Trends in the Risk of Death from Cardiovascular, Cerebrovascular and Ischemic Diseases in Thirteen States of Brazil from 1980 to 1998

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Objective: Analyze the trends in the risk of death from circulatory diseases (CD) in thirteen states in Brazil between 1980 and 1998.

Methods: Data on mortality from CD, ischemic heart diseases (IHD), and cerebrovascular diseases (CVD) in thirteen states were obtained from the Ministry of Health data base. Populational estimates from 1980 to 1998 were calculated through interpolation, using the Lagrange method, based on data from the 1970, 1980, 1991 censuses, and 1996 populational count. The trends were analyzed by multiple linear regression model.

Results: Mortality due to CD showed a trend towards decrease in most states. In Pernambuco state males presented increase in all age ranges, whereas in Goiás increase was shown from 40 years of age on, and in Bahia and Mato Grosso, from 50 years of age. Females showed increase starting at 30 in Mato Grosso, at 40 in Pernambuco, and in Goiás, in the age ranging from 30 to 49 years of age. In Goiás, increase was discreet in all other age ranges. As for IHD, mortality increase was reported in all age ranges in Mato Grosso and Pernambuco; in Bahia, Goiás and Pará, from 40 on. As for CVD, mortality increase was reported in all age ranges in Mato Grosso and Pernambuco; and from 40 on in Bahia and Goiás.

Conclusion: Significant increase in the risk of death from circulatory diseases could be observed in less developed states in Brazil.

Key words: Circulatory diseases, mortality, epidemiology, Brazil.

Circulatory disease (CD) – the major cause of death in Brazil – showed a decline trend in ≥ 30-year-old males and females from 1984 to 1996[1]. From all CDs, isquemic heart disease (IHD) and cerebro vascular disease (CVD) are to be pointed out, both having shown the same trend. IHD and CVD were equally important in males, whereas in females CVD mortality rate was almost twice as high when compared to IHD. A later study analyzed mortality rate from CD in the five geographical regions in Brazil. The same decline trend was shown in the population ≥ 30 years of age in Southern, Southeastern, and Northern Brazil.[2] In the Northeastern and Center-Western regions, the risk of death showed increase due to CD, and the same trend was observed after isolated analyses on IHD and CVD. Those distinctive findings in the different geographic regions have shown the relevance and the variability of regional analysis of CD as well as of the risk of death in the most unfavored regions from the social and economic point of view. Those characteristics were more evident when mortality rate was analyzed in all five regions, in eleven Brazilian capitals[3].

CD showed a decline trend in most capitals, except for discreet increase in Brasília Federal District. Porto Alegre, Curitiba, Rio de Janeiro, Cuiabá, Goiânia, Belém and Manaus all showed decline in the risk of death from IHD and CVD. Brasília showed IHD and CVD increase; São Paulo showed discreet IHD increase both for males and females in the age range between 30 and 39 years of age, and in females in the age range between 40 and 59. In São Paulo state, however, a recent study has shown a decline in ischemic heart diseases between 1980 and 1996. Such decline was more significant in males (-1,2%)[4]. In Recife and Salvador CD reduction was shown in all age ranges, both in males and females, although Recife reported IHD increase in younger age ranges (30-49), downwards to a discreet (-4%) in males ≥ 70y.

Characteristics detected in capitals, however, are not necessarily a mirror image of the corresponding state. Therefore, the present study had the purpose to analyze the risk of death from CD, IHD and CVD in thirteen Brazilian states.

Methods

Population - The thirteen most densely populated Brazilian states were selected from Brazil's five regions. North: Amazonas (AM) and Pará (PA); Northeast: Bahia (BA) and Pernambuco (PE); Center-West: Goiás (GO) and Mato Grosso

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(MT); Southeast: Espírito Santo (ES), Minas Gerais (MG), Rio de Janeiro (RJ) and São Paulo (SP); South: Paraná (PR), Rio Grande do Sul (RS) and Santa Catarina (SC).

Data on CD, IHD and CVD mortality rate were obtained from the Ministry of Health for the period between 1980 and 1998[5]. Populational estimates on July 1,1980 and July 1,1998 in the thirteen Brazilian states were calculated using Lagrange interpolation method and based on 1980 and 1991 Censuses, as well as on the 1996 populational count, for each age range and gender[7-10].

For the 1979-1995 period deaths followed CID-9 classification – 9th Conference on International Disease Classification, 1975, adopted by the 20th World Health Assembly. CDs are grouped in codes 390-459; IHDs in codes 410-414; and CVDs in codes 430-438 in IDC 9th revision for the Brazilian population in the period between 1979 and 1995. Mortality rate between 1996 and 1998 was classified by IDC 10th revision. CDs are grouped in codes 390-459; IHDs in codes 410-414; and CVDs in codes 430-438 in IDC 9th revision for the Brazilian population in the period between 1979 and 1995. Mortality rate between 1996 and 1998 was classified by IDC 10th revision.

Statistical Analysis - Multiple linear regression model was used.[11,12] Information on mortality rate from all CDs were modeled; followed by data on mortality rate from IHD and CVD. Natural logarithm of gross coefficient (number of deaths/population following July 1 estimate) was used as dependent variable. Independent variables were IHD and CVD, the thirteen Brazilian states, gender, years of study calendar (1980 -1996), age ranges (30-39, 40-49, 50-59, 60-69, 70 and higher) and their respective interactions. A partial F test was carried out to remove interactions that were not significant for the models. The purpose was to reach modeling process final stage with the lowest number of interactions possible. Models adjustment was tested by residue analysis and by correlation coefficient. Residue analyses were carried out through envelope-type graphs and model residue graphs vs values adjusted to evaluate the adjustment of adopted models.

Results

The trends for the risk of death from CD that have been observed can be found in Table 1. Coefficients are presented in Neperian logarithm following age range and gender (Fig.1), and in three columns -1980, 1989 and 1998 series - as well as percentual variation between 1980 and 1998 (Table 2). Residue analysis showed good adjustment of multiple linear regression model.

CD, IHD and CVD Trends - CD, IHD and CVD coefficients and mortality percentual variations can be found in Tables I and II. Observations included: 1) RS, SC and PR (Southern Region): decline trend for CD, IHD and CVD in all age ranges both for males and females in the time period between 1980 and 1998. Highest reduction from CD was reported in RS by all age ranges and both by males and females. IHD and CVD reduction was similar in the three states. 2) ES, MG, RJ and SP (Southeastern Region): decline trend for CD, IHD and CVD stronger in MG, RJ and SP states. Mortality rate reduction was very close in MG and SP states. ES state reported gradual reduction of the risk of death from CD, being -8% for males and 0% for females, respectively, in the ≥ 70 age range. As for IHD and CVD, RJ was the state to report best results. 3) GO and MT (Center-Western Region): generally speaking, a trend towards CD, IHD and CVD increase in GO and MT states, with the following exceptions: a) CD decline in GO both in males and females in the 30-39 age range, and females in the 50-59 age range; IHD and CVD reduction both in males and females in the 30-39 year-old age range; b) CD reduction in MT state in males, in the 30-49 year-old age range. 4) BA and PE (Northeastern Region): a) slight increase in the risk of death from CD in Bahia in the 50-59-year-old age range in males, and both in males and females for subsequent age ranges. Mortality rate increrase due to IHD and CVD in BA for all age ranges - both males and females – except in the 30-39-year-old age range; b) increase in the risk of death due to CD, IHD and CVD in all age ranges both for males and females, except for CD in 30-39-year-old females. 5) AM and PA (Northern Region): Mortality rate decrease due to CD, IHD and CVD in AM; and due to CD and CVD in PA. Mortality rate increase due to IHD in PA in the age ranges above 40 years of age.

Discussion

The present study showed the same trend for risk of death increase in the Northeastern and Center-Western Regions, and of decrease in the Southern, Southeastern, and Northern Regions[2]. Similar behavior was detected while analyzing mortality rate due to CD in major capital cities in the same regions[3]. Those data suggest that despite the fact that some reduction in mortality rate from those diseases could be observed in Brazil as a whole[1], analysis per region and per age range showed different results. Less favored regions, states and capitals – from the social and economic point of view – were the ones showing mortality rate increase due to mortalidade from CD, IHD and CVD. It is interesting to point out that mortality rate from CVD in males was significantly higher in the different states when compared to IHD.

Such finding was less evident in previous studies on geographic regions and major capitals, therefore showing the relevant role played by CVD in the risk for death due to CD in those states as a whole, except in their capital areas. Such data are extremely relevant, since they may act as flagpoles for public health policies. Hypothetically, for instance, public health programs focusing mostly hypertension control may be more impacting in reducing CD in the states as a whole, whereas in the capital areas programs should consider other risk factors, weather conditions included [13].

Mortality rate increase in those states may have been influenced by: 1) improved diagnosis for the cause of death; 2) the results from higher urbanization level; 3) worse social and economic conditions in the region; 4) low schooling; and 5) other reasons, still questionable, which include from body weight at birth[14] to nutritional[15], cultural[16], and behavioral[17] aspects. Worsened social and economic conditions, low urbanization level, and low schooloing are attractive hypotheses, since better living standards are associated to decreased risk of death due to CD[18-20]. More

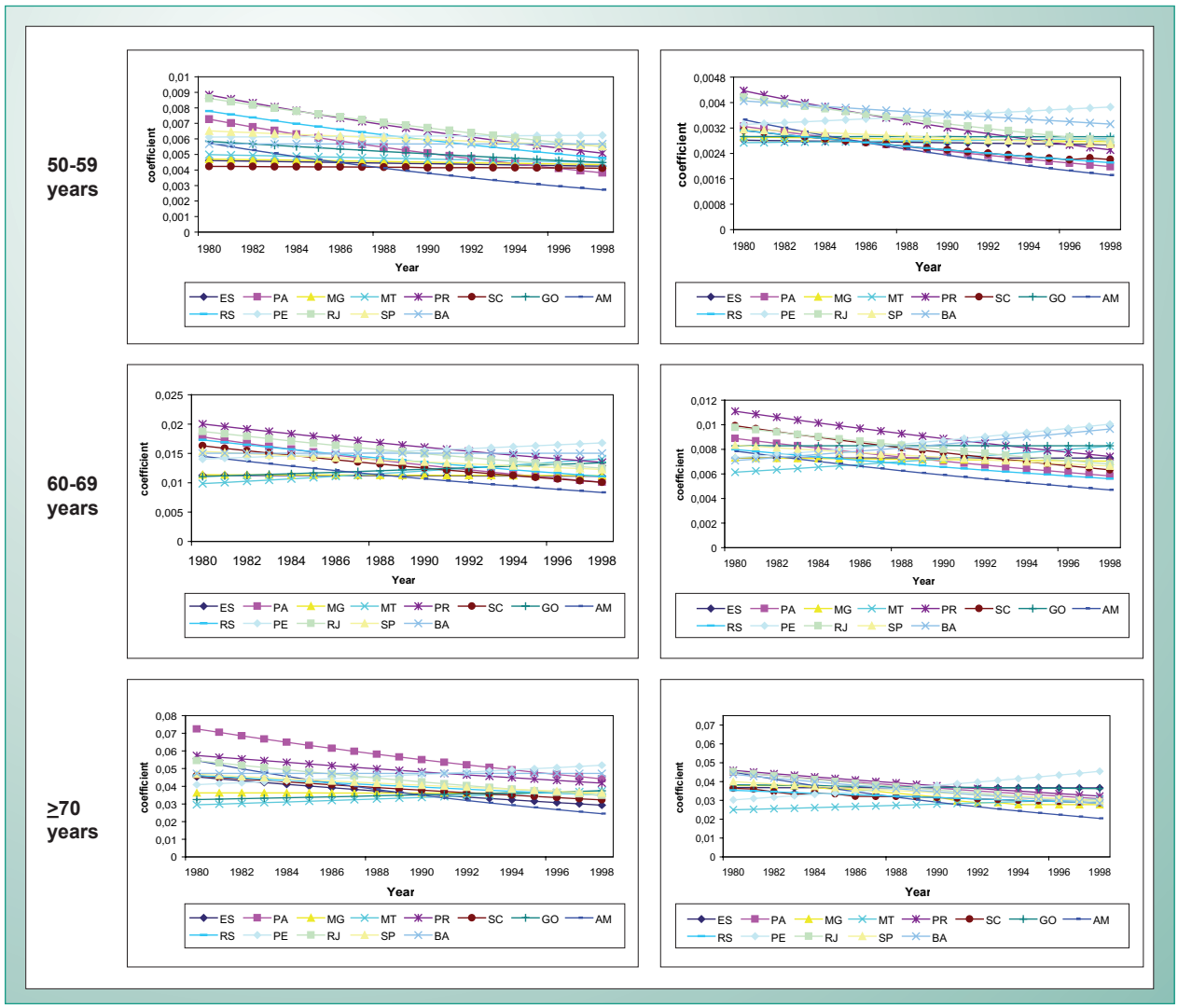

Fig. 1 - *Trends in the risk of death from circulatory diseases in men (left column) and women (right column).*

developed regions in Brazil, in their turn, showed a reduction in mortality rate, as observed in recent study[21]. Southern and Southeastern regions were the ones to show the best results. General reduction over 20% for IHD was observed in MG, SP and RJ states, with RJ showing stronger decline (> 30%). As for CVD, decline was even higher in the same regions, and again RJ was the one most favored - over 40% as a whole. Most appropriate control of risk factors and better tertiary assistance to the population most probably influenced such significant lower figures in those states.

We could propose that better social and economic conditions, as well as appropriate health services in less favored states may revert the trend of death risk increase from CD, particularly CVD. The latter depend mostly on diagnosis and the hypertension management – a low cost logistic factor with high social return.

Limitations of the study - Mortality rate levels available at the Ministry of Health information system are subject to problems such as: diagnosis errors, deficiencies in filling out death declarations, a number of deaths with no clear cause, and errors in entering data. Validation studies for mortality rate information are non-existent in most states, and cities and town in this country. However, an indirect indicator for data quality control is the number of death certificates with the cause of death as "poorly defined symptoms, signals, and affections", which is still significant in most Brazilian towns in the Northeastern, Northern and Center-Western regions.

Circulatory Diseases									
Age Range		Males				Females			
	States	1980	1989	1998	% variation	1980	1989	1998	% variation
30-39	AM	31.5	20.4	15.0	-52.6	21.4	13.0	6.3	-70.4
	BA	34.0	31.8	29.6	-13.0	34.6	27.7	20.5	-40.6
	ES	65.7	45.7	37.4	-43.1	64.6	41.8	28.3	-56.1
	GO	51.7	46.3	40.2	-22.3	43.0	29.9	17.7	-59.0
	MG	76.2	66.1	46.5	-39.0	63.5	46.8	28.6	-55.0
	MT	50.3	38.8	31.1	-38.3	20.1	25.6	26.8	33.0
	PA	31.1	25.7	19.7	-36.8	22.8	18.0	14.6	-36.0
	PE	34.4	36.2	38.2	11.2	40.0	28.6	26.1	-34.7
	PR	57.7	47.2	34.3	-40.5	50.5	41.7	26.5	-47.5
	RJ	101.1	75.4	54.8	-45.8	68.1	50.7	35.6	-47.8
	RS	61.0	47.9	34.9	-42.8	45.4	34.6	21.1	-53.5
	SC	44.8	35.0	29.6	-34.0	31.2	23.3	16.9	-46.0
	SP	75.2	66.8	47.4	-37.0	49.8	35.7	27.4	-45.1
40-49	AM	137.9	73.1	58.4	-57.6	74.1	45.5	39.6	-46.5
	BA	99.4	88.7	87.9	-11.6	80.4	70.2	59.4	-26.1
	ES	216.1	172.8	137.2	-36.5	132.2	99.8	73.4	-44.5
	GO	119.1	128.7	139.1	16.9	71.0	82.8	95.7	34.7
	MG	210.1	182.4	152.1	-27.6	149.1	106.0	83.2	-44.2
	MT	148.7	135.9	125.0	-16.0	42.8	81.5	102.2	138.6
	PA	91.5	79.2	61.9	-32.4	71.1	61.5	53.0	-25.5
	PE	132.3	141.3	151.7	14.7	93.0	101.3	119.5	28.5
	PR	189.2	169.9	147.9	-21.8	148.4	113.7	102.4	-31.0
	RJ	316.0	259.8	199.9	-36.7	187.9	151.3	123.3	-34.4
	RS	226.9	163.4	134.6	-40.7	134.0	103.2	83.1	-38.0
	SC	146.3	127.0	102.0	-30.3	106.3	90.8	79.6	-25.1
	SP	253.0	213.2	176.7	-30.2	148.9	115.8	97.7	-34.4
50-59	AM	284.4	242.7	205.0	-27.9	197.8	134.9	99.9	-49.5
	BA	227.8	232.9	233.9	2.7	176.4	171.4	171.0	-3.1
	ES	470.3	425.2	390.7	-16.9	242.5	230.7	220.7	-9.0
	GO	261.5	308.4	353.8	35.3	225.0	224.8	221.1	-1.7
	MG	510.2	467.8	396.4	-22.3	303.7	263.4	207.2	-31.8
	MT	211.8	290.8	331.7	56.6	133.3	191.6	275.2	106.5
	PA	271.5	244.8	220.8	-18.7	152.7	134.1	122.9	-19.5
	PE	319.1	351.3	391.0	22.5	193.0	230.9	276.5	43.3
	PR	515.4	487.5	455.3	-11.7	372.6	320.8	277.9	-25.4
	RJ	846.2	704.6	532.9	-37.0	422.6	416.8	285.0	-32.6
	RS	620.9	504.2	413.9	-33.3	308.6	261.7	223.5	-27.6
	SC	478.2	401.2	340.1	-28.9	268.0	236.6	203.5	-24.1
	SP	643.1	575.5	492.2	-23.5	346.3	294.6	262.4	-24.2

Table 1 - Mortality Rate Coefficient from Circulatory Diseases (CD) per 100,000 habitants

Circulatory Diseases									
Age Range		Males				Females			
	States	1980	1989	1998	% variation	1980	1989	1998	% variation
60-69	AM	745.9	528.2	383.4	-48.6	408.4	368.4	327.0	-19.9
	BA	464.0	547.8	552.0	19.0	363.0	398.0	423.5	16.7
	ES	1058.7	981.3	904.9	-14.5	605.4	598.7	590.5	-2.5
	GO	553.1	681.3	746.2	34.9	607.9	618.2	620.4	2.1
	MG	1123.3	1015.4	895.3	-20.3	813.6	692.2	542.5	-33.3
	MT	587.4	789.3	895.6	52.5	296.7	389.5	583.6	96.7
	PA	656.1	515.9	435.9	-33.6	408.8	369.9	243.7	-40.4
	PE	658.0	760.1	893.9	35.8	432.7	436.4	440.4	1.8
	PR	1374.5	1223.0	1140.2	-17.0	1008.4	791.8	799.8	-20.7
	RJ	1791.1	1539.9	1251.7	-30.1	1057.3	891.0	699.6	-33.8
	RS	1422.8	1189.5	1044.0	-26.6	931.2	750.5	608.1	-34.7
	SC	1163.4	1082.7	1009.2	-13.3	783.9	631.1	585.5	-25.3
	SP	1563.5	1265.7	1092.7	-30.1	971.3	736.0	642.1	-33.9
>70	AM	2760.9	1458.3	1286.7	-53.4	2716.5	1740.8	1223.8	-54.9
	BA	1358.1	1359.8	1368.1	0.7	1340.7	1269.2	1236.7	-7.8
	ES	3129.1	2967.2	2890.4	-7.6	2397.0	2390.8	2387.3	-0.4
	GO	1942.9	2214.1	2441.1	25.6	2131.5	2133.0	2135.7	0.2
	MG	3515.9	2961.9	2511.4	-28.6	3296.4	2531.0	1036.2	-68.6
	MT	1810.0	2426.4	2660.7	47.0	1501.9	1879.5	2353.9	56.7
	PA	1878.1	1628.2	1506.6	-19.8	2093.7	1690.0	1441.9	-31.1
	PE	1651.7	1950.7	2279.6	38.0	1629.7	1765.3	2121.3	30.2
	PR	4320.0	3884.7	3463.7	-19.8	3783.1	2987.1	2361.8	-37.6
	RJ	5244.2	4389.7	3484.3	-33.6	4626.9	3683.2	2936.6	-36.5
	RS	4481.7	3639.9	3142.2	-29.9	3975.9	3158.1	2898.8	-27.1
	SC	3631.1	3284.3	2870.4	-21.0	3331.0	2808.7	2595.3	-22.1
	SP	4970.0	3864.0	3507.6	-29.4	4291.8	3278.1	2986.8	-30.4

(cont.) Table 1 - Mortality Rate Coefficient from Circulatory Diseases (CD) per 100,000 habitants

	HID								CVD							
	Male				Female				Male				Female			
Age range and states	1980	1989	1998	%V	1980	1989	1998	%V	1980	1989	1998	%V	1980	1989	1998	%V
30-39									**30-39**							
AM	6.0	4.3	3.1	-48.4	2.9	2.1	1.5	-49.0	9.9	6.8	4.6	-53.4	8.1	5.5	3.7	-53.9
BA	6.8	6.4	6.0	-11.8	3.7	3.4	3.2	-12.8	12.2	10.9	9.7	-20.4	11.2	9.9	8.8	-21.3
ES	15.1	12.0	9.5	-36.9	7.1	5.6	4.5	-37.6	26.3	19.8	15.0	-43.1	21.0	15.7	11.8	-43.7
GO	8.3	7.9	7.5	-10.4	4.1	3.9	3.6	-11.4	14.8	13.4	12.0	-19.1	12.3	11.0	9.8	-20.0
MT	6.8	8.4	10.4	51.7	3.7	4.5	5.5	50.0	8.4	9.9	11.5	37.0	7.6	8.9	10.3	35.5
MG	16.8	12.7	9.7	-42.2	7.7	5.8	4.4	-42.8	28.1	20.3	14.7	-47.8	21.6	15.6	11.2	-48.4
PA	7.0	6.3	5.6	-20.6	3.5	3.1	2.8	-21.4	10.6	9.0	7.6	-28.3	8.9	7.5	6.3	-29.1
PR	17.7	14.2	11.3	-36.1	8.4	6.7	5.3	-36.8	23.0	17.5	13.3	-42.3	18.3	13.8	10.4	-43.0
PE	8.6	9.6	10.7	25.4	4.3	4.7	5.3	24.0	11.8	12.6	13.4	13.2	9.9	10.5	11.1	12.0
RJ	38.3	26.8	18.8	-51.1	17.1	11.9	8.3	-51.6	41.9	27.8	18.5	-55.8	31.5	20.8	13.8	-56.3
RS	22.2	17.8	14.3	-35.3	10.0	8.0	6.4	-36.0	22.1	16.9	12.9	-41.6	16.8	12.8	9.7	-42.3
SC	13.1	10.7	8.8	-33.1	6.0	4.9	4.0	-33.9	15.9	12.4	9.6	-39.6	12.3	9.5	7.4	-40.3
SP	27.4	20.7	15.7	-42.7	11.6	8.7	6.5	-43.4	27.1	19.5	14.0	-48.3	19.2	13.7	9.8	-48.9
40-49									**40-49**							
AM	24.1	19.5	15.8	-34.3	11.0	8.8	7.1	-35.1	34.0	26.2	20.2	-40.7	26.1	20.0	15.3	-41.4
BA	21.7	23.0	24.3	12.2	11.1	11.7	12.3	10.9	33.3	33.6	33.8	1.3	28.8	28.8	28.8	0.2
ES	52.8	47.3	42.4	-19.8	23.5	20.9	18.6	-20.7	78.3	66.7	56.8	-27.6	58.7	49.7	42.1	-28.4
GO	28.8	30.8	32.9	13.9	13.3	14.2	15.0	12.7	43.7	44.4	45.0	2.9	34.1	34.4	34.7	1.8
MT	22.4	31.1	43.2	93.0	11.3	15.6	21.6	90.9	23.5	31.0	40.9	74.2	20.0	26.2	34.4	72.3
MG	54.3	46.5	39.9	-26.4	23.4	19.9	17.0	-27.2	77.5	63.1	51.5	-33.6	56.2	45.5	36.9	-34.3
PA	24.1	24.2	24.3	1.0	11.3	11.3	11.3	-0.1	30.8	29.4	28.1	-8.8	24.3	23.1	21.9	-9.8
PR	67.9	61.2	55.2	-18.7	30.2	27.1	24.3	-19.6	75.2	64.4	55.2	-26.6	56.3	47.9	40.8	-27.4
PE	30.5	38.5	48.7	59.5	14.3	17.9	22.5	57.8	35.9	43.1	51.7	44.0	28.2	33.7	40.2	42.5
RJ	130.8	103.2	81.4	-37.8	54.9	43.1	33.8	-38.4	121.9	91.4	68.5	-43.8	86.2	64.3	47.9	-44.4
RS	82.9	75.2	68.2	-17.7	35.2	31.7	28.6	-18.6	70.5	60.7	52.4	-25.7	50.4	43.2	37.0	-26.5
SC	53.3	49.1	45.3	-14.9	23.0	21.1	19.3	-15.9	55.0	48.2	42.3	-23.2	40.0	34.9	30.4	-24.0
SP	95.6	81.6	69.7	-27.1	37.9	32.2	27.3	-27.9	80.4	65.2	52.9	-34.2	53.7	43.3	35.0	-34.9
50-59									**50-59**							
AM	82.7	68.6	56.9	-31.2	35.8	29.5	24.4	-31.9	103.8	81.8	64.5	-37.9	75.6	59.2	46.4	-38.6
BA	58.3	63.2	68.5	17.5	28.4	30.6	33.0	16.3	79.4	81.8	84.2	6.1	65.1	66.7	68.3	5.0
ES	154.8	142.0	130.2	-15.9	65.4	59.7	54.4	-16.8	203.6	177.4	154.5	-24.1	144.8	125.5	108.7	-24.9
GO	82.1	89.7	98.0	19.4	36.0	39.2	42.6	18.1	110.3	114.5	118.9	7.8	81.6	84.2	87.0	6.6
MT	55.7	79.2	112.7	102.2	26.7	37.8	53.4	100.0	51.8	70.0	94.6	82.6	41.8	56.2	75.5	80.6
MG	148.1	130.1	114.2	-22.9	60.6	52.9	46.2	-23.8	187.4	156.3	130.4	-30.4	129.0	107.0	88.8	-31.2
PA	75.8	78.0	80.3	5.9	33.8	34.5	35.3	4.7	86.1	84.2	82.3	-4.4	64.5	62.8	61.0	-5.4
PR	209.3	193.1	178.2	-14.8	88.3	81.1	74.4	-15.8	205.2	179.9	157.8	-23.1	145.9	127.2	111.0	-23.9
PE	89.0	115.1	148.8	67.2	39.5	50.8	65.3	65.4	92.8	114.0	140.1	51.0	69.3	84.7	103.5	49.3
RJ	361.9	292.3	236.1	-34.8	144.3	115.9	93.1	-35.5	298.8	229.3	176.0	-41.1	200.6	153.1	116.9	-41.7
RS	246.9	229.2	212.8	-13.8	99.5	91.8	84.8	-14.7	186.1	164.2	144.8	-22.2	126.3	110.8	97.2	-23.0
SC	170.2	160.7	151.7	-10.8	69.8	65.5	61.5	-11.8	155.8	139.8	125.4	-19.5	107.6	96.0	85.7	-20.4
SP	270.5	236.4	206.5	-23.6	101.9	88.5	76.9	-24.5	201.6	167.4	139.0	-31.1	127.9	105.6	87.2	-31.8

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Table 2 - Mortality rate coefficient due to heart ischemic disease (HID) and cerebrovascular disease (CVD) per 100,000 habitants

	HID								CVD							
	Male				Female				Male				Female			
Age range and states	1980	1989	1998	%V	1980	1989	1998	%V	1980	1989	1998	%V	1980	1989	1998	%V
60-69									**60-69**							
AM	184.7	156.2	132.1	-28.5	87.2	73.4	61.7	-29.3	222.6	178.9	143.8	-35.4	177.0	141.5	113.1	-36.1
BA	116.8	129.1	142.7	22.2	62.1	68.2	75.0	20.8	152.9	160.6	168.7	10.3	136.8	142.9	149.3	9.1
ES	325.3	304.1	284.3	-12.6	150.0	139.5	129.7	-13.6	410.9	365.0	324.3	-21.1	319.2	282.0	249.1	-22.0
GO	184.1	205.2	228.6	24.1	88.3	97.8	108.4	22.8	237.8	251.7	266.5	12.1	192.0	202.1	212.8	10.9
MT	123.4	179.0	259.5	110.2	64.6	93.2	134.3	107.9	110.3	151.9	209.3	89.8	97.2	133.2	182.5	87.7
MG	324.7	290.7	260.2	-19.9	144.9	129.0	114.8	-20.7	394.7	335.7	285.6	-27.6	296.6	250.9	212.3	-28.4
PA	182.3	191.3	200.6	10.1	88.5	92.4	96.4	8.9	198.9	198.3	197.7	-0.6	162.7	161.3	159.9	-1.7
PR	502.5	472.8	444.9	-11.5	231.6	216.7	202.8	-12.4	473.5	423.3	378.5	-20.1	367.4	326.7	290.5	-20.9
PE	191.7	252.7	333.2	73.8	92.9	121.7	159.6	71.9	192.1	240.6	301.4	56.9	156.7	195.2	243.2	55.2
RJ	756.7	623.1	513.1	-32.2	329.4	269.7	220.9	-32.9	600.3	469.7	367.5	-38.8	440.0	342.4	266.5	-39.4
RS	580.2	549.2	519.9	-10.4	255.1	240.2	226.1	-11.4	420.2	378.0	340.0	-19.1	311.2	278.4	249.0	-20.0
SC	425.0	409.1	393.9	-7.3	190.2	182.1	174.3	-8.3	373.9	342.0	312.9	-16.3	281.8	256.3	233.2	-17.2
SP	616.5	549.2	489.3	-20.6	253.5	224.6	199.0	-21.5	441.6	373.8	316.5	-28.3	305.8	257.4	216.7	-29.1
70 and +									**70 and +**							
AM	503.5	408.6	331.5	-34.2	340.5	274.8	221.8	-34.9	735.8	567.4	437.5	-40.5	838.0	642.6	492.8	-41.2
BA	276.5	293.2	311.0	12.5	210.5	222.0	234.1	11.3	438.8	442.2	445.7	1.6	562.6	563.8	565.1	0.5
ES	897.1	804.7	721.8	-19.5	592.7	528.7	471.6	-20.4	1374.5	1171.5	998.6	-27.4	1529.1	1296.2	1098.7	-28.1
GO	464.3	496.3	530.6	14.3	318.8	339.0	360.4	13.0	726.9	738.4	750.1	3.2	840.7	849.3	858.0	2.1
MT	301.2	419.0	582.9	93.5	225.8	312.4	432.3	91.4	326.2	431.3	570.1	74.8	412.0	541.6	712.0	72.8
MG	859.4	738.2	634.0	-26.2	549.3	469.2	400.8	-27.0	1266.7	1033.9	843.9	-33.4	1363.6	1106.9	898.4	-34.1
PA	500.8	504.1	507.5	1.3	348.5	348.8	349.2	0.2	662.6	633.8	606.3	-8.5	776.5	738.6	702.6	-9.5
PR	1311.6	1184.1	1069.0	-18.5	865.8	777.3	697.9	-19.4	1498.5	1285.5	1102.8	-26.4	1665.9	1421.3	1212.6	-27.2
PE	426.3	539.2	682.1	60.0	295.8	372.1	468.1	58.2	517.9	622.5	748.3	44.5	605.2	723.4	864.7	42.9
RJ	1888.9	1492.4	1179.2	-37.6	1177.8	925.4	727.2	-38.3	1817.1	1364.3	1024.3	-43.6	1908.1	1424.7	1063.7	-44.3
RS	1638.0	1487.7	1351.2	-17.5	1031.8	932.0	841.9	-18.4	1438.7	1241.7	1071.7	-25.5	1526.3	1310.0	1124.4	-26.3
SC	1141.6	1054.5	974.1	-14.7	731.8	672.3	617.6	-15.6	1217.8	1068.9	938.2	-23.0	1314.7	1147.6	1001.8	-23.8
SP	1693.8	1447.9	1237.7	-26.9	997.7	848.1	721.0	-27.7	1471.2	1195.0	970.7	-34.0	1459.3	1178.9	952.3	-34.7

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(cont.) Table 2 - Mortality rate coefficient due to heart ischemic disease (HID) and cerebrovascular disease (CVD) per 100,000 habitants

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