Cancer risk and social inequalities in Italy

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Abstract

Study objective **– To investigate social differences in cancer incidence in Turin, Italy in 1985–87.**

Design **– A cancer incidence follow up study of the Turin population in relation to socioeconomic characteristics was performed through record linkage between the 1981 census and the cancer registry. A case-control study nested in the cohort was analysed, where cases were subjects with a new diagnosis of cancer in 1985–87 and controls were a sample of the Turin population, frequency matched by sex and age group. Incidence odd ratios (ORs) were calculated for social classes (defined by education, housing tenure, and socioeconomic group) using a logistic regression model.**

Setting **– The study population comprised subjects included in the 1981 Turin census ($n \cong 1\,100\,000$) who were still alive, 20–69 years old, and were resident in Turin in the middle of study period.**

Participants **– The analyses were based on 4215 male and 3451 female cases, and on 16 913 male and 13 838 female controls.**

Main results **– Compared with the highest educational level, the men in the lowest one showed an OR>2 for respiratory cancers; OR=1·48 for stomach cancer; and ORs<0·7 for skin, colorectal, and prostate cancers. Women with a primary school education were protected against colorectal (OR=0·71), skin (OR=0·59), and breast cancer (OR=0·66) compared with university degree women, but were at risk for cancer of the cervix (OR=2·33) and stomach cancer (OR=2·84). The association between educational level (primary school *v* university) and lung cancer risk is negative for men (OR=2·47) and positive for women (OR=0·62), while the association with housing tenure is negative for both sexes (OR=1·44).**

Conclusions **– The socioeconomic distribution of some risk factors (for example smoking, alcohol, and diet) in Italy can partially explain the differences in respiratory and digestive cancers. "Unbalanced" health promotion interventions, targeted at social groups with the highest prevalences of risk factors, and national policies for increasing the level of education in the country may play an important role in reducing social differences in cancer risk.**

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Studies on the social distribution of cancer occurrence are generally based on mortality. The cancer sites whose mortality presents a more regular negative correlation with socioeconomic status are stomach, larynx, and lung for men and cervix/uterus for women. Large bowel, breast, ovary, and testis cancers, on the contrary, show a positive gradient, but with less regularity.[1] These differentials, even though they vary in size, are evident and consistent at any latitude, both in rich countries such as Switzerland or New Zealand[2–7] and in poorer ones such as Argentina and Brazil.[8 9] In Italy, the mortality data from the Turin Longitudinal Study show odds ratios (ORs) for all cancers of 1·2 for males under 60 and 1·2 for males aged 60–74 between the highest and the lowest educational level.[10] International reports on social inequalities in cancer incidence are few.[11–14] More systematic analysis comes from the OPCS Longitudinal Study[15] and shows a similar distribution of positive and negative associations with social class and mortality.

Social class has also been studied as a prognostic factor in cancer survival. Lower socioeconomic groups usually have poorer survival than higher ones,[16 17] but English and Swedish data indicate that class differences in cancer mortality are primarily affected by differences in incidence rather than in survival. On the other hand, the available evidence is insufficient to identify more than a few of the risk factors such as smoking and alcohol, that link cancer risk to socioeconomic disadvantage, and in any case the relative estimates of the attributable fraction seem to be small.

This paper aimed to describe the social distribution of the incidence of the most relevant cancer sites in Turin, a large industrial town in the north-west of Italy.

Methods

The results of this work are based on record linkage between the cancer registry (Registro Tumori Piemonte, RTP) and the census data of the Turin population (Studio Longitudinale Torinese, SLT). The cancer incidence data are up to the quality standards defined by the International Agency for Research on Cancer, Lyon, and the census, carried out every 10 years by the National Institute of Statistics, is considered a reliable source for social variables. The SLT included all people living in the City of Turin on the census day (October 21, 1981), followed up to 1989 for mortality and migration. A total of 95% of the census records matched the corresponding population register record.[18] Errors in filling in the date of birth in the census questionnaires explain more than 80% of the failures in record linkage. People who migrated after the census date were considered lost to follow up at the date of migration, while those who were born or

immigrated in the years between the two censuses are present in the study only at the time of the next census. Therefore, between the censuses, SLT takes the shape of a closed cohort. The RTP provides the cancer incidence data for the Turin population from 1985.[19] The 1985–87 data were available for the study.

RTP and SLT records were matched according to a key including first name, surname, sex, and date of birth. For the ages included in the study (20–69), 95% of the male cases and 94·2% of the female ones were matched. Unsuccessful pairing was mainly due to subjects who had moved to Turin after the 1981 census and were therefore excluded from the SLT. Paired and unpaired cases were compared to determine any selection characteristics: no significant differences were found for either ICD or age.

A case-control design, nested into the cohort, was chosen to study the relationship between the risk of cancer and social class indicators. Four controls for each incident case were randomly selected from the SLT file, using a frequency matching strategy, by sex and five-year age class, without replacement. The controls were: not included in the cancer registry, alive, and residents in Torino halfway through the study period (June 30, 1986), as determined by the historical city population register. The study is therefore based on 4215 male cases and 16 913 controls, and 3451 female cases and 13 838 controls. Using the available census data, the study population was classified according to the following socioeconomic indicators: educational levels (university (corresponding to not less than 16 years of school education), high school (12–13 years), middle school (8 years), primary school, or less (0–5 years)); housing tenure; and socioeconomic status, obtained on the basis of the professional position and occupational status.[20] In this last classification, housewives were considered a separate category because of their specific social condition.

Seventy one per cent of cases could be classified in terms of socioeconomic status by information from the census record. Twenty nine per cent of cases were not classified according to the individual census record: 77% of them (22·6% of the total) were classified according to the census record of the head of family, matched to the individual record through a family identificator code. Information was not available ultimately for 6·7% of the cases. For controls, the above mentioned percentages were respectively: 72·1%, 21·7%, and 6·5%. Education and housing tenure indicators come from the individual record exclusively. The proportions of cases with missing or unhelpful data for these indicators were 0·0% for education and 2·4% for housing tenure; the corresponding percentages for controls were 0·2% and 3·2%. The distribution of cases and controls entered in the analysis in relation to the social indicators can be found in the first row (labelled 'all sites') of the tables of results.

ORs of incidence have been estimated through a non-conditional logistic model.[21] Confidence intervals have been calculated at 95%. The reference group (OR = 1) is always represented by the highest social group – university graduates, house owners, managers and professional people. For women, since this reference group is often too small, the two highest categories of the social scale have been pooled to form a reference group (university degree plus high school education; managers plus clerks). To test the trend significance for education, this last indicator was introduced in the model as a continuous variable, on the hypothesis of the equidistance of the different school levels. The results of this analysis have been presented as a p value which stands for the probability associated with the values of χ^2 related to the variable in the model. Adjustment for the residual confounding for age was obtained by including in the models the dummy variables related to the same age groups from which the sample had been obtained. The confounding due to birth areas was controlled for with a variable at six levels: province of Turin, the rest of the north-west, the north-east, the centre, the south and the isles of Italy, and foreign countries. It is well known that death rates and cancer incidence are lower in southern than in northern Italian regions[22,23] – in some cancer sites they may be even halved – and that there was massive immigration into Turin from the south of Italy in the 50s and 60s.

To avoid multicollinearity among indicators, the results presented refer to two different models in which the variables analysed are as follows: model 1 – education and housing tenure, standing respectively for the cultural level and for the income; model 2 – socioeconomic status, and representing a summary measure for prestige, income.[24] Analysis was performed for all cancers and for some sites chosen because of the number of observations. The distribution of cases by site is reported in first column of table 1 for men and of table 3 for women. Larynx and bladder cancers for women did not have sufficient number of cases for the analysis (n = 7 and n = 64 respectively). Skin cancer refers only to non-melanoma cancers (ICD 173); malignant melonoma was excluded because of the small numbers (M = 61; F = 66).

Results

In men the lower educational group shows a 15% significant, excess risk for all cancer sites in each class indicator (tables 1 and 2). For women the observed differentials are not consistent between the three indicators: the risk of cancer is lower for less educated women and for those in the lower socioeconomic group and is higher among housing tenants (tables 3 and 4). These differentials are the result of site-specific associations of different direction and size.

MEN: NEGATIVE ASSOCIATIONS WITH SOCIAL CLASS

Upper respiratory and digestive tract, larynx, stomach, and lung cancers present a consistent negative trend along the three social scales, with trends for education and risk for lower socioeconomic groups always significant, ex-

Table 1 Differences in men's risk of cancer in relation to education and housing tenure in Turin in the 1980s. Absolute numbers (cases/controls), odds ratios (OR), 95% confidence intervals (CI), p value for trend in education are given. (ORs are adjusted for age, birth area, and variables presented in table.)

		Education level					*Housing tenure*	
Cancer site (ICD 9)		*University*	*High school*	*Middle school*	*Primary school*	$p(\chi^2)$	*Owners*	*Tenants*
All sites	No	262/1169	599/2517	1026/4234	2328/8954		1810/7742	2305/8677
(140–208)	OR	1	1·03	1·04	1·15		1	1·14
n=4215*	(95% CI)		(0·87, 1·22)	(0·90, 1·22)	(1·00, 1·34)	0·001		(1·06, 1·22)
URDT	No	20/113	52/281	108/507	298/1015		173/929	289/936
(140–150,	OR	1	0·92	1·16	1·71		1	1·64
161)	(95% CI)		(0·51, 1·66)	(0·68, 1·98)	(1·02, 2·88)	0·000		(1·32, 2·04)
n=478*								
Stomach	No	11/61	28/152	48/232	152/512		91/446	138/491
(151)	OR	1	0·83	1·02	1·48		1	1·38
n=239*	(95% CI)		(0·38, 1·84)	(0·49, 2·10)	(0·74, 2·95)	0·032		(1·01, 1·87)
Colon-rectum	No	49/111	64/239	114/440	200/914		207/773	208/886
(153–154)	OR	1	0·54	0·59	0·48		1	0·92
n=427*	(95% CI)		(0·34, 0·86)	(0·39, 0·88)	(0·33, 0·71)	0·001		(0·73, 1·15)
Larynx	No	8/62	28/127	60/251	129/462		89/438	130/439
(161)	OR	1	1·45	1·83	2·23		1	1·48
n=225*	(95% CI)		(0·60, 3·47)	(0·83, 4·08)	(1·02, 4·87)	0·015		(1·08, 2·02)
Lung	No	31/278	100/508	223/910	575/2024		344/1732	573/1900
(162)	OR	1	1·66	2·03	2·47		1	1·44
n=929*	(95% CI)		(1·07, 2·57)	(1·36, 3·04)	(1·67, 3·65)	0·047		(1·24, 1·68)
Skin	No	50/158	97/315	135/539	239/1072		265/918	249/1102
(173)	OR	1	1·05	0·81	0·72		1	0·82
n=521*	(95% CI)		(0·70, 1·57)	(0·56, 1·18)	(0·50, 1·03)	0·013		(0·68, 1·01)
Prostate	No	20/49	29/88	30/162	95/395		96/330	76/342
(185)	OR	1	0·81	0·45	0·66		1	0·80
n=174*	(95% CI)		(0·40, 1·65)	(0·23, 0·87)	(0·36, 1·19)	0·195		(0·56, 1·14)
Bladder	No	23/108	58/262	100/404	252/961		189/898	231/862
(188)	OR	1	1·03	1·10	1·16		1	1·17
n=433*	(95% CI)		(0·60, 1·79)	(0·66, 1·82)	(0·72, 1·88)	0·363		(0·93, 1·46)
Lymphomas,	No	15/52	40/161	66/262	101/413		88/367	125/496
leukemias	OR	1	0·81	0·85	0·81		1	1·08
(200–208)	(95% CI)		(0·40, 1·65)	(0·44, 1·64)	(0·43, 1·55)	0·705		(0·78, 1·49)
n=222*								

*Site specific number of cases. URDT = cancers of the upper respiratory and digestive tract.

Table 2 Differences in men's risk of cancer in relation to socioeconomic groups in Turin in the 1980s. Absolute numbers (cases/controls), odds ratios (OR), and 95% confidence intervals (CI) are given. (ORs are adjusted for age and birth area.)

		Socioeconomic group				
Cancer site (ICD 9)		*Managers/ professionals*	*Clerks*	*Self employed*	*Manual workers*	*Unemployed*
All sites	No	478/2021	793/3462	496/2022	2031/7857	67/232
(140–208)	OR	1	0·97	1·05	1·14	1·26
	(95% CI)		(0·86, 1·10)	(0·91, 1·21)	(1·01, 1·28)	(0·94, 1·68)
URDT	No	30/209	77/404	56/270	261/870	13/23
(140–150, 161)	OR	1	1·37	1·53	2·51	4·61
	(95% CI)		(0·87, 2·16)	(0·94, 2·48)	(1·65, 3·81)	(2·08, 10·18)
Stomach	No	24/117	40/197	24/100	123/460	3/14
(151)	OR	1	0·99	1·19	1·30	1·00
	(95% CI)		(0·57, 1·72)	(0·63, 2·23)	(0·79, 2·14)	(0·27, 3·77)
Colon-rectum	No	70/196	86/357	49/194	173/823	8/11
(153–154)	OR	1	0·69	0·72	0·63	2·11
	(95% CI)		(0·48, 0·99)	(0·47, 1·99)	(0·45, 0·87)	(0·81, 5·50)
Larynx	No	17/105	43/182	30/132	119/414	4/10
(161)	OR	1	1·59	1·57	2·14	2·95
	(95% CI)		(0·86, 2·93)	(0·82, 3·01)	(1·21, 3·79)	(0·81, 10·71)
Lung	No	71/451	154/755	124/437	487/1759	11/56
(162)	OR	1	1·30	1·80	1·81	1·32
	(95% CI)		(0·96, 1·76)	(1·31, 2·49)	(1·37, 2·38)	(0·65, 2·66)
Skin	No	93/251	122/435	49/239	212/956	5/24
(173)	OR	1	0·75	0·55	0·59	0·55
	(95% CI)		(0·55, 1·03)	(0·37, 0·81)	(0·44, 0·78)	(0·20, 1·50)
Prostate	No	21/70	32/149	26/78	76/295	1/5
(185)	OR	1	0·73	1·17	0·94	0·75
	(95% CI)		(0·39, 1·36)	(0·60, 2·28)	(0·53, 1·66)	(0·08, 6·92)
Bladder	No	54/196	75/349	57/211	214/810	4/15
(188)	OR	1	0·79	0·99	0·98	0·98
	(95% CI)		(0·53, 1·17)	(0·65, 1·51)	(0·69, 1·39)	(0·31, 3·08)
Lymphomas,	No	29/98	51/186	26/104	100/419	6/27
leukemias	OR	1	0·94	0·85	0·85	0·77
(200–208)	(95% CI)		(0·56, 1·58)	(0·47, 1·56)	(0·52, 1·39)	(0·28, 2·12)

cept for the stomach cancer along the socioeconomic scale. Bladder cancer shows a slight negative non-significant association with education and housing tenure.

MEN: POSITIVE ASSOCIATIONS WITH SOCIAL CLASS

Less educated people are significantly protected against colorectal and skin cancer. Managers and professional people seem to be the only socioeconomic group at high risk for these sites. Prostate cancer shows a slight, non-significant positive association with education and housing tenure.

MEN: SITES PRESENTING NO ASSOCIATION WITH SOCIAL CLASS

Lymphoma and leukaemia do not seem to have

Table 3 Social differences in the women's risk of cancer in relation to education and housing tenure in Turin in the 1980s. Absolute numbers (cases/controls), odds ratios (OR), 95% confidence intervals (CI), and p value for trend are given. (ORs are adjusted for age, birth area, and variables presented in table.)

		Education level					Housing tenure	
Cancer site (ICD 9)		University	High school	Middle school	Primary school	$p(\chi^2)$	Owners	Tenants
All sites	No	129/410	436/1681	942/3321	1944/8410		1520/6141	1844/7260
(140–208)	OR	1	0·87	0·90	0·76		1	1·06
n=3451*	(95% CI)		(0·69, 1·10)	(0·73, 1·12)	(0.62, 0·94)	0·002		(0·98, 1·15)
URDT	No		7/31	21/59	39/178		20/120	46/143
(140–150, 161)	OR		1	1·19	0·82		1	1·99
n=67*	(95% CI)			(0·43, 3·31)	(0·30, 2·24)	0·438		(1·11, 3·59)
Stomach	No		9/67	22/97	79/279		43/194	64/233
(1451)	OR		1	2·47	2·84		1	1·09
n=110*	(95% CI)			(0·93, 6·51)	(1·15, 7·01)	0·086		(0·70, 1·71)
Colon-rectum	No	15/47	40/148	84/331	214/888		162/659	181/707
(153–154)	OR	1	0·78	0·75	0·71		1	1·01
n=353*	(95% CI)		(0·38, 1·58)	(0·40, 1·42)	(0·38, 1·32)	0.314		(0·79, 1·28)
Lung	No		26/81	44/162	91/402		57/279	99/342
(162)	OR		1	0·74	0·62		1	1·44
n=161*	(95% CI)			(0·41, 1·35)	(0·35, 1·11)	0·099		(0·99, 2·10)
Skin	No	19/47	45/181	97/328	193/858		184/652	164/714
(173)	OR	1	0·62	0·79	0·59		1	1·10
n=354*	(95% CI)		(0·32, 1·17)	(0·44, 1·42)	(0·33, 1·04)	0·086		(0·70, 1·72)
Breast	No	44/126	161/551	316/1085	589/2684		503/1917	580/2400
(174)	OR	1	0·86	0·84	0·66		1	0·98
n=1110*	(95% CI)		(0·58, 1·29)	(0·56, 1·21)	(0·46, 0·96)	0·001		(0·86, 1·13)
Cervix uteri	No		10/94	32/131	92/313		34/243	97/286
(180)	OR		1	1·77	2·33		1	2·27
n=134*	(95% CI)		(0·81, 3·86)	(1·09, 4·97)	0·012		(1·46, 3·52)	
Corpus uteri	No		28/98	50/172	118/515		100/373	93/390
(182)	OR		1	0·93	0·81		1	0·98
n=196*	(95% CI)			(0·54, 1·60)	(0·49, 1·34)	0·862		(0·70, 1·35)
Lymphomas,	No		31/109	53/188	90/400		71/289	100/393
leukemias	OR		1	0·92	0·72		1	1·03
(200–208)	(95% CI)			(0·54, 1·56)	(0·42, 1·23)	0·283		(0·73, 1·46)
n=174*								

*Site specific number of cases.

Table 4 Differences in women's risk of cancer in relation to socioeconomic group. Absolute numbers (cases/controls), odds ratios (OR), 95% confidence intervals (CI) are given. (ORs are adjusted for age and birth area)

		Socioeconomic group					
Cancer site (ICD 9)		Managers/ professionals	Clerks	Self employed	Manual workers	Housewives	Unemployed
All sites	No	112/375	489/1766	216/928	451/1891	1971/8042	48/184
(140–208)	OR	1	0·93	0·80	0·86	0·86	0·92
	(95% CI)		(0·74, 1·18)	(0·62, 1·03)	(0·68, 1·09)	(0·69, 1·07)	(0·62, 1·35)
Stomach	No		13/69	4/43	22/48	64/255	1/10
(151)	OR		1	0·45	2·21	1·22	0·54
	(95% CI)			(0·14, 1·49)	(0·98, 4·94)	(0·61, 2·44)	(0·06, 4·66)
Colon-rectum	No	12/36	43/152	20/91	35/161	220/891	4/4
(153–154)	OR	1	0·84	0·67	0·68	1·33	3·13
	(95% CI)		(0·40, 1·75)	(0·30, 1·51)	(0·32, 1·45)	(0·67, 2·61)	(0·67, 14·61)
Lung	No		34/85	18/54	16/80	80/382	2/10
(162)	OR		1	0·86	0·45	0·49	0·41
	(95% CI)			(0·44, 1·71)	(0·22, 0·91)	(0·30, 0·82)	(0·08, 2·09)
Skin	No	15/35	47/172	25/94	35/193	211/825	3/16
(173)	OR	1	0·63	0·64	0·45	0·63	0·42
	(95% CI)		(0·32, 1·26)	(0·30, 1·35)	(0·22, 0·92)	(0·34, 1·20)	(0·11, 1·69)
Breast	No	38/114	187/628	68/313	159/665	616/2515	8/53
(174)	OR	1	0·89	0·67	0·77	0·77	0·48
	(95% CI)		(0·59, 1·33)	(0·42, 1·05)	(0·51, 1·16)	(0·52, 1·12)	(0·21, 1·09)
Cervix uteri	No		16/95	11/37	24/77	78/292	3/11
(180)	OR		1	1·88	2·15	1·81	1·69
	(95% CI)			(0·79, 4·48)	(1·03, 4·47)	(0·97, 3·41)	(0·42, 6·80)
Corpus uteri	No		27/101	8/42	34/105	116/488	2/8
(182)	OR		1	0·73	1·35	0·93	1·03
	(95% CI)			(0·31, 1·75)	(0·75, 2·44)	(0·57, 1·51)	(0·20, 5·24)
Lymphomas,	No		32/110	7/46	19/101	101/386	7/22
leukemias	OR		1	0·52	0·65	0·90	1·11
(200–208)	(95% CI)			(0·21, 1·28)	(0·34, 1·25)	(0·54, 1·48)	(0·43, 2·90)

any association with social class, even though lower classes seem to have a slight and constant protection. The separated analysis of lymphoma and leukaemia (results not presented) shows similar risk patterns: OR=0·90 (95% CI 0·40, 2·04) and OR=0·60 (95% CI 0·20, 1·83) for primary education, respectively.

WOMEN: NEGATIVE ASSOCIATIONS WITH SOCIAL CLASS

Among women, the only two sites that show consistent negative associations with social class are stomach and cervix. Stomach cancer presents a higher risk for women with primary education than those with a university degree. Cervical cancer shows a significant trend for education and a strong significant excess among tenants. Risks for both stomach and cervix cancer are at least double for manual workers compared with managers. Housewives show an almost significant risk for cancer of the cervix. Upper respiratory and digestive tract cancers show a strongly significant excess among tenants. Because of the small number of cases in the reference category, the model with socioeconomic groups could not be calculated.

WOMEN: POSITIVE ASSOCIATIONS WITH SOCIAL CLASS

Breast, skin, lung, and large bowel cancers are more frequent in higher social levels. Breast cancer shows a positive and significant trend with education while skin cancer shows a clear but not significant trend for this indicator, and a significant protection for female manual employees. The risks of lung cancer in both manual working women and housewives are halved compared with managers, but the same risk, adjusted for education among tenants, is 44% higher than for house owners, and is almost significant. Colorectal cancer shows a slight, but not significant, positive association within education and socioeconomic groups.

WOMEN: SITES PRESENTING NO ASSOCIATION WITH SOCIAL CLASS

Cancer of the uterus, lymphomas, and leukaemias do not show any coherent association with the social scales used in this analysis. Lymphomas, when analysed separately (data not presented), show an OR of 0·57 (95% CI 0·32, 1·04) for less educated women; self employed women and manual workers present ORs of 0·56 (95% CI 0·11, 1·09) and of 0·66 (95% CI 0·32, 1·35) respectively.

Discussion

There is strong evidence of socioeconomic differences in the risk of specific cancers in Turin in the 1980s. The agreement with published studies[1] showing that lung, stomach, larynx, and uterus cancers are negatively associated with social class, and large bowel and breast cancers are positively associated, strengthens the validity of the social indicators used in our study. The positive association for skin cancer is a new finding that does not seem to have been reported before. Because skin cancers other than malignant melanoma are clinically benign[1], this finding could be missed in mortality studies. Our results reflect both a greater tendency of the higher socioeconomic classes to access diagnostic services and an effect of social differences in sun exposure while on vacation, since there is little occupational exposure to the sun in Turin.

Environmental risk factors that make a substantial contribution to cancer are associated with the greatest social differentials in cancer risk.[1] The main factor responsible for upper respiratory and digestive tract cancers is alcohol and its prevalence distribution in Italy in 1983 was negatively associated with education.[25] The prevalence odds ratios (PORs) of heavy alcohol consumers in Italy in 1983 (POR = 1·9 for less educated *v* more highly educated men and no differences in women) seems to agree with our ORs (OR = 1·71 for less educated men; no differences in women) for upper respiratory and digestive tract cancers in both sexes. Among men, lung and larynx cancers present a social profile that is consistent with Italian social differentials in smoking prevalence,[26] but the POR of less educated people *v* more educated ones was lower (1·35 in 1986). Occupational exposures in an industrialised town like Turin may play an additional, important role in producing differentials in lung cancer. The interaction of alcohol and smoking may explain the deep differences in larynx cancer. The inverse trend of ORs for lung cancer in women reflects the social distribution of smoking in Italy, which ranges from 14·2% for the lowest to 23·3% for highest educational level.[26] Rates of quitting smoking in both sexes are higher in higher social groups (ranging from 24·6 for the less educated to 29·3 for the more educated group): the widening of social negative differentials in lung cancer for males and an inversion of the social positive differential for women may therefore be predicted. The positive social differential in the risk of large bowel cancer could be attributable to the corresponding social profile in dietary habits, especially low fibre and high animal fat consumption.[1] In fact, in Italy, disadvantaged social groups showed, in a 1984 survey, healthier dietary habits in relation to these nutrients.[27]

The above considerations suggest that an important component of the social differences in cancer risk, can be considered solvable through unbalanced health promotion intervention – that is those targeted at the social categories which are more at risk. A similar conclusion can be drawn for invasive cervical cancer, for which an effective screening test (Pap test) is available: the prevalence of the use of this early diagnosis test in Italy in 1986 was negatively associated with social class.[28] Such a social distribution is similar to the use of mammographic screening for breast cancer, but in this case it goes in the right direction to protect the social group at highest risk for this cancer.

As has been discussed in studies on inequalites in health,[29] the issue is more complex. Educational level is not only a social indicator, in many cases it is a real protection factor. Education allows people to recognise the factors affecting health and the best solutions to health problems. Moreover, education, as well as the other class indicators, is considered a strong predictor of social instability,[12] and it can affect hazardous habits by putting the satisfaction of passing needs below long term expectations. Increasing the level of education in a country, by promoting the school attendance of young people (at national level in 1981, 61·8% of the population over 6 years had not accomplished the compulsory education stated by a 1963 law)[30] or prolonging compulsory education (in Italy it is up to 14 years), may be a suitable way of intervening to reduce differences and to increase the global health status of the population.

Differences in the risk of lung cancer in women associated with housing tenure and education follow the opposite direction. It seems a good example of the different meanings of two social indicators. Our interpretation is that income, represented by housing tenure, is a determinant of protective smoking habits. On the other hand, education is an independent predictor of the tendency towards emancipation, which has meant that during the last

20 years women have followed the smoking habits of men. The socioeconomic group is an indicator that is more sensitive to education than to income. The lower number of women in the manager category (ca/co = 7/13) makes the income differences between reference category (managers plus clerks) and manual employed workers very small.

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