Municipal Epidemiological Report (REC): a new fast monitoring tool for exposed population

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Abstract:
The law of March 2019 established the municipal epidemiological report to make easier the rapid and low-resource monitoring of the exposed population. Environmental observatory active in Trino since 2014 has equipped this tool and making the first evaluation of the risk with census sections from 1970 to 2018. The result highlighted that overall mortality (for total gender) show a decreasing trend while for oncological diseases the results are more difficult to interpret especially in areas close to former industrial sites or contaminated sites. Next step is producing a REC with data for 2019 and divided by gender.

Keyword: refer to epidemiological, Municipality of Trino, mortality, nuclear power plant

Keywords: mortality, causes of death, centenarians, Tuscany

Summary
Introduction: in Italy and Tuscany the resident population aged > 99 reached its all-time high in 2015. Respiratory diseases in men and ischemic heart diseases in women were the leading causes of death for Italian centenarians in 2015. The aim of this study is to describe the mortality of Tuscan centenarians by cause.

INTRODUCTION:
In the 2019 the activity of the ex-nuclear power plant, actually Trino’s Environmental and Epidemiological Observatory (Vercelli’s province, Piedmont), was equipped with a new sanitary tool for make more potent and fast the monitoring of population and for give directions to municipal administrator.
The Municipal Epidemiological Report (REC) was defined by the clause 4 of the law in 22 March 2019, n.29 as follows:
«the aggregate or macro data corresponding to the evaluation of the overall health status of a community which is obtained from an epidemiological examination of the main information relating to all patients and to all health events of a population in a specific temporal and territorial context limited or at national level, through the assessment of the incidence of diseases, the number and causes of deaths, as detectable in the hospital discharge sheets and medical records, in order to identify the spread and trend of specific pathologies and identify any critical issues of environmental, professional or socio-sanitary origin ».(9)
Although "report" evokes a document on a person's state of health, it is actually a scientific report (sometimes called "atlas" or "report") in which both health data are analyzed in their socio-economic and environmental context for draw useful information for health evaluation and planning. (4,7,8)

The activity of OSAT was to analyze the ordinary situation in Trino’s municipality through the frequency of the total dead (without distinction of cause) which is routinely update to registry office; it was also added the spatial variable with the assessment of mortality risk by census sections.

Furthermore, the previous OSAT studies make possible to generate an historical report with the analysis that has been activated since 1970 to also have a study of the evolving trend that is always updated over time.

AIM OF THE STUDY

Monitor the deviation of the standard value promptly (average data of the entire municipality) and the temporary trend of general and oncological mortality for every section in Trino depending on the historical subperiod considered, all correct for age.

The analysis carry out in this first report of REC finished at 31/12/2018 for all causes and at 31/12/2017 for all tumors with little delay due the necessary time for the classification of death’s causes.

MATERIALS AND METHODS

The data has been taken by the registry office of the Trino’s municipality that collects its continuously dead by dead; next they have been split for the 13 census sections with higher population density depending on the last available address.

The standardized risk values (SMR) was calculated among the observed for each individual census section of Trino by the specific mortality rates referred to the average population under study as a whole; in particular the populations of the entire municipality applied for the censuses of 1971,1981,1991,2001 and 2011. (4,15)

Lastly the statistical significance was verified through the processing of 90%/95% confidence intervals.

Though the REC is a rapid and statistic monitoring tool is necessary explain some environmental considerations in the Trino area. The sections, in all 13, with higher population density were considered excluding rural ones which present few residents mostly located in scattered houses / agricultural settlements. (see Fig.1)

Regarding environmental sources of risk of this OSAT study (6,12,13,14) is possible to recognise the following possible exposures:

• Section 1,2,7,8 = close to the cement works
• Section 4,2, partially 3 = close to the former Prolafer Foundry
• Section 9 partially = near to Ex Plastica Italiana / TVR
• Section 13 = Fraction Robella (passive and occupational exposure to pesticides)
• Section 3 = presence of former hospital now nursing home (about 100 beds)
• Finally, for the more peripheral sections, especially those close to the agricultural settlements / rice fields, an indirect / passive exposure of the residents to pesticides / pesticides can be assumed.
The table n°1 and the graph show the “inversion of the demographic pyramid” where in the 1971-1981 censuses the pediatric age groups are more numerous unlike the older ones. Furthermore, the subjects that can be involved from an employment point of view between the ages of 30 and 50 are always greater in the censuses of the 70s and 80s and fall drastically thereafter also due to the employment crisis of the numerous companies in Trino.
For the male gender, the highest number of excess and statistically significant (red color) SMRs between the 70s and the end of the 80s is observed; subsequently the overall situation tends towards a gradual reduction of risks. Increments to be monitored (yellow) remain for sections 6, 10, 11 and 12.
For the male gender, the highest number of excess and statistically significant (red color) SMRs between the 70s and the end of the 80s is observed; subsequently the overall situation tends towards a gradual reduction of risks. Increments to be monitored (yellow) remain for sections 6, 10, 11 and 12.

Among women, the main excesses of mortality, for the total causes with statistical confirmation, are observed in the 70s and end of the 80s; Section 3 is an exception with the presence of a nursing home located in Corso Italia 7 which induces a constant and persistent increase in mortality, more marked in the female gender, due to the greater average survival compared to men.

Even the insignificant increases (yellow) decrease significantly starting from the 90s with the exception of sections 2, 8, 9 and 10.

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**MUNICIPAL EPIDEMIOLOGICAL REPORT FOR TOTAL CAUSES (AGG.31/12/2019) - WOMEN**

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Analyzing the overall trend for total malignancies in men, it is observed that the greatest number of statistically significant excesses (red) and also without statistical confirmation (yellow color) are concentrated in the 70-80s and then gradually decreased in the first decade of the 2000s and even more later (prevalence of green color).

For women, the total tumor shows a more compromised situation compared to the male gender since three distinct periods are indicated: an initial between the 70s and late 80s with several statistically significant excesses (red) and in excess, albeit without statistical confirmation (yellow); a second part essentially identifiable from 92 to 2003 with a widespread reduction or zero risks (white color). Finally the last 15 years with recovery of excesses (both red and yellow). Sections 1, 2, 3, 5, O and 12 remain to be monitored for the next few years.

CONCLUSION

This Municipal Epidemiological Report has certainly confirmed that for the total causes the situation continues to be positive with a gradual and constant reduction in mortality rates more evident in the female gender.

It is evident in the overall observation of the approximately 50 years of study that the greatest increases in risk were concentrated in the 70-80s following the strong industrialization of the Trinese area that began in the early 60s. (6,12-14)

From a temporal point of view it seems that the reduction below the risk threshold (value 1) began in the early 2000s and then proceeded with a constant decrease in the SMR values; the only exception is section 3, where still currently, especially among the female gender, the values are still in excess. As already explained, this distortion is induced by the presence of the rest home with about 100 beds.
There are different sections for both genders that present a trend either in reduction or in constant values and below risk; for the latter, prospective monitoring is important to understand if this "silent" situation persists, will continue to decrease or if there will be an increase in risk again. In particular, the sections near the cement factories and the former Italian Plastics still suffer slightly from health. (3,5,11)

With regard to the total number of malignancies, a slowly improving situation is noted for the male gender compared to the 70-80 decades, although there are still census sections worthy of perspective attention; in this regard, sections 3, 4, 7 and 9 near cement factories and the former Prolafer foundry should be noted. (3,5,11,14)

On the other hand, the trend in the female gender is different with a gradual and widespread increase in risks starting from the second half of the 2000s with greater localization in sections 1 to 5, most of which are also close to production sites that are still active or abandoned.

It should be noted that the most evident reductions affecting both genders concern sections without the presence of contaminated or industrial sites such as 11, 12, 8 and 6.

These results, also considering the results of the inferential studies (6), confirm to us on the one hand that the female gender can be defined as a "tracer" for the historical greater residence in the place of residence and on the other confirm (as already emerged in the study of the questionnaires, case-control) a slower reduction in mortality in municipal areas where there are still operational sites and/or brownfield sites but still subject to reclamation. (3,6,11)

Support for these explanations is also provided by the trend of section 3 where the nursing home is present: in fact, it is noted that for men the excess indicators (yellow) are lower than those of the female gender. This diversification is certainly due to a higher life expectancy for women who therefore experience oncological diseases later than men. Finally, this temporal shift forward of women compared to men, in the onset of oncological diseases, can be due both to the previous and lower propensity to smoke and to the different concentrations of pollutants between the occupational environment (certainly greater) and the residential area adjacent to production sites. (1,2,3,5,11)

The situation, although overall good, must be subject to continuous attention and monitoring, as today more or less widespread recovery of excess mortality cannot be excluded given the complex mixture of carcinogens (and not only) to which different layers of the population, with different concentrations, may have been exhibited during their residency in Trino. In this regard, this second REC highlights a different trend between men and women with implications epidemiological, health and preventive measures to be considered in subsequent inferential investigations. (4,7)
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