Update of water-borne diseases (WBD) risk map as a warning for new threats in Lebanon.

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Introduction

Lebanon faces an imminent threat from various water-borne diseases (WBD), posing significant risks to public health and safety. The cholera outbreak in 2022 highlighted significant vulnerabilities within Lebanon's infrastructure, highlighting the urgent need for immediate and proactive measures to prevent another public health crisis. Despite the investment in WaSH systems the persistent risk of diseases such as Hepatitis A remains a concern. This paper aims to highlight the multifaceted risks, contributing factors, and necessary actions to safeguard Lebanon's population from the looming threat of water-borne diseases.

This paper will show the areas at high risk of water-borne diseases in Lebanon, as identified by the updated risk map developed within this document. By examining key indicators and employing robust methodologies, this product will pinpoint areas most vulnerable to waterborne diseases, allowing for targeted interventions and resource allocation to mitigate the risks.

Context of Recent Outbreaks and Current Risks

The cholera outbreak that began in October 2022 exposed severe vulnerabilities within Lebanon's public health, water and sanitation systems. Contaminated water sources and inadequate sanitation, particularly prevalent in informal settlements and economically disadvantaged regions, contributed to the rapid spread of the disease. Furthermore, significant reductions in funding for Water, Sanitation, and Hygiene (WaSH) services have further strained Lebanon's capacity to address these challenges effectively, heightening the risk of future outbreaks.

Importance of Risk Mapping and Data

The cholera risk map that was developed in 2022 has served as a crucial tool for identifying high-risk areas and guiding emergency interventions. Building upon this framework, an updated WBD risk map for 2024 has been developed, incorporating a comprehensive set of indicators to assess the vulnerability of different cadastres to waterborne diseases. This updated map highlights areas with dense populations, inadequate infrastructure, and limited access to safe water and sanitation facilities, providing valuable insights for targeted intervention strategies.

Methodology of 2024 WBD Risk Map

The 2024 WBD risk map methodology involves a rigorous analysis of key factors, with the most relevant and reliable data, conducted at the cadaster level (admin 3). These factors include:

Population factors:

- Density of population, factoring in the presence of displaced Syrians, Informal Settlements and IDPs (Data source: Inter-Agency population package)

Surveillance factors:

- Occurrence of water-borne diseases registered and reported by the Ministry of Public Health Epidemiological Surveillance Unit (MoPH ESU) for the past and current year (Data source: MoPH ESU).
- Occurrence of self-reported water-related diseases and symptoms in the previous and current year in Informal Settlement within three months from data collection (Data source: WaSH sector, WaSH Assessment Platform).
- Water samples that do not conform to LIBNOR standards, as reported by the MoPH ESU, include indications of water sources with known contamination or inadequate treatment (Data source: MoPH ESU, Water Quality tests reporting).

Access to water and wastewater services:

- Access to functional public water supply infrastructure (Data sources: National Water Sector Strategy NWSS, WatSan Infrastructure Assessment)
- Informal Settlements with highly insufficient water access, <15 litres per capita per day (l/c/d). (Data source: WaSH sector partners 3W - May 2024 update).
- Access to sanitation infrastructure and functionality of Wastewater Treatment Plants (Data sources: NWSS , WatSan Infrastructure Assessment)
- Assessment of desludging services in Informal Settlements (Data source: WaSH sector partners 3Ws - May 2024 update).

Environmental factors:

- Proximity of permanent and seasonal rivers as a proxy indication of the elevated risk of wastewater/water contamination (Data source: NWSS).
- Flood Risk Analysis for cadasters, based on historical data of flooding occurrences between 2017 and 2024 (Data source: WaSH Assessment Platform).

The factors mentioned above are translated into ten main indicators, supported by data from various sources and analyzed using a geographic information system (GIS). Each indicator is equally weighted at 0.1. Scores for each cadaster are calculated based on these weighted indicators, with the maximum possible score being 1.

The higher the score for a cadaster, the greater the risk of water-borne diseases occurrence and transmission.

## Changes in context and applied indicators: 2022 vs. 2024

The 2024 WaSH context varies compared to 2022, with slightly improved access to public water and sanitation services while, on the other hand, deteriorating access to WaSH in informal settlements due to severe funding constraints.

In 2022, Lebanon faced a severe fuel crisis and virtually zero hours of electricity from the public grid in the last quarter of the year, which significantly impacted the functionality of public water supply systems and reduced access to safe water across the country. However, in 2024, access to water improved due to better public electricity functionality and the collective efforts to solarize water supply and treatment stations. Regarding sanitation, very few wastewater treatment plants (WWTPs) were operational in 2022, but in contrast, in 2024, much more WWTPs are functional, significantly reducing the risks associated with untreated sewage.

Additionally, the indicator related to bordering Syria has been removed. In 2022, this indicator played an important role due to the cholera outbreak in Syria, the legal and illegal population crossing between the countries, and the prediction that the outbreak would spread into Lebanon. For 2024, this indicator has been replaced with one focusing on regular water quality testing, highlighting the importance of ongoing monitoring efforts to detect and address contamination promptly.

Results and High-Risk Areas

After a thorough analysis of the data using the above methodology, the 2024 WBD risk map has been developed. This map serves as a visual representation of the areas at highest risk for water-borne diseases, providing stakeholders with a clear understanding of the areas that require immediate attention and action.
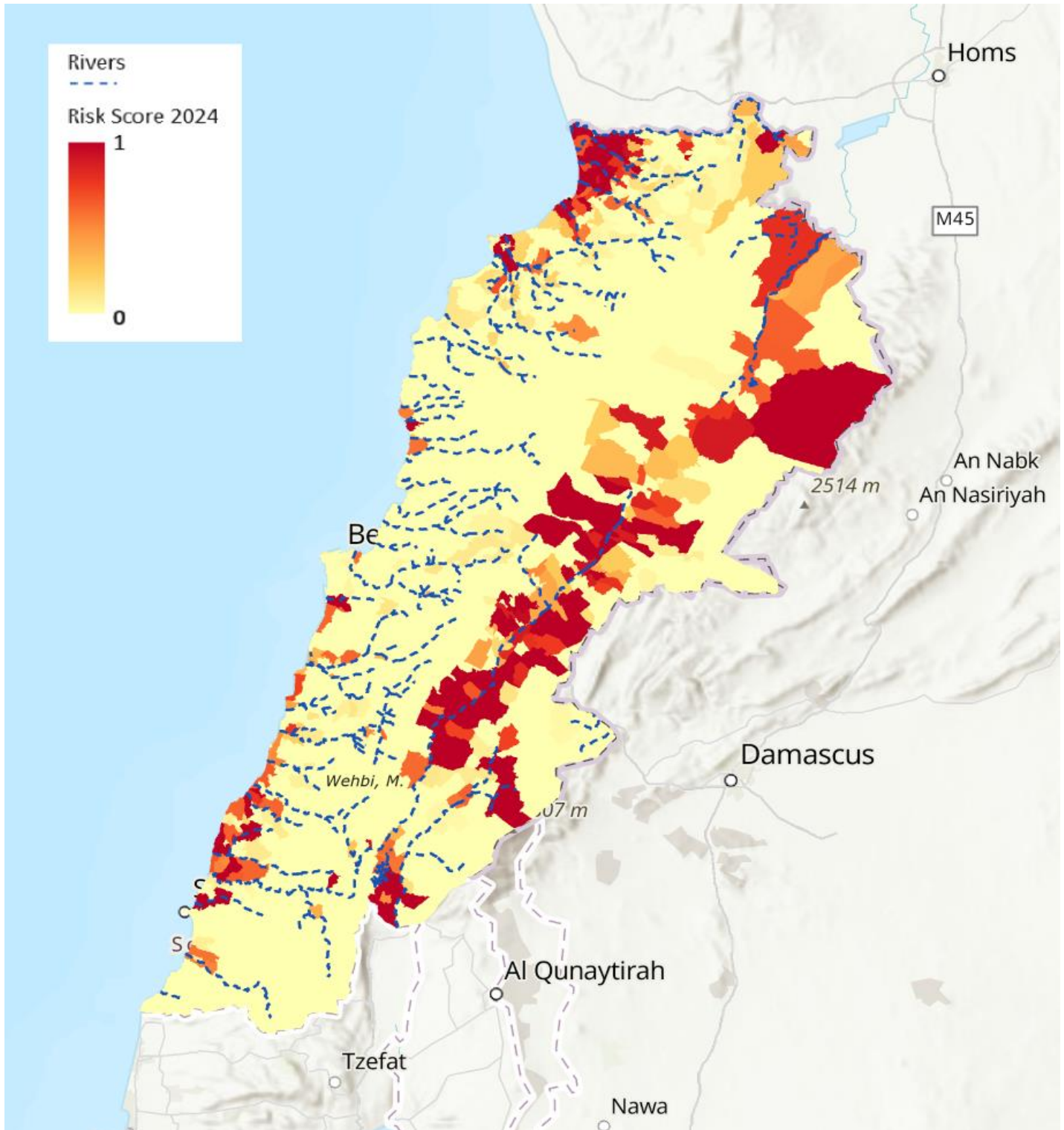
The highest-risk 20 cadasters are as follows:

Rank	Cadaster	District	Governorate
1	Qoubber Chamra	Akkar	Akkar
2	Qaabrine	Akkar	Akkar
3	Mqaiteaa	Akkar	Akkar
4	Barr Elias	Zahle	Bekaa
5	Saadnayel	Zahle	Bekaa
6	Aarsal	Baalbek	Baalbek-Hermel
7	Taraiya	Baalbek	Baalbek-Hermel
8	Aali En-Nahri	Zahle	Bekaa
9	Haouch Er-Rafqa	Baalbek	Baalbek-Hermel
10	Bissariye	Saida	South
11	Qleiaat Aakkar	Akkar	Akakr
12	Aarqa	Akkar	Akkar
13	Kamed El-Laouz	West Bekaa	Bekaa
14	Hokr Etti	Akkar	Akkar
15	Taalbaya	Zahle	Bekaa
16	Aamayer	Akkar	Akkar
17	Tall Meaayan Tall Kiri	Akkar	Akkar
18	Khodr Baalbek	Baalbek	Baalbek-Hermel
19	Bednayel Baalbak	Baalbek	Baalbek-Hermel
20	Ablah	Zahle	Bekaa

It is important to note that the risks are not limited to the 20 cadasters listed above. Stakeholders are encouraged to refer to the full list and map for a comprehensive understanding of the risk landscape, ensuring that efforts to mitigate the occurrence and spread of waterborne diseases are targeted effectively across all vulnerable areas.

Utilization of the Risk Map

The 2024 WBD risk map serves as a vital tool for directing resources and interventions to prevent the spread of waterborne diseases. High-risk areas identified on the map should be prioritized for targeted interventions, including:

- Vaccination campaigns: High-risk areas should be prioritized for vaccination campaigns to mitigate the risk of outbreaks.
- Water quality monitoring: Enhanced water quality monitoring should be conducted in high-risk areas to detect and promptly address contamination.
- Sanitation improvements: Infrastructure upgrades and sanitation services should be prioritized in areas with inadequate facilities to reduce the risk of disease transmission.
- Community education: Public awareness campaigns should be tailored to high-risk areas, focusing on hygiene practices, safe water consumption, and disease prevention measures.

Call for Immediate International Support and Funding

Immediate and sustained international support and funding are indispensable to stabilize Lebanon's water and sanitation infrastructure and mitigate the risk of waterborne diseases. Efforts must include enhancing water quality monitoring, improving sanitation infrastructure, and ensuring an uninterrupted supply of clean water to all communities. Without adequate support, Lebanon remains vulnerable to outbreaks of water-borne diseases, endangering the health and well-being of its population. Urgent action is imperative to address these challenges and prevent another humanitarian crisis.

Conclusion

The imminent threat of water-borne diseases in Lebanon demands urgent attention and concerted action from national and international stakeholders. By leveraging data-driven risk mapping, bolstering infrastructure, and securing critical funding and support, Lebanon can mitigate the impact of WBD and protect the health and safety of its population. Failure to act decisively could result in dire consequences, underscoring the urgent need for collaborative efforts to address these pressing public health challenges.