Eur J Cancer Clin Oncol, Vol. 22, No. 12, pp. 1425–1429, 1986.
Printed in Great Britain

0277-5379/86$3.00+0.00

Cancer Mortality in Italy: Temporal Trends and Geographical Distribution

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THE Italian Central Institute of Statistics has been publishing from 1955 onwards numbers of death certifications by cause according to the Standard Revisions of the International Classification of Diseases, stratified for sex and age in 5-year groups [1]. Furthermore, from 1969 onwards, copies of the original computer tapes with extracts of all primary death records have been available.

Although independent checks have confirmed an acceptable level of completeness and reliability of Italian death certification [2], relatively little comprehensive work on these data has been published, with the exception of an Atlas of Cancer Mortality for the period 1970–72 [3]. We decided therefore to undertake a systematic revision of trends in cancer death certification rates in Italy from 1955 onwards, and of the geographic distribution of cancer mortality within various provinces (the 95 administrative areas). Extensive data from this work have been (or will be) published elsewhere [4–12]. It is nonetheless of interest to summarize here the major features of cancer mortality in Italy, since information and comparisons of cancer death certification rates in various European countries are clearly of general interest from a public health viewpoint, and may give useful indications which may help in developing or verifying hypotheses about aetiological factors.

NATIONAL TRENDS IN CANCER MORTALITY

When national trends in cancer death certification rates for the mid 1950s to the late 1970s were considered (see Table 1 for major sites before age 65) increases in overall cancer mortality for males were evident in all age groups [4, 6]. However, when respiratory and other tobacco related neoplasms were excluded, rates were slightly decreasing up to age 64 (Table 2). In females, the increase in mortality from tobacco related neoplasms has been moderate, and possibly in a certain proportion attributable to a general increased tendency towards diagnosing these neoplasms.

On account of the decreasing trends observed in other cancer sites, overall cancer mortality has been decreasing in females below age 65 (−6.6% over the period 1955–78, Table 1), the downward trend being more pronounced in the younger age groups (−18.5% in women aged 35–44). As a consequence of these discrepant trends in the two sexes, Italian total cancer mortality rates in the late 1970s were among the highest registered in any Western European country for young and middle aged males and among the lowest for females [13].

The rise in lung cancer mortality has been exceedingly rapid in males, with a more than 2-fold increase in the age-standardized rate under age 65, and an almost 5-fold increase at older ages. In the 35–44 age group lung cancer death certification rates stabilized around the beginning of the 1970s, but [contrary to what was observed in several developed countries, including the U.S.A., Britain and Scandinavia (14)] no hint of a downward trend has since been noted [10]. Consequently, Italian lung cancer mortality rates in younger and middle-aged males are currently among the highest registered in any Western European country [10]. At all subsequent ages, rates are currently showing marked increases. This pattern of trends indicates that, in the absence of substantial changes in exposure to cigarette smoking, all-age lung cancer mortality rates in Italian males can be expected to reach a maximum in the first and second decade of the 21st century, just when overall rates in several other developed countries are expected to be falling [10]. Other tobacco related cancers (mouth or pharynx, larynx, oesoph-

Accepted 30 June 1986.

Table 1. *Age-standardized Italian death certification rates/*100,000 *people aged under* 65 *from selected cancers or groups of cancers,* 1955–78*

Type of cancer	Sex	Rates/100,000 people aged < 65 for: 1955–58	1959–62	1963–66	1967–70	1971–74	1975–78	Rate of change: Absolute change (rate 1975/78—rate 1955/58)	Percent change/year†
Trachea, bronchus and lung	♂	16.19	20.22	23.49	26.56	29.19	33.74	+17.55	+ 3.67
	♀	2.83	3.10	3.35	3.53	3.70	4.09	+ 1.26	+ 1.84
Stomach	♂	21.44	20.21	19.07	16.50	14.70	12.74	− 8.70	− 2.60
	♀	11.26	9.91	9.04	7.62	6.48	5.68	− 5.58	− 3.42
Intestines, chiefly large intestines (colon and rectum)	♂	5.99‡	6.65	7.24	7.87	8.60	8.82	+ 2.83	+ 1.93
	♀	5.54	6.06	6.20	6.58	7.25	7.41	+ 1.87	+ 1.45
Liver	♂	1.23§	1.65	1.87	2.06	2.13	2.77	+ 1.54	+ 4.06
	♀	1.08§	1.11	1.25	1.24	1.18	1.34	+ 0.26	+ 1.08
Pancreas	♂	1.94	2.69	2.47	2.83	3.22	3.74	+ 1.80	+ 3.28
	♀	1.26	1.42	1.45	1.51	1.70	1.89	+ 0.63	+ 2.03
Breast	♀	12.66	13.72	14.54	15.78	16.90	17.22	+ 4.56	+ 1.54
Uterus (cervix and corpus)	♀	13.46	13.28	12.53	11.41	9.93	8.25	− 5.21	− 2.45
Prostate	♂	2.02	2.15	2.18	2.11	2.04	2.05	+ 0.03	+ 0.07
Total, all sites, all histologies, benign and malignant	♂	91.77	99.07	102.92	105.24	107.90	111.49	+19.72	+ 0.97
	♀	78.95	80.01	79.60	78.20	76.90	73.73	− 5.22	− 0.34

*In each 4-year calendar period, there are 85–95 million people per sex. So the standard error (S.E.) of the rates presented, by the Poisson approximation, is roughly one thirtieth of their square root (e.g. a rate of 3 would have an S.E. of about 0.06).
†Average annual rate of change assuming that the change has been constant and approximated as 100% × difference in log$_e$ rates divided by 20 years.
‡1956–58 (standard error ~ 1.2 that of other rates).
§1957–58 (standard error ~ 1.4 that of other rates).

Table 2. *Italian age standardized death certification rates from selected groups of neoplasms, Italy,* 1955–78

Group of cancers	Sex	Rates/100,000 people aged under 65 for: 1955–58	1959–62	1963–66	1967–70	1971–74	1975–78	Percent change (1975–78/55–58)
Tobacco related neoplasms*	♂	31.84	37.79	41.42	45.55	49.51	55.78	+75.2
	♀	6.61	7.18	7.44	7.62	8.05	8.71	+31.8
All other neoplasms	♂	59.93	61.28	61.50	59.69	58.39	55.71	− 6.9
	♀	72.34	72.83	72.16	70.58	68.85	65.02	−10.1

*Lung, mouth or pharynx, larynx, oesophagus, pancreas, kidney and bladder.

agus, pancreas, kidney and bladder) also rose considerably.

In both sexes, gastric cancer mortality dropped almost 50% below age 65. Nonetheless, death certification rates from cancer of the stomach in the late 1970s in Italy were almost four times greater than American, two times greater than French ones and 20–50% higher than in most other Western European countries [13]. Downward trends, however, are currently evident in all age groups (including the younger ones), so within the next few decades further substantial reductions in overall gastric cancer mortality can reasonably be expected.

Likewise, mortality from cancer of the (cervix) uteri decreased markedly, mostly in the younger age groups, with an overall decrease around 60% below age 50. These downward trends, however, started flattening off in younger women (below age 35) in the early 1970s and a few years later in women aged 35–44 [11]. In other countries (e.g. Britain) increasing cervical cancer incidence and mortality in younger women have actually been registered over more recent years [15], which have

been generally attributed to changes in life style (chiefly sexual) habits in younger generations.

Upward trends were evident for cancers of the large bowel in both sexes, of the liver in males and of the breast in females. These trends, however, have been flattening off since the late 1960s in the younger age groups. It is thus possible that modifications in reproductive patterns (for female breast and possibly intestines), diet or other unspecified life habits over the current century have produced these upward trends, followed by a tendency towards stabilization of rates at higher levels.

Among neoplasms accounting for lower proportions of cancer deaths, marked changes were observed in mortality from skin cancers. Consistent increases were observed at younger ages in both sexes (largely or totally attributable to melanoma), whereas mortality at older ages (> 65) decreased, possibly or account of decreasing incidence (or improved treatment) of other cell types. Thus, trends in mortality from melanoma of the skin are similar to those observed in most developed countries, though the absolute values of Italian death rates are considerably lower than North European, American or Australian ones [13].

GEOGRAPHICAL VARIATION

The geographical distribution of cancer mortality between various Italian geographical areas is quite peculiar, since for most sites certified mortality was considerably elevated in Northern Italy compared to Southern regions, and generally intermediate in Central areas [9] (Table 3). This large variation can hardly be dismissed as due to differences in death certification accuracy between various geographical areas, since: (i) it is of similar magnitude (at least in males) also in young middle age (40–49), when death certification is known to be more accurate; (ii) recent information on registration of cancer incidence in Central and Southern areas (e.g. Sicily) is largely consistent with death certification data and, (iii) mortality rates from several other common causes of death, including ischaemic heart and cerebrovascular diseases were (at least in males) higher in the North as well, whereas geographical variations in death certification from "senility, ill defined or unknown

*Table 3. Age-standardized truncated death certification rates/*100,000 *people aged* 35–64 *in different geographical areas from selected cancers or groups of cancers. Italy*, 1969–73

Type of cancer	Sex	Rates/100,000 people aged 35–64 for: North	Centre	South	Ratio North/Centre	Ratio North/South
Trachea, bronchus	♂	82.16	60.73	46.44	1.35	1.77
and lung	♀	8.90	7.91	5.92	1.13	1.50
Stomach	♂	43.00	41.23	21.53	1.04	2.00
	♀	16.68	16.82	10.37	0.99	1.61
Intestines, chiefly	♂	23.15	19.57	12.16	1.18	1.90
large intestines	♀	17.34	16.27	10.50	1.07	1.65
(colon and rectum)						
Liver	♂	6.25	5.46	3.46	1.14	1.81
	♀	2.76	2.88	2.26	0.96	1.22
Pancreas	♂	9.21	7.15	4.49	1.29	2.05
	♀	4.27	3.08	2.37	1.39	1.80
Breast	♀	42.48	34.61	30.23	1.23	1.41
Uterus (cervix and corpus)	♀	23.24	20.58	25.73	1.13	0.90
Prostate	♂	5.19	4.54	3.87	1.14	1.34
Total, all sites	♂	277.18	221.17	164.31	1.25	1.69
all histologies	♀	170.47	150.31	131.33	1.13	1.30
(malignant only)						

Standard errors of the rates presented, based on the Poisson distribution:

$$\text{North} \simeq \sqrt{\text{Rate}/14}$$

$$\text{Centre} \simeq \sqrt{\text{Rate}/9}$$

$$\text{South} \simeq \sqrt{\text{Rate}/10}$$

Rates under 0.50 for North, under 1.00 for Centre and for South are based on less 100 deaths, thus being rather unreliable.

causes" (ICD 780–796) are negligible below age 65 [16].

The geographical variation was of similar magnitude for tobacco-related and tobacco-unrelated epithelial neoplasms, the major exceptions to this general pattern being cancer of the oesophagus (showing differences over a factor four in younger males) and cancers of the bladder and of the (cervix) uteri, being slightly more frequent in Southern areas. The variation, however, appeared clearly more limited for non-epithelial neoplasms (Table 4).

Some of the variations can be at least partly explained in terms of available knowledge of the causes of cancer (e.g. tobacco for lung and other respiratory sites, alcohol plus tobacco for oesophageal cancer, reproductive patterns for breast and ovarian neoplasms). It is however difficult to explain any such variation in terms of generalized specific consequences of industrialization, since cancer mortality was comparably elevated in highly industrialized and chiefly rural Northern areas.

The most curious pattern is probably that observed in the case of gastric cancer mortality, since lower rates were observed in the South, which is the poorest part of the country. It is however of interest to notice that death certification rates from cancer of the stomach are low in Greece as well [13], and the Greek diet is in several aspects similar to the Southern Italian one. Furthermore, there are a few well defined areas in Northern and Central Italy where gastric cancer mortality is in both sexes 2–3-fold higher than the national average [3]. Although several hypotheses have been made and are currently tested [including genetic factors, diet and nitroso compound levels (17–19)], there is still no satisfactory explanation for this quite peculiar geographical distribution in mortality from cancer of the stomach.

Acknowledgements—This work was conducted within the framework of the CNR (Italian National Research Council) Applied Projects "Oncology" (Contract no. 84.00639.44) and "Preventive and Rehabilitative Medicine" (Contracts no. 84.002233.56 and no. 84.02299.56). The contribution of the Italian Association for Cancer Research and of the Italian League Against Tumours, Milan, Italy, are gratefully acknowledged. We wish to thank Dr. Eva Negri for skilful help with data processing and Angela Simm for editorial assistance.

Table 4. Geographical variation for age-standardized death certification rates from selected groups of neoplasms—Italy 1969–73

Groups of cancers	Sex	Rates/100,000 people aged 35–64 for: North	Centre	South	Ratio North/Centre	North/South
Tobacco-related	♂	139.18	98.59	75.78	1.41	1.84
neoplasms*	♀	19.55	15.52	12.24	1.26	1.60
Non-epithelial	♂	26.30	23.74	20.63	1.11	1.27
neoplasms	♀	14.74	13.79	12.98	1.07	1.14
Other neoplasms	♂	95.21	86.30	53.01	1.10	1.80
	♀	125.79	110.63	92.79	1.14	1.36

*Lung, mouth or pharynx, larynx, oesophagus, pancreas, kidney and bladder.

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