

Spatial Pattern of unsafe drinking water:

80% of humanity resides in areas where water security is threatened due to the highly unequal distribution of renewable freshwater resources. Many developing regions do not have access to a sustainable water source... A spatial pattern visible on the map is the high concentrations of unsafe drinking water. There are clearly 3 major concentrations; in Western and Central Africa including countries such as Chad and Ethiopia, and Asia including specifically Lao People's Democratic Republic, Cambodia, China and India...

There is evidence of this concentrated pattern occurring between the equator and 30°N however, but this is not a true linear pattern as access to safe water is not such an extreme issue for Central America as it is for parts of Africa and Asia (1)... 8-10 of the top ranked countries for limited access to safe water are in this zone, and this indicates that climate is a primary factor to be considered.

Patterns of access to safe water clearly show extremes ranging from countries where less than 50% of the population can access safe water (Afghanistan 13%); to countries in Western Europe with 100% access... The choropleth map which shows a larger range also confirms the concentration pattern, but also shows regions with moderate access to safe water such as the South American nations of Brazil, Venezuela and Bolivia. This gives us more detail and it is possible to identify some influence of landmasses and climate patterns.

The size of the concentration in Africa varies depending on the detail of the indicator used. Much of the continent could be included in the one concentration as few countries or even parts of countries have access to safe water. But within Africa there are three separate nodes or concentrations; one based around the arid regions (Sahara) to the north, Central Africa and South Eastern Africa. It is important to identify these areas separately as the reason for the poor access to safe water and degree of this problem varies... (2)

The Asian concentration shown on the map...

The pattern of concentration emphasises that countries with the least access to safe water are also linked to regions with high rates of poverty and in many cases they are also low rainfall zones. There is a close correlation between world maps of the human development index, poverty and access to safe water...

As a continent Africa dominates in having the lowest access rates to safe water, it also experiences the highest rates of poverty.

Factors/Processes contributing to the spatial pattern

Climate zones show a link with the global patterns of access to safe water. Extreme climatic conditions like droughts and flooding clearly contribute to the spatial pattern of concentrations (3).

In arid areas there is simply a shortage of water and people have to often survive off lake water and wells which do not provide safe water. The concentration in northern Africa, including Ethiopia, Chad across the Sahel region to Mauritania is a semi desert region that experiences very low and unreliable rainfall (3). The total rainfall can range from 200-600mm a year. When rain does occur it can be in isolated areas and very intense often causing flooding and consequently limiting how safe the saved water quality will be. This shows that receiving rain doesn't equate to safe water being available. Ethiopia experiences very low rainfalls with the lowlands receiving only 250mm annually. ... In an area that also receives high temperatures much of the available water is evaporated. Low rainfall together with high evaporation rates results in a lack of safe water... Arid climates are a major factor contributing to the concentration in Northern Africa (4) ...

Large areas of S.E. Asia experience monsoon climates where high rainfalls lead to flooding and clean water sources become polluted. In areas like Bangladesh and Cambodia where monsoonal flooding is a common occurrence, the flooding destroys wells, rivers carry a lot of debris and silt, and the options for saving clean water are nil... Cambodia receives 75% and Bangladesh 80% of their annual rainfall during the monsoon wet season (4). Most parts of Bangladesh receive more than 1,525 mm of rain a year, and areas near the hills receive more than 5,080mm ...

Selected countries within the concentrations of poor access to safe water also rank low on the human poverty index showing a link between these two factors. Within the Northern Africa concentration the following countries are examples that rank within the low group, (3) Chad, Mali, Eritrea... In the Asian concentration there are Bangladesh, Myanmar, Cambodia... It cannot be a coincidence that low development characterises the areas of poor access to safe water, leading me to believe that levels of development contribute to the spatial pattern. Access to safe water requires networks of water pipes and methods of water quality control and improved sanitation. These developments require huge investment it set up and maintain... The nations in the concentrations rely on surface water (ponds or rivers) or wells for most of their water... (5)

Many of the people in some of these countries like Somalia, Ethiopia are in refugee camps where the pressure on safe water is limited... In some Asian countries namely Cambodia and Bangladesh most of the people do not have piped water as they are in isolated village communities...