Unattended death cases amongst the elderly population in developing countries: the case of Brazil (1996-2005)

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ABSTRACT

Objectives: This paper has as a goal investigate the distribution of ill defined deaths ton elderly population, in 1996-2005 period, in Brazil. It has as a main focus the proportion of unattended deaths, that shows significative results in developing countries. **Methods:** The researched data come from the Mortality System of DATASUS. The ill defined deaths are included in the 10th revision of ICD, in the chapter XVIII – Symptoms and abnormal findings not classified in another part. This chapter shows the R98 category, the unattended deaths, and it has been used to calculate indicators, standardized to the age structure of the elderly population of the year 2000. The data were analyzed grouped by Federation Units. **Results:** The results suggest that, in general, in Brazil, this unattended deaths cases notification are falling, but there some Federation Units that presents elevations in those indicators. **Conclusion:** The mortality data in Brazil must to be improved, since great number of under notification. The fact is that, in Brazil, in general, the unattended deaths cases in the elderly populations is falling, and some Federation Units have rising trends, suggests that policies to provide access to elders to the public health system have to be revised. It is important to public health managers to pay attention in the occurrence of this event.

Keywords: elderly, aging, mortality from ill-defined causes.

INTRODUCTION

Studies about the tendency of the causes of death are important and, within this context, the study of deaths from ill-defined causes appears as an element of great importance to the quantitative measurement of this variable, given that this kind of study evaluates the health status of the population and the access to the country's health care services. Once the main causes of death of a region are known, it is easier to adjust public

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policies for the prevention of the diseases that most affect the population and to reduce the general mortality rates.

The behaviour of this demographic variable may be seen from different perspectives. The general criteria of mortality are homogeneous in all societies and all agree to the idea that the decrease of mortality and the increase of life expectancy are yearned for goals.

The features mentioned before can be better perceived in developed countries. After revising some world trends, Brazil was considered to be a good example for the analysis of the theme. The reason for that is the fact that Brazil, as many other countries, has been longing for a decrease in its death rates from ill-defined causes, given that it is one of the Latin American countries with high levels of these rates.

All demographic studies indicate that Brazil, along with other developing countries, has been undergoing a demographic transition. PNDS-2006 (*Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher* - National Survey of Women's and Children's Demography and Health) foregrounded the fall of fertility in Brazil, which is around 1.8 children per woman (1). The consequence of the fall of fertility is the narrowing of the base of the population pyramid and, subsequently, the ageing of the population age structure. This evident ageing of the age structure in Brazil justifies the importance of demographic studies that focus on ageing.

The investigation of the proportion of deaths from ill-defined causes specifically of senior citizens is important given that general studies of that nature focus on all ages. This proportion has been decreasing in the country and in 2001 it reached 14% of the deaths for all ages. This index is considered high given that in developed countries it is around 1% (2).

Deaths from ill-defined causes are those that occur without enough medical assistance so as to identify the cause of death when the corpse arrives at the health unit or even for omission of information by those who issued the death certificate (3). When there

is no information about the basic cause of death and the hypothesis of violent death is discarded, the certificate of undetermined or ill-defined cause is issued. In-hospital deaths present lower chances of being classified as deaths from ill-defined causes (4).

In Brazil this proportion of death from ill-defined causes, like in all developing countries, shows higher values in economically disadvantaged regions. According to Costa & Marcopito (5) cases of under-notification of records should be taken in consideration in mortality studies of developing countries.

A study carried out with data from Brazil shows that around 7.1% of deaths had their basic cause attributed to unattended deaths, similarly to ill-defined causes. The regions with the largest proportions were the Northeast (18.9%) and the North (13.5%), regions which are economically disadvantaged. The lowest proportions were found in the Centre-West (1.6%), the Southeast (2.2%) and the South (2.8%), regions which are economically privileged. Among the deaths from ill-defined causes, 53.3% correspond to unattended deaths. The Northeast region presented once more numbers above 70% of deaths considered as unattended deaths. In the other states this number was also high, with the exception of the states of Rio de Janeiro and Distrito Federal (6).

Between 1996 and 2005, Rio de Janeiro was the Brazilian state with the highest number of ill-defined causes of death of senior citizens. In that same state the proportion of in-hospital deaths from ill-defined causes was almost the double of the other capitals (4).

In Brazil, RIPSA (7) (*Rede Interagencial de Informações para a Saúde* - Health Information Network) is an organ that articulates entities involved in the production and analysis of health data and promotes useful information about Brazilian sanitary conditions and its trends. According to them, the proportion of deaths from ill-defined causes points to the availability of health infrastructure and of conditions for the diagnosis of diseases and the professional capability of filling in death certificates. This indicator tends to be underestimated in places with low coverage of the Mortality Information System, which

usually present unsatisfactory conditions of assistance, jeopardizing the identification of the causes of death.

To reduce the ill-defined causes of death is one of the main measures to be taken for the improvement of the statistics of mortality in Brazil. However, with the current decentralized health care, the responsibility for this reduction falls on the municipalities, where both attendance and coverage can be improved, such as with identification and filling in of death certificates (6).

The probability of dying from ill-defined causes grows with age (8). Brazilian senior citizens are the group analyzed in this research, which focuses on unattended deaths. Most of the elder's deaths whose cause is classified as ill-defined takes place at home (9).

The deaths from ill-defined causes in the elderly are a consequence of senile processes, due to the physiological weakness caused by a disease and are called in general 'natural deaths'. This term, however, is not used in death certificates; it is replaced by 'death from ill-defined causes.' The proportion of deaths from senile processes increases with age. In Chile, 50% of the deaths from ill-defined causes were classified as such because physicians did not have the elders' medical records; therefore the death certificate was issued as an unknown cause of death (10).

A study undergone with centenarians observed that most of the deaths in this age group happened due to this weakness of the age associated with a disease; hence, autopsies were often conducted in order to determine the disease that caused the death (8).

Unattended deaths, although decreasing in Brazil, present the highest rates among Latin-American countries, only below El Salvador, Paraguay and Haiti. According to Jaspers-Faijer & Orellana (10), this phenomenon is typical of higher age groups.

Studies that verify deaths from ill-defined causes are of great importance given that the investigation of the fall of these deaths is a fact that leads to the improvement of the

mortality statistics in Brazil. With the current decentralized health care, the responsibility for this reduction falls on the municipalities, where both attendance and coverage can be improved, such as with identification and filling in of death certificates (6).

With the problem of the notification of unattended deaths or deaths from ill-defined causes, Botha & Bradshaw (11) named the South-African mortality statistics system 'black hole,' since they were not able to correctly identify the deaths, what resulted in deleterious effects. These effects are also observed in the Brazilian Mortality Information System (SIM), where the category of deaths from ill-defined causes and, more specifically, the notification of unattended deaths, still have a high level.

The social-geographical context of Brazil

Only recently has Brazil become prominent in the global scene; it is, however, a country of inequalities. In general, poverty occupies notably the North and the Northeast of the country, while the South and the Southeast and wealthier regions. The GNP per capita of the country is disparately distributed throughout the territory and the GNP of the regions North/Northeast correspond to almost a third of those of the regions South/Southeast, as it can be observed on Table 1.

Table 1 - Brazil and the big regions. Total population, Total fertility rate, Life expectancy, and Gross National Product for the selected years and periods

Region	Total population (a) (2007)		TFR*(b)		Life expectancy (b)		Unattended deaths in the elderly (%)** (c)		GNP (2003) (dollars) (d)		Years of study (2004) (e)
	Absolut (millions)	Relative (%)	1980	2000	1980	2000	1996	2005	Per capita (USD)	Gini coefficient	
Brazil	**189,335.2**	**100.0**	**4.1**	**2.2**	**56.2**	**70.5**	**12.4**	**6.0**	**3,478**	**0.84**	**6.7**
1. Northeast	52,193.9	27.6	6.0	2.5	53.1	68.6	34.7	15.1	1,722	0.80	5.6
2. North	15,342.5	8.1	5.7	2.9	63.2	69.9	25.3	15.1	2,205	0.81	6.1
3. Centre-West	13,516.2	7.1	4.1	2.1	63.9	71.0	7.6	1.5	3,711	0.79	7.0
4. South	27,641.4	14.6	3.4	2.1	65.7	72.6	7.4	2.3	4,399	0.73	7.0
5. Southeast	80,641.2	42.6	3.2	2.0	63.2	71.0	4.2	2.3	4,503	0.87	7.3

Sources: (a) DATASUS (http://w3.datasus.gov.br/datasus/datasus.php (Accessed on 13/09/2008:21:12); (b) IBGE (2006)[5] ; (d) IBGE (2006) Gross National Product of Municipalities, 1999-2003. Contas Nacionais, nº 16. Page 93; (e) IBGE (2004) People aged 10 or more. Note: *TFR refers to Total Fertility Rate; **the numbers refer to the percentage of senior citizens' deaths notified as 'unattended deaths'.

According to Table 1, given the size of Brazil, it is interesting to notice that the smaller populations, i.e. the North and the Centre-West, which have vast areas of equatorial forest, have expressive population numbers often larger than many countries in Europe. That could explain, for example, the population's inequality in access to health.

The largest population concentrations are in the Southeast and the Northeast, both with more than 50 million people. If they were considered as countries, the Southeast would be rated only below Mexico (in Latin America), while the Northeast would have population numbers similar to Italy or England.

In terms of population ageing, the Total Fertility Rate from 1980 to 2000 initially shows high levels in poor areas and moderate levels in more privileged areas. However, although the levels at the end of the analyzed period dropped to around 2.0, in the Northeast they impressively dropped from 6.5 to 2.5 in only 20 years. This is one of the facts that lead to a faster population ageing in those states.

Life expectancy also raised its levels in 20 years, whereas mortality showed downward trends of similar intensity. Once more, the Northeast surprises with the increase of 30% in life expectancy in 20 years.

Regarding unattended deaths, in the period of 1996-2005, we can observe that in spite of the significant falls in the rates of unattended deaths in all regions, the North and the Northeast still notify 15% of deaths without the assistance of a physician to define the *causa mortis.*

In sum, although Brazil has one of the biggest economies in the world, it comprises a population of great social and economic diversity. Also, the demographic transition that occurred in the country affected some regions more than others, notably the Northeast.

OBJECTIVES

To investigate the proportion of ill-defined causes of death, specifically the unattended deaths, of the elderly population in Brazil, given that general studies do not focus on this age group despite the alarming numbers of this data.

METHODOLOGY

The data for the investigation of the ill-defined causes of death come from SIM – Mortality Information System (*Sistema de Informação de Mortalidade)* and from DATASUS, an organ from the Ministry of Health responsible for collecting and systematically organizing the deaths in Brazil (12).

The ill-defined causes of death comprise those included in 'Chapter XVIII – Symptoms, signals and abnormal findings of clinical and laboratorial exams not classified elsewhere', from the International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10), where the category R98 identifies 'unattended death'.

For all calculations Excell® was used and for relating the tables, selections and aggregations Access® was used, both from Microsoft Corporation.

For the numerator we selected the elderly population (in the case of Brazil those older than 60 (13)); for the denominator we selected the unattended deaths of the elderly in the years of 1996-2005. The rates found were standardized using the age structure of the population who lived in the respective states in 2000 as the standard population. This counting was made for the Federative Units (States) of Brazil.

Even though we have data since 1978, the year 1996 was chosen as the initial year because the tenth revision of ICD was adopted for the codification of deaths in Brazil in 1996. With the data of each Federative Unit we calculated the inclination of a line and we selected the lines with positive inclination, with two decimals.

The calculation of the inclination of the lines was chosen due to a linear regression, given that a 10-year time series might present fluctuations as a result of differences in notification. Working with a trend is, hence, mostly indicated.

RESULTS

By analyzing a specific age group, i.e. the elderly, we can observe that some Federative Units (UF's) present a tendency that goes against the general trends.

Table 2 – Standardized rates of unattended deaths – 1996-2005. Federative Units – Brazil (standardized by the age structure of 2000, age groups 60-69, 70-79, and 80+)

Federative Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Beta
Rondônia	5.84	5.08	4.23	6.06	2.82	2.09	2.64	2.40	2.28	1.09	-0.49
Acre	11.92	13.47	15.68	12.64	11.84	11.14	7.44	7.24	8.15	1.95	-1.12
Amazonas	4.20	3.87	4.51	6.03	6.39	6.38	7.30	7.43	6.54	5.92	**0.32**
Roraima	0.70	3.28	0.21	0.10	1.22	0.73	0.71	0.83	0.67	0.76	-0.08
Pará	8.29	8.18	8.96	9.18	7.29	7.27	6.89	7.42	7.74	6.63	-0.20
Amapá	0.00	0.00	0.12	0.30	0.26	0.74	0.38	0.51	1.20	0.37	**0.09**
Tocantis	8.82	9.59	9.66	8.75	6.31	5.63	2.69	0.92	0.75	0.91	-1.19
Maranhão	7.13	7.74	8.84	8.12	8.04	10.12	11.31	11.66	11.42	4.78	**0.18**
Piauí	8.55	8.83	9.40	9.25	9.75	9.85	8.74	9.59	8.65	8.44	-0.02
Ceará	8.74	8.18	5.64	5.14	3.32	3.55	5.49	5.37	4.28	2.64	-0.50
Rio Grande do Norte	4.44	11.08	12.20	12.44	10.16	10.75	10.35	9.08	7.57	2.49	-0.38
Paraíba	19.65	19.38	19.55	19.20	14.81	15.22	13.99	11.94	9.72	5.03	-1.53
Pernambuco	10.68	9.86	9.49	12.71	10.14	8.94	8.42	8.05	7.40	4.14	-0.59
Alagoas	18.26	18.33	17.96	16.41	11.53	11.69	11.27	10.35	9.90	4.28	-1.44
Sergipe	14.56	14.08	14.37	14.50	13.94	12.26	9.41	8.37	3.08	2.52	-1.41
Bahia	10.78	10.25	10.22	10.88	8.44	8.16	8.63	8.89	8.25	8.10	-0.31
Minas Gerais	4.31	4.27	4.07	2.59	2.19	1.94	2.03	2.23	2.16	1.83	-0.29
Espírito Santo	8.09	7.59	8.99	8.89	6.49	4.86	3.51	1.81	1.60	1.37	-0.95
Rio de Janeiro	0.26	0.22	0.23	0.19	0.14	0.12	0.11	0.08	0.06	0.04	-0.03
São Paulo	0.94	0.95	1.06	1.08	0.92	0.87	0.90	0.85	0.92	0.87	-0.02
Paraná	3.60	2.81	2.72	2.30	1.43	1.20	1.03	1.01	1.03	0.96	-0.30
Santa Catarina	6.42	5.77	6.25	5.45	4.42	3.97	3.76	3.22	2.75	2.22	-0.48
Rio Grande do Sul	1.99	1.76	2.00	1.69	1.16	0.98	1.08	0.88	0.57	0.36	-0.19
Mato Grosso do Sul	1.48	1.46	1.48	1.41	1.06	0.59	0.27	0.21	0.07	0.09	-0.20
Mato Grosso do Sul	2.43	1.80	2.36	1.82	1.50	0.83	0.69	0.38	0.70	0.37	-0.24
Goiás	4.30	3.84	3.43	3.32	1.95	1.51	1.45	1.34	1.23	1.03	-0.39
Distrito Federal	0.05	0.01	0.02	0.10	0.10	0.01	0.03	0.13	0.02	0.02	0.00

Source: DATASUS (2008) – Mortality Information System (*Sistema de Informação de Mortalidade* - SIM) - Ministry of Health, Brazil (2008). Note: the rates refer to the number of deaths per thousand.

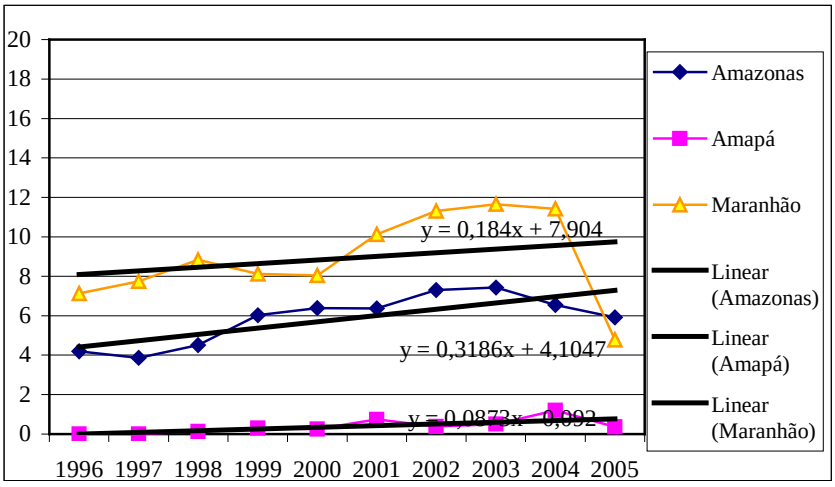
When we standardize all unattended death rates by the age structure of 2000 (comprising the age groups 60-69, 70-79 and 80+), we can notice that after the calculation of a line that passes through the average of all points (linear regression), we have three

states with positive inclination (Beta) in their trends: Amazonas, whose notifications were in constant elevation until 2003 (Beta of 0.32), and that might have had a momentary reduction from 2004 onwards (we cannot affirm that the fall is constant); Amapá had its Beta of 0.09; and Maranhão presented a Beta of 0.18, as one can see in Table 2.

Despite the general downtrend, the trend lines that present negative values show very low values of inclination, showing that the fall is still slow. However, for the Federative Units of Paraíba, Alagoas, Sergipe, Tocantins, and Acre, the notifications of unattended deaths showed accentuated drops (all Betas higher than the unit).

In the analysis of Graph 1, we can observe that the states had positive trends in the notifications of unattended deaths in the analyzed period (1996-2005). All the other states presented, for the same period, downtrends in the notification of unattended deaths.

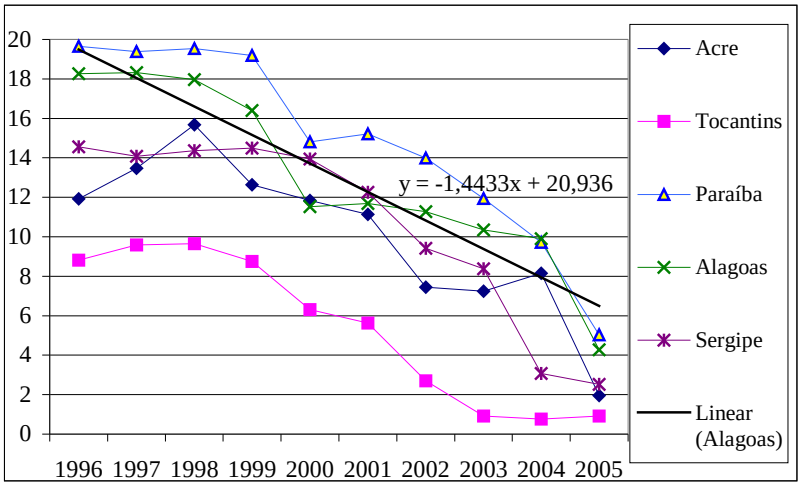
Graph 1 – Standardized rates of unattended deaths – 1996-2005. Federative Units – Brazil (standardized by the age structure of 2000, age groups 60-69, 70-79 and 80+)



Source: DATASUS (2008) – Mortality Inforation System (*Sistema de Informação de Mortalidade* - SIM) - Ministry of Health, Brazil (2008). Note: Only states with positive trend of notification. The rates refer to the number of deaths per thousand.

For the Federative Units that had the most severe drops in the period (Graph 2), we can see that the fall was much accentuated. This fact leads to the question of whether some states go against that movement because they have a generalized trend of increase of notifications of unattended deaths, a non-satisfactory quality of the data, or an inefficient network of health assistance.

Graph 2 - Standardized rates of unattended deaths – 1996-2005, Federative Units – Brazil (standardized by the age structure of 2000, age groups 60-69, 70-79 and 80+)



Source: DATASUS (2008) – Mortality Information System (*Sistema de Informação de Mortalidade* - SIM).
Note: Only states with negative trends higher than the unit of notification. In the example only the trend line of the state of Alagoas was shown. The rates refer to the number of deaths per thousand.

In Table 3 one can see that unattended deaths do not depend on sex.

Table 3 – Unattended Death Rates for the Big Regions of Brazil for the age of 60 years and plus, disaggregated by sex, 1996-2005

Year	Masculine	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine	Feminine
	N	N	NE	NE	SE	SE	S	S	CW	CW	Brazil	Brazil
1996	25.55	24.97	34.37	34.94	4.33	3.97	7.44	7.37	7.84	7.23	12.35	12.40
1997	24.83	23.60	34.12	34.57	4.32	4.04	6.64	6.45	6.46	6.20	12.27	12.23
1998	25.19	23.77	31.71	32.08	4.40	4.09	6.43	6.57	6.12	5.56	11.86	11.78
1999	24.12	23.86	32.47	32.80	3.56	3.21	5.71	5.68	5.26	5.47	11.49	11.43
2000	22.41	22.22	29.41	29.52	3.44	3.04	4.69	4.58	4.56	3.66	10.51	10.29
2001	20.46	20.61	27.62	27.70	3.01	2.67	4.12	3.99	2.87	2.74	9.92	9.71
2002	19.62	19.11	27.00	26.68	2.95	2.56	3.85	3.87	2.45	2.20	9.74	9.39
2003	18.87	18.53	25.70	25.19	2.71	2.43	3.24	3.39	2.05	1.98	9.13	8.88
2004	18.08	17.97	22.25	22.02	2.66	2.40	2.74	2.64	1.91	1.69	8.08	7.86
2005	15.43	14.58	15.07	15.24	2.49	2.20	2.30	2.22	1.48	1.52	6.07	5.90

Source: DATASUS (2008) – Mortality Information System (*Sistema de Informação de Mortalidade* - SIM) - Ministry of Health, Brazil (2008). Notes: the rates refer to deaths per thousand. N = North; NE = Northeast; SE = Southeast; S = South; CW = Centre-West

DISCUSSION

The analysis of the trends of unattended death rates in Brazil from 1996 to 2005 corroborates with data obtained by PAHO (Pan-American Health Organization) that informs of the decrease of the notification of deaths from ill-defined causes. In this study we verified that this reduction has been occurring since the beginning of the analyzed period(14).

The states of the regions North and Northeast of Brazil have large numbers of notifications of unattended deaths and the downtrend in the notifications of those deaths can be clearly perceived. It is possible to observe a general trend of annual reduction of the rates of unattended deaths, which indicates a qualitative improvement in the statistics of mortality in Brazil.

However, in the regions North and Northeast, as seen, these rates keep high. The fact that most of the deaths from ill-defined causes are unattended deaths in those regions suggests a deficient health care, corroborating with data from RIPSA (7). The state of Amapá presented in the mid-1990s very low levels of notifications of ‘unattended deaths’,

what might suggest that in the initial years of the present analysis the deaths that should have been notified as unattended were probably mistakenly notified under other codes of ICD-10.

The findings related to sex do not agree with Armstrong, Wing & Tyroler's (15), who, in a study undergone in the United States, concluded that the deaths from ill-defined causes, unattended deaths in this case, occur in larger quantities in men in relation to women. In the present work, according to Table 3, it is possible to verify that this effect does not occur in Brazil in the analyzed age groups (older than 60).

It is important to highlight that the ill-defined or unattended causes of death prevails among elders who are 80 years old and more, along with more frequent causes of death such as cardiovascular diseases and cancer (16).

The elderly, who generally die unattended in the economically less privileged regions, i.e. who live under the worst health conditions, generally present low levels of education as well as low income. Regarding the major incidence of the notifications of deaths from ill-defined causes in that age group, it is possible to see in some studies that elder citizens also have less access to health services (17,18).

Some limitations of the study deserve to be highlighted, such as the quality of the coverage of the Brazilian data. Even though they hinder more precise results, they point to the tendency of the occurrence of facts. The quality of the data in Brazil jeopardizes precise investigations due to the high quantity of under-notified records and, for that reason, important information in lost. The high levels of deaths occurred in Brazil classified as ill-defined, generally by the lack of medical assistance, makes that evident.

In the first place, this might be happening due to problems of access to health care services; due to social exclusion and economic problems; and due to the monitoring of the clinical history of the senior citizen until the moment of his/her death. On the other hand, the low education level in these regions might coincide with the fact that these citizens take

home remedies and do not use basic health services, leading, therefore, to the difficulty in determining the cause of death.

Finally, we highlight that Brazil, in general, has a downward trend in the proportion of deaths from ill-defined causes in the elderly, but that some states present upward trends. This suggests that issues of policies of access of these elderly to Public Health should be reviewed, and that it is important that those responsible for public policies turn their attention to the occurrence of that fact.

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