SPATIAL ANALYSIS OF THE RELATIONSHIP BETWEEN THE DENSITY OF THE ENVIRONMENTALLY ASBESTOS-EXPOSED POPULATION AND THE INCIDENCE OF MESOTHELIOMA IN RURAL AREAS

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BACKGROUND AND PURPOSE

Environmental asbestos exposure may cause different epidemiological and clinical characteristics in diffuse pleural mesothelioma (DPM) etiology. It will continue as a global public health problem in the coming years. This study aimed to determine the degree of correlation between the population density with environmental asbestos exposure and the incidence of DPM in rural areas by spatial analysis.

METHOD

In the asbestos strategic plan studies carried out in Turkey between 2008 and 2012, the distribution of DPM cases according to the province, district, and village where they were born and DPM incidence rate according to the regions were calculated. Then, soil samples were analyzed according to the birthplace of the patients, and the areas with environmental asbestos contact in the rural area and the contact population were determined[1]. In this study, the correlation and regression between the ratio of the population exposed to environmental asbestos in rural areas and the incidence of mesotehlioma in the provinces were calculated using the geographic information system.

Turkey map was used with QGIS (version 3.28) and geographic information software. The created map was transferred to the software GeoDa (version 1.20.0.22). The distance was used as a criterion for the weight matrix in addiction. The Kernel-based weighting method was used to construct a weight matrix. Univariate Local Moran's I, Bivariate Local Moran's I, and Local Indicator of Spatial Association (LISA) spatial autocorrelation analyses were used. Moran's I value ranges from +1 to -1. When Moran I equals 0, it represents a random pattern. Positive values mean positive spatial correlation, which is strong aggregation between them. Negative values indicate a negative spatial correlation between regions.

RESULTS

Table 1. Crude and standardized mesothelioma incidence rates.

	Crude Incidence Rate Annual per 100.000 (95%CI)	Standardised Incidence Rate Annual per 100.000 (95%CI)
Turkey		
Male	1.86 (1.79-1.89)	2.88 (2.86-2.89)
Female	1.49 (1.43-1.56)	1.86 (1.85-1.87)
Total	1.84 (1.79-1.92)	2.33 (2.32-2.34)
Villages with continuing asbesteos exposure		
Male	79.94 (67.64-92.17)	87.27 (87.21-87.33)
Female	66.92 (55.84-78.00)	68.44 (68.39-68.49)
Total	73.42 (65.30-81.67)	79.00 (78.94-79.06)

Table 2. Descriptive statistics of the study.

	Median	**Minimum**	**Maximum**
Standardised Incidence Rate Annual per 100.000	1,28	0,10	15,12
Percentage of the Population with Asbestos Exposure in The Rural Areas	0,28%	0,001%	4,35%

Figure 1. Quartil map of regions with asbestos exposure in Turkey.

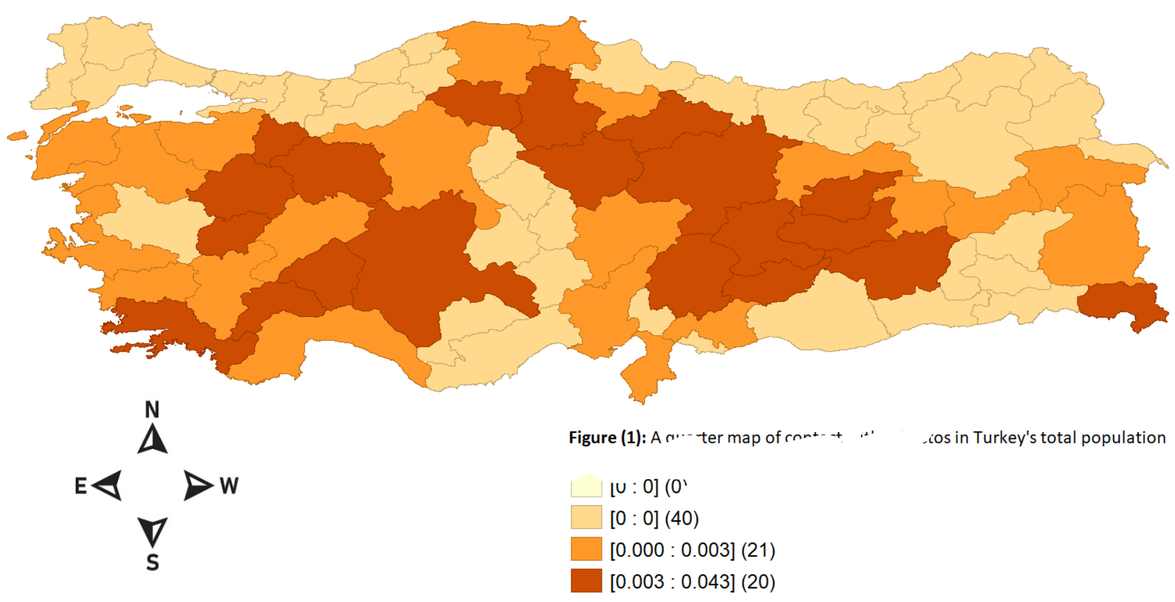


Figure 2. Cluster map of mesothelioma cases in Turkey.

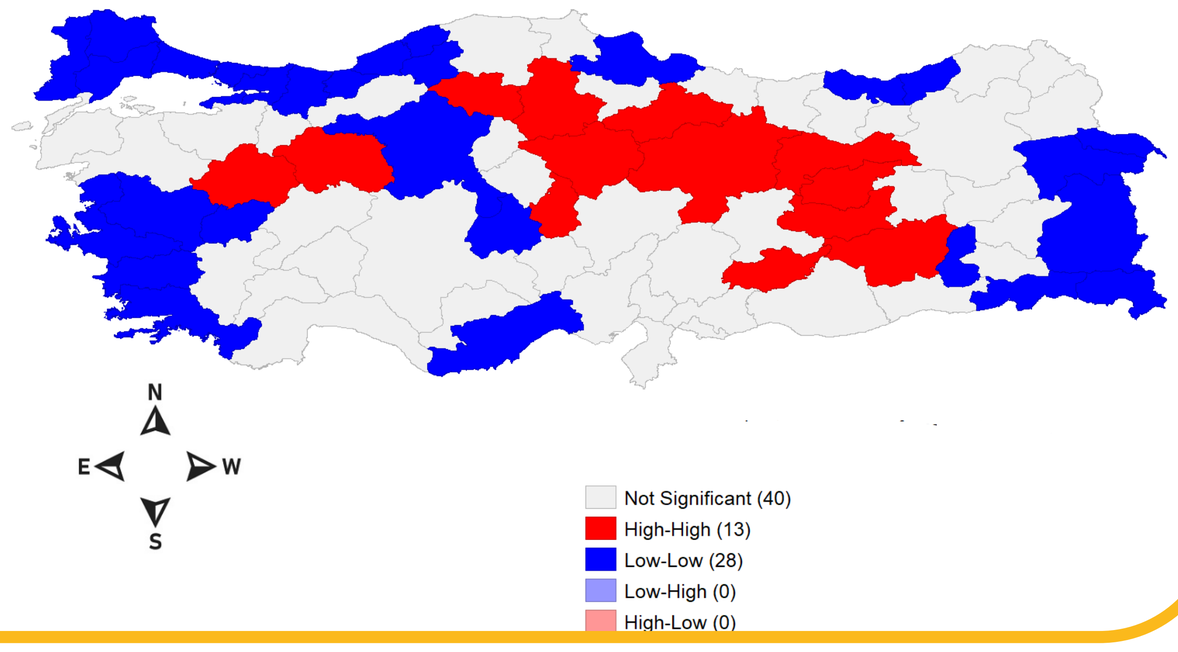


Figure 3. Moran Scatter Plots of AMIR with Kernel based weighting

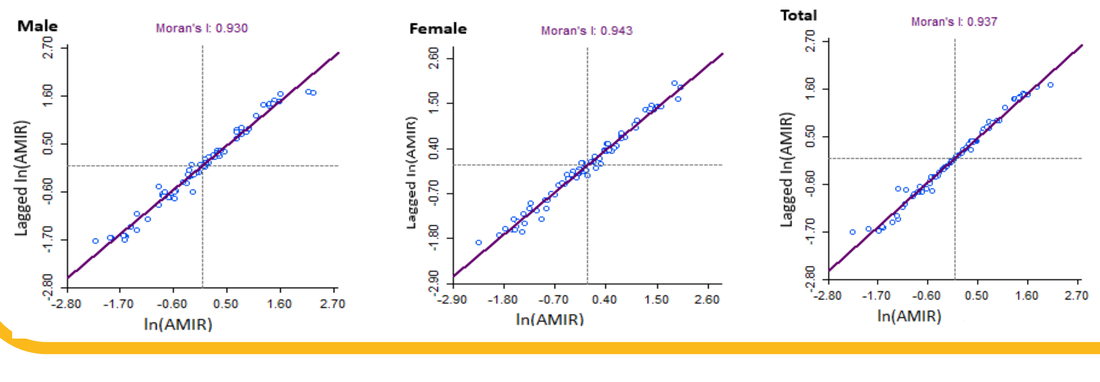
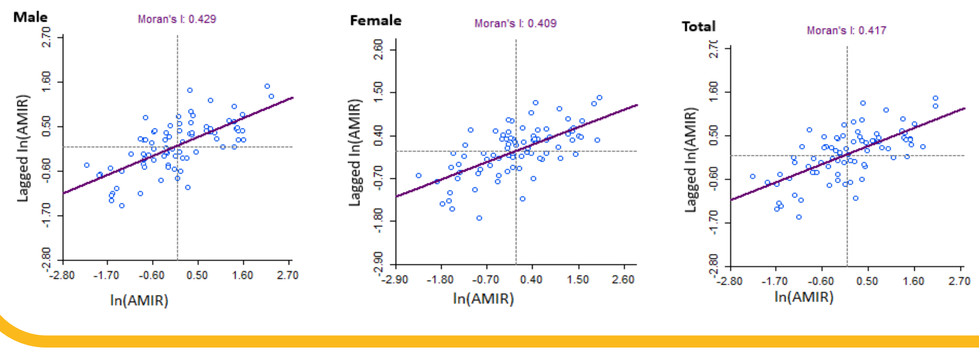


Figure 4. Moran Scatter Plots of AMIR with distance weighting



*AMIR:Annual Mesothelioma Indcidence Rate

CONCLUSION

Although the incidence of DPM in rural areas is related to environmental asbestos exposure, it can explain about half of the cases with DPM. At this point, it is clear that besides the gene-environment (fiber) interaction, other factors that may be associated with the etiopathogenesis of DPM should also be studied.

[1]*Turkey National Mesothelioma Surveillance and Environmental Asbestos Exposure Control Program. Int. J. Environ. Res. Public Health 2017, 14, 1293*