

# Environmental Pollution and the Mediterranean Diet: A Study on Health and Fertility

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**Abstract** Environmental pollution significantly endangers human health, contributing to premature deaths, chronic diseases, reduced longevity, and declining fertility. While adherence to the Mediterranean diet supports increased lifespan and reproductive health, the influence of environmental quality remains insufficiently explored. This study adopts a multidisciplinary One Health approach to examine the relationship between environmental quality and health outcomes in two areas of the Campania region (southern Italy). It integrates environmental monitoring, epidemiological data, and assessments of dietary and lifestyle habits. The initial phase involves territorial and demographic analysis to understand aging patterns. Historical data on air, water, and soil quality will be used to assess long-term environmental trends. Disease incidence and mortality rates linked to pollution will also be evaluated. By cross analyzing these datasets, the study aims to identify qualitative associations between environmental conditions and health indicators. These will be further investigated using advanced statistical and mathematical models. Expected results include actionable strategies to mitigate environmental health risks, promote sustainable dietary practices, and support longevity and fertility. Ultimately, this research emphasizes the importance of integrating environmental quality into public health strategies to address health inequalities in contemporary society.

**Keywords:** One Health, Environmental quality, Environmental Exposure, Environmental medicine, Health risks assessment

## 1. Longevity and Fertility Algorithm

Environmental pollution is a leading global health risk, causing millions of deaths annually and contributing to a range of non-communicable diseases, including cardiovascular, metabolic, neuropsychiatric disorders, and fertility issues[1], [2]. Contaminated water and soil also

pose serious health threats, particularly through the spread of infectious diseases and bioaccumulation of toxins in the food chain [3].

This study, part of the LAFA project ("Longevity and Fertility Algorithm") funded by Italy's National Recovery and Resilience Plan, explores the relationship between environmental quality and human health, with a focus on longevity and fertility. Using a One Health perspective, it compares two areas in Southern Italy: the polluted "Land of Fires" and the ecologically preserved Cilento Geopark. A cohort of 400 individuals, divided into two age groups (18–25 and 70+), was analyzed to assess the impact of long-term environmental exposure on reproductive and general health.

## 2. Soil and groundwater quality in areas of interest

This section highlights the stark contrast in soil and groundwater quality between the two study areas. In the "Land of Fires," extensive monitoring revealed widespread soil contamination, with significant exceedances of regulatory limits for lead, cadmium, arsenic, and the presence of hazardous compounds such as PAHs and dioxins, especially near former illegal dumping sites. Groundwater quality was similarly compromised, with nearly half of the monitoring wells classified as having poor chemical status due to high concentrations of nitrates, chlorinated solvents, and heavy metals. In sharp contrast, the Cilento Geopark showed consistently safe levels for all tested parameters, reflecting minimal anthropogenic impact and strong environmental preservation.

### 3. Soil and groundwater quality in areas of interest

Assessing mortality risk is a key component of environmental health research, helping to identify populations affected by environmental hazards. Using data from the "Atlas of Mortality in the Campania Region" (2006–2014), this study analyzes adjusted relative risk ( $RR_{adj}$ ) for all-cause mortality and specific cancers associated with soil and groundwater contamination, also considering socio-economic factors through a deprivation index. The "Land of Fires" shows consistently elevated  $RR_{adj}$  values for all-cause mortality, stomach, and liver cancer, suggesting a strong link to chronic environmental exposure. In contrast, the Cilento Geopark displays lower-than-average mortality risks, confirming its status as a low-impact area. An exception is noted in the southern part of Cilento, where liver cancer risk slightly exceeds the regional average.

### 4. Interactions between environmental status and mortality risk

Empirical evidence increasingly confirms the link between environmental degradation and public health, particularly when mortality risk is analyzed alongside environmental exposure. In the two case study areas, contrasting environmental conditions are reflected in distinct disease and mortality patterns. Spatial analysis strengthens this connection: data comparing groundwater chemical status with  $RR_{adj}$  for all-cause, stomach, and liver cancer reveal clear trends. In the "Land of Fires," municipalities with poor groundwater quality show significantly elevated  $RR_{adj}$  values, especially for cancer-related mortality, with

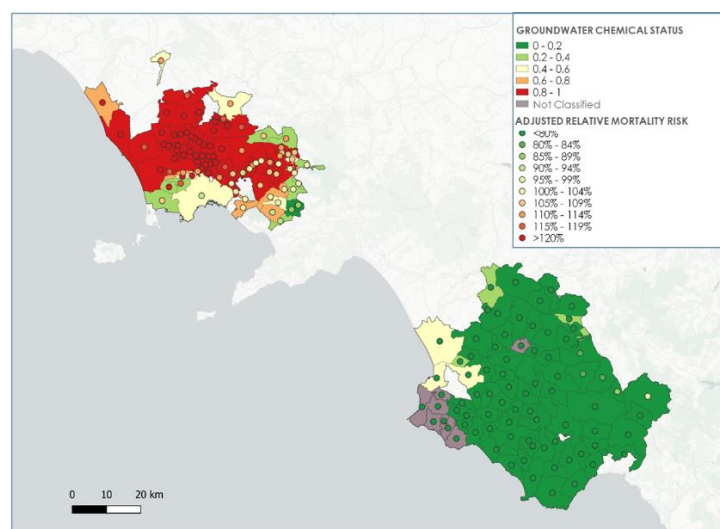
some areas reaching nearly double the expected rate. Conversely, the Cilento Geopark displays low mortality risk and high groundwater quality, emphasizing the protective effects of a clean environment. These findings underscore the importance of integrating geospatial environmental data with epidemiological indicators to guide public health interventions and sustainable land-use planning in high-risk regions.

### 5. Conclusions

This study highlights a clear link between environmental degradation and health outcomes in two areas of Campania. The "Land of Fires" shows significant soil and groundwater contamination and higher mortality risks, especially for liver and stomach cancers. In contrast, the Cilento Geopark has better environmental quality and health indicators. While limited by data availability and geographic scope, the study underscores the importance of integrating environmental and health data to support One Health strategies and guide evidence-based public health policies.

### 6. Acknowledgements

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**Figure 1.** Connections between the chemical status of groundwater and  $RR_{adj}$  for stomach cancer

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