

Proportional cancer incidence according to selected sites - comparison between residents in the City of S. Paulo, Brazil: Japanese and Brazilian/Portuguese descent*

Incidência proporcional por câncer - comparação entre residentes no Município de São Paulo de diferentes origens: japonesa e brasileira

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SOUZA, J.M.P. de et al. Proportional cancer incidence according to selected sites - comparison between residents in the City of S. Paulo, Brazil: Japanese and Brazilian/Portuguese descent. *Rev. Saúde públ.*, S. Paulo, 25: 188-92, 1991. The percentual distributions of selected sites of cancer cases according to origin, sex and age are compared. Data were obtained from the Registry of Cancer of S. Paulo (School of Public Health of the University of S. Paulo, Brazil). The reference period for inhabitants of Japanese descent was 1969/78 and for those of Brazilian descent, the period was 1969/75. Standardized Proportionate Incidence Ratios (SPIR) with approximate 95% Confidence Intervals (CI) were evaluated using age specific Incidence Ratios of S. Paulo, 1973, as standards. The results agree with findings of previous works on mortality, but show different patterns according to origin. The well known fact that some sub-groups of a population may be different from the overall group is once again brought to the fore. Attention should be drawn to the differences detected for stomach, skin and prostate, in males, and for stomach, skin, cervix and uterus in females.

Keywords: Neoplasms, epidemiology. Incidence studies. Ethnic groups. Japan, ethnology.

Studies of migrants have provided many clues to cancer etiology. Japanese immigrants in the United States of America have yielded important information on the theory of environmental carcinogenesis in humans³. In Brazil, the number of Japanese migrants is the largest in the world, being currently estimated at 1,200,000, including descendants⁷. Their life style is situated somewhere between those of native residents of Japan and Brazil².

The cancer mortality pattern found in Brazil is different from that found in Japan and previous works^{5,6} on general and cancer mortality among first generation Japanese residents (Issei) in the city of S. Paulo had brought to light some differences from those of Japan and

S. Paulo. The 1980 age-standardized mortality rates for cancer of the stomach were 14.8, 12.7 and 7.6 per 10,000 men in Japan, S. Paulo and for the S. Paulo Issei, respectively. Breast cancer mortality rates (age-standardized) were 1.4, 4.5 and 1.0 per 10,000 women, respectively, in Japan, S. Paulo and for the female S. Paulo Issei. Cancer of prostate age standardized mortality rates were 0.9 per 10,000 men in Japan, 4.2 per 10,000 men in S. Paulo and 2.0 per 10,000 S. Paulo Issei.

The aim of this study is to compare the percentual distribution of selected sites of cancer in patients of Japanese origin with that of inhabitants of Brazilian/Portuguese origin.

Material and Method

The source of data were the files of the Cancer Registry of the Department of Epidemiology-School of Public Health of the University of S. Paulo. Patients were considered of Japanese origin when the respective registration card declared Japan as the place of birth and/or yellow as the skin color; surnames were also used as indicators of origin and to eliminate subjects of Korean and Chinese origin. Initially this group

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was composed of an admixture of Issei and Nissei and subjects not known whether Issei or Nissei but of general Japanese origin. This group will be called "Japanese". The period covered was 1969/1978, and it is assumed that the coverage is total for the residents of the city of S. Paulo.

The inhabitants of Brazilian/Portuguese origin comprised patients having the surnames Santos, Silva or Souza, the most common family names in S. Paulo. Cases in this category were filed in specific drawers and a systematic sampling (interval 3) was performed. For these residents of the city of S. Paulo the period covered was 1969-1975. This group was composed of a mixture of inhabitants of Brazilian, Portuguese and unknown, either Brazilian or Portuguese origin, and will be called "Brazilian/Portuguese".

For the analysis according to selected cancer sites only two supposedly more clearly opposed groups were studied: the "Japanese born" and the "Brazilian born" patients.

The cancer sites of the cases were classified according to the International Classification of Diseases, 8th Revision, 1965 (ICD)⁸. Standardized Proportionate Incidence Ratios (SPIR), with approximate 95% confidence intervals - obtained alike as for the SMR¹ - were evaluated for selected sites, using the age specific incidence ratios of S. Paulo, 1973, as reference⁴, for ages 40 to 79, in 10-years groupings for each sex. The appendix provides the formula for the point and confidence interval estimation and a program for use in an HP 11C pocket calculator to obtain the respective limits.

Results

The total number of new diagnosed cancer patients were 3,078 and 3,958 for those of Japanese and those of Brazilian/Portuguese origin, respectively. The proportions of cancer incidence according to the seven most frequent categories of ICD, for males and females, stratified by age groups are shown in Tables 1 and 2. It is noteworthy that cancer of the digestive organs (ICD 150-159) was the most frequent type among Japanese patients, accounting for 54.8% of males and 34.6% of females, practically twice the figure for Brazilian/Portuguese. The excess is seen across all ages. Although the proportion of ICD 150-159 cancers in Brazilian/Portuguese males is much lower than in Japanese, it is still the greatest in the former group, being of 31.9%; the other sites are evenly distributed. In females, the picture is quite different, since cancer of the digestive organs does not have the highest percentage among Brazilians/Portuguese; it accounts for 14.9%, while genito-urinary organs and connective tissue account respectively for 32.5% and 29.2% of the cases, for all ages.

The SPIR calculation with 95% approximate Confidence Intervals (CI) are shown for males and females by sites and study groups in Tables 3 and 4. In males, cancer of the stomach was higher in both groups as compared to the rate for the general population of S. Paulo (CI 1.34 - 1.71 and CI 2.20 - 2.66, respectively, for Brazilians and Japanese). The opposite behavior was detected for skin cancer, being higher in the population of the city of S. Paulo as a whole (CI

Table 1. Proportion of incidence of cancer in males according to age, origin and site in the city of São Paulo, Brazil^a(%)

Site ^c	Age																			
	0—19		20—29		30—39		40—49		50—59		60—69		70—79		80 +		Unknown		All ages	
Origin ^b	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P
140-149	—	.9	—	3.2	8.0	12.4	8.0	13.5	3.3	13.1	4.1	10.6	4.1	11.1	1.7	8.1	4.2	6.0	4.1	10.5
150-159	4.2	.9	40.0	15.1	48.7	24.8	55.2	37.2	59.4	39.9	57.7	38.1	52.8	31.9	57.8	32.4	43.8	17.9	54.8	31.9
160-163	—	2.6	2.9	3.2	2.7	8.1	10.4	9.1	13.8	14.2	15.9	13.7	17.3	10.2	15.5	13.5	14.6	7.5	14.2	10.7
170-174	12.5	11.1	11.4	20.4	10.8	19.9	4.8	11.2	4.4	12.6	3.7	12.8	4.9	12.4	5.2	8.1	16.7	23.9	5.3	13.6
180-189	8.3	3.4	5.7	6.5	2.7	5.6	.8	8.8	3.6	7.7	6.3	13.7	11.3	24.3	9.5	25.7	12.5	13.4	6.7	11.8
190-199	37.5	31.6	14.3	22.6	12.2	19.3	12.0	12.5	10.2	8.7	9.6	8.8	8.5	6.6	7.8	6.8	4.2	20.9	10.0	12.5
200-209	37.5	49.6	25.7	29.0	14.9	9.9	8.8	7.8	5.3	3.8	2.7	2.3	1.0	3.5	2.6	5.4	4.2	10.2	4.9	9.1
All causes	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number	24	117	35	93	74	161	125	296	362	366	512	444	388	226	116	74	48	67	1.684	1.844

a) Japanese: period 1969 - 1978; Brazilian/Portuguese: period 1969 - 1975

b) Origin: Jpn. = Japanese; Br/P = Brazilian, Portuguese

c) ICD codes: 140-149 - Malignant neoplasm of buccal cavity and pharynx
 150-159 - Malignant neoplasm of digestive organs and peritoneum
 160-163 - Malignant neoplasm of respiratory system
 170-174 - Malignant neoplasm of bone, connective system
 180-189 - Malignant neoplasm of genitourinary organs
 190-199 - Malignant neoplasm of other and unspecified sites
 200-209 - Neoplasm of lymphatic and hematopoietic tissue

Tabela 2. Proportion of incidence of cancer in females according to age, origin and site in the city of São Paulo, Brazil^a(%)

Site ^c	Age																			
	0—19		20—29		30—39		40—49		50—59		60—69		70—79		80 +		Unknown		All ages	
Origin ^b	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P	Jpn.	Br/P
140-149	4.6	2.8	—	3.8	—	1.2	—	2.3	1.3	1.0	1.4	3.3	1.4	3.0	—	6.5	—	2.2	.9	2.3
150-159	—	.9	10.3	.9	19.6	10.6	19.6	11.4	32.0	15.6	42.0	22.5	56.3	25.9	60.2	37.1	10.0	8.6	34.6	14.9
160-163	—	1.9	2.6	1.9	4.4	2.0	3.8	1.9	5.6	5.2	6.8	5.2	5.6	3.0	6.8	6.5	—	2.2	5.1	3.5
170-174	13.6	12.2	28.2	23.6	38.4	35.0	35.4	29.3	22.2	31.3	16.7	28.2	9.3	27.1	10.7	19.4	36.0	41.9	22.7	29.2
180-189	—	14.0	20.5	35.9	25.4	35.4	30.0	41.8	29.1	35.0	20.6	28.8	18.1	23.5	14.6	14.5	46.0	23.7	24.3	32.5
190-199	22.7	32.7	18.0	17.9	10.1	10.6	8.8	10.4	5.9	9.0	9.3	8.5	6.1	15.1	6.8	16.1	6.0	20.4	8.2	12.3
200-209	59.1	35.5	20.5	16.0	2.2	5.1	2.5	2.9	3.9	2.9	3.2	3.6	3.3	2.4	1.0	—	2.0	1.1	4.3	5.4
All causes	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number	22	107	39	106	138	254	240	481	306	480	281	365	215	166	103	62	50	93	1.394	2.114

a) Japanese: period 1969 - 1978; Brazilian/Portuguese: period 1969 - 1975

b) Origin: Jpn. = Japanese; Br/P = Brazilian, Portuguese

c) ICD codes: 140-149 - Malignant neoplasm of buccal cavity and pharynx
 150-159 - Malignant neoplasm of digestive organs and peritoneum
 160-163 - Malignant neoplasm of respiratory system
 170-174 - Malignant neoplasm of bone, connective system
 180-189 - Malignant neoplasm of genitourinary organs
 190-199 - Malignant neoplasm of other and unspecified sites
 200-209 - Neoplasm of lymphatic and hematopoietic tissue

Table 3. Standardized Proportionate Incidence Ratios (SPIR) and 95% approximate confidence intervals (CI) for registered MALE cases with Brazilian/Portuguese surnames born in Brazil and Japanese surnames born in Japan, aged 40 to 79, residents in S. Paulo, based on age specific proportional incidence ratios of the city of S. Paulo, 1973, according to selected sites of the tumour

ICD - Site	Brazilian/Portuguese Brazil born		Japanese Japan born	
	SPIR	CI	SPIR	CI
151- Stomach	1.51(260)*	1.34-1.71	2.42(438)	2.20-2.66
153- Colon	0.75(30)	0.51-1.07	1.15(50)	0.85-1.52
154- Rectum	0.95(25)	0.62-1.41	1.36(39)	0.97-1.86
155- Liver	1.22(6)	0.45-2.67	4.37(20)	2.67-6.74
157- Pancreas	1.21(24)	0.78-1.80	1.50(33)	1.03-2.10
162- Lung	0.71(90)	0.57-0.87	1.13(144)	0.95-1.33
172-3 Skin	0.55(110)	0.45-0.67	0.19(35)	0.13-0.26
186- Prostate	1.22(74)	0.95-1.53	0.51(43)	0.37-0.69
200-3 Lymphoma	0.97(34)	0.67-1.36	0.87(25)	0.57-1.29
204-8 Leukemia	1.34(17)	0.78-2.15	0.75(9)	0.34-1.42

* In parenthesis the number of observed cases

0.45 - 0.67 and 0.13 - 0.26, respectively, for Brazilians and Japanese); cancer of the prostate was lower for the Japanese (CI 0.37 - 0.69). Lung cancer was lower for Brazilians (CI 0.57 - 0.87).

In females, the SPIR 95% confidence intervals show that breast cancer and skin cancer were lower for the Brazilians (CI 0.66 - 0.86 and 0.56 - 0.81, respectively), and for the Japanese (CI 0.56 - 0.83 and 0.14 - 0.31, respectively). Stomach, colon and lung cancers were higher for the Japanese (CI 2.89 - 3.86, 1.18 - 2.17 and 1.43 - 2.78, respectively).

Table 4. Standardized Proportionate Incidence Ratios (SPIR) and 95% approximate confidence intervals (CI) for registered FEMALE cases with Brazilian/Portuguese surnames born in Brazil and Japanese surnames born in Japan, aged 40 to 79, residents in S. Paulo, based on age specific proportional incidence ratios of the city of S. Paulo, 1973, according to selected sites of the tumour

ICD - Site	Brazilian/Portuguese Brazil born		Japanese Japan born	
	SPIR	CI	SPIR	CI
151- Stomach	1.19(97)*	0.97-1.46	3.35*(190)	2.89-3.86
153- Colon	1.08(44)	0.79-1.45	1.62(45)	1.18-2.17
154- Rectum	0.75(23)	0.47-1.12	0.93(17)	0.54-1.50
155- Liver	2.24(4)	0.60-5.75	3.82(3)	0.77-11.24
157- Pancreas	0.94(16)	0.54-1.53	1.63(20)	1.00-2.52
162- Lung	1.20(35)	0.83-1.67	2.03(38)	1.43-2.78
172-3 Skin	0.68(120)	0.56-0.81	0.21(25)	0.14-0.31
174- Breast	0.76(230)	0.66-0.86	0.69(102)	0.56-0.83
180- Cervix	1.58(325)	1.41-1.76	1.01(94)	0.81-1.23
181-2 Uterus	1.48(393)	1.34-1.63	0.94(123)	0.78-1.13
183 Ovary	0.92(41)	0.66-1.25	1.44(29)	0.96-2.07
200-3 Lymphoma	0.71(21)	0.44-1.09	0.99(16)	0.57-1.61
204-8 Leukemia	1.50(18)	0.89-2.37	0.97(7)	0.39-2.00

* In parenthesis the number of observed cases

Comments

These results agree with findings of previous works that analysed cancer mortality⁵ and mortality differentials among Japanese residents in the city of S. Paulo, in Japan and the population of the city, as a whole⁶. These changes in the pattern of mortality among Japanese immigrants are considered to be the results of modifications in environmental factors, including dietary habits².

Incidentally, the study brings to the fore again the well known fact that some sub-groups of a population may be different from the overall group. It seems that the Santos, Silva and Souza patients depart from the general population in some aspects, as can be seen through the results for stomach, lung, skin, breast, cervix and uterus.

Since ecological type studies are not well fitted to detecting some fine differences, comparisons between the two ethnic groups must allow for the different age structures of the groups, which may be a confounding factor not completely controlled by the use of the SPIR. However, attention should be drawn to the differences detected for stomach, skin and prostate, in males, and for stomach, skin, cervix and uterus in females.

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SOUZA, J.M.P. de et al. Incidência proporcional por câncer. Comparação entre residentes no Município de São Paulo, SP (Brasil) de diferentes origens: japonesa e brasileira. *Rev. Saúde públ.*, S. Paulo, 25: 188-92, 1991. São comparadas as distribuições percentuais dos casos de câncer de algumas localizações anatómicas segundo país de nascimento, sexo e idade. Os dados foram coletados no Registro de Câncer de São Paulo da Faculdade de Saúde Pública da USP, referentes aos períodos 1969-1978, para os japoneses, e 1969-1975, para os brasileiros. Razões padronizadas de incidência proporcional e respectivos intervalos com 95% de confiança foram calculados, usando como padrão a incidência proporcional específica por idade de São Paulo, em 1973. Os resultados, consistentes com trabalhos anteriores relativos à mortalidade, mostraram haver possíveis padrões distintos de incidência de câncer em japoneses e brasileiros.

Chamou atenção para o fato de que alguns sub-grupos de uma população apresentam comportamentos diferentes e, no presente caso, principalmente quanto à incidência de cânceres de estômago, próstata, pele, em homens, e estômago, pele, colo uterino e útero, em mulheres.

Descritores: Neoplasias, epidemiologia. Estudos de incidência. Grupos étnicos. Japão, etnologia.

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Appendix

Interpretation and calculation of the Standardized Proportionate Incidence Ratio (SPIR)

The SPIR for a selected site *j* informs how many times the observed total number of cases for this site is greater in the study population than would be expected if, for each age in the age range of interest, the ratio “number of cases for site *j* / total of cases” were the same as the relation “incidence rate for site *j* / incidence rate for all sites”, the incidence rates being chosen from a reference population, also called the standard population.

Since the SPIR is not based in an underlying Poisson distribution, as the Standardized Mortality Ratio (SMR) is, the confidence intervals presented should be viewed as approximation ones.

Age	Population	Site	All sites
		1 2 ... j ... J	
1	Reference	r_{1j}	R_1
<i>i</i>		n_{ij}	N_i
...	Study	e_{ij}	
I		O_j	
All ages		E_j	

Given a table like the one above, where:
 r_{ij} = age *i* / site *j* specific rate of the reference population
 R_i = age *i* crude rate of the reference population
 n_{ij} = observed number of cases in age *i*/site *j* in the study population
 N_i = observed total number of cases in age *i* in the study population = $\sum_{j=1}^J n_{ij}$
 O_j = observed total number of cases for site *j* in the study population = $\sum_{i=1}^I n_{ij}$
 then:
 e_{ij} = expected number of cases in age *i*/site *j* in the study population = $N_i \times (r_{ij} / R_i)$
 E_j = total expected number of cases for site *j* in the study population = $\sum_{i=1}^I e_{ij}$
 And:
 SPIR_{*j*} = standardized proportionate incidence ratio for site *j* = O_j / E_j

Confidence Intervals for the SMR, according to Byar (in Breslow & Day¹, page 69)

$$SMR_L = \frac{O \left(1 - \frac{1}{9 \times O} - \frac{z_{\alpha/2}}{3 \sqrt{O}} \right)^3}{E}$$

$$SMR_U = \frac{(O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z_{\alpha/2}}{3 \sqrt{O + 1}} \right)^3}{E}$$

Where:

- SMR_L = lower limit
- SMR_U = upper limit
- O = observed value = O_j
- E = expected value = E_j
- $z_{\alpha/2}$ = tabled value in the Normal distribution (1.96 for a 95% confidence interval)

Program for HP IIC pocket calculator

```
f LBL A [O] STO 1 R/S [E] STO 2
RCL 1 ENTER 9 X 1 CHS ENTER RCL 1
X
√x 3 x 1.96 ÷ 1 - 1 + 3 y^x RCL 1 X RCL 2
X
÷ PSE PSE PSE R/S [SMRL] RCL 1 ENTER
1 + 9 X 1 CHS ENTER RCL 1
X
ENTER 1 + √x 3 X 1.96 ÷ 1 + 1 + 3 y^x ENTER
RCL 1 ENTER 1 + X RCL 2 ÷ PSE PSE PSE
[SMRU] RTN
where:
[O] = enter observed value, keying R/S
[E] = enter expected value, keying R/S
[SMRL] = calculator flashes SMRL, continue keying R/S
[SMRU] = calculator flashes SMRU.
```