Mauritania's Medical Intelligence

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Abstract: *This article aims to describe the public health and epidemiological risks specific to Mauritania. I will review factors that are specific to the region and country but different from those in Europe. I will analyse the demographic data, the specificities of the health system, and the environmental challenges that may contribute to the development of the above-mentioned risks.*

GENERAL OVERVIEW

Mauritania, formally known as the Islamic Republic of Mauritania, is located on the Atlantic coast of Africa and serves as a geographic and cultural bridge between the North African region and Sub-Saharan Africa. It is bordered by Senegal, Mali, Algeria, the Western Sahara, and the Atlantic Ocean. Mauritania is the 11th largest country in Africa, covering an area of more than eleven times the size of Hungary. With 90 percent of the country's territory in the Sahara, most of the population resides in the southern part of the country; most people are concentrated in the capital, Nouakchott.

Mauritania is a member of the Arab League; Islam is the official state religion and Arabic is the official language. The country, named after an ancient Berber kingdom, was historically inhabited by various nomadic ethnic groups (Black Moors, White Moors, and Sub-Saharan Mauritanians), who were organised according to a strict caste system with deep ethnic differences. These divisions have influenced subsequent power dynamics and access to resources.

Mauritania gained independence on 28 November 1960, after being a French colony since 1904. From the 1960s, the country was ruled by a one-party authoritarian regime. In 1976, Mauritania, along with Morocco, annexed the territory of Western Sahara, but the conflict nearly made the country collapse. Eventually, Mauritania became a minor player in the territorial dispute and is now supportive of a peaceful resolution. Following several military coups and successive authoritarian regimes, Mauritania held its first fully democratic presidential elections in 2007. Following a series of political upheavals, Mohamed Ould Ghazouani was elected president in 2019 and re-elected in June 2024. Today, Ghazouani contributes to the stability and maintains good

relations with the United States, France, and neighbouring countries.

Mauritania is rich in mineral resources, especially iron and ore, but it remains one of the poorest countries in the world, with more than half of its population living in poverty.

MODERN SLAVERY

During the French colonial period, slavery was already fought against, but various forms of modern slavery still exist in Mauritania, although it was officially abolished three times: in 1905, 1981, and in August 2007. In addition to modern slavery, child labour, sexism, racism, female genital mutilation, forced marriage, and human trafficking must also be fought in the country. Modern slavery in Africa can be attributed to ongoing political instability, poverty, ethnic caste systems, and climate risks, which have been exacerbated by the COVID-19 pandemic. Countries with the highest prevalence of modern slavery in Africa are Eritrea, Mauritania, and South Sudan. According to the Global Slavery Index, Africa Regional Report 2023,[1] there are about 7 million people in modern slavery in Africa, with an estimated prevalence of 32 per 1,000 inhabitants in Mauritania.

DEMOGRAPHY OF MAURITANIA

The infant mortality rate in Mauritania was 185 per 1,000 in 1950 and has decreased to 29 per 1,000 live births by 2024. During the same period, the deaths under age 5 fell from 310 to 36 per 1,000 live births. As a result, Mauritania's population has grown from 700,000 in 1950 to more than 5 million by 2024, a more than sevenfold increase in three-quarters of a century.

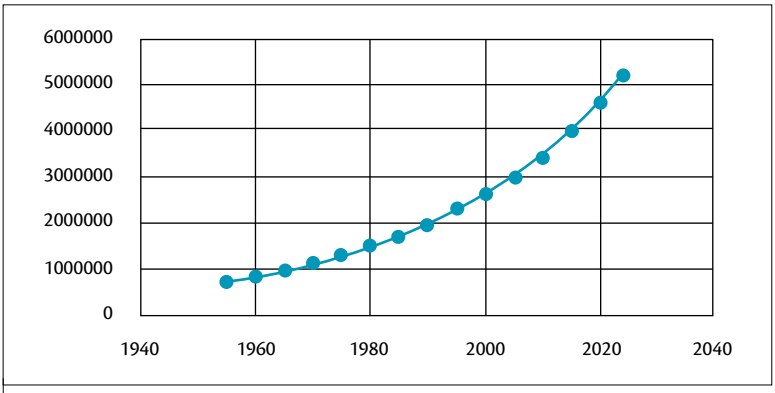

Figure 1: Population of Mauritania between 1955–2024 (https://www.worldometers.info/world-population/mauritania-population/ *Downloaded: 01.10.2024.)*

1 Walk Free: *Africa Regional Report 2023.*

It is expected that the rate of growth will be similar in the coming decades as well. Currently, the total fertility rate is 4.6 births/woman.

The gender and age distribution of the population in Mauritania is pyramidal. This is typical of countries with young and growing populations.

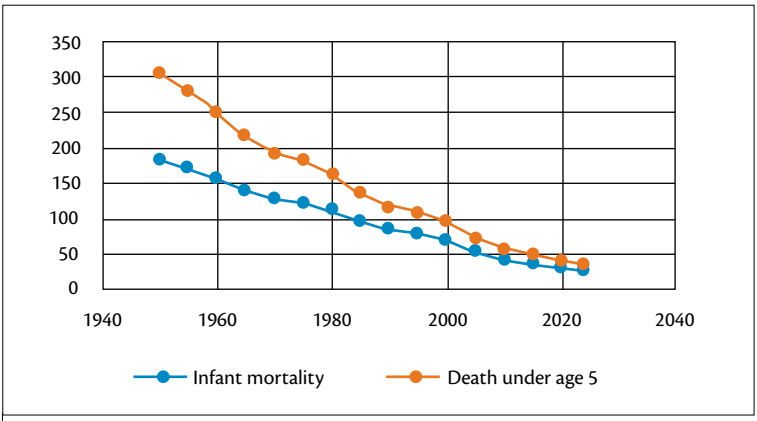

Figure 2: Infant and under age 5 mortality rates in Mauritania (per 1000 live births, 1950–2024)
(https://www.worldometers.info/world-population/mauritania-population/, *Downloaded: 01.10.2024.)*

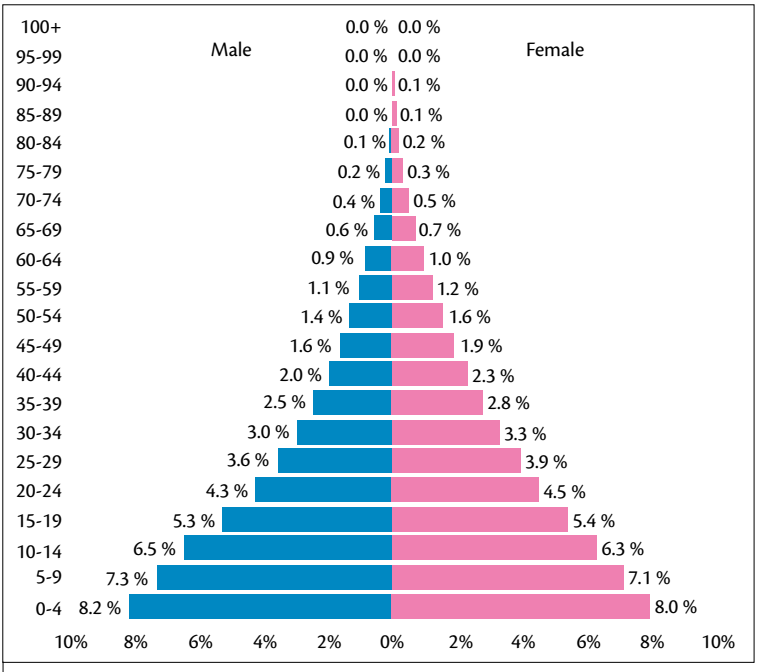

Figure 3: Population pyramid in Mauritania (2022)
(https://www.populationpyramid.net/mauritania/2022/, *Downloaded: 10.01.2024.)*

HEALTHCARE SYSTEM

The organization of the public healthcare system in Mauritania is also pyramidal, with three levels:[2]

1. Operational level: This includes health posts and health centres.
2. Intermediate level: There are three types of hospitals: county hospitals, regional hospitals, and regional hospital centres.
3. Tertiary level: This consists of general and specialized hospitals.

The private healthcare sector is primarily concentrated in the capital and larger cities and has experienced significant development over the past 10 years.

Expensive medical treatments and surgeries remain out of reach for most residents. This is only minimally helped by projects implemented within the framework of aid programs, such as when King Salman Humanitarian Aid and Relief Centre volunteers performed 37 specialised and minimally invasive operations using the latest laparoscopic and robotic devices for heart surgery.[3] [4]

Traditional medicine practices are still widely accepted in Mauritania, there is no legal regulation in this regard.

The ratio of doctors to the population is 20 times lower than in the European Union (EU). There are only *0.2 doctors per 1,000 people* in Mauritania, compared to *4.3 per 1,000 people* on average in the EU (2018).[5]

The availability of hospital beds is 13 times lower than in the EU. In Mauritania, there are only 0.4 hospital beds per 1,000 people[6] (2006 – *No new data found.*) compared to 5.16 beds per 1,000 people on average in the EU[7] (2022). This was the case in 2006 when the country had only 3 million inhabitants. Since then, the population has increased by 70 percent and is still growing today. This rate may have lowered since then. If we look at the growth of the country's population (about 140,000 people per year), 50–60 new hospital beds would be required to maintain the 2006 level. The last hospital, the Nouadhibou Regional Hospital, was built in 2017 and has 250 beds.[8] In 2021, the construction of a new 300-bed hospital began with financial assistance from Saudi Arabia.[9] However, the limited availability of medical infrastructure significantly reduces access to high-quality healthcare for the population.

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2 *Plan National de Développement Sanitaire 2021–2030,* 14–16.

3 Arab World Press: *King Salman Aid Centre Concludes Laparoscopic Heart Surgery Project in Mauritania.*

4 After the Cuban Revolution in 1959, Cuba sent doctors and medical personnel to developing countries in Africa, Latin America, and Oceania under a new health program. These missions have had a significant positive local impact on the populations affected. In fact, doctors and medical personnel have become Cuba's "exports" over the years. Based on a previous agreement between the two countries, some sixty Cuban doctors and health technicians have been working in a hospital in Nouadhibou since 2017.

5 The World Bank Group: *Health Nutrition and Population Statistics.*

6 The World Bank Group: *Hospital beds (per 1,000 people) - Mauritania.*

7 Eurostat: *EU counted 2.3 million hospital beds in 2022.*

8 C.R.I.DE.M – Carrefour de la République Islamique de Mauritanie: *Nouadhibou: inauguration par le chef de l'état d'un hôpital des spécialités médicales.*

9 Saudi Gazette: *Saudi Arabia is building largest hospital in Mauritania.*

*Picture 1: New medical centre in Atar by the Saudi Fund for Development (*https://spa.gov.sa/_next/image?url=https%3A%2F%2Fportalcdn.spa.gov.sa%2Fbackend%2Foriginal%2F202312%2FrOpML7H2rUnaGyl7KNV34vqPFDszX06CCKyoFSqi.jpg&w=3840&q=75 *Downloaded: 01.10.2024.)*

*Picture 2: Kaedi regional hospital constructed with local materials and skills (*https://www.journeygourmet.com/continentes/Africa/Mauritania/Ka%C3%A9di/Ka%C3%A9di/imagenBig.jpg *Downloaded: 01.10.2024.)*

ENVIRONMENTAL RISK FACTORS

The climate in Mauritania is subtropic-desert, with hot and dry conditions prevailing in the central and northern regions. Rainfalls are extremely rare here, amounting to less than 30 millimetres annually. In the south, the climate transitions to a subtropical steppe, with the summer monsoon providing some rainfall between June and early October. Along the coast, sea breezes help moderate the heat, though the climate remains mild only in the

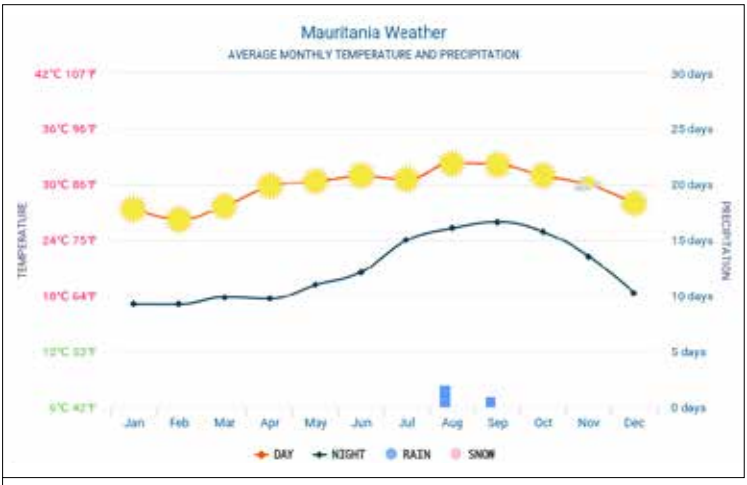


*Figure 4: Mauritania weather – average monthly temperature and precipitation (*https://hikersbay.com/climate/mauritania?lang=en *Downloaded: 25.10.2024.)*

northernmost part, influenced by cool sea currents.

Mauritania is a "climate change sensitive" country. The trend of global warming contributes to several natural disasters such as drought, flooding, and deforestation in the region. This situation is further aggravated by population displacement, increasing urbanization, rising temperatures, prolonged heatwaves, increased variability in precipitation, higher evaporation rates, and an uneven geographic distribution of rainfall. These factors exacerbate the country's existing poverty by worsening conditions in water-dependent sectors such as agriculture and livestock.[10]

Mauritania faces a severe shortage of water resources. Fresh (and clean) water is a luxury, as the population only has 20 litres of water per person available for daily consumption. Low rainfall and high temperatures in urban areas result in increased salinity and pollution of water sources, leading to diarrheal diseases associated with contaminated water.

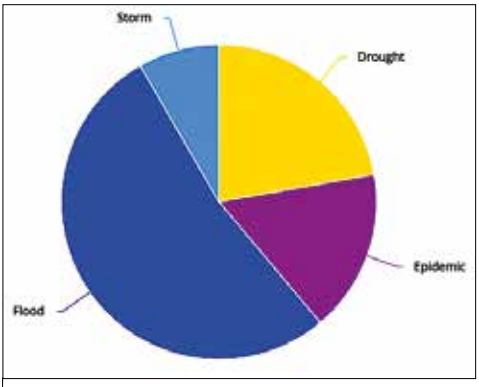
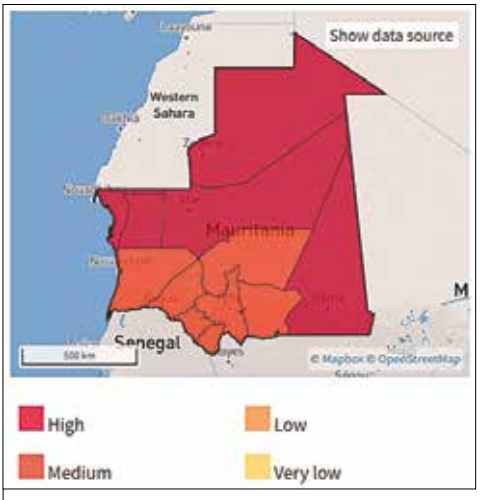


Figure 5: Average annual hazard occurrence for 1980–2020
*(*https://climateknowledgeportal.worldbank.org/country/mauritania/vulnerability#:~:text=While%20Mauritania%20is%20prone%20to%20drought%20and%20flooding,to%20agricultural%20lands%20as%20well%20as%20human%20health *Downloaded: 15.10.2024.)*



Map 1: Hazard levels of water scarcity in Mauritania
*(*https://thinkhazard.org/en/report/159-mauritania/DG *Downloaded: 28.10.2024.)*

The country's largest river, located on the southern border, is the Senegal River. According to a 2018 study, in the capital "only 26% of households had

10 Anta, Ndoye et al.: *Can Mauritania Reduce the Impact of Climate Disasters on its Economy.* "Climate-related natural disasters are becoming more frequent and severe in Mauritania, exacerbating long-standing challenges like land and infrastructure degradation, water stress, and food insecurity."

access to safe drinking water sources, while 70% of the population had access to improved latrines. The situation in rural areas is even worse."[11]

HEALTH RISK FACTORS

The leading causes of death per 100,000 inhabitants in Mauritania are listed in the graph below. Mauritania has a high burden of both communicable (such as malaria, tuberculosis, HIV/AIDS) and non-communicable diseases. According to the World Health Organization (WHO), "Mauritania's coverage rates of vaccination in children have historically been below the 90% target rate".[12]

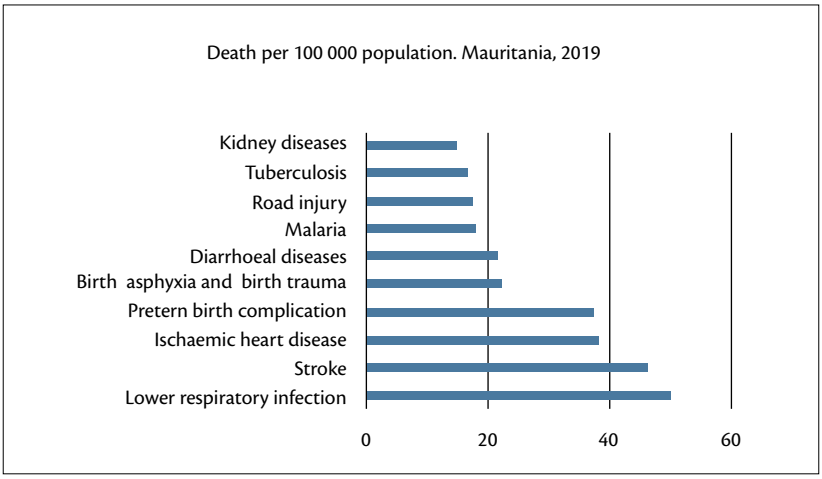


Figure 6: Top causes of death
*(*https://data.who.int/countries/478#:~:text=The%20top%20ten%20causes%20of%20death%20are%20statistical%20estimates%20based
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INFECTIOUS DISEASES

The country's climatic, hygienic, and epidemiological conditions are significantly different from those in East-Central European countries. Adequate medical care, comparable to East-Central European countries, is not ensured.

Based on the probability of occurrence and severity of hazard, the risk levels of diseases in Mauritania can be categorized as follows:

- *Low risk:* infrequent, mild illnesses.
- *Moderate risk:* endemic but mild infections.

11 Mohamed, Lemine Cheikh Brahim Ahmed et al.: *Hospitalizations and Deaths Associated with Diarrhea and Respiratory Diseases among Children Aged 0–5 Years in a Referral Hospital of Mauritania.*
12 WHO: *Country Disease Outlook, Mauritania.*

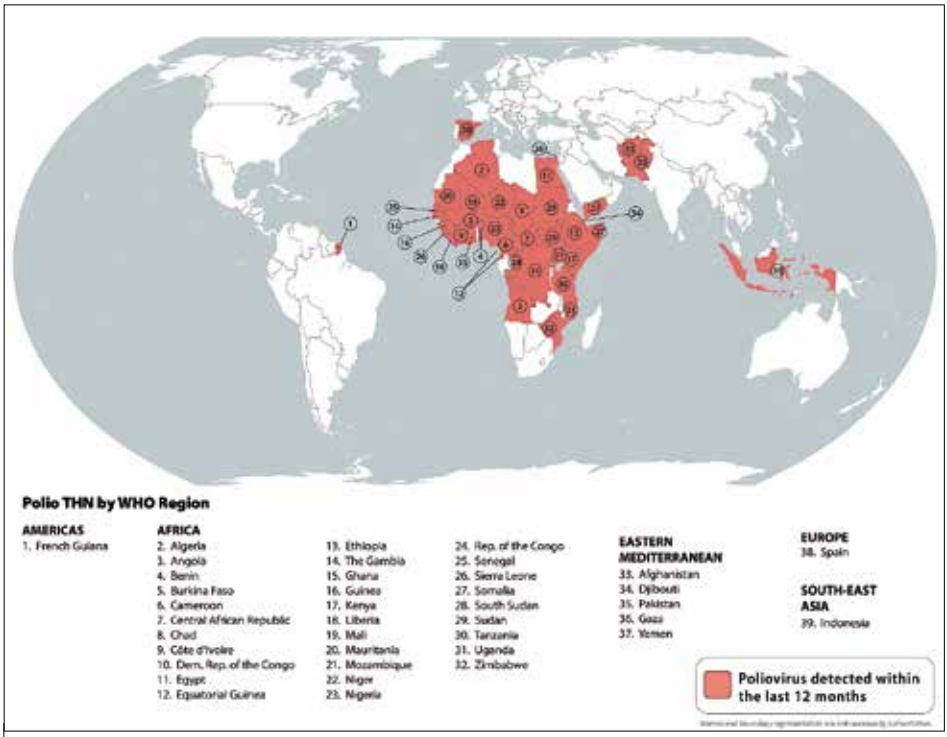
– *Significant risk:* infections that cause outbreaks of severe illness.
– *High risk:* unavoidable, potentially fatal diseases.

Without the aim of being exhaustive, here is a summary of the most common infectious diseases in Mauritania.

Malaria is a high risk in Mauritania. It is a vector-borne disease, in humans caused by protozoan parasites, which are transmitted by the bite of an Anopheles mosquito. Occasionally, transmission occurs by blood transfusion, needle sharing, etc. Malaria transmission occurs in large areas of Africa. According to the World Health Organization's World Malaria Report 2023,[13] "Globally in 2022, there were an estimated 249 million malaria cases in 85 malaria

*Map 2: Malaria-endemic destinations in Africa & the Middle East (*https://wwwnc.cdc.gov/travel/content/images/yellowbook/2024/_504_MAP_5-_13_Malaria-_endemic_destinations_in_Africa_the_Middle_East.jpg, *Downloaded: 20.10.2024.)*

13 WHO: *World Malaria Report 2023.*



*Map 3: Poliovirus detected within the last 12 months (*https://wwwnc.cdc.gov/travel/images/polio-global-map.png *Downloaded: 20.10.2024.)*

endemic countries and areas. […] The WHO African Region, with an estimated 233 million cases in 2022, accounted for about 94% of cases globally." In 2021, Mauritania was estimated to have 85,030 malaria cases (18 cases per 1,000 population), resulting in 1,144 deaths.[14]

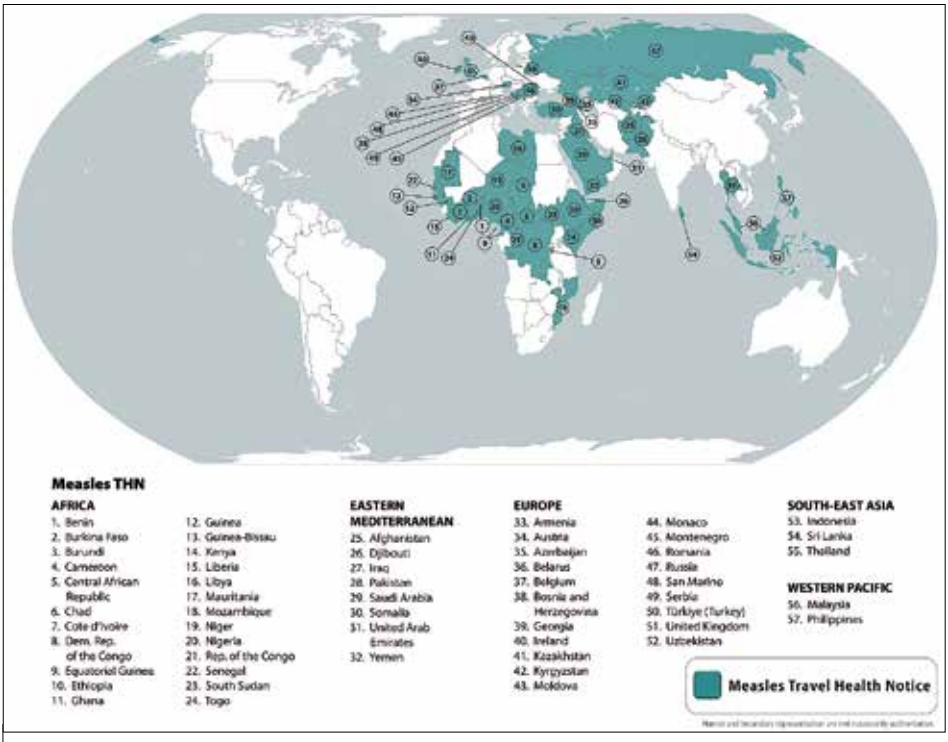
Malaria prevention consists of a combination of mosquito avoidance measures and chemoprophylaxis.

Poliomyelitis and measles have significant risks. In August 2024, there was a polio outbreak in Mauritania. Vaccine-derived poliovirus is circulating in many countries in the world. Mauritania reported an increased incidence of measles in September 2024. The transmission is high in some countries worldwide.

Preventive measure: a highly effective and well-tolerated vaccine is available against polio and measles.

Yellow fever has moderate risk in Mauritania. It is a vector-borne disease transmitted by the bite of an infected mosquito, primarily Aedes or Haemagogus spp. Yellow fever occurs in Sub-Saharan Africa and tropical South America, where it is endemic and intermittently epidemic. Vaccine against yellow fever is recommended for travellers over 9 months old to areas south of the Sahara Desert.

14 WHO: *Country Disease Outlook, Mauritania.*



*Map 4: Countries in the world with reported measles outbreaks (*https://wwwnc.cdc.gov/travel/images/measles_global_map.png *Downloaded: 20.10.2024.)*

*Map 5: Yellow fever vaccine recommendations for Africa (*https://wwwnc.cdc.gov/travel/content/images/yellowbook/2024/_465_MAP_5-_10_Yellow_fever_vaccine_recommendations_for_Africa1_2.jpg *Downloaded: 20.10.2024.)*

Overall, public health and epidemiology risks are significant in Mauritania. The table below lists the recommended vaccinations for the country.

Table 1: *Recommended vaccinations for Mauritania*

Vaccination			Regimen for primary immunisation	Earliest time of deployability (in exceptional cases)	Duration of immunity
Diphtheria	(Boostrix)	(Adacel Polio)	1 dose		10 years
Pertussis					
Tetanus Note: For management of a tetanus-prone wound, a dose of Boostrix or Adacel Polio may be administered if at least 5 years have elapsed since the previous receipt of a tetanus-containing vaccine.					
Polio					
Hepatitis A (Havrix 1440)			2 doses 0, 6–12 months	14 days after the first dose	20 years
Hepatitis B (Engerix B)			3 doses 0, 1, 6 months	after the third dose	The need for a booster dose in healthy individuals who have received a full primary vaccination course has not been established.
			4 doses 0, 1, 2, 12 months		
Measles	**MMR**		1 dose	14 days after vaccination	lifelong
Mumps					
Rubella					
Seasonal influenza			1 dose	14 days after vaccination	1 season
Tick-bone encephalitis (TBE)			3 doses 0, 1–3, 9–12 months	14 days after the second dose	3 years
Rabies (Verorab) Note: After exposure, post-exposure prophylaxis must be ensured also for previously vaccinated persons on days 0 and 3!			3 doses 0, 7, 21–28 days	after the third dose	After basic immunisation, initial protection: 2 years. After each boost: 5 years
Yellow fever (Stamaril)			1 dose	10 days after vaccination	lifelong
Typhoid (Typhim VI)			1 dose	14 days after vaccination	3 years
Meningococcal Meningitis ACWY (Menactra) Note: Menactra can be used between the ages of 9 months and 55 years.			1 dose		4 years if one has a high risk of meningococcal infection
Chemoprophylaxis					
Malaria (Doxycycline)			The daily dosage for adults is 100 mg. The drug is started 1–2 days before traveling and finished 4 weeks after traveling.		

SUMMARY

In summary, Mauritania faces a wide range of challenges. The healthcare system struggles to keep pace with the population growth. Global warming, which is affecting the region and Mauritania, is expected to have increasingly serious consequences. Desertification is increasing, causing further economic damage and increasing poverty among the population. Access to drinking water is already critical and, in addition to vector-borne diseases, the spread of food- and water-borne infections is a major challenge. The question remains how long the current political stability will endure and whether it can effectively control or resolve these pressing issues.

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MAURITÁNIA EGÉSZSÉGÜGYI FELDERÍTÉSE

Szerző Szabó-Filyó Krisztina őrnagy, MH Egészségügyi Központ, a Nemzeti Közszolgálati Egyetem Hadtudományi Doktori Iskola doktorandusza

Kulcsszavak egészségügyi ellátás, kockázatértékelés, fertőző betegségek, egészségügyi felderítés

Absztrakt *A cikk célja, hogy ismertesse azokat a közegészségügyi és járványügyi kockázatokat, amelyek Mauritániára jellemzőek. Áttekinti azokat a tényezőket, amelyek az adott régióra és országra jellemzőek, de eltérnek az európaitól. Elemzi a demográfiai adatokat, az egészségügyi rendszer sajátosságait, a környezeti kihívásokat, amelyek hozzájárulhatnak a fent említett kockázatok kialakulásához.*