

## TITLE

### CORRELATION BETWEEN EMPLOYMENT RATE AND LIFE EXPECTANCY AT THE PROVINCIAL LEVEL IN ITALY

## AUTHORS

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## INTRODUCTION

Life expectancy is one of the most used synthetic indicators for the general health of a population, therefore temporal variations and geographical differences are generally indicative of changed risk factors (1).

In Italy, life expectancy at birth is about 82.4 years (2021 data): 80.1 for men and 84.7 for women. At the territorial level, however, there are profound differences: in the North people live on average 1 year and 7 months longer than in the South, with Italian provinces where this difference even exceeds 2 years (1).

It goes without saying that the state of health is very heterogeneous between the Italian provinces and that avoidable mortality differs widely between the geographical areas of the country for almost all the main causes of death (2).

This heterogeneity between provinces affects almost all aspects related to quality of life, wealth and socio-economic status. Specifically, the main economic indicators used overall are average income and employment rate (3).

Employment rates (like life expectancy) also follow a north-south gradient with higher levels in the north and gradually decreasing levels moving toward the southern provinces.

To date, however, there are no structured studies that directly compare average employment levels with life expectancy. For a comprehensive study, individual data would be ideal; however, such data are not available at the population level, so a first attempt can be made on data aggregated at the provincial level.

## OBJECTIVE

The objective of the study is to identify possible correlations between employment rates and life expectancy (4).

Since this is geographic data, however, the first question to ask is whether it is spatially correlated data, i.e. data in which the levels of employment and life expectancy are influenced by the levels in the neighboring areas. (5) (6)

## METHODS

This is a cross-sectional ecological study, where the minimum detail available is provincial (110 provinces). The data used come from the national statistical institute's (ISTAT) census permanente. Both employment rates and life expectancy are standardized against the resident population taking into account the age distribution.

Firstly, the presence of spatial correlation between the provinces for the life expectancy and employment rate variables was tested using the variogram and Moran's index (7); after testing the correlation hypothesis, a linear mixed effects model (spatial error model - SEM, i.e. a spherical semi-variogram model) was used to model the spatial autocorrelation at the provincial level. The modeled variable is life expectancy as a function of the employment rate; furthermore, education level, stratified by gender, was also included as a predictor in the model. (*Source: Health for All – ISTAT*)

## RESULTS

Both the variogram and Moran's index showed the presence of spatial correlation in the data with respect to both the life expectancy and employment rate variables. From the graphic representation of the spatial correlation it emerged that it is not homogeneous between the territorial areas but rather concentrated around the large urban centres; we also observe areas in which this spatial correlation is completely absent (for example between the provinces of the islands).

After correcting for spatial autocorrelation, the final model shows that geographic area is not a significant predictor of life expectancy.

On the other hand, the effect of the employment rate is significant: for men, a one percentage point increase in the employment rate increases life expectancy by 0.09 years (just over a month); for women instead 0.06 (just under a month) (Table 2).

The model does not show any significance even with respect to the average levels of education (% of subjects with a maximum secondary school certificate and % of subjects with a qualification higher than a university degree).

## CONCLUSION

As known, almost all health outcomes and socio-economic indicators are markedly different between different geographical areas, even within the same country. What emerges from the study conducted is that, at an aggregate level, the average level of employment has a positive effect on "longevity".

This result probably derives from the fact that those who are employed are on average in a better state of health and have an average more active life both from the point of view of motor activity and at a social level, all aspects which can have an effect on longevity.

It can therefore be hypothesized that economic policies aimed at increasing the employment rate may have an effect not only of a socio-economic nature but also on public health, by increasing life expectancy.

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**Table 1.** Spatial error model output

Variable	Level	M			F		
		Estimate	StdErr	p-value	Estimate	StdErr	p-value
Intercept		74.46	1.42	0.000	82.72	1.26	0.000
<b>Employment rate 15+</b>		<b>0.09</b>	<b>0.01</b>	<b>0.000</b>	<b>0.06</b>	<b>0.01</b>	<b>0.000</b>
%subjects without a middle school license		2.86	3.05	0.350	0.63	2.92	0.828
%subjects with higher than high school degree		10.86	4.18	0.011	3.59	3.89	0.359
Geographical area	1.North	- 0.21	0.22	0.348	- 0.22	0.21	0.301
	2.Center	0.37	0.21	0.080	- 0.00	0.22	0.990
	3.South	-			-		

**Tema della comunicazione:**

epidemiologia generale