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for the vectors and rodents. We cross-compared known distributions of laboratory diagnoses with environmental-based risk maps and assessed how risk patterns changed over time.

Results. The main diseases prevalent in the study area were those transmitted by rodents (hantavirus and leptospirosis) and ticks (Lyme and Tick-borne encephalitis). The maps revealed distinct environmental risk patterns. By understanding these patterns over time, we were able to identify key areas where emerging zoonotic infections risk would be more and less likely to occur.

Conclusions. Our GeoMedTech approach to zoonotic infections will offer new insight in the occurrence and spread of vector-borne and rodent-related zoonotic infections, and into how this relates to climate change. In the future, this insight can be used to develop a MedTech innovation to support better targeted diagnostics and thereby prevent under- and misdiagnosis of zoonotic infections.

Using the IPCC-AR5 methodological framework to assess malaria risk in relation to climate change in Côte d'Ivoire

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Introduction. Malaria, the leading cause of morbidity and mortality in Côte d'Ivoire, has a heterogeneous geographical distribution due to considerable variations in the country's four climatic zones: Attiéen (zone I), Baouléen (zone II), Soudanais (zone III) and Montagnes (zone IV).

Aim. The aim of this article was to apply the concept of climate risk developed by the IPCC in its 5th Assessment Report (AR5) to the assessment of malaria risk in children under 5 and pregnant women in the 14 administrative districts of Côte d'Ivoire.

Methods. The annual rainfall and the mean annual temperature were used as indicators to characterize the climatic hazard. The most exposed groups considered were pregnant women and children under 5. For vulnerability, five indicators were considered, including one for sensitivity and four for adaptive capacity. A participatory approach based on expert judgement was adopted to assign weights to each of the indicators of the three components of risk : hazard, exposure and vulnerability. Future malaria risk was assessed using optimistic (rcp4.5) and pessimistic (rcp8.5) scenarios to 2050.The risk values obtained were classified according to a nominal scale ranging from "very low" (0) to "very high" (1).

Results. This study shows that malaria risk among pregnant women and children under 5 varies from Low (0.3) in climatic zone III (Savanes district) to Intermediate (0.55) in climatic zone IV (Montagne district). Analysis by risk component shows that climatic hazard is High (0.68) in climatic zone IV and exposure is Very High (0.83) in climatic zone I (Abidjan district). Vulnerability is Intermediate in climate zones II (Sassandra Marahoué district), I (Comoé district) and IV (Montagnes district). By 2050, the rcp4.5 scenario predicts an increase in scores from Low (0.35) in the Denguele district (Zone III) to High (0.61) in the Montagnes district (Zone IV). The risk will vary from Low (0.29) to Intermediate (0.56) for rcp8.5 scenarios. This scenario presents a level of risk almost identical to the current level, with the exception of some districts in climatic zones I, II and III, where the risk falls slightly from its current level.

Conclusion. The Montagnes district (zone IV) presents the highest level of risk and is therefore the priority zone for intervention. It also important to carry out prevention actions such as early warning systems in the Attiéen climate zone (zone I), mainly in the district of Abidjan, characterized by the highest exposure of pregnant women and children under 5 years of age, in order to reduce the risk.

Key words. West Africa, exposure, danger, malaria, vulnerability, health.

New sustainable tools and innovative actions to control cystic echinococcosis

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The aim of this study is to show the potential of GIS-based innovative tools to support control strategies against cystic echinococcosis in highly endemic areas.

Cystic echinococcosis (CE), caused by the larval stage of the cestode *Echinococcus granulosus*, has a worldwide distribution and is considered one of the most important zoonotic diseases of grazing sheep in the Mediterranean region. In this area, the traditional actions taken to control CE are still inefficient, because surveillance and treatment strategies fail to reach inaccessible grazing areas (accessible to stray canids) and

are usually designed for wide geographical areas without considering that the prevalence of CE can differ widely in different locations of the same region.

The use of GPS equipment makes it possible to track animal (sheep and dogs) movements and identify the most frequented locations within grazing areas. Furthermore, application of anthelmintic baits (laced with praziquantel) using unmanned aerial vehicles (UAVs) allows development of treatment strategies specifically designed for capillary and automatic distribution of anthelmintics in study areas, minimizing waste of time and resources. Further innovative devices to implement the control of CE are camera traps to continuously monitor the stray canids for praziquantel-laced baits.

These innovative tools and technologies have been successfully used in southern Italy to implement control of CE within the actions of the Echino-Safe-Med project.

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NASA's NextGen Remote Sensing Instruments Have be Announced: Implications for Public Heath

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NASA is designing a new set of Earth-focused missions to provide key information to guide efforts related to climate change, disaster mitigation, fighting forest fires, and improving real-time agricultural processes. The Surface Biology Geology (SBG) mission will collect global remote sensing measurements using a hyperspectral spectrometer and multispectral thermal data. These data sets will provide a significant enhancement in our ability to study disease vector ecology globally. Global public health is entering a new information age through the use of spatial models of disease vector/host ecologies driven by the use of remotely sensed data. Currently, instruments on the International Space Station (ISS)-ECOSTRESS (Thermal), DESIS (hyperspectral) and GEDI (lidar) are currently providing data sets that can be immediately used for public health applications and prepare the community for using SBG data products.

Spatial-Temporal Interactions to Predict Probability of Chronic Wasting Disease Distribution

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Chronic Wasting Disease (CWD) is a widespread infectious degenerative prion disease affecting captive and wild species of cervids (ex. white-tailed deer). It is present in over 30 states and provinces in North America, along with now most Scandinavian countries. Prior research suggests environmental factors (landscape, soil) may assist in the spread/sustainment of the disease, and further research is needed to understand how the disease spreads spatially beyond human-assisted means. In Kansas, these variables differ across multiple regions and presents challenges to disease surveillance and mitigation. Such heterogeneous geospatial factors, i.e., soil, land cover/land use, and landscape metrics are potential predictors for the disease. We constructed Generalized Additive Models (GAM) along with geospatial covariates derived from the USGS, and USDA-NRCS to evaluate the strength of associations with disease status. Additionally, spatial and temporal smooth functions were added to adjust for spatial/temporal autocorrelation in the GAM construct. Our analyses indicate that spatial locations (latitude and longitude) of animal locations is a significant driver for this disease (*P*-value: $<2e^{-16}$). The random effects models adequately discriminated true positives and negatives (AUC = 0.958 and 0.956). The model performance across the state and regionally did well which allow for further model fitting with landscape covariates to explain what proportion of the distribution is influenced by those covariates. Our geospatial models will include variables such as proximity of harvest locations to streams of Strahler stream orders 1-9 and waterbodies in the landscape, in addition to soil and landscape properties. Our initial analyses reveal that for stream orders 9 with annual flow, 24% of total positives are within 250 meters of the waterway compared to only 14% of negatives in the state, showing a distinct pattern in spatial heterogeneity for positives. This suggests that the disease probability rates are at least partially defined by the spatial heterogeneity and further refinement of environmental covariates (e.g., appropriate size and varying units of analysis, higher resolution geospatial data, etc.) are required. Additionally, analysis at a regional scale which share common geospatial features (e.g., watershed) may help identify geospatial covariate associations.
