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Accession number: OQ216746) as well as Zimbabwe (GenBank Accession number: MG780180). This suggests introduction into Chikwawa may have come from either Mangochi District (Mangochi District snails potentially descended from Zimbabwe snails. Primary finding from molecular xenomonitoring screen suggests that *S. mansoni* may be being transmitted in this area, however larger-scale assessment is needed. Among the explanatory variables, conductivity and TDS of water and elevation were more important in increasing accuracy of the prediction model. The results suggest that *B. pfeifferi* spatial presence across lower Shire is influenced strongly by conductivity, TDS of water, and elevation. Temperature and pH of water play a slightly less significant role in mediating the occurrence of *B. pfeifferi* occurrence in the lower Shire. Ascertaining the whereabouts and understanding the environmental determinants of *B. pfeifferi* occurrence in the lower Shire are critical steps in the implementation or redesign of appropriate and effective focal intestinal schistosomiasis control strategies.

Navigating the COVID-19 pandemic and new normal: a critical appraisal of the contributions of geographical information system.

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Nearly three years have elapsed since the COVID-19 pandemic surfaced. Its impact on the global community's lifestyle, demography and economy is gradually fading into history as more and more individuals recover from losses and adapt to the new reality or new normal. Though the new normal is rife with significant uncertainties and sustainability concerns. To tackle these concerns, further research is needed to advance the idea of geospatial science as an *intelligent nervous system*, vis-à-vis the COVID-19 and post-COVID-19 regimes. This study conducts a synthesis and critical analysis of the literature on the roles played by geographic information system (GIS), its components, and spatial analyses techniques in characterising the coronavirus disease, formulating practical solutions for populations to navigate the peaks of infections and fatalities, and enabling populations to adapt to the new normal. SCOPUS-indexed journals, GIS Bibliography, Litcovid, PubMed, Environmental science and other databases were searched for articles covering January 2020, to September 2023. Studies that met the predefined inclusion and exclusion criteria are profuse and highlight a robust correlation between GIS and COVID-19 epidemiology, including contact tracing, trend and pattern of spread, case fatalities, disease's hotspots. GIS played a significant role in the COVID-19 era, with a flurry of scholarly contribution marked by epistemological nuances and complexities involving novel conceptualisations, dynamic modelling schemes, and the use of advanced mathematical, statistical, and cartographic tools. While ongoing research explores how GIS can aid populations in adapting to the new normal, the post-COVID-19 era offers a distinctive scenario and a fresh research perspective, significantly expanding the integration of GIS in medicine.

Keywords. COVID-19 pandemic, Coronavirus, GIS, New normal, Uncertainty, Sustainability, Post-Covid-19, Intelligent nervous system

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Tracking the movements of sheep and shepherd dogs for a new control strategy of cystic echinococcosis in grazing areas of southern Italy

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Background. Cystic echinococcosis (CE) is one of the most severe parasitic zoonosis, caused by the larval stages of *Echinococcus granulosus*. The lifecycle of *E. granulosus* involves canids as definitive hosts and usually sheep and other herbivore species as intermediate hosts. CE has a worldwide distribution but exhibits the highest prevalence in communities where pastoral activities predominate, as the Mediterranean areas (Deplazes et al. 2017). Free-roaming dogs (owned and unowned) are the major source of echinococcosis and the most challenging category in dog population management for the control of CE (Kachani et al. 2014). New sustainable tools are needed to implement the efficiency of CE control programmes, especially for definitive hosts. In this regard, the combined use of Geographical Information Systems (GIS) and innovative devices (e.g., GPS collars) could be a useful tool to identify the spatiotemporal patterns of the free-roaming owned dogs and design new treatment strategies for wild canids.

Objectives. The spatial analysis performed in this study aimed to define the mean daily walking distances travelled by sheep and shepherd dogs, their spatio-temporal activity patterns and home range areas.

Methods. In 5 farms positive to CE, 1 sheep and 2 shepherd dogs were tracked for 1 month using 15 GPS wearable devices. A Multiple Ring Buffer analysis was conducted to estimate the distance of sheep and dog point locations from the farms, then spatial and temporal data were compared to determine their movement patterns. The home range areas were calculated performed using the Minimum Convex Polygons considering the 100% of the space used by the animals. Points for the delivery of praziquantel-laced baits for the treatment of wild canids were fixed on the boundaries of the home range areas.

Results. The mean daily walking distance travelled not significantly differ between sheep and dogs in the farms monitored. The extended home range areas ranged from 51 to 250ha. The farthest distances from the farms (1,500mt) were travelled between 10.00 and 17.00. New schemes for the delivery of medicated baits on the study area were designed.

Conclusion. This study confirms the importance of geospatial technology in supporting parasite control strategies and demonstrate that the tracking of free-roaming animal movements could be a useful method to interrupt the *E. granulosus* lifecycle and to reduce the spread of the disease.

Keywords. Echinococcosis, canids, home range, geospatial data, GPS

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Community-based precision mapping of Schistosomiasis: the experience of Rwanda

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Schistosomiasis is a neglected tropical disease transmitted by skin penetration of a cercaria when a person has contact with infested water. The disease is very focalized around areas surrounding water bodies. WHO set the elimination of schistosomiasis as a public health problem in all 78 endemic countries by 2030. Without accurate data from effective mapping design, the reach of this elimination target would be a fantasy. Rwanda is committed to eliminating schistosomiasis by 2024 which put unprecedented responsibility of using all available innovative tools to reach and demonstrate the achievement of this target. We conducted a nationwide community-based precision mapping survey with an innovative sampling design using spatial overlay function and spatial multicriteria analysis to locate all lower administrative areas (about 15000 “villages” in Rwanda), to which we appraised schistosomiasis risk level based on ecological and epidemiological factors favoring schistosomiasis transmission alongside epidemiological data. The selection of community mapping units to survey was based on high-risk level obtained after spatially explicit risk ranking. The selected areas represented villages sharing the same ecological and exposure context. In addition to the innovative design presented here, we demonstrated that potential barriers to the community-based mapping surveys are not unclimbable hills: inclusion of all age groups in the national community-based survey; persuasion of adults to provide stool sample among others were achieved. Our mapping process is comprehensive, practical, innovative and simple. It can be replicated and adapted elsewhere to produce optimal results. Meticulous planning, use of GIS technology, use of ecological and epidemiological information, and involving all relevant stakeholders including local stakeholders who have local knowledge is essential for this innovative mapping design.

Keywords: community-based, precision mapping, ecological and epidemiological factors, schistosomiasis, Rwanda

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A Marginalized Zero-Inflated Spatially Varying Coefficient Model for Disease Modeling

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Disease models are important for in public health emergency response and intervention. For rare diseases or sporadic epidemic diseases, the occurrences of zero observations within area references are common. Zero-inflated Poisson (ZIP) models have been developed to accommodate the excess zeros. We previously developed a zero-inflated Poisson spatially varying coefficient (ZIPSVC) model to account for the varying exposure effects. But there are inferential and interpretation challenges relating to modeling the exposure effects. The latent class interpretation that corresponds to the susceptible sub-population is often wrongly inferred to the sampled population. In this study, we propose a marginalized