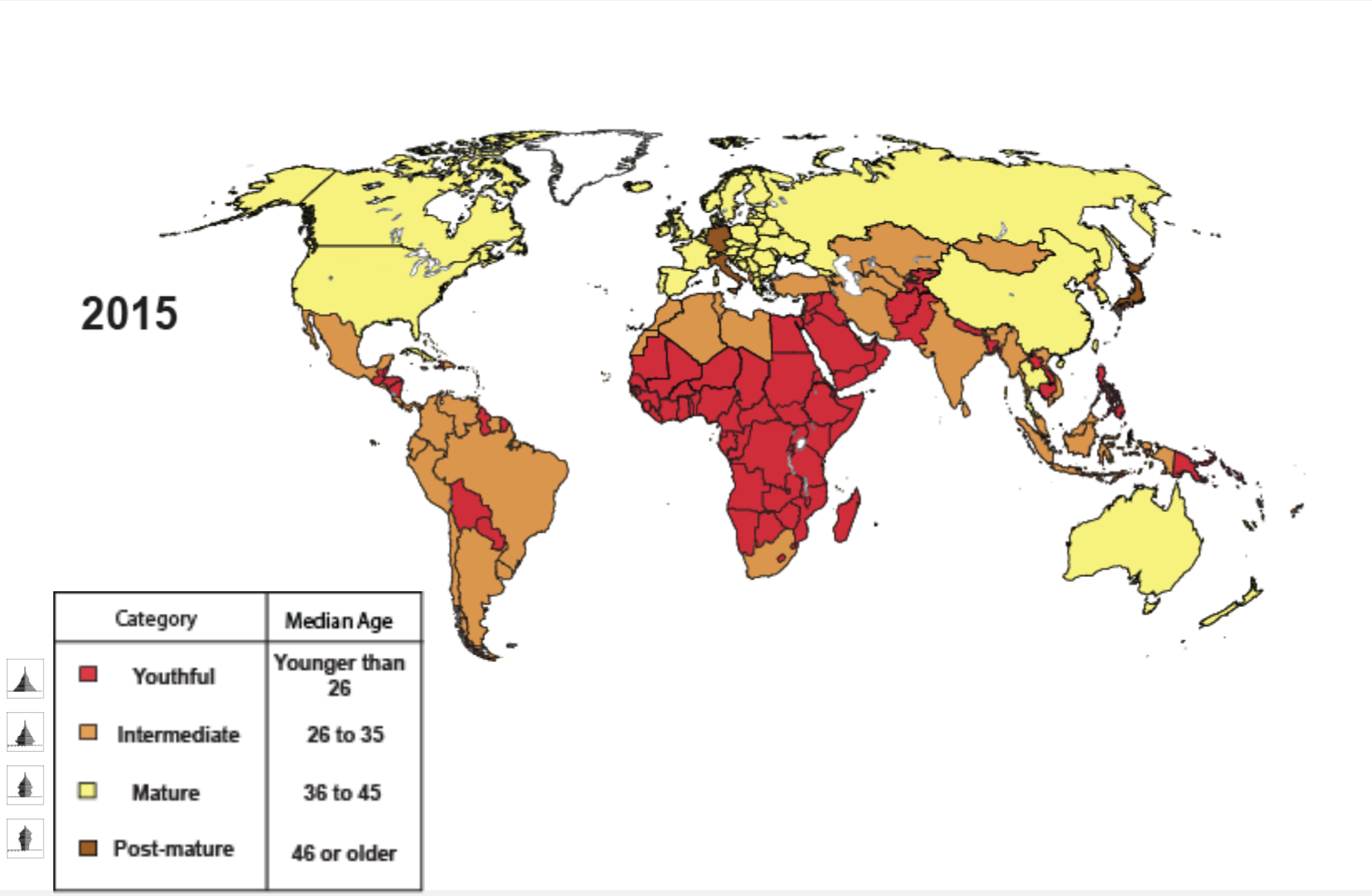
END

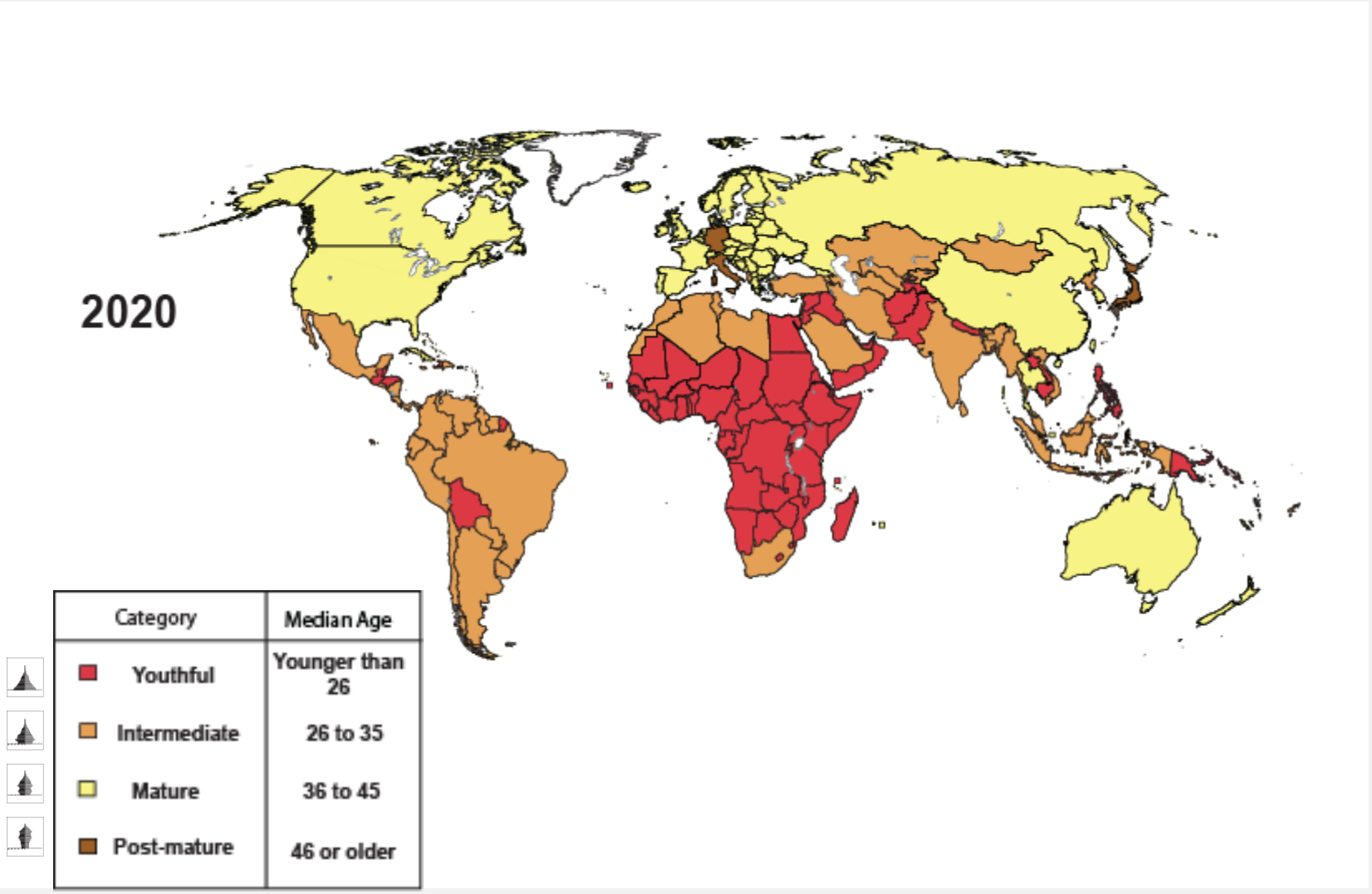
Richard Cincotta
rcincotta@stimson.org

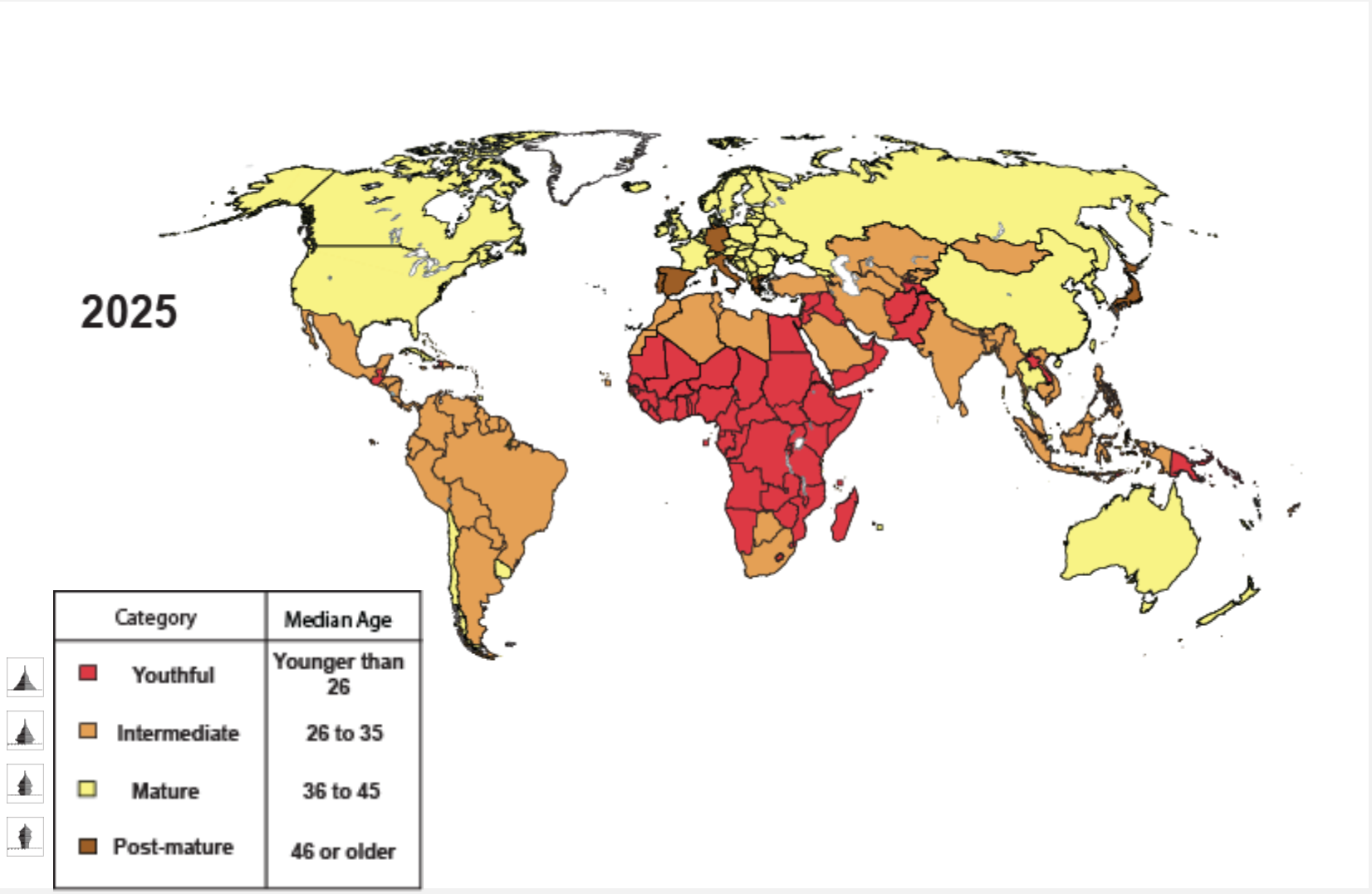
Woodrow Wilson Global Fellow
Dir., Global Political Demography Program,
The Stimson Center

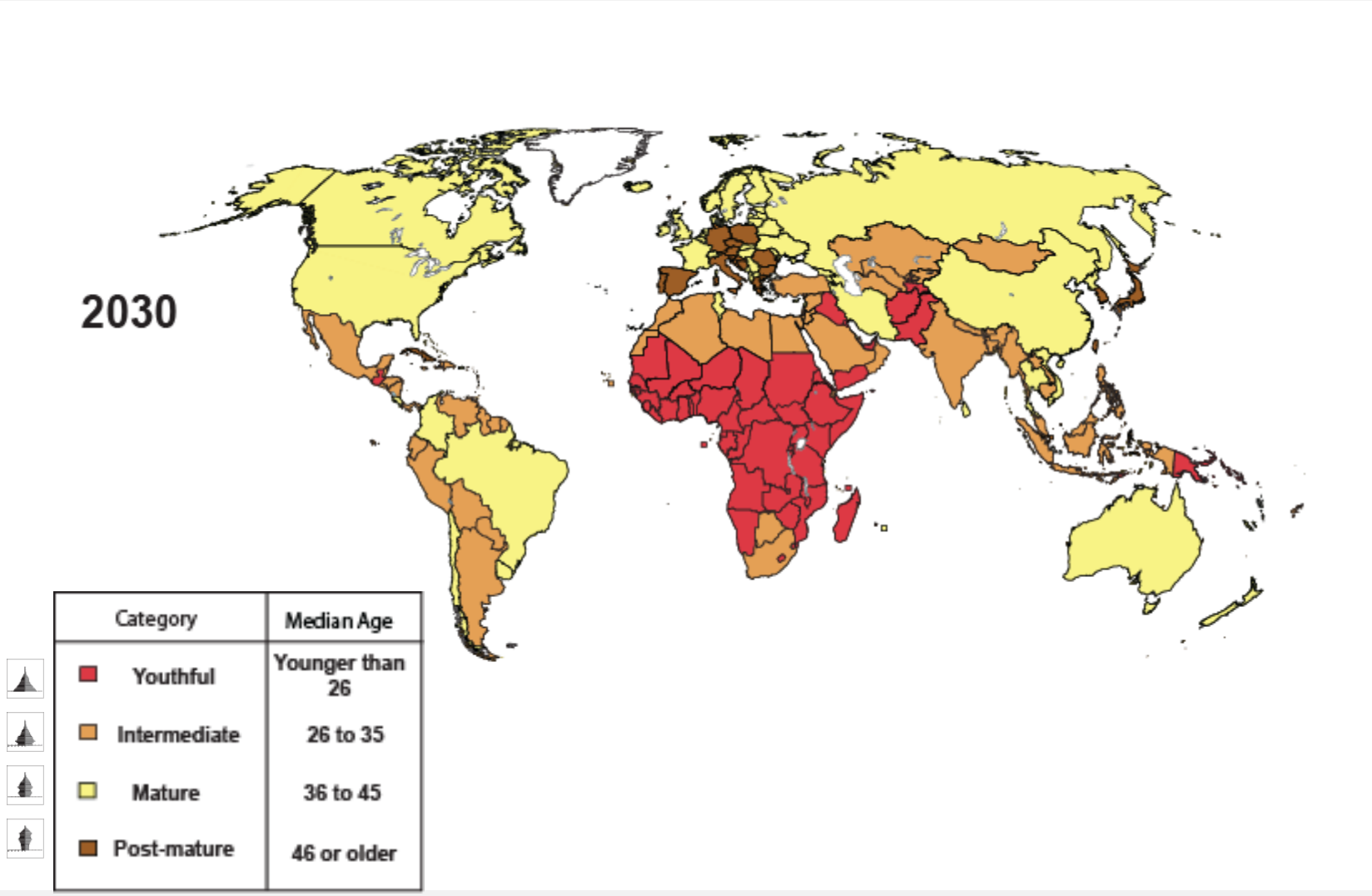
www.politicaldemography.org

newsecuritybeat.org/author/rcincotta


2015
Category
Median Age
Youthful
Younger than 26
Intermediate
26 to 35
Mature
36 to 45
Post-mature
46 or older

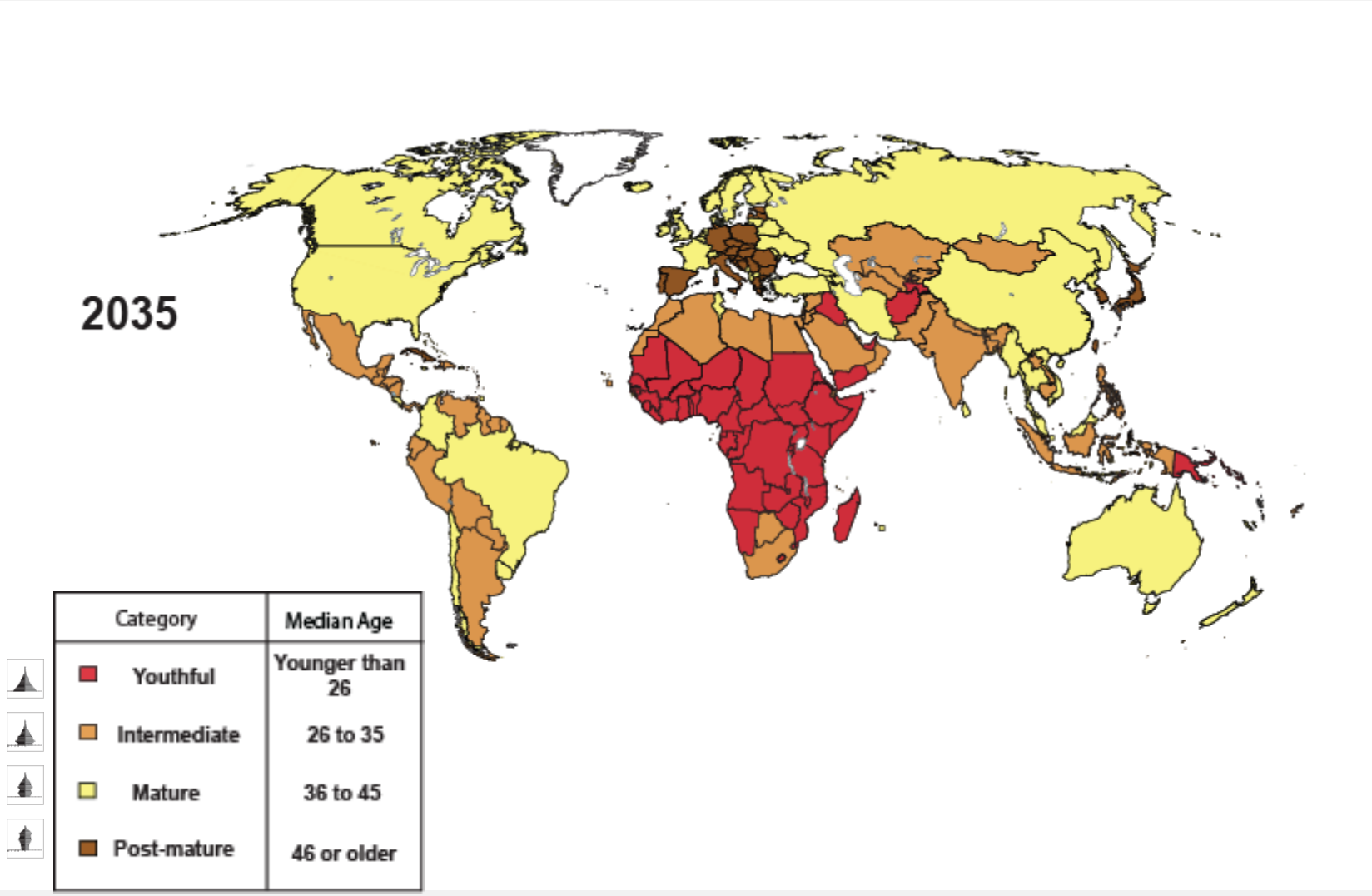

2020
Category
Median Age
Youthful
Younger than 26
Intermediate
26 to 35
Mature
36 to 45
Post-mature
46 or older


2025
Category
Median Age
Youthful
Younger than 26
Intermediate
26 to 35
Mature
36 to 45
Post-mature
46 or older

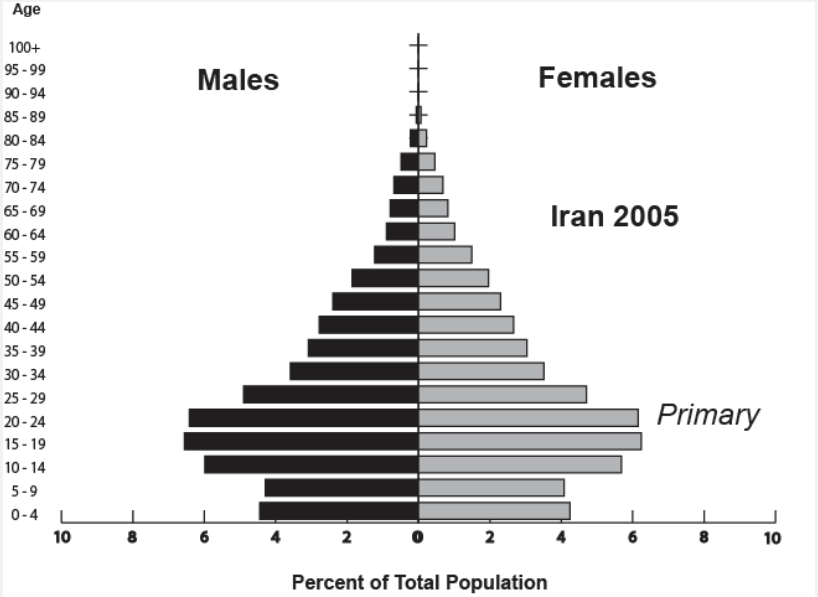


Cincotta, *2015 (updated)*

Data: UN Population Div., 2015

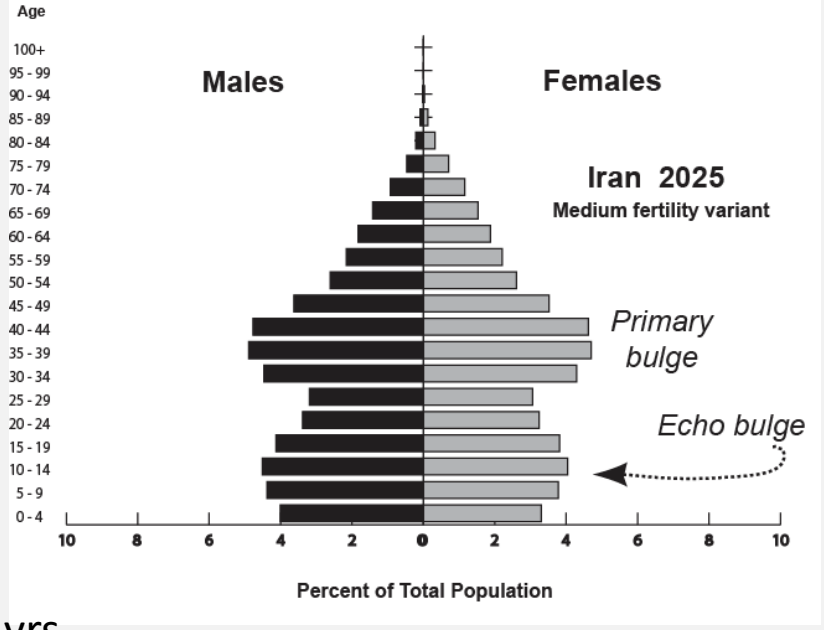

2035
Category
Median Age
Youthful
Younger than 26
Intermediate
26 to 35
Mature
36 to 45
Post-mature
46 or older

Youthful



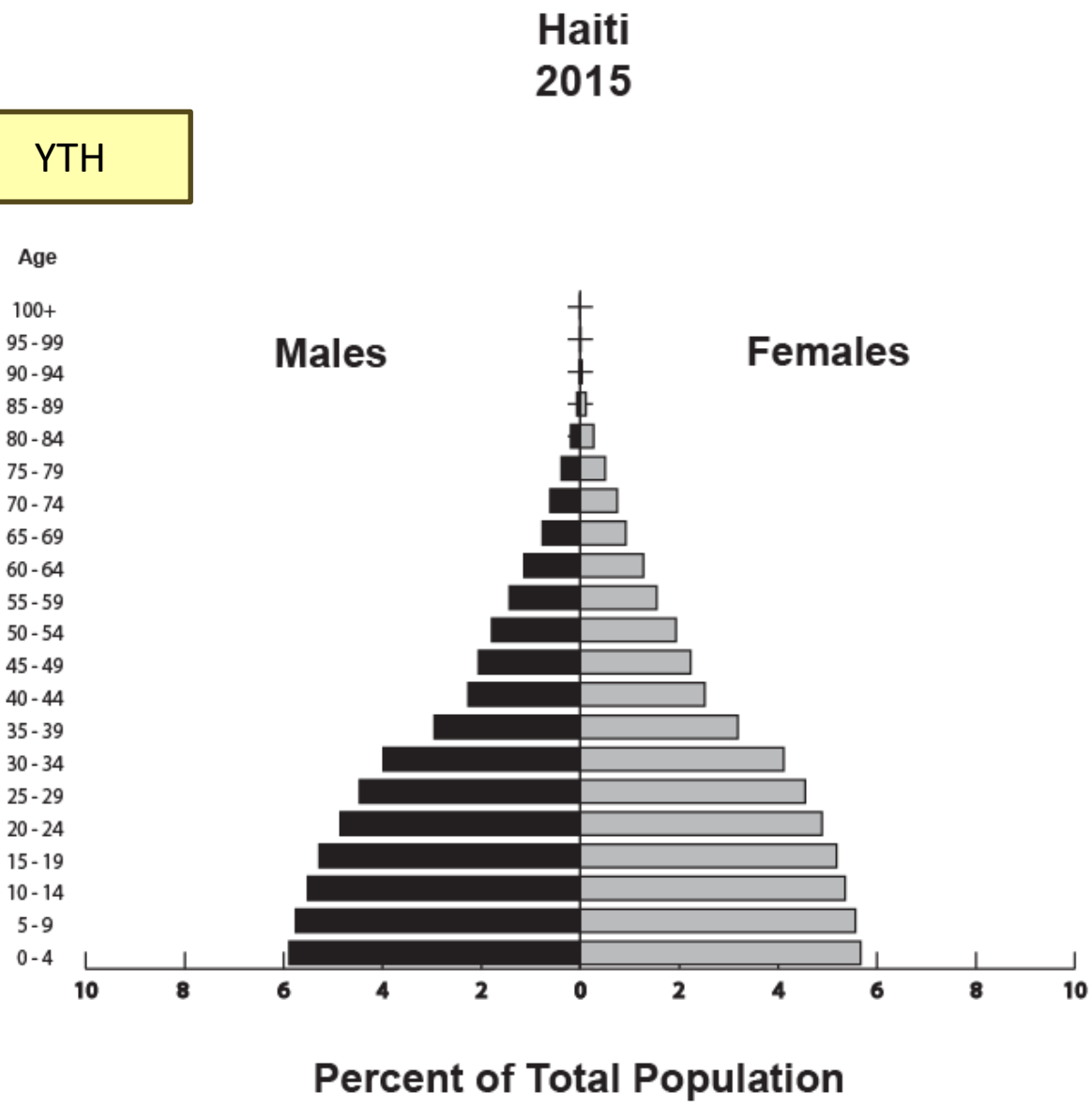
Median age: 24 yrs.

Intermediate

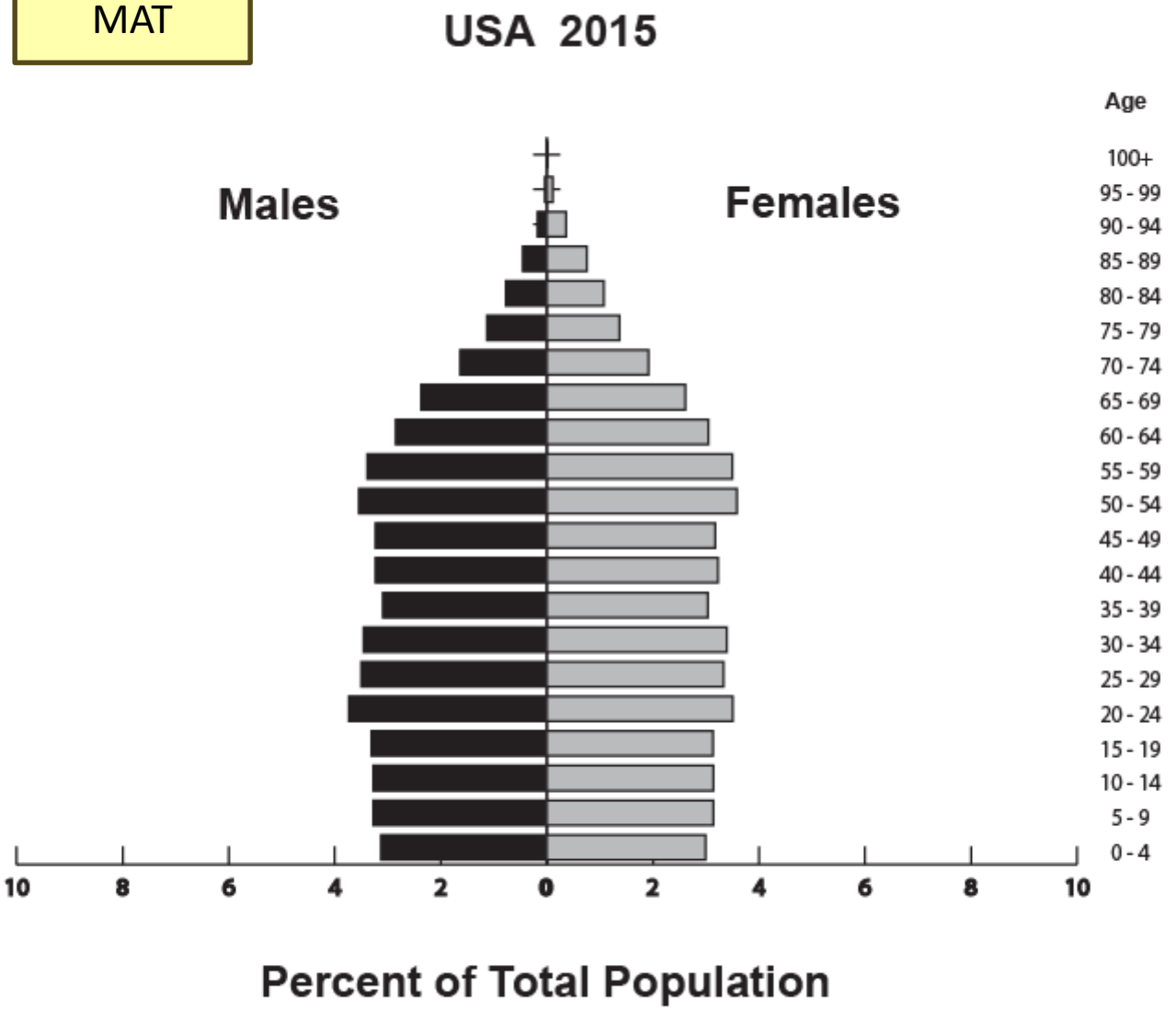


Projected Median age: 35 yrs.

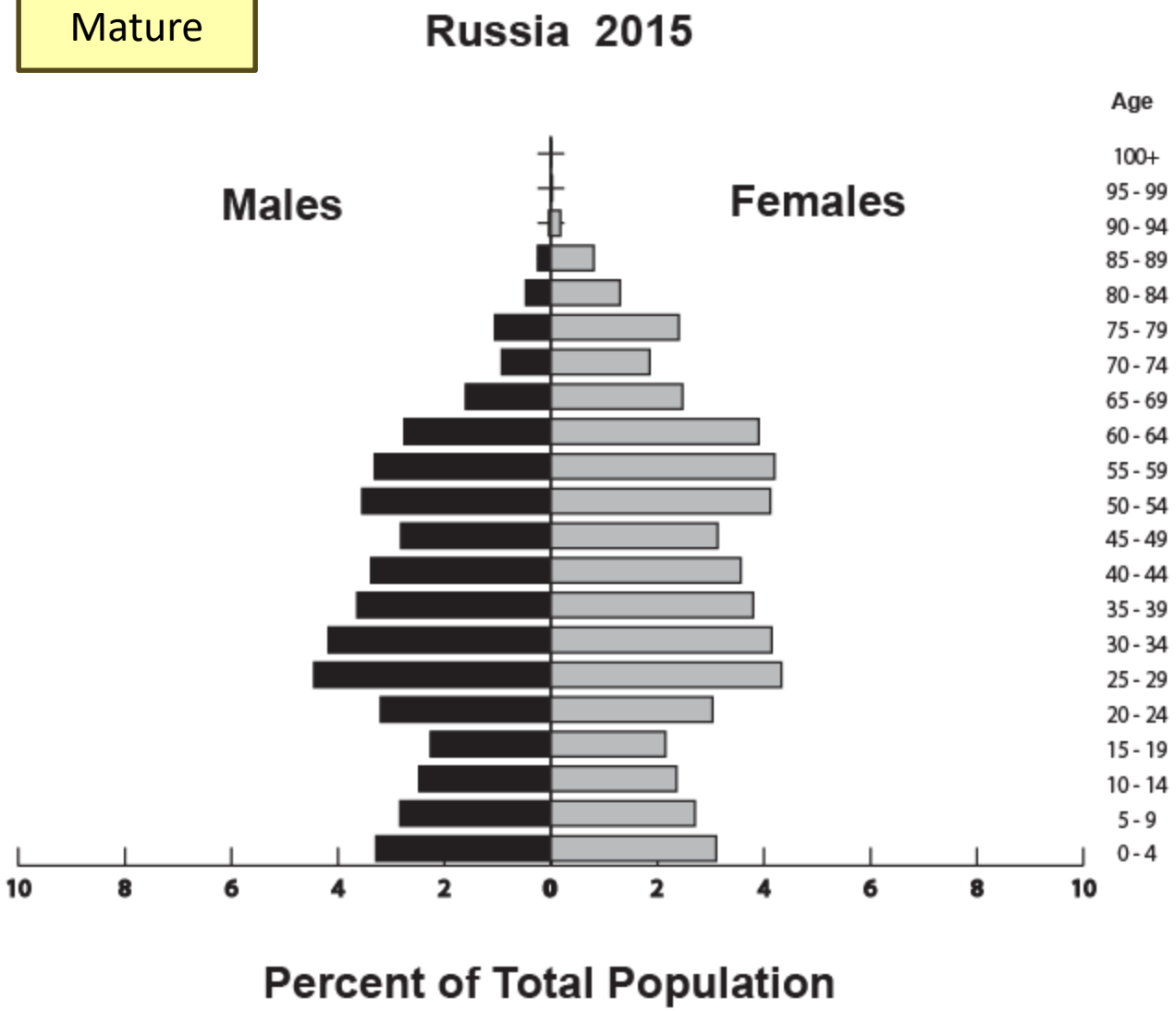
YTH


Haiti
2015
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
Males
Females
10
8
6
4
2
0
2
4
6
8
10
Percent of Total Population

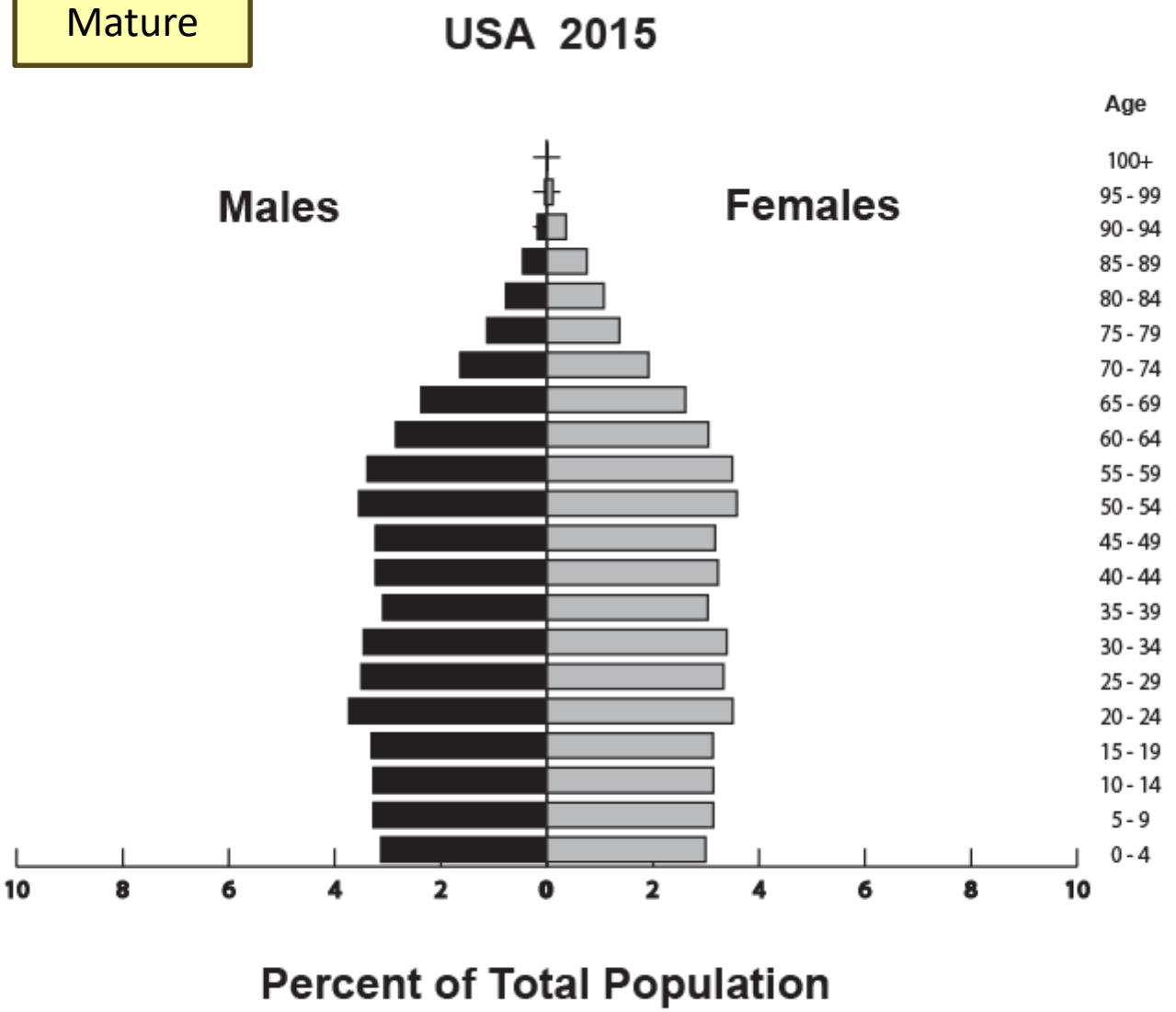
MAT


USA 2015
Males
Females
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10
8
6
4
2
0
2
4
6
8
10
Percent of Total Population

Mature

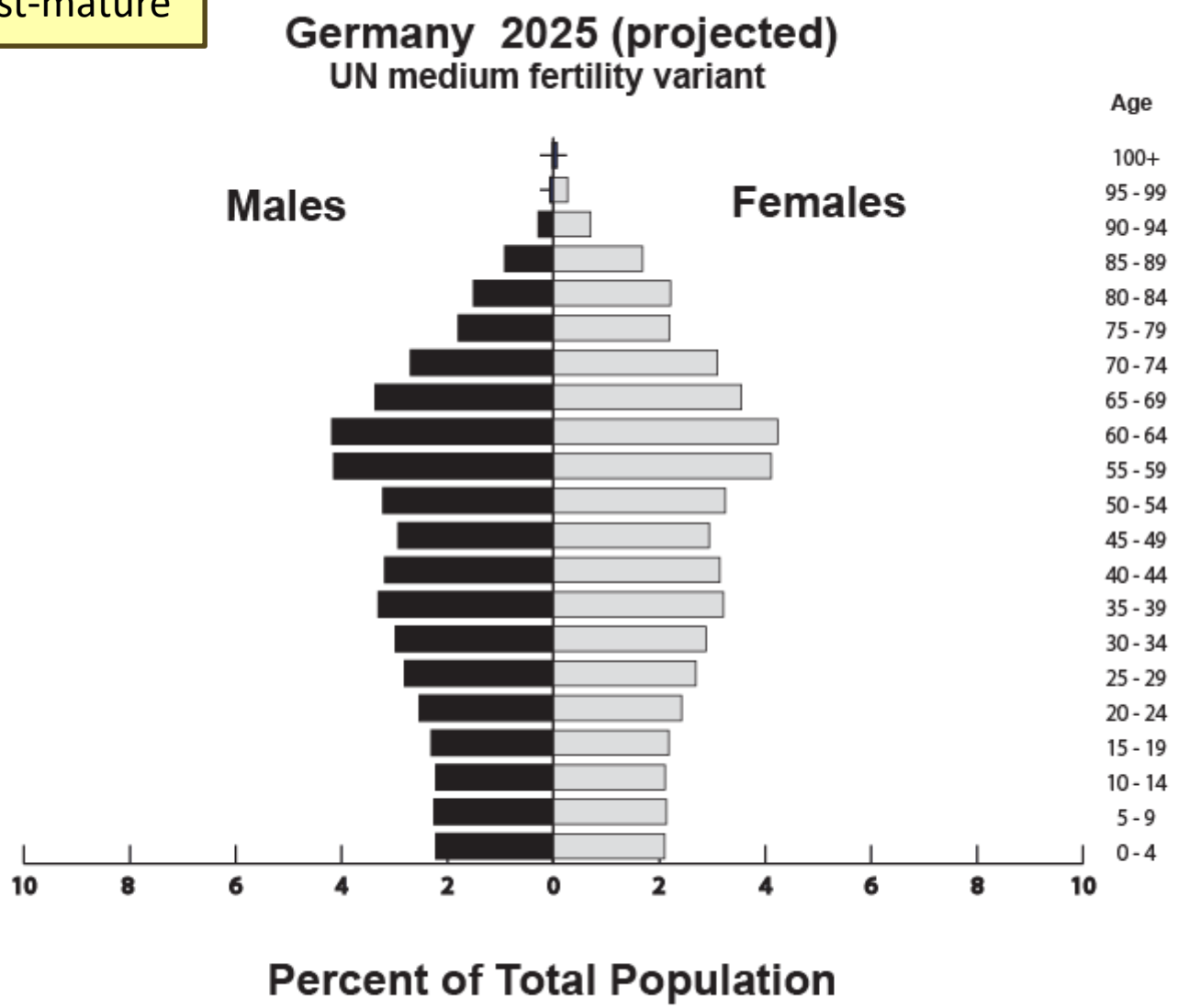

Russia 2015
Males
Females
Age
100+
95 - 99
90 - 94
85 - 89
80 - 84
75 - 79
70 - 74
65 - 69
60 - 64
55 - 59
50 - 54
45 - 49
40 - 44
35 - 39
30 - 34
25 - 29
20 - 24
15 - 19
10 - 14
5 - 9
0 - 4
10
8
6
4
2
0
2
4
6
8
10
Percent of Total Population

Mature



Data: UN Population Div., 2015 Rev.

Post-mature

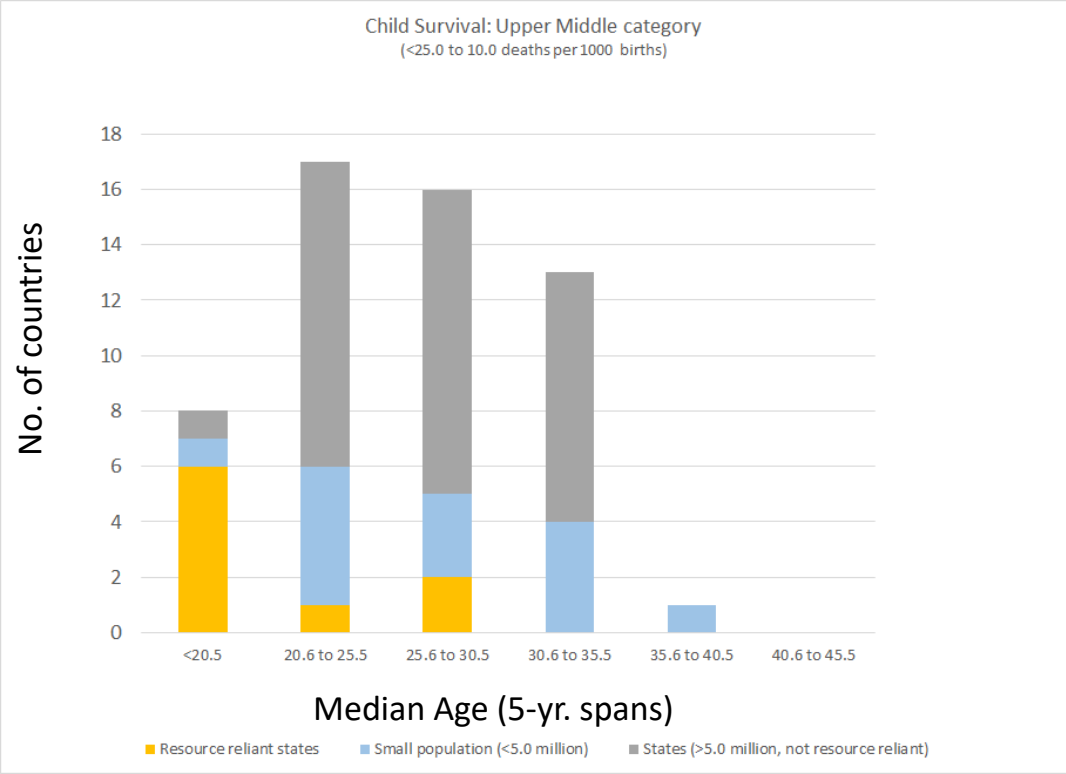


Projected Median age: 49 yrs.

Data: UN Population Div., 2012 Rev.

Exceptions

Age-structural Transition



Child Survival:

Upper-middle category

(<25 deaths per 1000 births)

Oil + mineral rents > 15% of GDP

Population < 5.0 million

All other countries