



University of Jordan
Faculty of Medicine



Medical Committee
The University of Jordan






Community Medicine



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In the previous lecture we talked about water availability, resources, and uses of water

There will be a question in the exam about the percentage of governmental subsidy on water bills in Jordan.

The negative impacts of humans on the water cycle

1 - Changing the surface of earth.

- Changing the surface of land changes the destination of water (whether it seeps underground or goes as runoff).
- Example: The land occupied by the University of Jordan used to be agricultural; there were no pavements, streets or buildings. So when water fell as rain or precipitation it had a great chance of seeping down forming underground water, and now after having buildings and streets there's much less of that water coming underground and a lot of it going as surface water runoff .

2- Withdrawing water supplies.

[Water overdrawn: exceeding a water resource capability or capacity by withdrawing water more than we should]

- Consequences of overdrawing surface water
 - 1) Inevitable shortage.
 - 2) Ecological effects: ecosystems will be affected, ex. in the past years we have overdrawn huge amounts of water from Al Azraq area which resulted in accumulation of salts (ملاحات الازرق) and that destroyed the ecosystem there. (there used to be birds and certain kinds of creatures living in that water).

- Consequences of overdrawing ground water.

(Water table: the surface of underground water and how far it is from the top, and there's a hypothetical line (red line) in underground wells that we shouldn't withdraw beyond).

1) Falling water tables and depletion

In certain places you just have to dig a few meters to find underground water, but when we overuse these resources we have to dig deeper to withdraw, like some certain wells in the northern parts of Jordan (more than 600 meters). And that increases the cost of drilling and pumping out water and as a consequence increases the cost of agricultural water, municipal water ... etc

2) Diminishing surface water.

Overdrawing of underground water decreases its saturation and consequently surface water seeps underground to recharge withdrawn water which results in diminished levels of surface water.

3) Land subsidence

A land changes due to change in underground water levels, and the use of a land is now different as a result of that (ex. An agricultural land might not be used in plantation anymore because of underground water overdrawing).

4) Salt water intrusion

For example, in the northern areas in Libya, the Mediterranean Sea water intruded into the ground water and the water became saline so they founded the "major river project."



This populated area collapsed down all of a sudden because of major withdrawing of underground water that used to play a role in supporting the lands.

Water pollution

Different activities of human beings such as transportation, industries, cities, pesticides, nuclear wastes and agriculture cause pollution of the water cycle and water sources. And whatever the source of pollution was, pollutants can be classified into 3 categories:

- 1) Chemical
- 2) Physical
- 3) Biological

What concerns us as physicians is the outcome of these pollutants on human beings and specifically water related diseases.

In third world countries the most important pollutant is the biological one we are not yet capable of winning the war against microbes which is something a lot of developed countries have done. although there's some illegal immigrants travel to the United States while having cholera , The last time we heard about cholera in the United States was 100-110 years ago . Why? In the United States and many

European countries they were able to separate waste water from drinking water so if anyone's having a water related disease it won't affect the drinking water because it doesn't get mixed with waste water that contains their microbes, While if we have the same immigrants with cholera travelling to a third world country there will be an outbreak in cholera.

Facts

1. WHO estimated that 80% of diseases in third world countries are water related.
2. WHO have classified diseases that are biological into :
 - A) Waterborne diseases
 - B) water-washed diseases

A) Waterborne diseases (Quality problem): these arise from the contamination of water by human or animal feces or urine infected by pathogenic viruses or bacteria which are directly transmitted when the water is drunk or used in the preparation of food , such as cholera , typhoid , amoebic dysentery, infectious hepatitis (Very common in Jordan specially Hepatitis A) and cryptosporidiosis. Bilharzia, isn't waterborne because it penetrates the skin, and we don't need to drink infected water to get it.

- Pathogens could be bacterial , parasites , amoeba , viral (Some viruses get transferred through water because part of their lifespan is there)

Q: If there's an outbreak of a certain disease such as typhoid or cholera how can we tell if its water related or not?

A: Using the coliform test (Routinely done)

Coliform is a nonpathogenic bacterium and used as an indicator and it has certain characteristics which are:

- 1) It's found in the intestines of humans and animals, so finding coliform in a water source indicates the presence of animal or human excretions.

- 2) It is hardy; meaning that it can survive more than other microorganisms in water, and the moment you find no coliform in a sample you don't look for other microorganisms. And if it's found there's a possibility that other microorganisms are living in the water source
- 3) It's easy to test for
- 4) It gives quick results within a short period of time; uncontaminated water should have coliform level of zero, if its level is positive water is contaminated.

So after testing, if the result comes back negative we exclude the possibility that the disease is water-related. But if the result is positive there's probably a contamination, so if we're having an outbreak of typhoid for example then there's a possibility that it's water-related and then we can test for typhoid in specific but after the coliform test is done.

- Drinking water in Jordan should test negative in the coliform test.
- In Al-Balqa area In 1974, back when we started to have a good documentation of waterborne diseases, 2000 people all of a sudden started having severe cramps, abdominal pain and diarrhea and it turns out that a sewer system had broke and there was a major contamination, and it was the first time in Jordan to document a disease called "Gillian barre "which is a certain kind of paralysis that is somehow similar to poliomyelitis. It was a fresh contamination meaning that people were drinking water contaminated with live viruses directly.

B) Water-washed diseases (Quantity problem).

[Also called water-washed out diseases]

Infrequent washing and inadequate personal hygiene are the main factors in these types of diseases such as diarrhea (cholera, typhoid, paratyphoid and amoebic dysentery, but we said those are waterborne disease. The reason is

that, in 3rd world countries waste water is used for irrigation so your crops might contain these diseases on them and due to consumption without washing crops you get infected and the reason being not washing the crops and not drinking infected water.) (There are 400 million cases of diarrhea each year and majority being children below 5 and that's why it's accepted that diarrhea used as an indicator of water contamination) and skin and eye infections.

We can decrease the incidence of these diseases by giving the consumers more water. The moment you start supplying people with more water (to clean their bodies, places, food and vegetables...etc) the diseases (e.g.:- scabies) will be washed out, that's why it's a quantity problem.

In conclusion water-washed diseases and waterborne diseases are similar (typhoid, cholera ... etc.) but we should be able to differentiate between the two categories. Because the way we act differs depending on the source of infection.