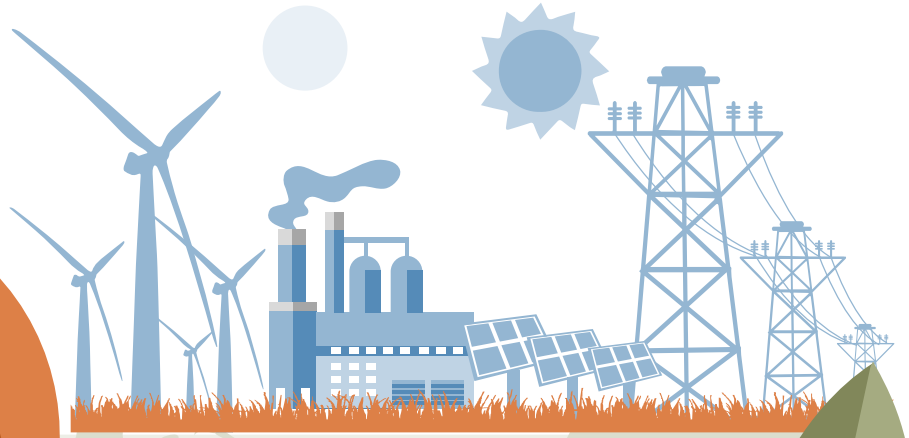

Nitric Oxide and E.Coli Water Poisoning

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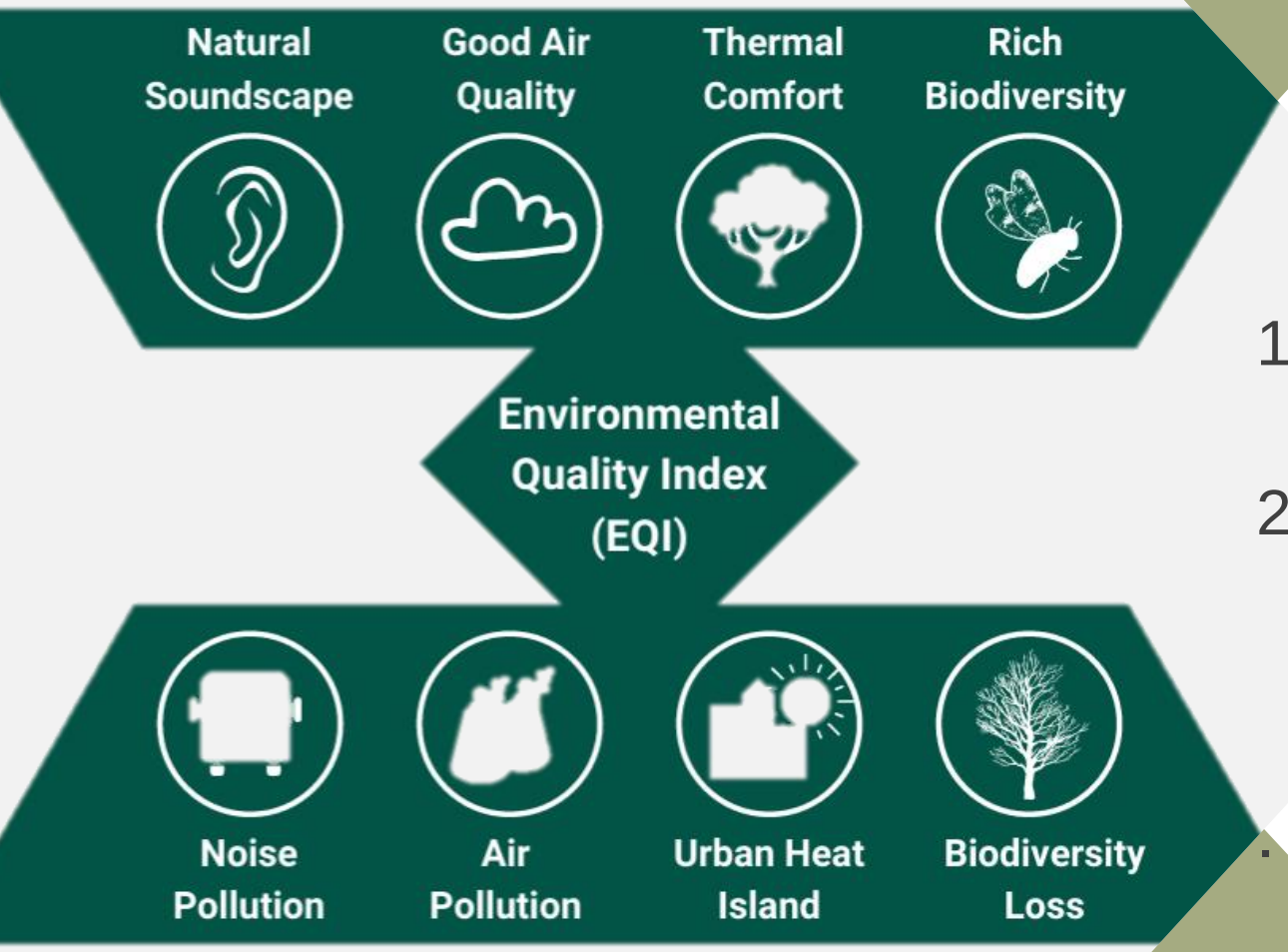
PTS 2022, 2nd Year AMS
Libyan International Medical University

What Do You Know?

Why As Medical Students should we know about it?


Lusail City, 2022



Textbook definition:

1. Reflects the [illegible] environment to meet the ba[illegible]eeds
2. A state of ec[illegible]nditions in environmental [illegible] expressed in terms of indicators or [illegible] related to environmental c[illegible]ndards.

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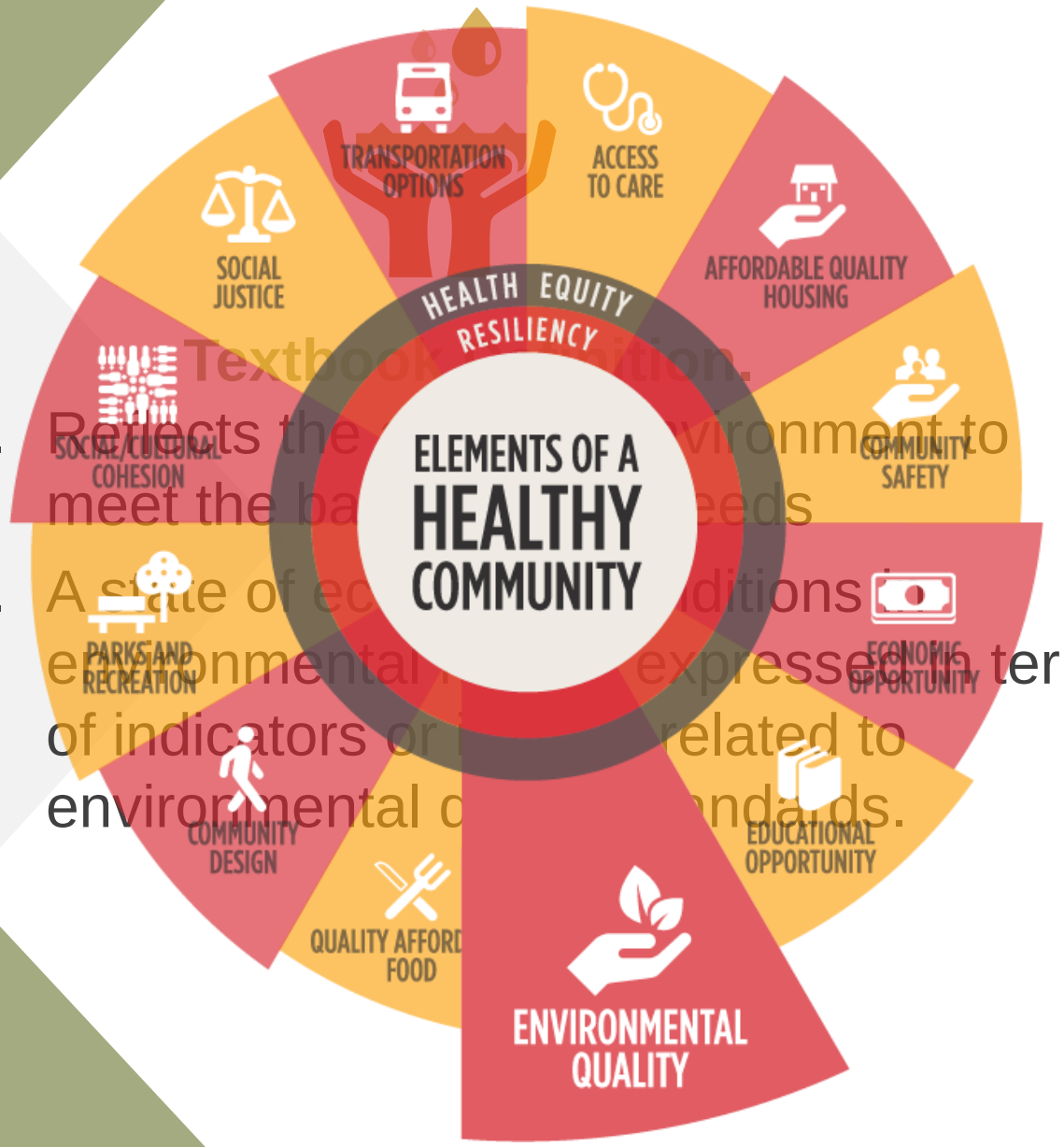
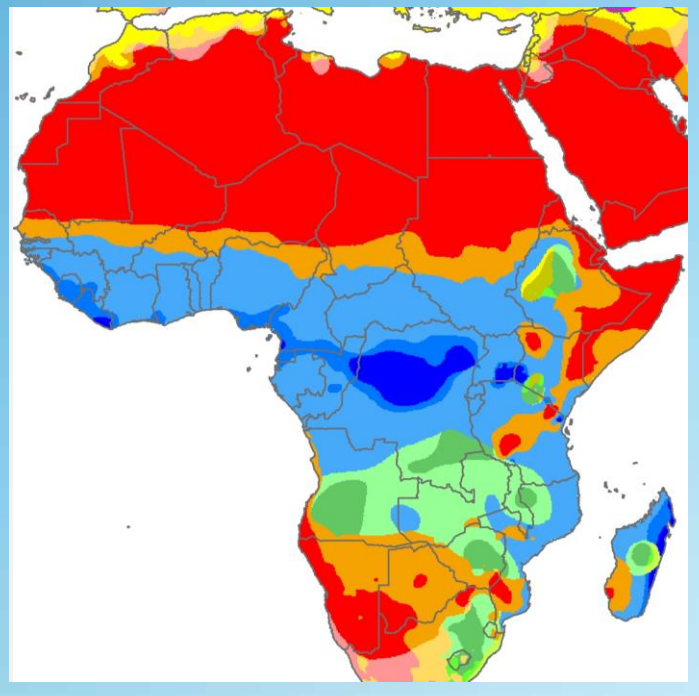


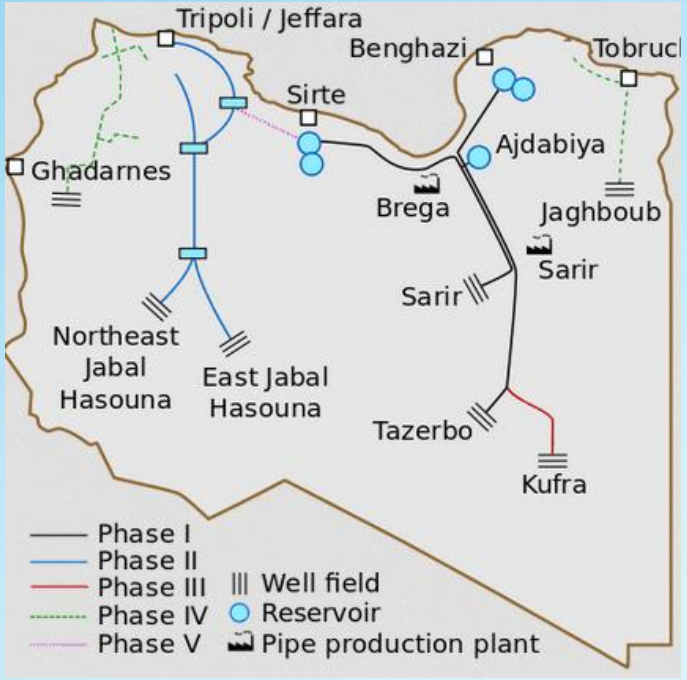
Agenda

- Discuss The Water Crisis and Libya
- Illustrate What Libyans are Doing to Cope
- Nitric Oxide and E. Coli in Water
- Suggested Solutions

Libya is an arid country



Libya is one of the top 36 countries in the world facing water stress with Baseline water stress score of 4.84



There are two types of resources: conventional water resources 97.3% and non-conventional water resources 2.7%

The Urgency:

- In 2012 an estimation for the water consumption in North Africa; the Amount was about 3890 mm3.
- However the water withdrawal was 4850 mm3, exceeding the amount; creating an imbalance of 1940 mm3.
- Experts project Libya will need 8 billion cubic meters of water annually by 2025.

Libyan Resources

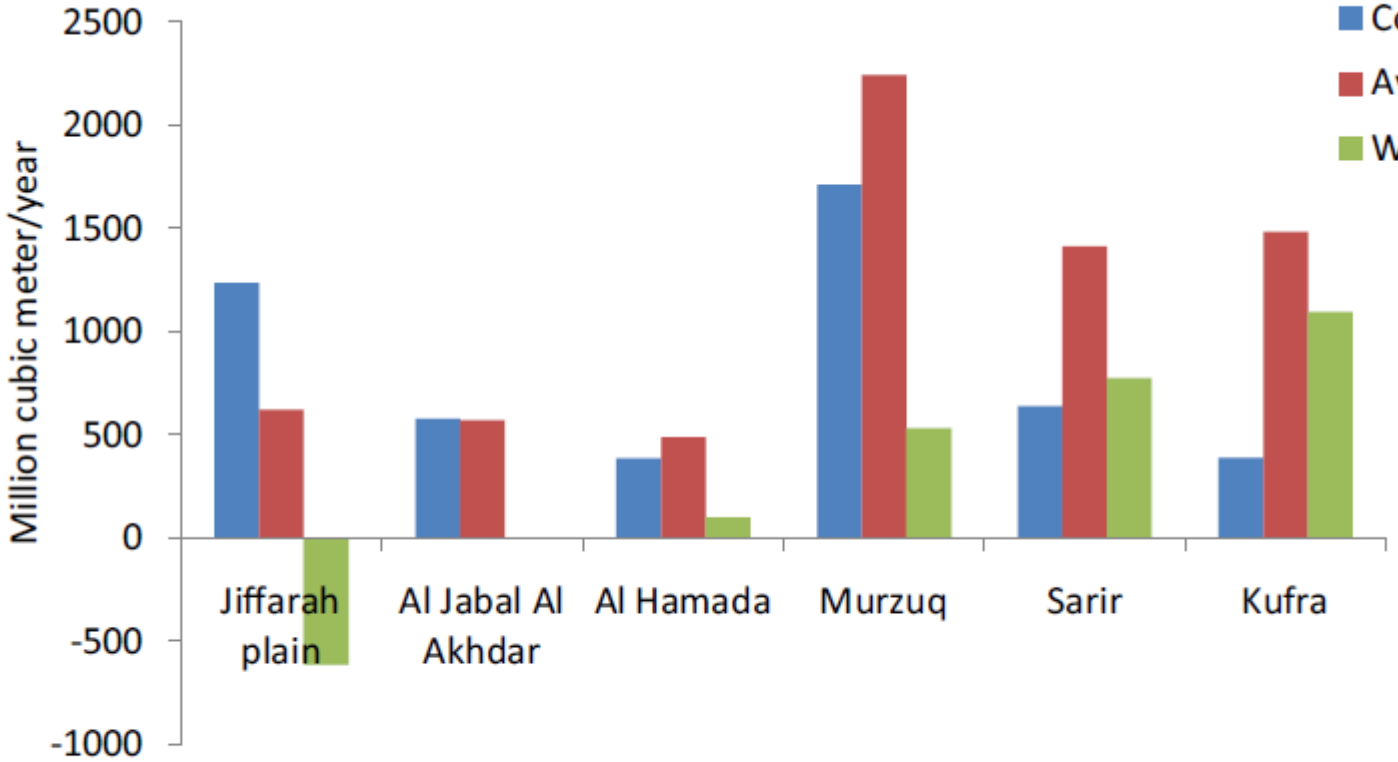


Fig. 2. Water supply-demand balance (2010).

Figure1.Underground Water Basins Map in Libya.

The Reasons for Libyan Water Crisis

- Lack of awareness of the need for the rational use and management of water resources
- Poor management in the General Water Authority (GWA)
- Lack of institutional framework
- Lack of clear strategy related to the local water sector
- Intensive agricultural activities in the coastal plains
- Excessive groundwater exploitation
- Low water tariffs

Libyans Dig for Water in Latest Test for Capital's Residents

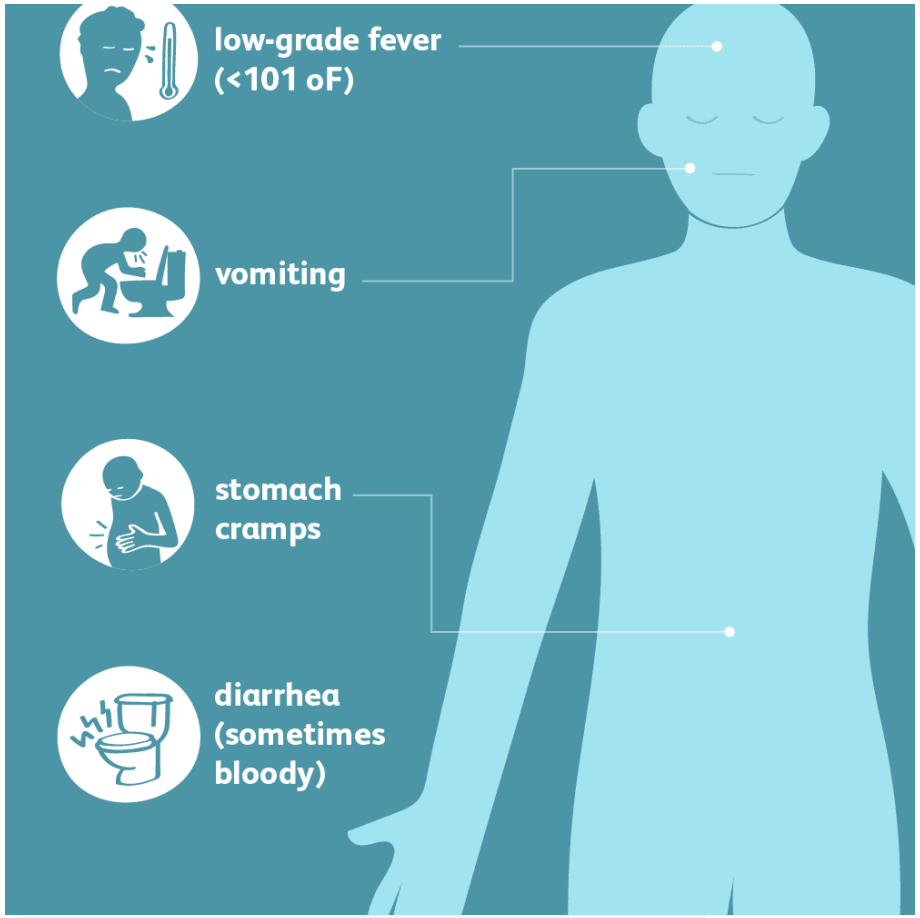
By Aiden Lewis, Ulf Laessing

October 27, 2017.

A flip side to this solution is Nitric Oxide Poisoning and E.Coli Contamination

- **Escherichia coli causes water and food-borne enteritis in children and elderly.**
- When you consume nitrate, your body converts it to nitric oxide.
- Under aerobic conditions, nitrate percolates in large quantities into the aquifer because of the small extent to which degradation or denitrification occurs..

- Do not consume water or brush teeth with water that has total coliform or E. coli bacteria unless it is properly disinfected.
- Wash dishes and utensils with disinfected water or run the sanitation cycle on a dishwasher.

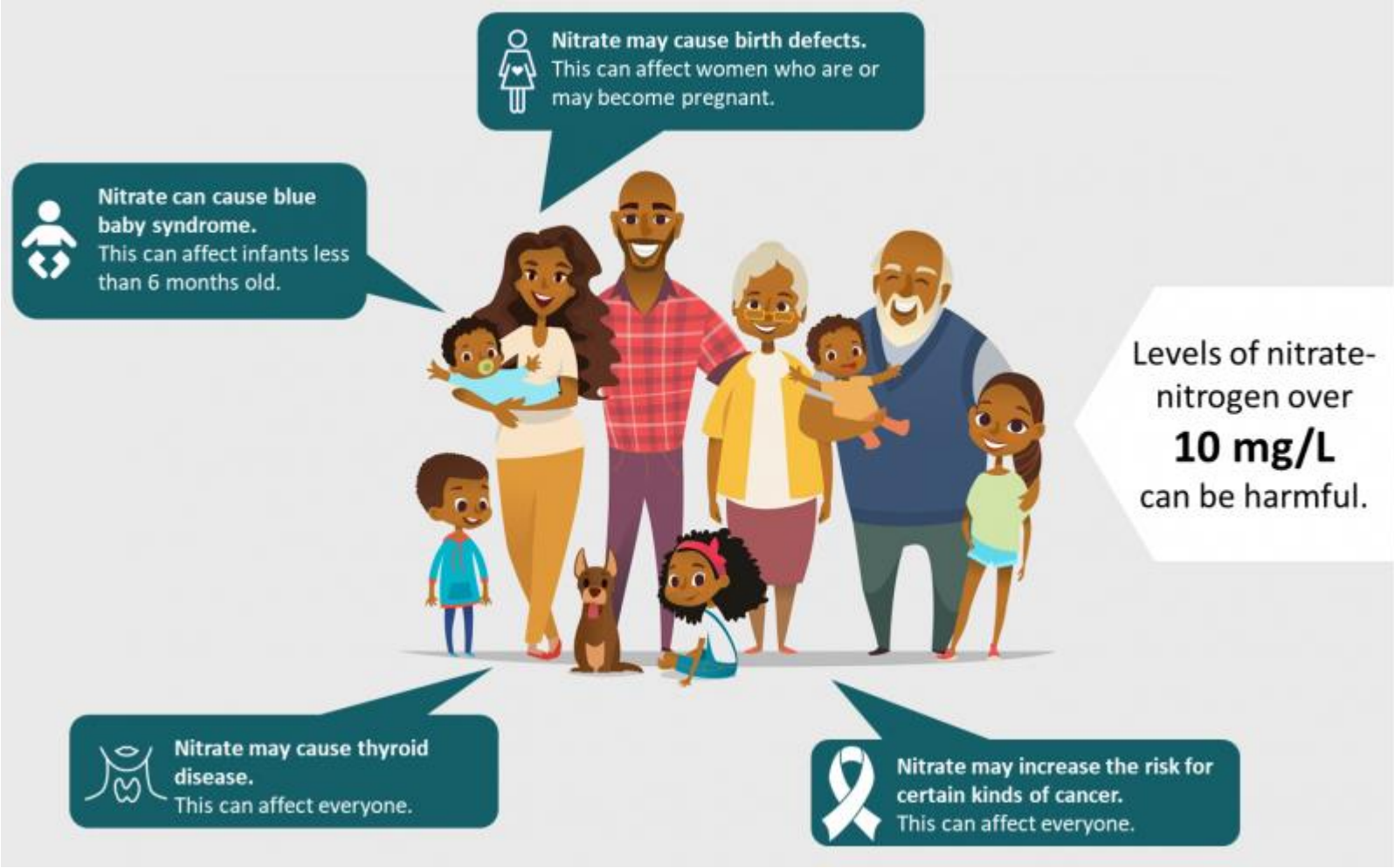


Coliform group bacteria are aerobic and facultative anaerobic , Gram (-), catalase (+), oxidase (-), non-spore bacteria
Death Rate 3-5%

Coliform/E.coli in Water Presentation

- The presence of E. coli bacteria in drinking water indicates that a pathway exists from a waste source such as animal feedlot runoff, septic tank or cesspool leakage, etc., to well water.
- If total coliform and E. coli bacteria are present in drinking water, this indicates that the water may be contaminated with disease-producing microorganisms.

Nitrogen
And its' Derivatives
In Water



Properties and Characteristics of Nitrogen:

- **Odourless, Colourless and tasteless.**
- **A component of all living things occurs naturally in soil and water.**
- **An important part of the nitrogen cycle that is present and harmless in food and water.**
- **Forms when microorganisms break down decaying plants, fertilizers, and manure.**

Process of Contamination

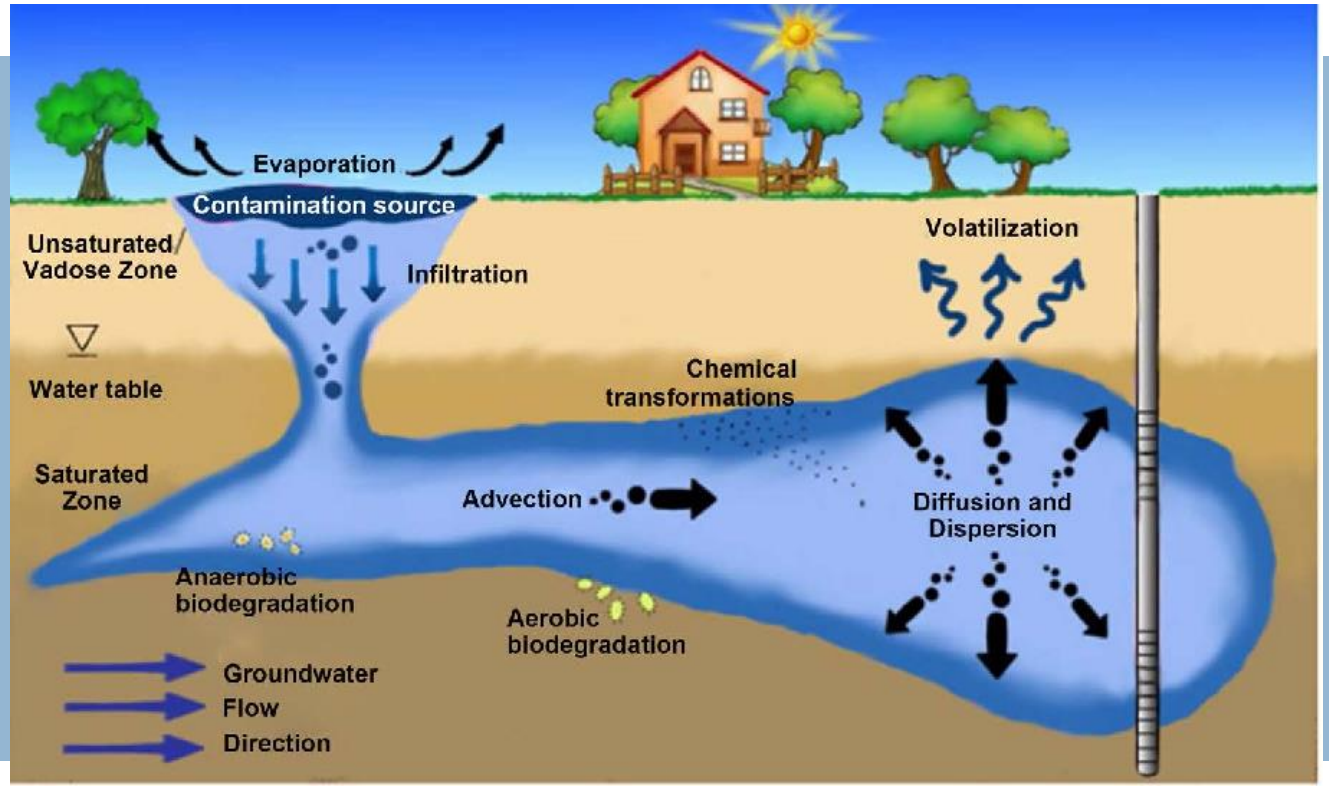


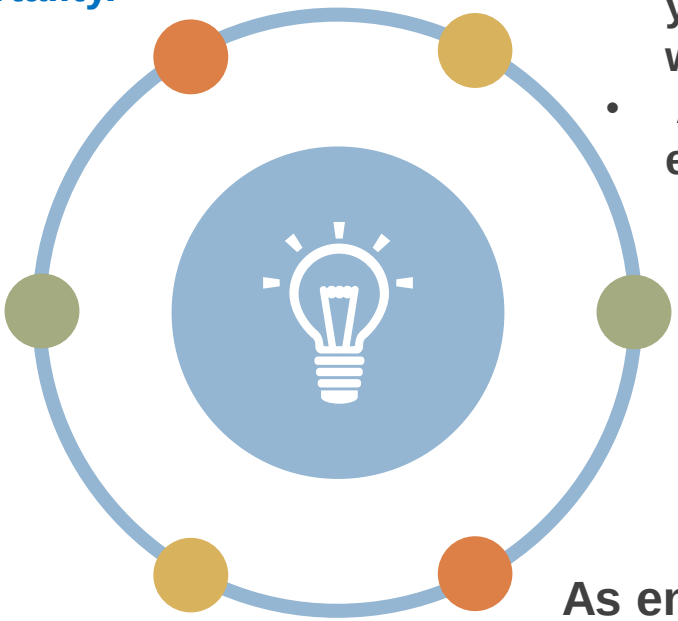
Figure 3. Process of contamination

Table1. Sources of contamination

Category	*Source of contamination*	
Residential	Air pollution	Septic tanks
	Household wastewater	Sewer network
	Household waste	Fuel oil
	Furniture stripping/refinishing	Paints
Municipal	Municipal sludge spreading in land	Air pollution
	Salt for street de-icing	Streets and parking lots
	Municipal incinerators	Municipal landfills
	Sewer lines	Road maintenance depots
	Wastewater treatment plants effluents	
Commercial	Airports	Metal plating
	Construction areas	Medical institutions
	Car washes	Research laboratories
	Cemeteries	Railroad tracks
	Dry cleaners	Laundromats
	Gas stations	Scrap/junkyards
	Golf courses	Recycling facilities
Industrial	Chemical industry/storage	Metal fabricators
	Electronics manufacture	Petroleum production
	Mining and mine drainage	Pipelines
	Metalworking shops	Storage tanks
	Toxic/hazardous spills	Wells
Agriculture	Animal feedlots	Fertilizer storage/use
	Irrigation sites	Manure spreading areas
	Sludge reuse	Chemical spills
	Livestock waste	Pesticides
	Tanks	Wells

Why Water Quality?

Access to improved water source and improved sanitary facilities were reported to reduce infant mortality.



Studies show:

- **Negative relation exists between under-five years' mortality rate and access to safe drinkin water**
- **A positive relationship exists between life expectancy and access to safe drinking water.**

Studies conclude: if environmental quality is interpreted as access of population to improved water, it will have a significant positive impact on health status.

As environmental quality declines health of population worsens.

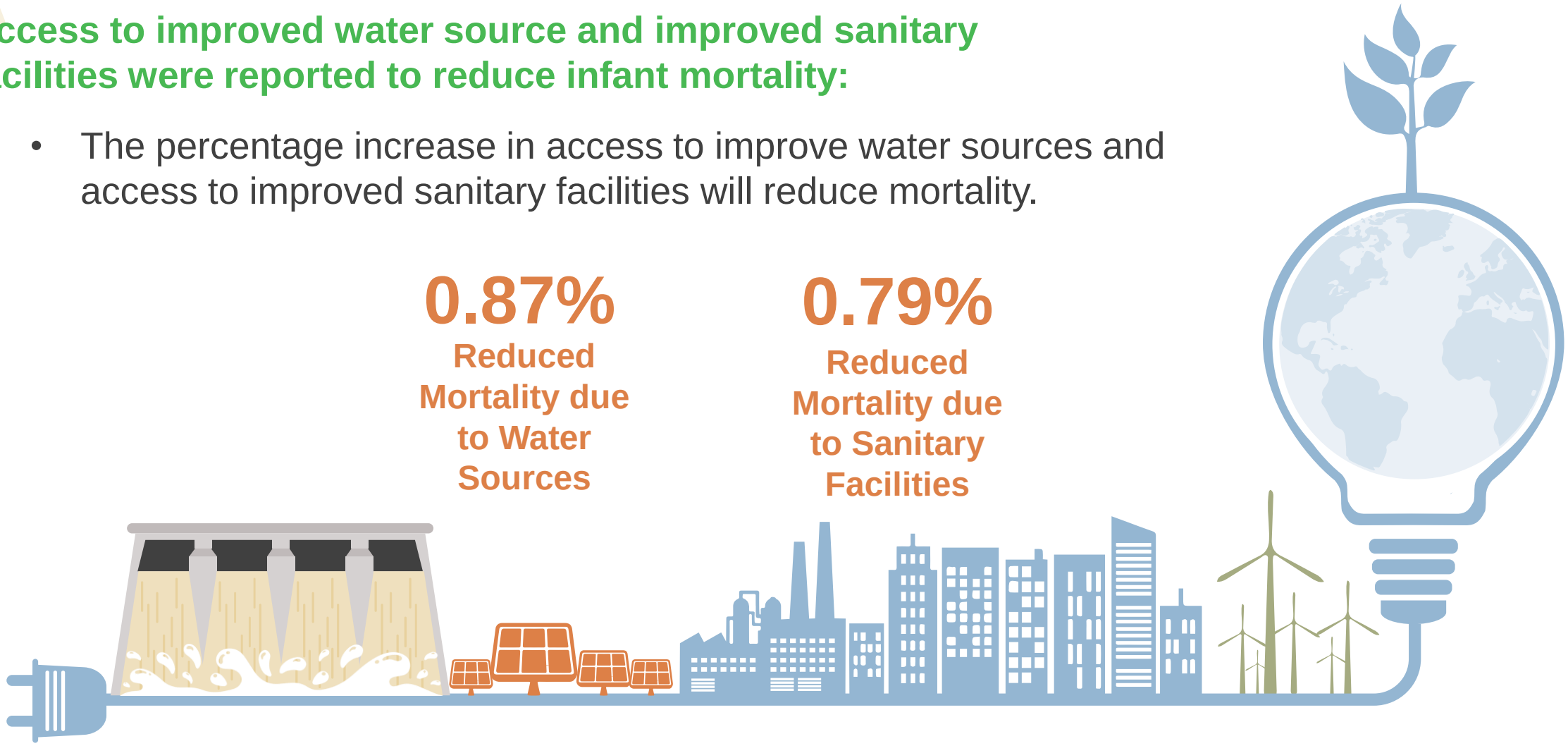
Importance of Water Quality

Access to improved water source and improved sanitary facilities were reported to reduce infant mortality:

- The percentage increase in access to improve water sources and access to improved sanitary facilities will reduce mortality.

0.87%
Reduced Mortality due to Water Sources

0.79%
Reduced Mortality due to Sanitary Facilities



Desalination & Water treatment

Libya has non-conventional water resources but unfortunately they are inactive.

- **Desalination is the process of removing dissolved salts from water:**
  - **Thus producing fresh water from seawater or brackish water.**
- **Desalting technologies can be used for many applications.**
- **The most prevalent use is to produce potable water from saline water for domestic or municipal purposes.**

The government should take initiative regarding water reuse and recycling by encouraging research in this field. This can be conducted by research centers and universities.

Conclusion

Changes in climate will most likely affect the basic natural life support systems.

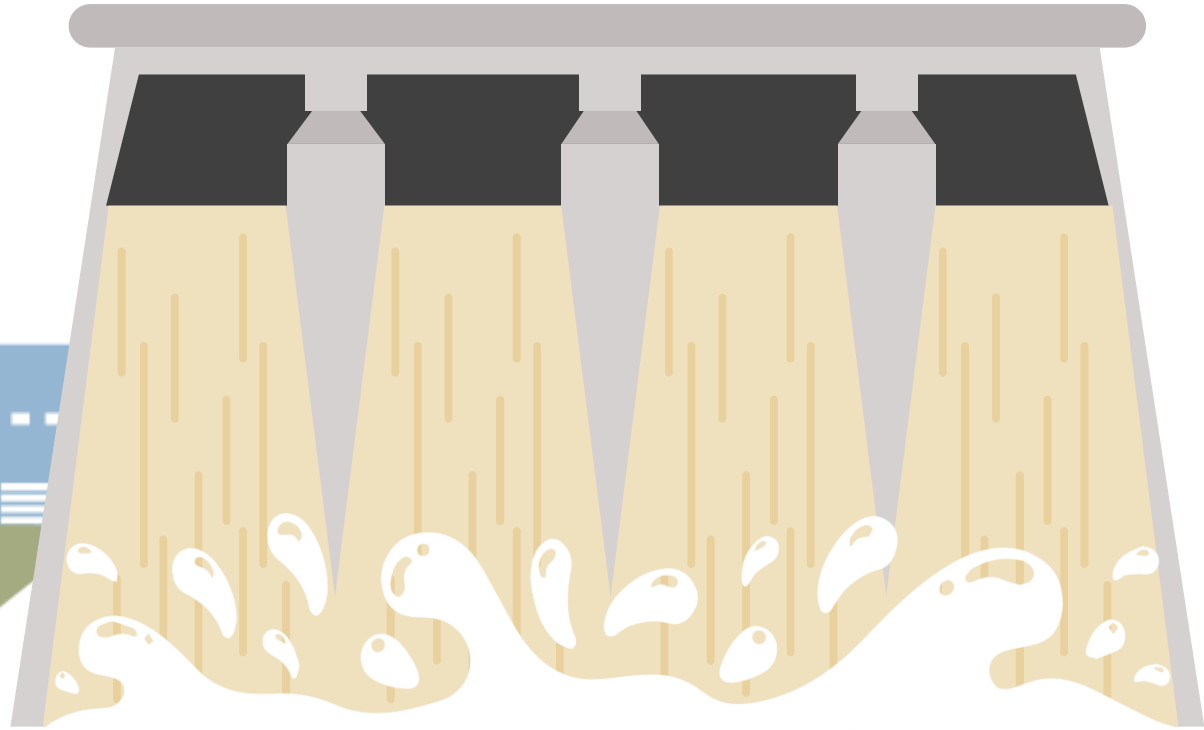
- This include safe drinking water, clean air, and sufficient food and secure shelter.

- Challenges in water supply and sanitation stem from:
- Inadequate funding of water and sanitation facilities, weaknesses in sector policy, poor infrastructure, and poor data and information for effective planning and…
- Inadequate public awareness on the importance of water for social and economic development.

- If environmental quality is interpreted as access of population to improved water and sanitary facilities, it will have a significant positive impact on health status.
- Thus as environmental quality declines health of population worsens.

Take Home Message

Water quality sought to provide another important channel of successfully improving health outcomes other than conventional means that include improving incomes, education and healthcare services.



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Thank You

Water Quality: Nitric Oxide and E.Coli Poisoning