Modified by: Ayat Nabil
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Dr. HAMZA ALDURAIDI

COLOR OF SLIDES IN BLACK, AND COLOR OF DOCTOR INFORMATION IN GREEN

Demography (Part 2)

In this lecture we will talk about the composition of population

- When you talk about the health of the population or the future of certain population, you need to take into consideration not only how many people die and how many people get born in a certain amount of time in that population ,But also you need to take into consideration other **characteristics** of this population including most importantly: the age groups within the population and the sex composition of that population.

- We refer to these characteristics as the population composition or the structure or the demographic structure of that population.
- It's basically when you describe certain population, you not only talk about the crude (or the net) number of people of that population in certain point of time, but also you refer to how many males versus females exist in that population and how old or young that population mostly is.

Population Composition
Age and Sex Composition

- Age and sex are the most basic characteristics of a population.
- Every population has a different age and sex composition—**the number and proportion of males and females in each age group**—
- This structure can have considerable impact on the population's social and economic situation, both present and future.

Population Composition
Age and Sex Composition

- Populations could be relatively young / developing countries, About 40 % <15 years e.g. Africa.. Jordan . Less than 4% are older groups.
- Relatively old populations (aging), developed countries, more than 10% over 65 years e.g. Europe/ Less than 25% of pop <15 years.

- Why do we care about age and sex composition?
  [1] Because they are a key to successful planning for the health sector and other developmental sectors in any country.
- For example:
  - for sex part :After major wars in the world, a sudden decrease in the proportion of males shows up; because males are basically the ones in armies who go to wars, fight and ultimately get killed or injured, which decreases the proportion of males in certain populations. But currently we live in a quite balanced proportion where men and women are almost equal in most country but sometimes there’re slight differences in certain countries but since it slight, they don’t need to give it heavy consideration in their policies.

- More examples:
  - for age part: If you have a very young country (such as the African countries, the middle eastern countries) where most population are aged below the age of 30 or 25, such a population has certain health needs.
  - On the other hand, when you talk about countries such as japan, south Korea, some eastern or western European countries, the united states, Canada or Scandinavian countries, they have older populations, so these have ultimately different health needs and their government need to consider the fact that their population is not getting any younger but it’s getting older so they need to take some steps in order to address this phenomenon.

Age and Sex Composition

[2] Young and old populations have markedly different age compositions; as a consequence, they also have different proportions of the population in the labor force or in school, as well as different medical needs, circumstances, consumer preferences in terms of health, education, media and probably every other aspect of life, and even crime patterns (crime rates).

Median Age الوسيط

Median means the individual who's located exactly in the middle of any distribution like age distribution

One of the ways of describing the age composition of certain population is median age

A population's age structure has a great deal to do with how that population lives.

- The **median age** is the age at which exactly half the population is older and half is younger.
- For example : the age distribution of a population is from 0 (newborn child) and 100 years old (the oldest person in this population) and each individual have certain age but the median person's age is the age of individual whose age is located exactly in the middle of the population.

- Examples:
  The median age of the Costa Rican population in 1995 was 23 years.
  - 50% of the people were aged below 23 years old, and the other 50% were aged 23 or above.
  While that in Sweden was 38, signifying an older population. (significantly older)
  In 1995, the median age in Jordan, with a young population, was 18(so the population was half children).
  In 2012, median age in Jordan was 20.3 years. In 2017 it became 22 years (still young and better than the situation in 1995).

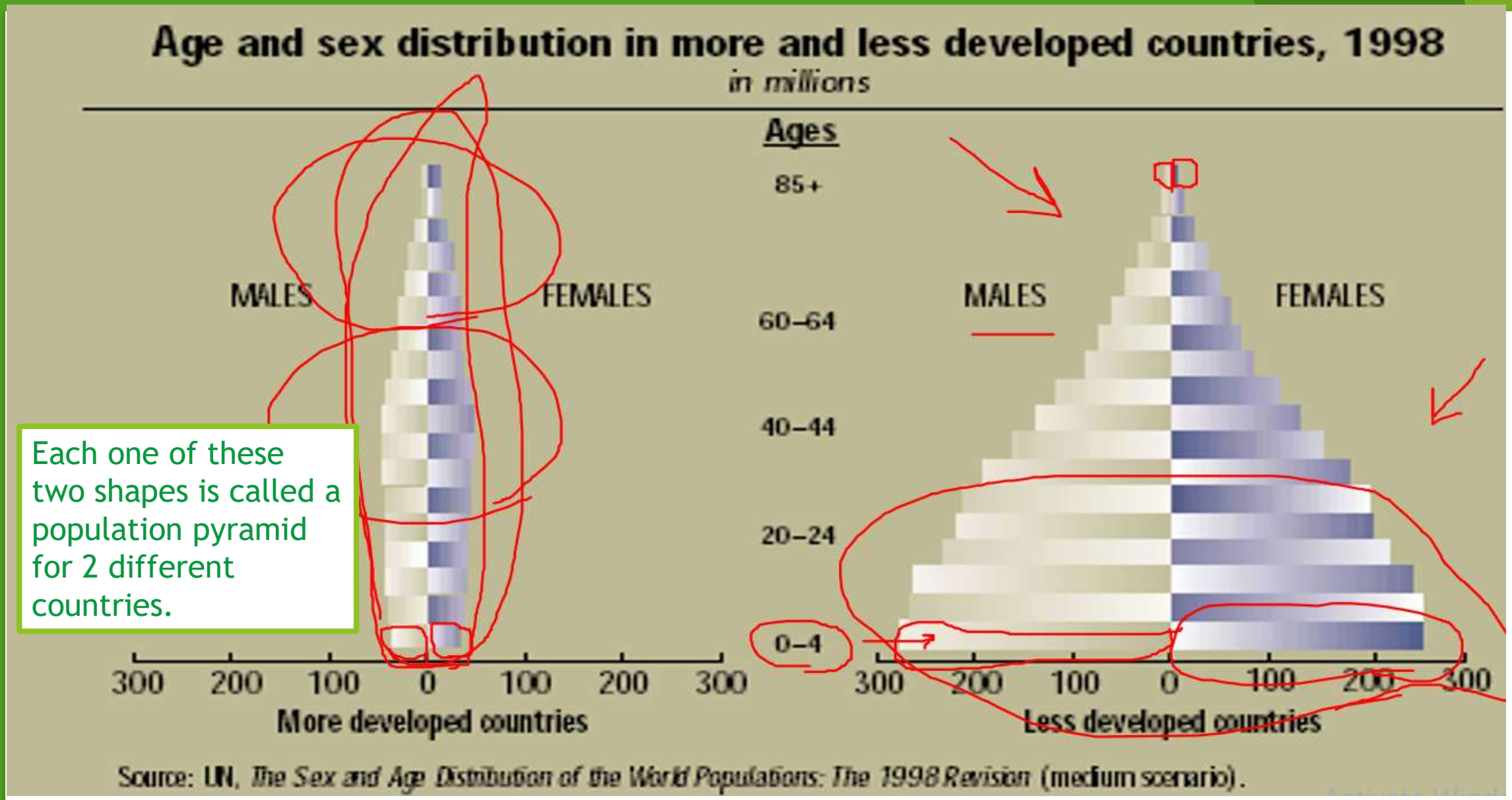
- In the rich countries, you find that population is usually older.
  - standards of living are very high
  - the health care is really advanced
  - the income per capita is really high
  - Examples: European or north American countries
- In the countries which still developing دولة نامية, you find that the population is extremely younger.
  - still struggling
  - Examples: Jordan, many other middle eastern countries, Africa, Latin America, south America, and many of the Asian nations.

Sex Ratio

- The sex ratio is ***the ratio of males to females in a given population***,
- usually expressed as the number of males for every 100 females.
  (we get population statistics using the census that we take in the first lecture)
- The sex ratio at birth in most countries is about 105 or 106 males per 100 females.
  - Usually you get very similar number to 100/probably males are slightly higher than females.(A global phenomenon النساء بعيشوا أطول (ولكن الرجال في كل مرحلة عمرية أكثر بالعدد)
  - Exception: certain situations such as after wars, like what happened in the country of the Uruguay in the beginning of the 20th century (Uruguay Vs brazil, Argentine and Paraguay) which cause sever sex ratio imbalance in 1930 since quarter of Uruguay Males got killed→ restored its balance year after year
- After birth, sex ratios vary because of different patterns of mortality and migration for males and females within the population.

Population Pyramid الهرم السكاني

- A population pyramid graphically displays a population's age and sex composition.
  → can be drawn for any population in any country in any year.
- Horizontal bars present the numbers or proportions of males and females in each age group.
  → the shape gives you a very quick impression/image of what the demographic composition of that population looks like so you can learn what the needs and characteristics of that population are.
- The sum of all the age-sex groups in the population pyramid equals 100 percent of the population.



Each one of these two shapes is called a population pyramid for 2 different countries.

The left pyramid:

- ✓ Very slim pyramid
- ✓ This represents that people who are aged very young in this population are very tiny proportion
- ✓ less than 30,000 males/ female are aged 0-4

The right pyramid:

- ✓ It has a very fat and wide base:
  - The younger population (aged between 0 and 4 which is 300,000) are so many.
- ✓ It has a very thin, slim and pointy top:
  - Very tiny proportion of male and female who're aged above 85
- ✓ This is a less developed country = This is a developing country

This indicates a huge economic problem; if more than half your population is very young, not even productive, then that's a challenge.

- ➢ The shape of the pyramid tells you about the special circumstances of any country
- ➢ What do we want our country's population pyramid to look like?
  - We want our working population to be the widest, if possible, and we want the aging and the children population to be reasonable, do not be much wider than the middle of the pyramid.

Population profiles

- Populations of countries can differ markedly as a result of **past and current** patterns of **fertility, mortality, and migration.** However, they all tend to fall into three general profiles of age-sex composition.
- When we calculate the number of individuals who die and who get born in a certain year and country, but also take into consideration the number of people who immigrate into and from that country, we should find something called the growth rate. (to what extent does this population grow in every year)

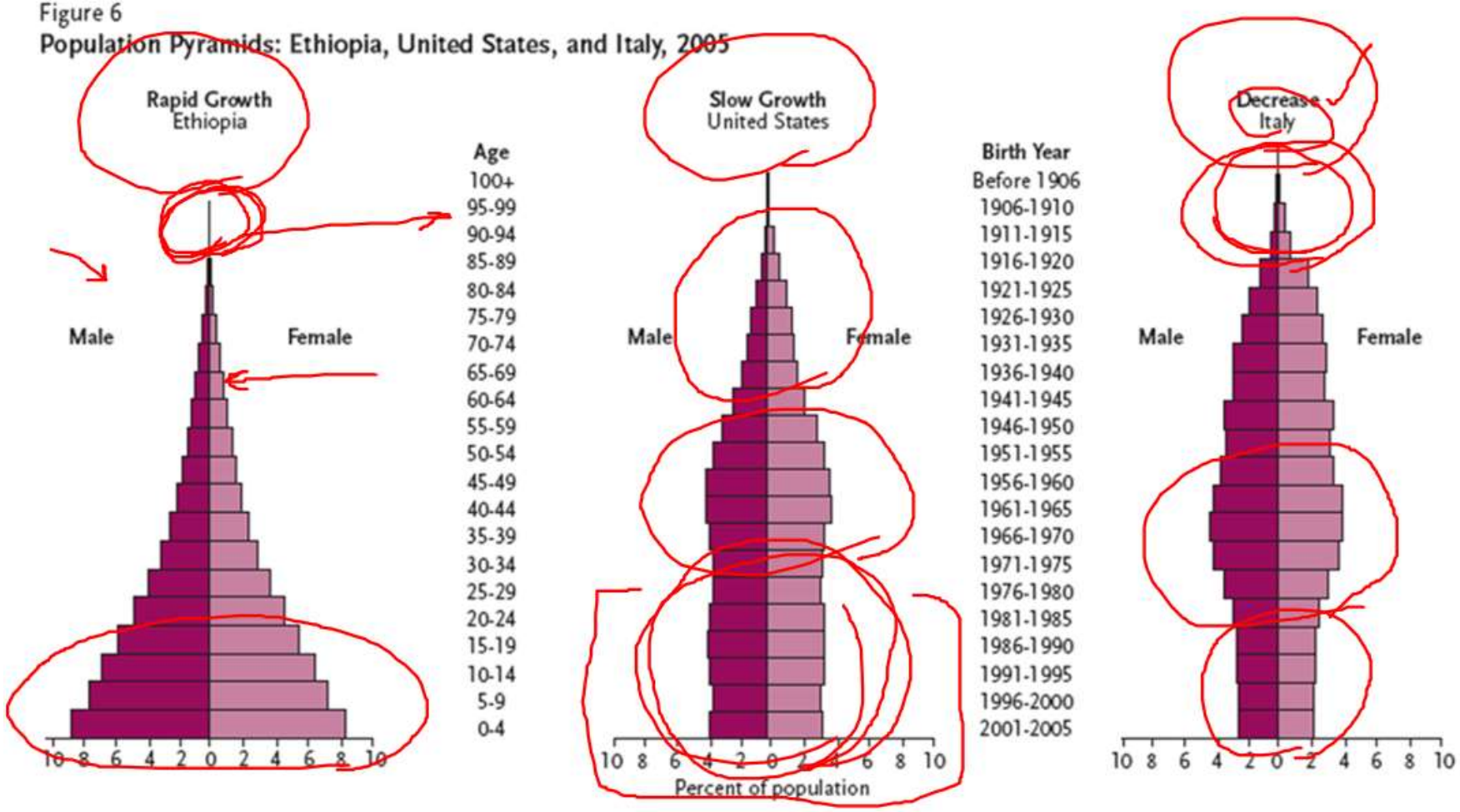
The different types of population growth:

1. **Rapid growth** is indicated by a pyramid with a large percentage of people in the younger ages.
2. **Zero growth or <u>decreasing</u>** is reflected by a pyramid with a smaller proportion of the population in the younger ages.
   - Grow negatively = decreases in growth
3. **Slow growth** populations are shown by roughly equal numbers of people in all age ranges, tapering off gradually at the older ages.

This's the way we use to divide the population in the world into different classes.

Figure 6

Population Pyramids: Ethiopia, United States, and Italy, 2005



Sources: UN, *World Population Prospects: The 2004 Revision, Online Data* (www.un.org/esa/population/unpop.htm, accessed Jan. 29, 2007); and U.S. Census Bureau, *National Population Estimates for the 2000s* (www.census.com, accessed Jan 29, 2007).

The left pyramid:

- ✓ Probably half the population is under the age of 20/25
- ✓ Very wide base, and very thin top.
  → Almost some age groups are non-existing in Ethiopia.
- ✓ This is a huge growth
- ✓ If you calculate the number of individuals in Ethiopia 10 years ago, and then calculate it today, you will find that it has grown greatly in millions or tens of millions in one decade.
- ✓ Life expectancy in Ethiopia is not expected to be very high, probably around the 60s or late 50s;very thin top; indicates we're struggling
  → Definitely not a good thing(we don't want our pyramid to be very fat the base and very thin in the top
- ✓ Ethiopia today has over 100 million people the 2nd country in the number of people after Nigeria then the 3rd is Egypt in Africa

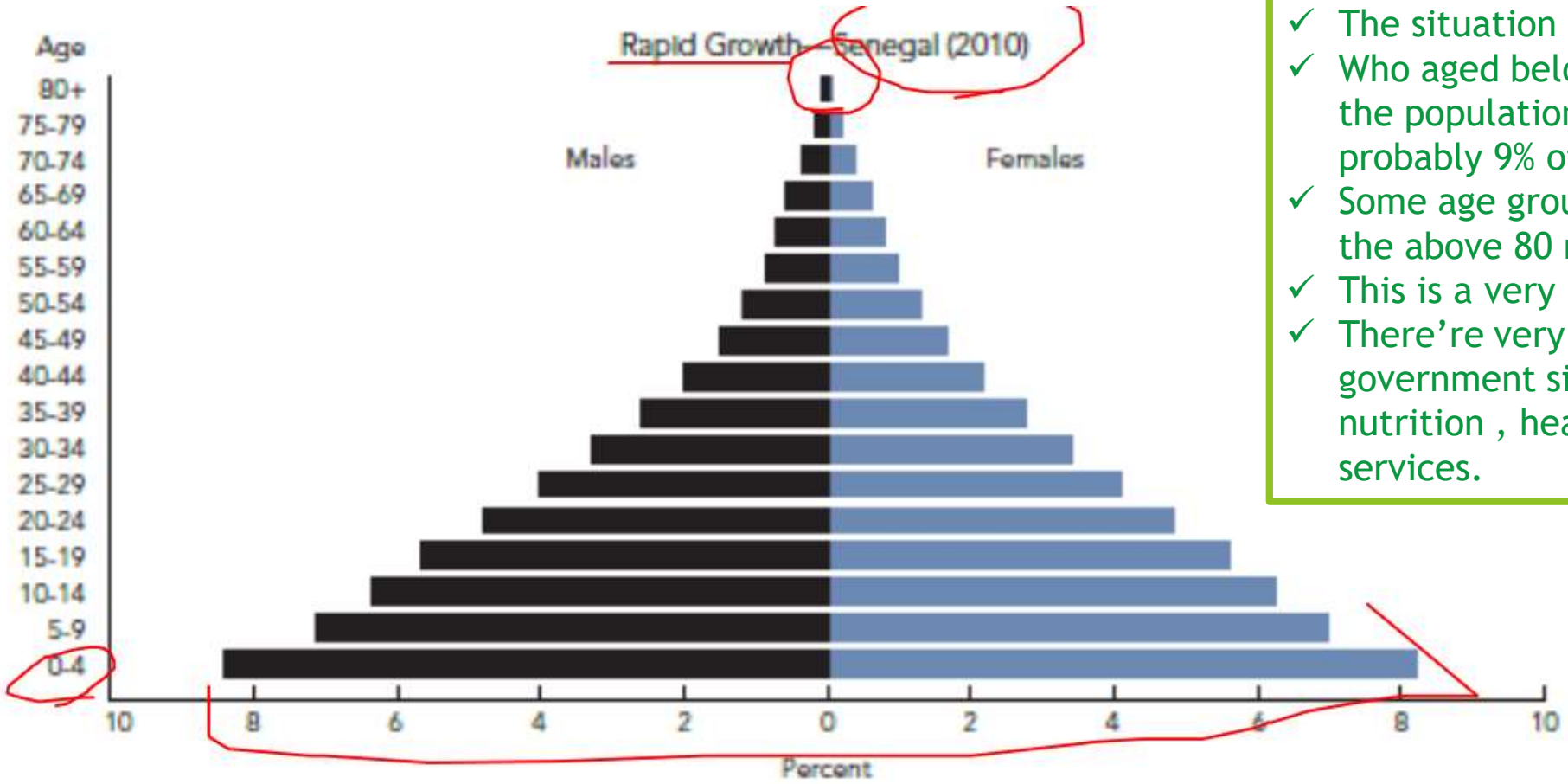
The middle pyramid:

- ✓ There are some children,a decent middle and older age populations. This means that the population in the United States is balanced and reasonable.
- ✓ The growth in the United States is larger than some European countries; because of immigration which increases the population and change the shape of the population pyramid.
- ✓ Not only we care about the citizens of a country, but also about those who migrate to that country, because they significantly can change the statistics in the country they immigrated to .

The right pyramid:

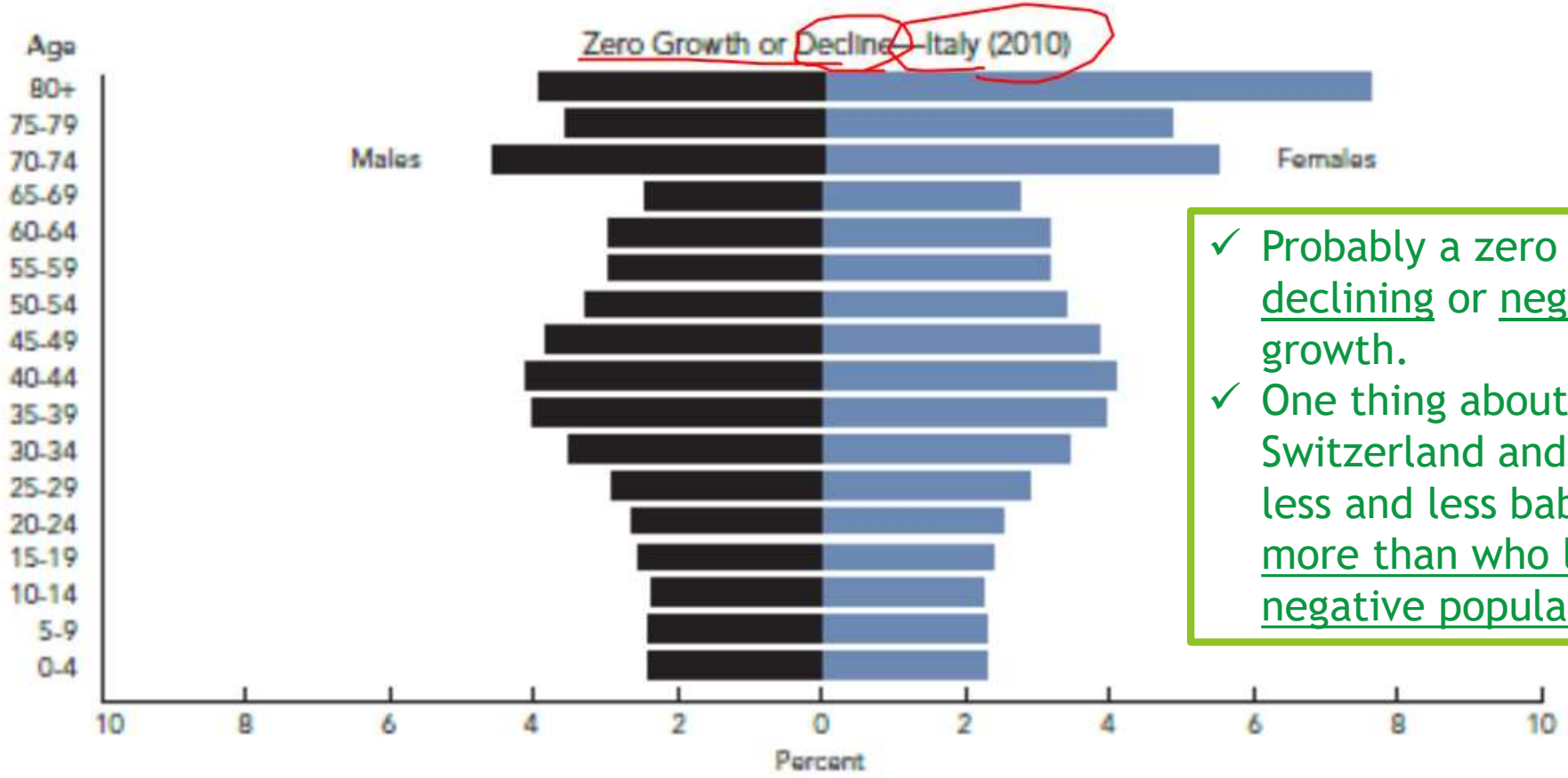
- ✓ The children population is very slim, it's narrower than the middle age population.
- ✓ The very older population is not that wide.
- ✓ If you now do the math, the total number (the net growth) in Italy gets negative.
  → which means that in 2007, the population of Italy was slightly larger than today.
  → This is called a decreased growth (a negative growth).
  → Not necessarily to be a good thing.

Age pattern of Senegal population, 2010



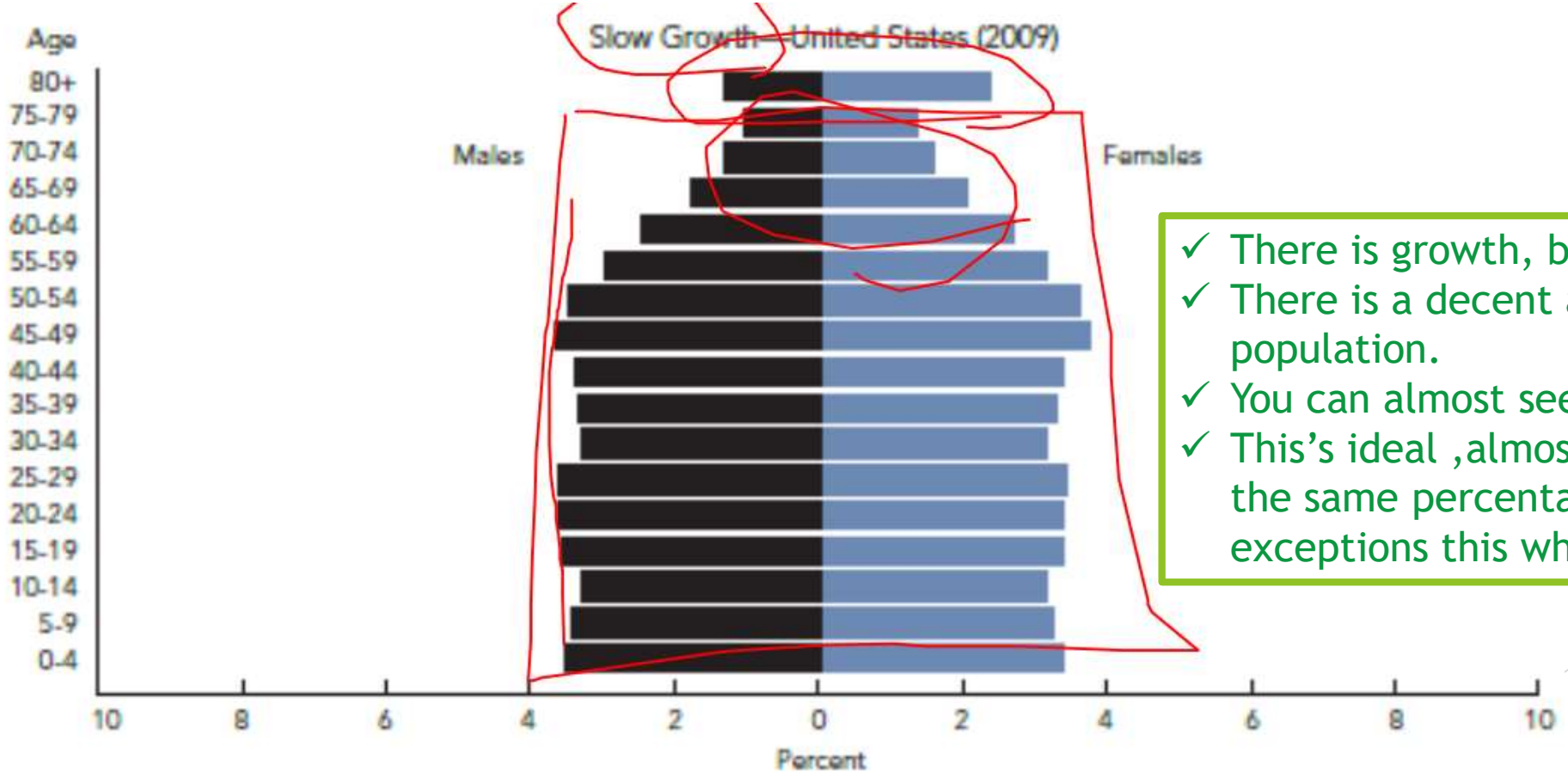
- ✓ The situation is so bad.
- ✓ Who aged below 5 are huge proportion of the population they consist 8% and probably 9% of the population .
- ✓ Some age groups are barely existing, like the above 80 near 0%.
- ✓ This is a very rapid growth population.
- ✓ There’re very large burden on the Senegal government since it need to provide nutrition , health care ,education , services.

Age pattern of Italy's population, 2010



- ✓ Probably a zero growth or even a declining or negative or decreasing growth.
- ✓ One thing about Italy, Germany, Austria, Switzerland and France, couples deliver less and less babies, so who dies are more than who lives expressed in negative population growth.

Age pattern of US population, 2009



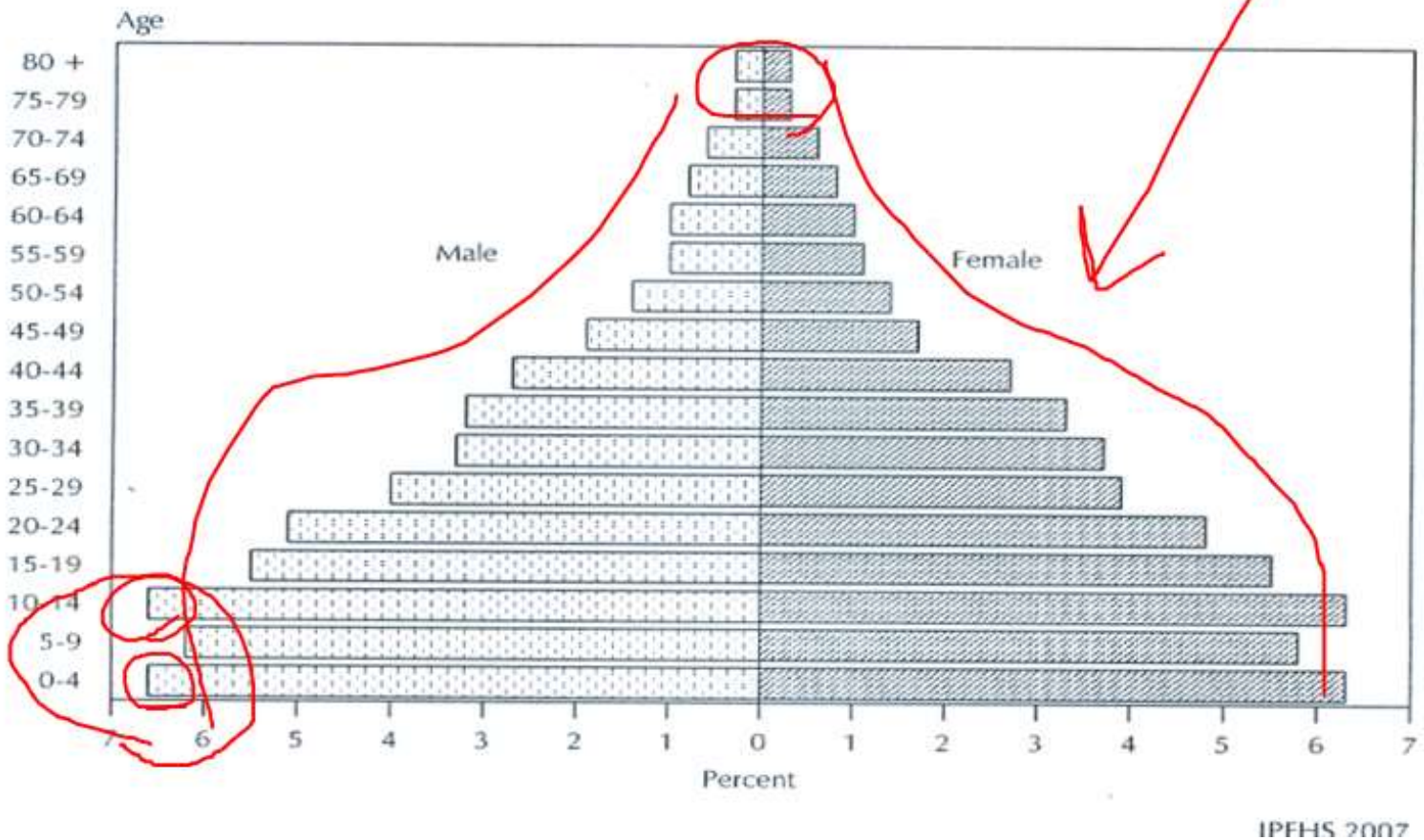
- ✓ There is growth, but it's not very rapid.
- ✓ There is a decent aging/elderly population.
- ✓ You can almost see a block.
- ✓ This's ideal ,almost every age group is the same percentage with very minor exceptions this what we aspire to have.

Jordan Population Pyramid

→ It reminds us of Senegal and Ethiopia, but a slightly more decent situation here in Jordan.

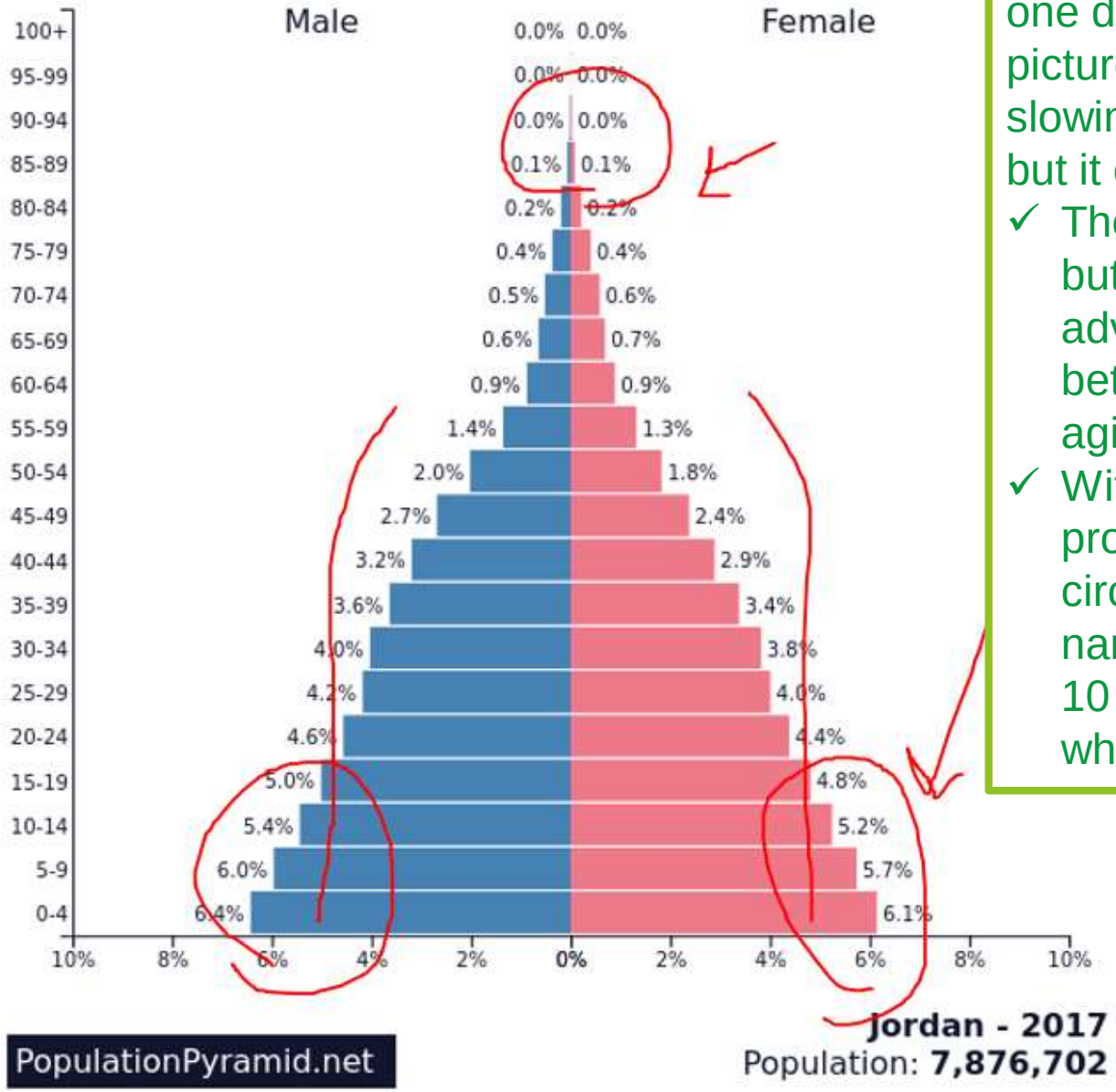
- ✓ We have a lot of children but not most of them are 0-4 and a decent aging population(above75)
- ✓ Still is problematic
- ✓ Jordan before 10 /13 years ago was a very young population.

Figure 2.2 Population Pyramid



JPFHS 2007

Jordan's Population Pyramid , 2017



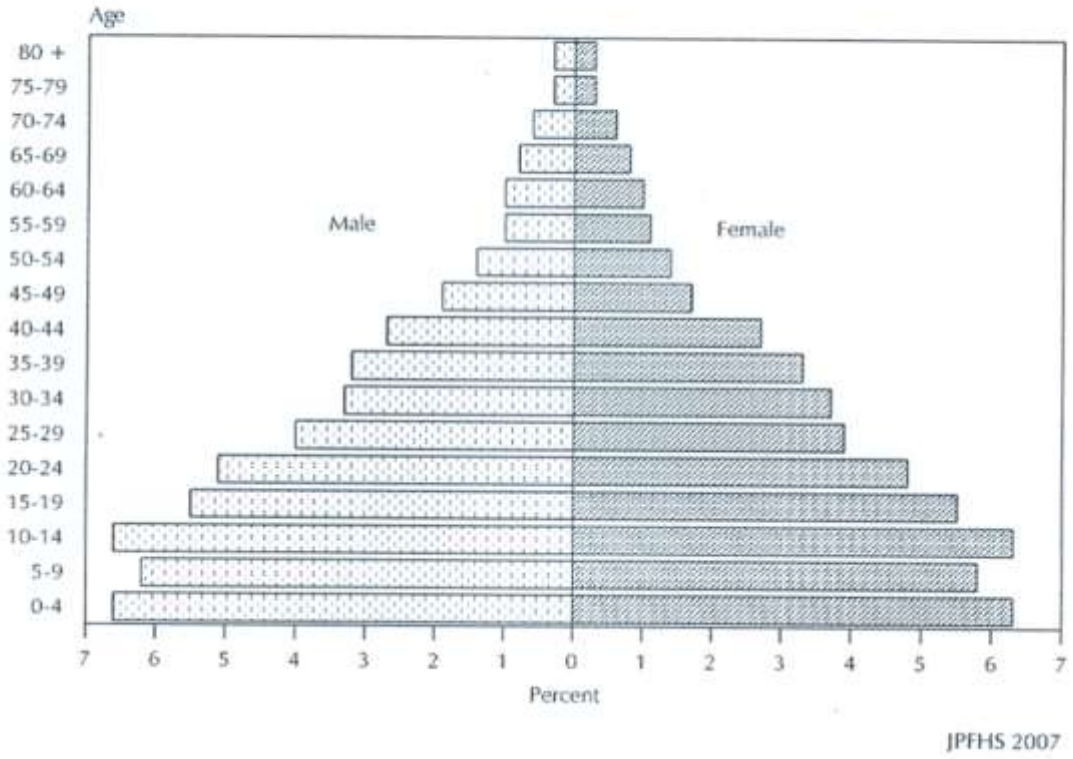
→ Things seem to have changed, one decade after the previous picture, more towards balance and slowing down growth, this's good but it can be better.

- ✓ The aging population is decent, but it will increase with the advances in healthcare and better health industry. We expect aging population to get wider.
- ✓ With the family planning programs in Jordan these in red circle will slow down and get narrower which will lead us after 10 years to shape like us shape which is slow growth pyramid.

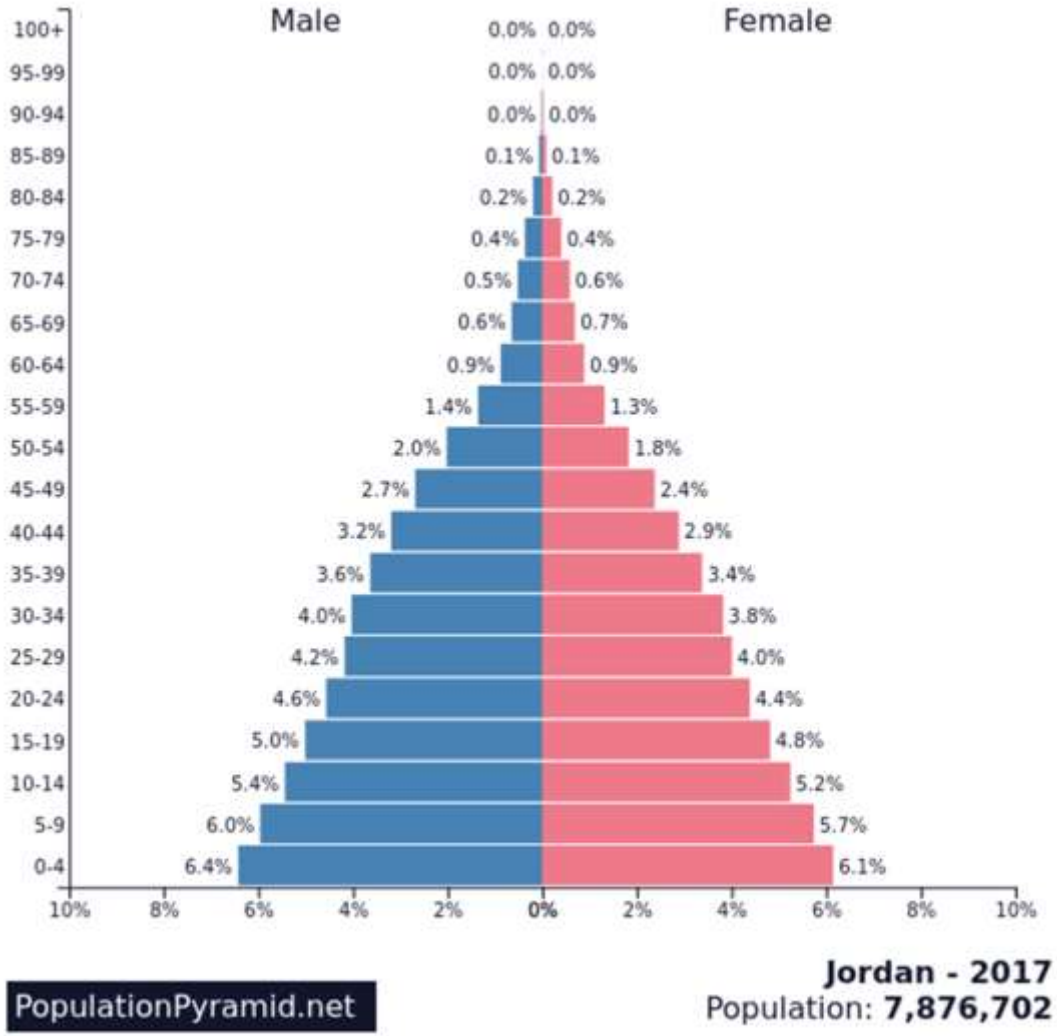
From 2007 to 2017

This is how deep the change, or the difference can be in just 10 years.

Figure 2.2 Population Pyramid



JPFHS 2007



The raw data from Jordan, 2017

جدول 5.2 عدد سكان المملكة المقدر حسب الجنس وفئة العمر في نهاية 2017

Table 2.5 Estimated Population of the Kingdom by Sex and Age Group, at End-year 2017

* نسبة الجنس Sex Ratio	المجموع Total		Female انات		Male ذكور		فئة العمر Age Group
	%	عدد	%	عدد	%	عدد	
105.3	11.5	1154040	11.9	562050	11.1	591990	4-0
104.6	12.3	1233450	12.7	602750	11.8	630700	9-5
106.0	10.6	1065660	10.9	517330	10.3	548330	14-10
111.0	9.9	999660	10.0	473860	9.9	525800	19-15
121.6	9.9	997710	9.5	450160	10.3	547550	24-20
124.0	8.7	876030	8.3	391030	9.1	485000	29-25
117.0	7.7	774560	7.5	356950	7.8	417610	34-30
118.2	6.8	686800	6.7	314810	7.0	371990	39-35
118.6	5.9	591610	5.7	270630	6.0	320980	44-40
120.4	5.0	499300	4.8	226580	5.1	272720	49-45
115.1	3.7	368970	3.6	171540	3.7	197430	54-50
108.5	2.6	258080	2.6	123750	2.5	134330	59-55
106.7	1.8	176220	1.8	85250	1.7	90970	64-60
102.3	3.7	370910	3.9	183310	3.5	187600	+65
112.5	**100.00**	**10053000**	**100.00**	**4730000**	**100.00**	**5323000**	**Total**

* *Sex Ratio: Number of males Per 100 females*

* نسبة الجنس: عدد الذكور لكل 100 أنثى

Source: Department of Statistics
http://dosweb.dos.gov.jo/DataBank/Population_Estimares/2017/PopulationEstimates.pdf

- The table represents the actual population composition in Jordan between the beginning and the end of the year 2017 , For example we've 11% of male and about 12% of female are under the age of 5 and the total about 11.5% this's large(but isn't bad compare to Senegal which's 20%) and need to be shrunk into smaller percentage .
- In Jordan, we are getting better, but we still have way to go.

- In addition to the burden of children who are a huge percentage of our population, the government also has another different type of burden, which is the aging(retired elderly) people which's in total about 4% of our population. So Jordan face a double burden situation(it's not unique since it's the situation in almost every developing country) where it has to think about chronic diseases such as diabetes, hypertension , cancers which effect aging population and also think about the infectious diseases and other health needs of children (how's below 18/20 age).

Population change

- Population change has three components: births, deaths, and migration.
- As people are born, die, or move, their total numbers in an area change.
- During most of history, world population increased very slowly, but during the 20th century, this growth has accelerated.
- The population composition in countries generally change over time this's normal but this change has its own pathway (slope)/curve.
  → Depending on how much change you witness in your population, you can be classified into one of several stages.

How do populations change?

- A change in **population size** over a given period of time equals **the number of people in the population at the beginning of the period** plus any **births that occur during the period**, minus any **deaths,** plus **net migration during the period**(people who migrate into your country – who leave.
- it's very important to calculate the change of any population over a certain time usually over one year

Calculating population change over time

P1+(B-D)+(I-E)= P2

$P_1 + (B - D) + (I - E) = P_2$

Where P_2 is the population at the later date and P_1 is the population at the earlier date; B is births and D is deaths between the two dates; and I is immigration (or in-migration) and E is emigration (or out-migration) between the two dates.

Jan. 2009 population	+	(2009 Births-Deaths)	+	(2009 Immigration-Emigration)	=	Jan. 2010 population of Sweden
9,256,000	+	(111,800 – 90,080)	+	(102,280 – 39,000)	=	9,341,000

During 2009, the population of Sweden increased by 85,000. ✓ Almost there is a zero change.

If we take a developing country such as Ethiopia the number of birth will be in millions and the number of death will be severely a smaller so the population change is larger than that of Sweden which have a balance between births and deaths.

Population change

- The change in population size accounted for by more births in the population than deaths is referred to as "**natural increase.**"
- The term "**natural decrease**" refers to population decline resulting from more deaths than births.
- Naturally there must be an increase in the population , since we started counting in 1800s it has never decreased in the total earth population
- In the past 10/20 years only(not reported before) , Certain places/countries have a population that’re decreasing/ declining rather than naturally increasing.
- We can calculate this increase in any population which we call (rate of natural increase)

Rate of Natural Increase

- The rate of natural increase is the rate at which a population is increasing (or decreasing) in a given year due to a surplus (or deficit) of births over deaths, expressed as a percentage of the base population.
- Net migration is the number of immigrants minus emigrants.
- Natural increase takes into consideration the births and deaths, in addition to the immigrants(join) and emigrants(leave).

Growth Rate

- The growth rate is the rate at which a population is increasing (or decreasing) in a given year due to natural increase and net migration, expressed as a percentage of the base population.
- The growth rate takes into account all components of population growth: births, deaths, and migration.
- **It equals (births - deaths)+_ net migration/ total population X K (100).**
- It should never be confused with the birth rate, but it sometimes is.

- Growth Rate is the same thing as a population change except you multiply it by 100 at the end.
- Very nice way of comparing nations to one another, calculating and probably predicting or expecting how much increase there will be in the near or far future so it’s very useful means of planning for future.

The Demographic Transition

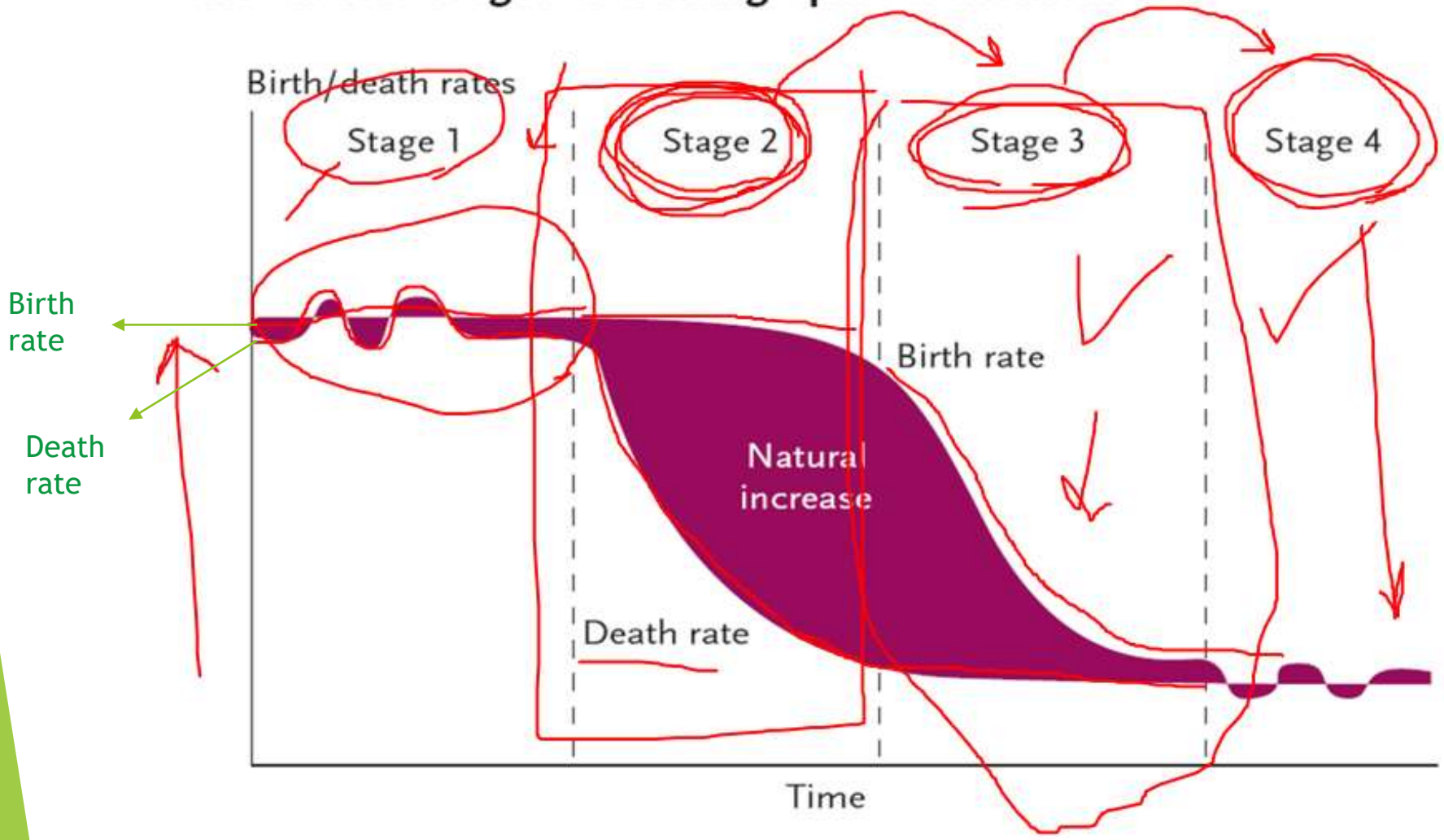
- The demographic transition refers to the change that populations undergo from high rates of births and deaths to low rates of births and deaths.
- High levels of births and deaths kept most populations from growing rapidly throughout most of time.
- Depending on how much growth there is and demographic numbers in certain country, you can classify and divide every country into one of different stages of demographic change (demographic transition).

The Demographic Transition

- The decline in mortality usually precedes the decline in fertility, resulting in population growth during the transition period.
- Historically there has been some different major changes in the way populations looked over the past few centuries and Based on the shape of the demographic changes and transition of certain nation/part of the world, you can expect certain characteristics to be combined with that stage/level of transition .

Figure 11

The Classic Stages of Demographic Transitions



Note: Natural increase or decrease is produced from the difference between the number of births and deaths.

This slide show the history of e ach the 4 stages and why each stage happened with some exapmles

Finland is a good example of a country that has passed through the four stages of the demographic transition.

Stage I

High birth rate, high death rate = little or no growth

Finland in 1785-1790)

Birth rate: 38 per 1,000

Death rate: 32 per 1,000

Rate of natural increase: 0.6 percent

Stage II

High birth rate, falling death rate = high growth

(Finland in 1825-1830)

Birth rate: 38 per 1,000

Death rate: 24 per 1,000

Rate of natural increase: 1.4 percent

Stage III

Declining birth rate, relatively low death rate = slowed growth

(Finland in 1910-1915)

Birth rate: 29 per 1,000

Death rate: 17 per 1,000

Rate of natural increase: 1.2 percent

Stage IV

Low birth rate, low death rate = very low population growth

(Finland in 1996)

Birth rate: 12 per 1,000

Death rate: 10 per 1,000

Rate of natural increase: 0.2 percent

- Stage I:

- ✓ There’s a very high birth and death rate so Almost the number of people who get born is equals the number of people who die.
- ✓ This Causes a population that is quite balanced in terms of the number of individuals at the population size, but there is unfortunately a lot of deaths that happen unnecessarily while it could be prevented.
- ✓ This happens when you have: نظام صحي متخلف
  the case used to be all over the world back in1700s and early 1800s, before the invention of vaccines, surgery and anesthesia advances in healthcare/medicine in general.
- ✓ Only the very poor rural population are still in stage I. But generally the world has moved on from this stage.
- ✓ Examples: Sub-Saharan African countries, some populations in Latin America and southern Asia.

- Stage II:

- ✓ You have still very high birth rate, so there hasn't any steps in family planning.
- ✓ Improving health care causes death rate to decrease significantly.
- ✓ This's Jordan in the 20thcentury where the fertility rate and family size was high .
- ✓ So many developing countries are currently in stage II.
- ✓ This produce rapid growth since the women give birth to so many kids but the deaths are slowing down rapidly.

- Stage III:

- ✓ Still we have declining death rate because of the advancement of medicine and healthcare.
- ✓ The countries have started to work on family planning issues (ex: contraceptives), so the fertility rate, family size and number of babies in each family are decreasing.
- ✓ Most developed countries and some middle eastern countries are in stage III.

- Stage IV:

- ✓ We have significant decrease in death rate and birth rate.
- ✓ If not zero growth, it is negative growth.
- ✓ Exist in some countries, very few countries such as Germany, Japan, Italy, Austria, Switzerland and Spain (one of the smallest birth rate countries in Europe and in the world).
- ✓ Do we need to think about jumping from (like in Jordan late stage 2)to stage IV?
  It's a controversial question, it depends on how do you plan for the future, your ideology, your vision, your strategic plans for the future and what type of culture and background you have in your country.

- Why do we study the stages or the growth in general? So we can build up our population policies that we need to follow in order to control the growth and use our resources in the most wise and effective way possible, which is the ultimate goal of demography.

- There is a very famous example regarding population policy and reproductive health policy:
  For more that two decades, the family was not allowed to procreate more than one baby, which is unhuman and controversial. But the result of that was a very significant drop in the rate of growth in the Chinese population.
- It is expected that the Indian population will outgrow the Chinese population around the year 2035. Unless India does something as tough as what China did.

- The country that suffers the most from the population growth(expansion)/ exploded in Arab country back in the 1960s, 1970s and 1980s is Egypt , now it's more than 100 million while back in 1950 it was about 20 million , 5 times in 70 years

- Jordan today is about 10 million. In 1994 there was a census, and Jordan was 2.5 million. Jordan population has doubled twice (2.5 → 5 → 10) million

Population policies

- National population commissions were formed in different countries
- They formulated national population policies and action plans
- One major component of the action plan deals with reproductive health
- Reproductive health in the context of population includes reproductive rights, sexuality, family planning, reproductive morbidity, violence against women, gender based differences, male involvement in reproductive health.

Selected Indicators of Jordan

- Jordan Population and Family Health Survey (JPFHS), 2017/2018

Total population **10,234,315** by September 7, 2018
(including 3 million non-Jordanian residents)

Population Growth Rate (%) **2.2**

Rate of natural increase (%) **2.1**

Population Doubling time (year) **31.5**

Population less than 15 years (%) **34.4**

- Population Age 15-65 years (%) 61.9
  Population Age 65+ years(%) 3.7
  Dependency ratio 63.5
  Urban population (%) 90.3
  Rural population (%) 9.7
  Life Expectancy at birth (year) 73.5
  Male 72.8
  Female 74.3

- Total fertility rate (Women 15-49 years) 2.7
  Urban 2.7
  Rural 3.1
  General Fertility Rate (women 15-44) 90
  Sex ratio 112.5 (Number of males/100 females)

هذا وبالله التوفيق، وله الحمد والمنة
♥♥♥

{إِذْ تَسْتَغِيثُونَ رَبَّكُمْ فَاسْتَجَابَ لَكُمْ أَنِّي مُمِدُّكُمْ بِأَلْفٍ مِّنَ الْمَلَائِكَةِ مُرْدِفِينَ (9) وَمَا جَعَلَهُ اللَّهُ إِلَّا بُشْرَىٰ وَلِتَطْمَئِنَّ بِهِ قُلُوبُكُمْ ۚ وَمَا النَّصْرُ إِلَّا مِنْ عِندِ اللَّهِ ۚ إِنَّ اللَّهَ عَزِيزٌ حَكِيمٌ (10)}
[الأنفال : 9-10]

"وإن الوسائل مهما عظمت، والأسباب مهما كثرت، لا تؤدي إلى النتيجة المطلوبة والغاية المرجوة، إلا إذا أيدتها إرادة الله وقدرته ورعايته"