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SURVEY OF MORTALITY IN THE SEVESO AREA

1975-1981

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STUDY OF MORTALITY IN THE SEVESO AREA (1975-1981)

In previous mortality surveys we emphasised several times the problems arising from the characteristics of the reports presented, both positive and negative.

The first survey, done at Communal level in the period 1975-79, presented serious limitations in regard to use of the data for an assessment of the damage attributable to the ICMESSA accident. This was because of the characteristics of the population under study defined only on administrative criteria: the residents in each Commune.

In the second survey deaths were distributed between zones A, B and R. This study, though more concretely related to the potential risk of exposure to dioxin, presented limitations due to the mobility of people, limitations due to the use of the dioxin present in the soil as sole potential indicator of risk.

This version, updated to 1981, gives the data processed in a third way, in order to arrive at further, more precise indications on the possible correlation between the accident of July 1976 and the specific mortality rates by sex, age and cause in the following years.

This study is divided into three parts: one using as denominators the inhabitants of each of the 11 Communes; one with the residents in zones A, B, R and one breaking down the population into 6 belts from S1 to S6 (see figure). The definition of these belts is at present at a preliminary stage and is based mainly on the cases of chloracne and of acute skin lesions that occurred in every square with a side of about 1 km in the whole area under study. The division into belts is not at all final

but it was done because, as the study progressed, we felt it was important to process the data even in a rough form, in order to get more experience of analysing the pathological events occurring in the area under study.

The definition of these risk areas is still under study and a preliminary version should emerge by the end of the year.

In addition to the definition of the exposed, that is the denominator necessary for the calculation of rates, there was the problem of the numerators, that is the definition of the causes of death.

For the period 1975-1979 all the causes (93%) were of course traced ex post by ISTAT personnel in Rome. These data have already been coded by the ISTAT personnel. Since 1 January 1980 all the causes of death have been traced, with the authorisation of ISTAT, at the 11 Communes. From 10 of them we have obtained photostats of ISTAT form D4/D5 while from one we have been able to get only transcriptions.

In the case of deaths occurring outside the 11 Communes we are notified only of the place of death and periodically, by writing to the offices of the Commune in which death occurred, it has been possible to retrieve information on the cause of death.

The information for the entire period is now over 99% complete. Since January 1980 the coding of the causes of death has been handled by our personnel (1 epidemiologist), who codes all three causes of death.

As to the method of applying the codes, we came to an agreement with the ISTAT coders and obviously we use the same classification of diseases (ICD VIII revision).

Our analysis of the data yielded some differences between the two periods, in our view to be attributed to a different criterion of definition of the cause of death first diagnosed. These doubts are stated in the text when these criteria are thought to have altered the trend. The causes of death have been grouped in 55 categories as per attached list.

At this stage of the survey we were still tied to citizens' residence and so it is not yet a cohort study but a survey of mortality on citizens resident each year in the areas reported (communes, zones, belts).

The next version of the survey would logically be targeted on citizens resident on 10 July 1976, excluding immigrants and retrieving information on emigrants.

The present study gives the crude and standardised rates in each commune, zone and belt by cause of death, sex, age-group and year of death. We have also calculated the expected rates on the basis of the mortality both in the zones outside R and in the belts considered blank ($S_5 + S_6$) for the purpose of internal comparison.

The causes of death are stated in detail in the attached tables. The population resident each year in the area has been reconstructed through the Special Department computer, which stores the registry office data for all 220 000 residents, including births, deaths and changes of address.

In the attached printout the population is broken down by commune, zone and belt for each year.

Comment on the tables

INFECTIVE AND PARASITIC DISEASES (000-136, A1-A44). There are no significant increases through time or differences between communes, zones or belts.

ALL TUMORS (140-239, A45-A61)(including benign). The rate ranges from 207 cases per 100 000 inhabitants in 1978 to 246 in 1982 in males and from 131 in 1977 to 175 cases in 1981 in females. The general trend is upward within the limits expected for the Italian population. There are no noteworthy differences by commune, zone or belt.

ENDOCRINE, NUTRITIONAL AND METABOLIC DISEASES EXCLUDING DIABETES MELLITUS (240-246, 251-279, A62-A63, A65-A66) - No noteworthy differences.

DIABETES MELLITUS (250, A64) - There is a noteworthy increase in the years 1980-81. In our view, the difference is largely due to an overestimate compared to ISTAT because from 1980 onwards the disease codes have been applied by our epidemiologists, who have always regarded diabetes, when present with other cardiovascular causes, as the primary cause of death, as in fact was indicated by the ISTAT coders. The rates from 1980 on seem to be twice the 1979 rate without difference by commune or zone. In the two belts S1+S2 we find an increase in deaths since 1977 in females, constant in time at 40 cases per 100 000 compared to the expected 24 cases.

DISEASES OF THE NERVOUS SYSTEM AND SENSORY ORGANS (370-389, A72-A79). The trend is constant through time and, given the small number of deaths, there are no differences even at territorial level.

RHEUMATIC FEVER AND CHRONIC RHEUMATIC HEART DISEASE (390-398, A80-A81) - Nothing noteworthy.

HYPERTENSION (400-404, A82) - Here again, the increase noted in 1980-81 is probably due to a coding overestimate. At all events, there are no important differences territorially. It should, however, be mentioned that the mortality rate of females is slightly higher in the belts S1+S2 and S3+S4 as from 1977 compared to the zones rated blank.

ISCHEMIC HEART DISEASE (410-414, A83) AND OTHER HEART DISEASES (420-429, A84) - As stated earlier, there is a peak in 1976 for females, but it does not seem to be attributable to the accident as the distribution of deaths was homogeneous throughout 1976 before and after 10 July. At territorial level there are no significant differences. There is a slight decline through time.

CIRCULATORY DISEASES OF THE BRAIN (430-438, A 85) - The time trend is downward with 70 deaths per 100 000 inhabitants in the past few years compared to 100-110 in 1976.

DISEASES OF THE ARTERIES, ARTERIOLES AND CAPILLARIES (440-448, A86) - The time trend is constant and there are no noteworthy differences within the territory attributable to the ICMESA accident.

EMBOLISM AND VENOUS THROMBOSIS (450-453, A87) - Nothing noteworthy.

OTHER DISEASES OF THE CIRCULATORY SYSTEM (454-458, A88) - Nothing noteworthy.

ACUTE RESPIRATORY TRACT INFECTIONS, INFLUENZA OR GRIPPE AND PNEUMONIA (460-486, A89-A92) AND BRONCHITIS, EMPHYSEMA AND ASTHMA (490-493, A93) AND OTHER DISEASES OF THE RESPIRATORY SYSTEM (500-519, A94-A96) - The time trend is downward.

PEPTIC ULCER (531-533, A98) - Nothing noteworthy.

APPENDICITIS AND INTESTINAL OCCLUSION, HERNIA AND PERITONITIS (540-543, 550-554, 560-576-568, A100, A101, A104-0) - Nothing noteworthy.

CIRRHOSIS OF THE LIVER AND OTHER DISEASES OF THE LIVER AND GALL-BLADDER (570-573, 576, A101.1), OTHER DISEASES OF THE DIGESTIVE TRACT (520-530, 534-537, 561-567, 569, 574, 575, 577, A97, A99, A103, A104.2, A104.9) - The time trend is constant. There are no differences of any interest either between communes or between zones A,B,R or between belts.

GENITOURINARY TRACT DISEASES (580-629, A105-A111) - Nothing significant. The number of cases is tiny.

CONGENITAL MALFORMATIONS AND SOME CAUSES OF PERINATAL MORBIDITY AND MORTALITY (740-749, A126-135). The time trend is stable. Within the territory there were 5 cases in zone B for 1980-81 against 1.34 expected, with a relative risk of 3.7 and in belts S1+S2 there were 7 cases among males in 1981 against 2.55 expected, with a relative risk of 2.75. This could, however, be a random phenomenon, as will be explained in detail in the study on malformations now approaching completion.

ILL-DEFINED MORBID SYMPTOMS, OTHER DISEASES AND CAUSES NOT FOUND - There is nothing noteworthy apart from a slightly rising trend of ill-defined symptoms for the years 1980-81, perhaps due to differences of coding. The number of cases is very small.

ACCIDENTS, POISONING, INJURIES (800-999, A138-A150) - The time trend is stable. As to territorial distribution, there is nothing noteworthy either between communes or belts. In zone A there were 5 cases in the two years 1976-1977 compared to the 0.5 expected and the 3 deaths in 1976 from injury occurred before 10 July.

DEATHS FROM ALL CAUSES - The apparent excess in zone A in 1976 is distributed equally before and after the accident.

TUMORS - With regard to the trend of individual tumor types, it may be said that the situation reflects that of northern Italy, taking into account the socioeconomic status of the area under study. No dioxin-related differences were found either between communes or between zones or between belts. The time trends are very close to the nationwide trends for tumors of the stomach and a slight increase for intestinal tumors, especially in females. There was a small increase in hepatic tumors. For respiratory tract tumors there was an increase in line with that of industrialised areas, especially in females. Tumors of the breast are likewise on the increase, as throughout northern Italy. Tumors of the uterus show a decline. There is an appreciable decline in prostatic tumors while the trend of bladder tumors is stationary. Nothing noteworthy for the moment for lymphomas and leukemias.

Discussion

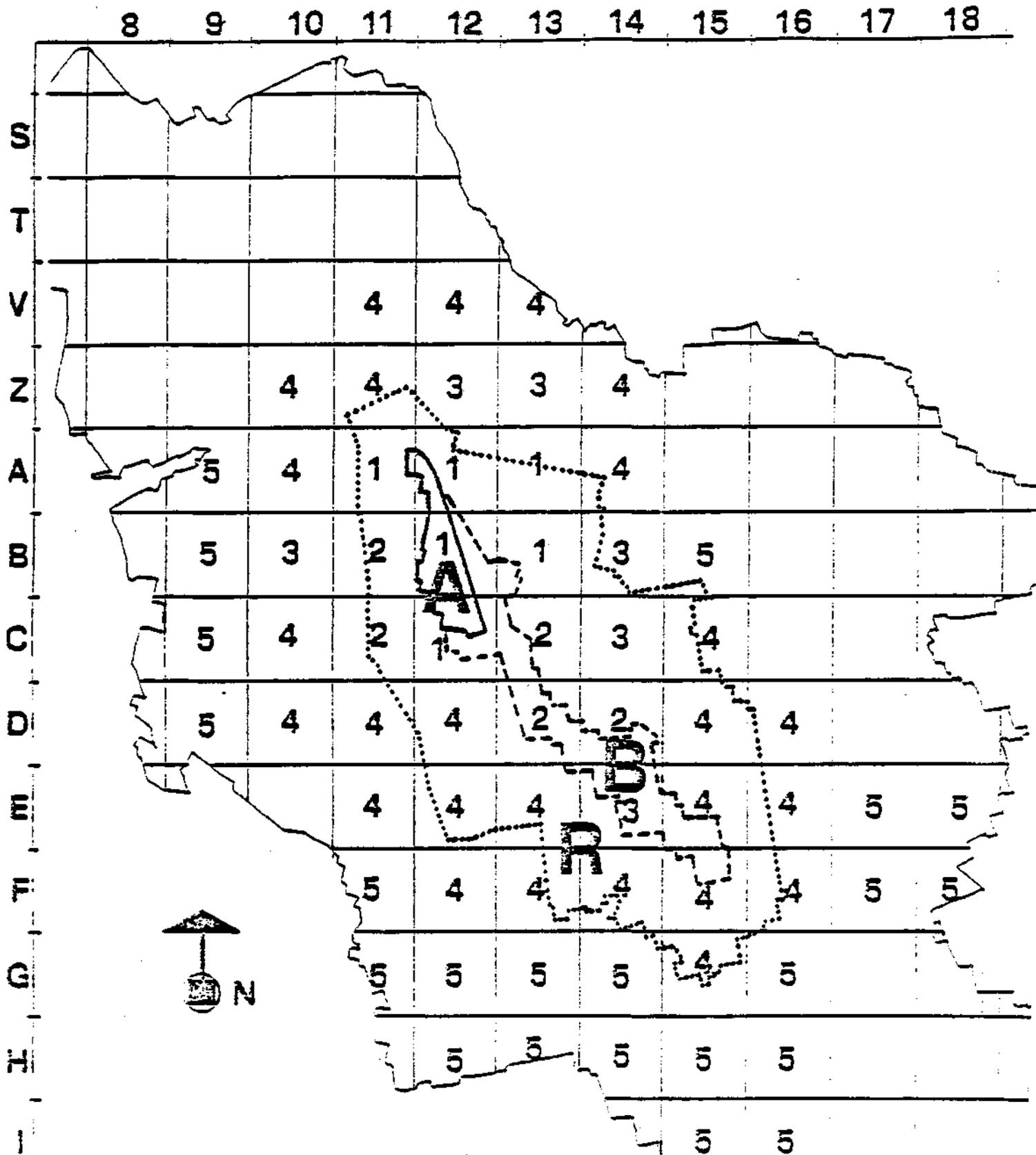
From the purely statistical angle the data we have reported yield no information that suggests that the ICMESSA accident appreciably altered the specific mortality rates by sex, age and cause in the population resident in the area monitored. This statement refers mainly to the trend within the area under study. By that we mean that with the level of sensitivity pertaining to a mortality study based on the compulsory notification of death (ISTAT form D4/D5) no significant clusters were observed within the area either in space or time that could be attributed to the accident.

To understand clearly the characteristics and limitations of mortality surveys generally and of this one in particular, one needs to consider the following points. In the first place, any study hinging on causes of death is obviously concerned only with serious diseases with a high lethality rate. To be recorded these diseases must be easily diagnosed and not confused with more frequent causes of death. In the case of deaths from rare or infrequent diseases, if these diseases do not present precise signs and symptoms they may easily be missed by the physician who completes the ISTAT form. Other problems bearing more particularly on our study concern the controls and the definition of exposed and nonexposed or at any rate of more or less exposed persons. The two aspects to some extent merge in that as soon as one decides to make an internal comparison it is obviously important to define the potential exposure of the area. Migration within and outside the area further compound the problem.

In our study we have sought to define the areas in different ways with the aim of identifying the best possible definition of the areas at risk. Our impression at the moment is that by taking the resident population year by year we have reached the highest level of sensitivity attainable in a situation like the one with which we are dealing in the Seveso area. As stated in the report on priority activities, the mortality survey of residents must now be followed by a closer investigation: on the cohort of 10/7/76. With the data currently available such a study, which could hardly be achieved in 1980, now becomes relatively simple.

In short, we think that the next mortality study should be handled with the following points in mind:

- definition of the cohort of residents as at 10 July 1976;
- better use of the indicators of exposure for the definition of belts;
- conduct of external comparisons using the ISTAT tapes available up to 1978;
- review of the coding system with the ISTAT operators.



- 1 = VERY HIGH RISK BELT
- 2 = HIGH RISK BELT
- 3 = MEDIUM-HIGH RISK BELT
- 4 = MEDIUM-LOW RISK BELT