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Completeness of death-count coverage and adult mortality (45q15) for Brazilian states from 1980 to 2010

Estimativas do grau de cobertura e da mortalidade adulta (45q15) para as unidades da federação no Brasil entre 1980 e 2010

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ABSTRACT: ***Objective:*** Assess the completeness of the DataSUS SIM death-count registry, by sex and Brazilian state, and estimate the probability of adult mortality (45q15), by sex and state, from 1980 to 2010. ***Methods:*** The study was based on mortality data obtained in the DataSUS Mortality Information System, from 1980 to 2010, and on population data from the 1980, 1991, 2000, and 2010 demographic censuses. The quality assessment of the registry data was conducted using traditional demographic and death distribution methods, and death probabilities were calculated using life-table concepts. ***Results:*** The results show a considerable improvement in the completeness of the death-count coverage in Brazil since 1980. In the southeast and south, we observed the complete coverage of the adult mortality registry, which did not occur in the previous decade. In the northeast and north, there were still places with a low coverage from 2000 to 2010, although there was a clear improvement in the quality of data. For all Brazilian states, there was a decline in the probability of adult mortality; we observed, however, that the death probability for males is much higher than that for females throughout the whole analysis period. ***Conclusion:*** The observed improvements seem to be related to investments in the public health care system and administrative procedures to improve the recording of vital events.

Keywords: Brazil. Mortality. Demography. Underregistration.

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RESUMO: ***Objetivo:*** Avaliar a qualidade do registro de óbitos do Datasus, por sexo e estados brasileiros, e estimar as probabilidades de morte adulta, 45q15, por sexo e estados, entre 1980 e 2010. ***Métodos:*** O estudo foi baseado em dados de mortalidade obtidos no Sistema de Informação de Mortalidade do Datasus, de 1980 a 2010, e em dados de população dos censos demográficos de 1980, 1991, 2000 e 2010. A avaliação da qualidade dos dados de registro foi feita utilizando-se métodos demográficos tradicionais e métodos de distribuição de mortes, e as probabilidades de morte foram calculadas a partir dos conceitos de tabelas de vida. ***Resultados:*** Os resultados indicam uma melhoria considerável do grau de cobertura de óbitos no Brasil desde 1980. Nas regiões Sudeste e Sul, observamos uma completa cobertura do registro de mortalidade adulta, o que não ocorria no decênio anterior. Por outro lado, no Nordeste e no Norte ainda existem localidades com baixo grau de cobertura entre 2000 e 2010. Em todos os estados do Brasil, observa-se um declínio da probabilidade de morte dos adultos. Observamos que as probabilidades de morte dos homens são muito mais elevadas do que as das mulheres. ***Conclusão:*** As melhorias observadas parecem estar relacionadas aos investimentos no sistema público de saúde e aos procedimentos administrativos para melhorar o registro dos eventos vitais.

Palavras-chave: Brasil. Mortalidade. Demografia. Sub-registro.

INTRODUCTION

The study of the mortality levels and standards as well as the attaining of reliable estimates are very important in the understanding of demographic dynamics and in fiscal planning and social policies. AbouZahr and Boerma[1] argue that appropriate decisions for public health only occur when there is good information on health-related events, such as mortality, morbidity, and causes of death, which depend on the good coverage of the health information system.

In many countries, estimating mortality is a challenge, as the quality of information is generally unsatisfactory, and limitations on mortality and population data have persisted over time[2,3]. However, efforts in many of them resulted in the improvement of health and mortality information in recent decades[3]. In Brazil, for example, the completeness of coverage of the death records of adult males went from 83.2% in the 1980–1991 period to 89.7% in the 2000–2010 period[4].

These results indicate that, despite advances in information quality, efforts still need to be undertaken to assess the quality of data and, where necessary, to adjust the under-enumeration of deaths so that mortality estimates become more reliable. There is a number of methods that permit circumventing these problems and measure mortality indirectly or via demographic relations[5-9].

This study is part of this discussion by assessing the quality of mortality data obtained by DataSUS SIM, presenting estimates of adjustment factors for the under-registration of the declaration of death, by sex and period, and producing estimates of adult mortality (45q15) for Brazil from 1980 to 2010. In the Burden of Disease Project[10], the

assessment of the quality of mortality data and the attaining of proper mortality estimates are fundamental for proper investigation of the observed advances in Brazil and in its states over the last years. Problems regarding under-reporting of death have a direct impact on the calculation of the mortality envelope, the basis of all the measures of the Burden of Disease Project[10,11], and affect how the evolution and trends of morbidity and mortality occur in the country. This article uses the same demographic methods used in the Global Burden of Disease Study, with minor adjustments and changes to the application. Therefore, this study presents a systematic assessment of the quality of data on death in Brazil and in its states and enables comparative studies with project results.

METHODS

The study makes extensive use of the Ministry of Health database, DataSUS[(1)]. The system provides information on deaths and causes of death by age and sex at state level. Data have been available since 1979, but the information used was from 1980 to 2010. Mortality data are organized according to the Revision of the International Classification of Diseases (ICD) codes (9th, from 1980 to 1995, and 10th, from 1996 onwards). For the models used, the simplified average of the number of deaths per age in each intercensal period was calculated. Population by age and sex was obtained from the Brazilian censuses (1980, 1991, 2000, and 2010). The geometric mean of the population from each pair of census was used to obtain an estimate of the intercensal population. The intercensal population is used in the methods to estimate death counts under-registration.

The article uses formal demographic techniques to assess the quality of mortality data and estimate the completeness of coverage of mortality information. Several methods have been developed based on equation models for population dynamics to analyze the death coverage in comparison to the population[9]. Death-distribution methods are most commonly used to estimate the completeness of coverage of adult mortality in non-stable populations[8,9]. These methods compare death distribution by age to the age distribution of the population, providing the age standard of mortality for a determined period. There are three main methods to assess coverage in death records: general growth balance (GGB), proposed by Hill[7], synthetic extinct generation (SEG), proposed by Bennett and Horiuchi[6], and adjusted synthetic extinct generations (SEG-adj), proposed by Hill et al[9]. There are method requirements related to the following recent demographic dynamics:

1. the population is closed, that is, not subject to migration;
2. the completeness of death coverage remains constant by age;
3. the completeness of population-count coverage remains constant by age; and
4. the ages of the living and deaths are declared without errors.

[(1)]Available at: <http://www2.datasus.gov.br>

The advantage of these three methods compared to previous formulations for the adjustment of death under-registration[5,8] is to introduce flexibility to the requirements of the stable population[11], that is, they do not require that population growth rates to be constant by age.

The GGB method is derived from the basic demographic balancing equation that defines the growth rate as the difference between the population birth rate and death rate. This relation also occurs for any age group with an $x+$ open interval (people aged x and over). Otherwise speaking, in a population without migration, birth occurs as birthdays in x ages. Thus, the difference between the birth rate at $x+$ and the population growth rate at $x+$ yields a residual estimate of the mortality rate at $x+$. If the residual mortality estimate can be estimated from two population censuses and compared to a direct mortality estimate using the death registry or enumeration of the demographic census, the completeness of coverage of the death registry can be estimated from the relationship between these two quantities[7-9].

Therefore, from a linear regression of the difference between the birth rate and the growth rate in each age group relative in comparison with the age-specific mortality rate in each age group, it is possible to estimate an intercept that captures any coverage variation between the two censuses, as it is also possible to estimate a slope which serves as an indicator of the completeness of coverage of the death registry compared with the average coverage of both censuses[7-9]. The method contrasts the age distribution of deaths (average in the intercensal period) with intercensal population. The estimate specifically refers to registry coverage between censuses, not to a particular date.

Bennett and Horiuchi's method[6], known as a method of extinct generations (SEG), using specific growth rates by age to convert deaths by age in population age distribution. As the observed deaths from an age x in a population are equal to the x-age population, adjusted by the population growth rate by age interval, the deaths of a population at the $x+$ age provide an estimate of the age x population. The completeness of coverage of the death registry is calculated by the ratio between the population estimated from the deaths above x and the population observed above x + *years of* age.

Hill et al.[9] suggest the combination of Hill's[7] and Bennett and Horiuchi's[6] methods can be more robust than the application of these two methods separately. The adjusted method consists in applying the GGB to obtain estimates of the change in the relative coverage of the demographic censuses, use that estimate to adjust one of the demographic censuses (population enumeration) and then apply the SEG method using the adjusted population to obtain the completeness of mortality data coverage.

The three methods require a closed population or small migration flows to improve the use of estimates. There are methodologies in the literature that allow dealing with this problem[12,13]. A simpler alternative, suggested by Hill et al.[9], is to consider only age groups that are not greatly influenced by migration flows. The most appropriate way of deciding which age interval to use in the production of under-registration estimates should involve the assessment of diagnostic charts produced by the GGB method.

It is important to emphasize that, as there is no standard model, all methodological alternatives should be considered obtaining better estimates of data quality and mortality tendencies in Brazil and its regions. Thus, results of under-registration estimates are presented based on the three methods. Estimates of death probability between the ages of 15 and 59 years (45q15) are presented using the adjusted SEG method, which combines GGB information with SEG results. Estimates were produced using the adult coverage package, developed by Lima, Riffe, and Queiroz for the R-Cran software[2]. Regarding the problem of populations with migration flows, the solution proposed by the package was accepted, that is, the best age group in each period and unit of analysis.

RESULTS

The evaluation of the performance for the death-distribution methods is best observed in charts. Figures 1 and 2 show the GGB results for two states in the 2000–2010 period. The first, Maranhão, has a high under-registration level, and the second, São Paulo, shows a death-coverage rate of 100%. To simplify the analysis, we present only results for males, which are quite similar to those for females. The *x*-axis shows mortality rates observed for the *x*+ ages, and the *y*-axis represents mortality rates observed for the *x* + ages derived as a

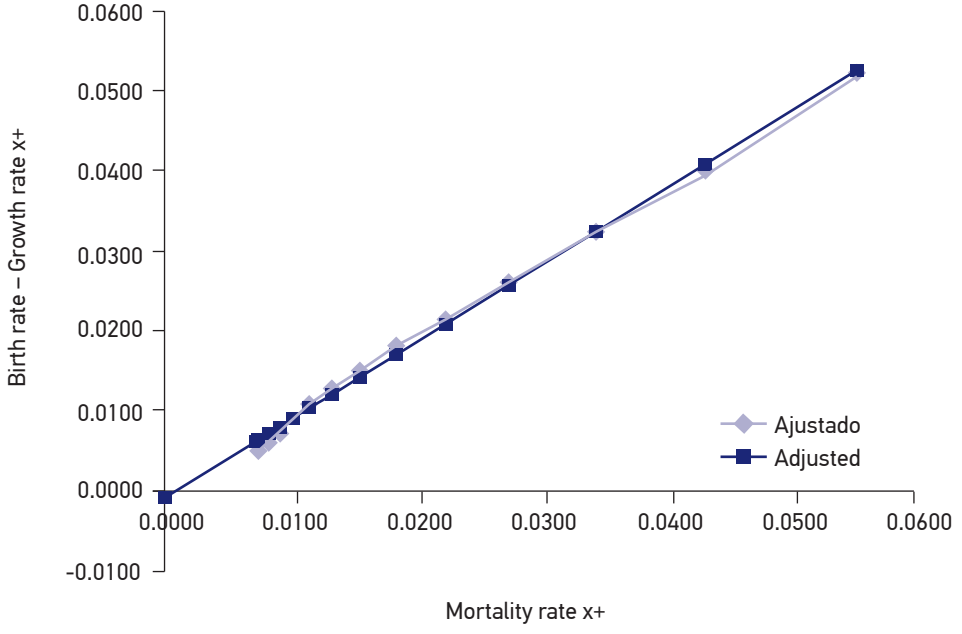

Figure 1. Diagnostic charts, general growth balance (GGB), males, São Paulo, 2000–2010.

[2]Available at: <https://github.com/timriffe/AdultCoverage>

residue of the growth and birth rates at $x+$ ages. The estimate of the completeness of coverage is obtained from an orthogonal regression in the points for the considered age groups. The slope of the line estimates the adjustment factor needed to adjust observed mortality rates. The intercept of the estimated line provides an estimate of the relative coverage between the two censuses used in the analysis[4,8,9,14]. The analysis of the dispersion chart confirms the concern with the requirement of closed population in these states. The points at younger ages, especially for males, present greater distance from the estimated line.

For São Paulo, the observed curve is practically on the observed data, and the estimates obtained from the differences between the birth rates and the growth rates are practically the same as the observed rates. In any case, there is still greater variation in ages with higher migration flows and in more advanced ages. The results for Maranhão show a high level of death under-registration in the state. The observed curve shows estimates of mortality rates, calculated based on the difference between birth and population growth rates, well above the observed mortality rates. The result also indicates that estimating the adjustment factor using the entire age distribution can be problematic, and it is preferable to use the ages over 35 years and under 65 years. The results suggest that the age declaration is reasonable, and the GGB method requirements, except for the closed population, are partially met.

Tables 1 and 2 present the estimates of the completeness of coverage obtained between 1980 and 2010 for each state by the three methods, for males and females, respectively. The results

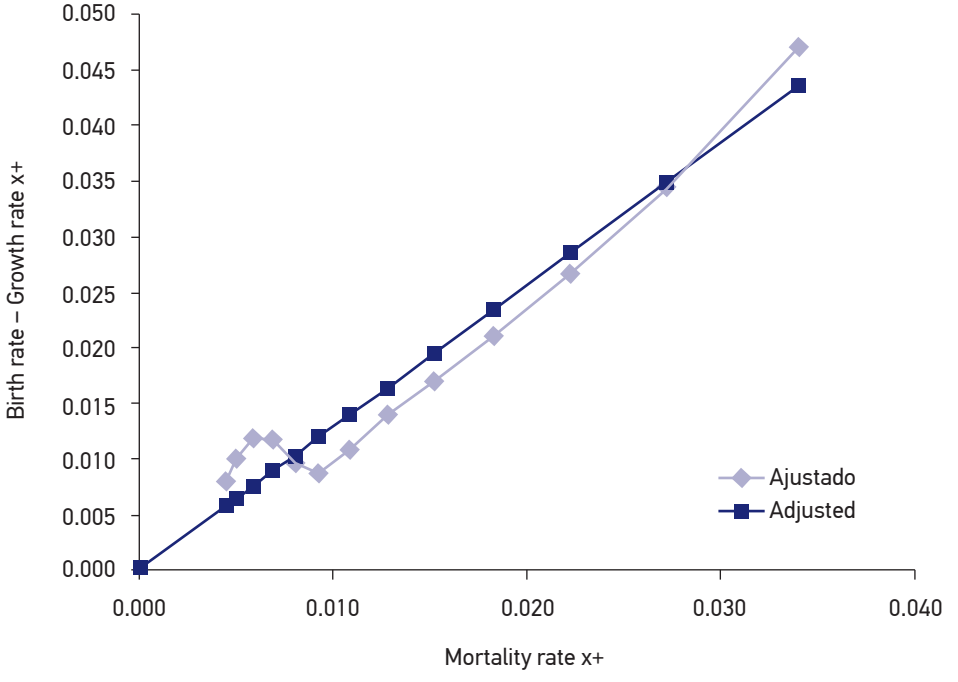

Figure 2. Diagnostic charts, general growth balance (GGB), males, Maranhão, 2000–2010 intercensal estimate.

show a considerable improvement in the death coverage in Brazil since 1980. In almost all states of the south and southeast between 1991 and 2000, we observed a complete coverage of the adult mortality registry, which was not observed in the period between 1980 and 1991. Although there are still places with a low completeness of coverage in north and northeast states, as in Maranhão, there has been a clear improvement in the quality of mortality information.

Table 1. Coverage completeness of the male death registry by period and different methods, Brazilian states, 1980–2010.

States	1980/1991		1991/2000		2000/2010	
	GGB	SEG-adj	GGB	SEG-adj	GGB	SEG-adj
Rondônia	0.93	0.91	1.00	0.98	0.94	0.89
Acre	1.04	1.09	1.30	1.08	0.93	0.86
Amazonas	0.64	0.67	1.01	0.92	0.99	0.91
Roraima	0.36	0.95	0.99	1.02	1.01	0.87
Pará	0.81	0.80	0.94	0.84	0.79	0.77
Amapá	0.96	0.94	1.00	0.85	0.92	0.82
Tocantins	0.58	0.54	0.69	0.70	0.99	0.86
Maranhão	0.76	0.60	1.01	0.79	0.97	0.78
Piauí	0.76	0.60	1.01	0.85	0.98	0.88
Ceará	0.88	0.73	1.01	0.87	0.97	0.87
Rio Grande do Norte	1.01	0.94	1.00	0.91	1.01	0.91
Paraíba	0.97	0.92	1.03	0.96	0.98	0.91
Pernambuco	1.00	0.98	1.00	0.96	1.00	0.95
Alagoas	0.97	0.94	1.03	0.97	1.00	0.95
Sergipe	1.00	0.98	1.00	0.94	1.01	0.95
Bahia	0.83	0.77	1.01	0.91	1.00	0.91
Minas Gerais	1.01	1.00	0.99	0.94	1.00	0.93
Espírito Santo	0.96	0.94	1.03	0.96	1.09	1.01
Rio de Janeiro	1.04	1.07	0.99	0.97	1.00	0.96
São Paulo	1.00	1.00	0.99	0.97	1.01	1.00
Paraná	1.18	1.34	1.05	1.01	1.04	0.99
Santa Catarina	1.00	0.98	1.00	0.96	1.00	0.94
Rio Grande do Sul	1.02	1.01	1.00	0.98	1.02	0.99
Mato Grosso do Sul	0.99	0.95	1.07	0.99	1.09	0.98
Mato Grosso	0.46	0.88	1.00	0.92	1.00	0.92
Goiás	0.91	0.88	0.96	0.89	0.98	0.90
Distrito Federal (Federal District)	0.94	1.16	1.01	1.07	1.00	1.00

Source: Mortality Information System (SIM), DataSUS.
GGB: *general growth balance*; SEG-adj: *adjusted synthetic extinct generation*.

The under-registry adjustment estimates allow correcting the number of deaths recorded and producing proper life tables for the Brazilian population and states. Table 3 shows the adult mortality estimates for males and females between 1980 and 2010, corrected by the adjusted synthetic extinct generations (SEG-adj) method. Adult mortality is represented by the probability of death between ages 15 and 60 years (45q15). We chose

Table 2. Coverage completeness of the female death registry by period and different methods, Brazilian states, 1980–2010.

States	1980/1991		1991/2000		2000/2010	
	GGB	SEG-adj	GGB	SEG-adj	GGB	SEG-adj
Rondônia	0.93	0.93	1.07	1.05	1.00	0.96
Acre	1.16	1.33	1.20	1.06	0.95	0.88
Amazonas	0.92	0.94	1.11	1.01	0.99	0.91
Roraima	0.98	0.79	0.99	0.83	0.99	0.83
Pará	0.87	0.85	0.99	0.89	0.82	0.77
Amapá	1.00	0.98	1.01	0.88	1.00	0.86
Tocantins	0.52	0.45	0.75	0.72	0.94	0.84
Maranhão	0.79	0.53	0.99	0.66	0.83	0.64
Piauí	0.75	0.56	1.06	0.84	0.99	0.86
Ceará	0.98	0.77	0.98	0.84	1.02	0.88
Rio Grande do Norte	1.01	0.92	1.00	0.89	0.97	0.86
Paraíba	0.99	0.96	1.01	0.94	0.98	0.89
Pernambuco	1.00	1.00	1.00	0.98	1.01	0.95
Alagoas	1.00	0.98	1.01	0.96	0.97	0.88
Sergipe	0.99	0.98	0.98	0.94	1.00	0.91
Bahia	1.01	0.91	0.98	0.87	0.96	0.86
Minas Gerais	1.02	1.02	0.99	0.94	1.00	0.93
Espírito Santo	1.01	0.97	1.00	0.95	1.04	0.96
Rio de Janeiro	1.02	1.05	0.99	0.98	1.01	0.96
São Paulo	1.01	1.01	1.00	0.99	1.02	1.00
Paraná	1.15	1.22	1.04	1.02	1.05	1.00
Santa Catarina	1.00	1.01	1.00	0.97	1.00	0.93
Rio Grande do Sul	1.04	1.04	1.00	0.97	1.04	1.00
Mato Grosso do Sul	0.99	0.99	1.07	1.00	1.04	0.96
Mato Grosso	0.49	0.96	1.01	0.97	1.00	0.95
Goiás	0.97	0.96	0.99	0.92	1.00	0.93
Distrito Federal (Federal District)	0.93	1.10	0.97	1.05	0.96	1.02

Source: Mortality Information System (SIM), DataSUS.
GGB: *general growth balance*; SEG-adj: *adjusted synthetic extinct generation*.

to use this measure for its simplicity and the possibility of comparing estimates of under-registration and adult mortality with other studies. We consider that the entry into adulthood occurs at age of 15 years; at that age, there is the inflection point in which the declining of childhood mortality risks is replaced by increased mortality risks for young adults and adults. In addition, this measure covers a substantive age interval — up to the age of 60 years — and avoids problems inherent in estimates of mortality at more

Table 3. Corrected adult death probabilities (45q15), men and females, Brazilian states, 1980–2010.

States	Males			Females		
	1980–91	1991–00	2000–10	1980–91	1991–00	2000–10
Rondônia	0.2768	0.2218	0.2276	0.1600	0.1081	0.1033
Acre	0.2163	0.2095	0.2290	0.0962	0.1186	0.1305
Amazonas	0.2574	0.1941	0.1964	0.1099	0.0946	0.1060
Roraima	0.2213	0.2088	0.2414	0.1315	0.1568	0.1442
Pará	0.2242	0.1947	0.2274	0.1238	0.1054	0.1186
Amapá	0.1964	0.2288	0.2177	0.1031	0.1082	0.0907
Tocantins	0.2058	0.1990	0.1993	0.1452	0.1149	0.1126
Maranhão	0.2129	0.1889	0.1931	0.1131	0.1129	0.1319
Piauí	0.1741	0.1574	0.1829	0.1055	0.0896	0.1010
Ceará	0.1720	0.1806	0.2073	0.0877	0.0959	0.0959
Rio Grande do Norte	0.1635	0.1756	0.1829	0.0923	0.0986	0.0975
Paraíba	0.2084	0.1893	0.2172	0.1146	0.1026	0.1058
Pernambuco	0.2627	0.2767	0.2557	0.1494	0.1339	0.1176
Alagoas	0.2630	0.2270	0.2451	0.1500	0.1288	0.1297
Sergipe	0.2244	0.2269	0.2255	0.1285	0.1226	0.1138
Bahia	0.2206	0.1971	0.2118	0.1167	0.1178	0.1158
Minas Gerais	0.2548	0.2321	0.2130	0.1476	0.1266	0.1096
Espírito Santo	0.2669	0.2623	0.2326	0.1381	0.1282	0.1092
Rio de Janeiro	0.2990	0.3078	0.2593	0.1526	0.1469	0.1294
São Paulo	0.2709	0.2701	0.2237	0.1358	0.1215	0.1027
Paraná	0.1886	0.2243	0.2139	0.1191	0.1191	0.1042
Santa Catarina	0.2238	0.2143	0.1968	0.1154	0.1085	0.1007
Rio Grande do Sul	0.2480	0.2359	0.2083	0.1252	0.1184	0.1025
Mato Grosso do Sul	0.2314	0.2274	0.2196	0.1330	0.1200	0.1141
Mato Grosso	0.2181	0.2320	0.2293	0.1111	0.1129	0.1100
Goiás	0.2542	0.2379	0.2255	0.1426	0.1244	0.1123
Distrito Federal (Federal District)	0.2119	0.2143	0.1908	0.1359	0.1127	0.0890

Source: Mortality Information System (SIM), DataSUS.

advanced ages. In all states, there has been a decline in the probability of adult mortality. Males's death rates are much higher than those of females, and there has been a stagnation in the decline rate in male mortality in the last decade. As a result, we observe great male over-mortality in all regions of Brazil.

DISCUSSION

In developing countries, in general, infant deaths have a greater under-registration than adult deaths[15-19]. Still, estimates of adult mortality in the developing world are less satisfactory than those of infant mortality for two main reasons. First, there are no longitudinal data, such as birth history, to calculate infant mortality from household surveys. Second, indirect estimation techniques for adult mortality do not seem as robust as indirect estimates for infant mortality[8,9,20]. As a result, much of what we know about adult mortality in developing countries is based on assessed civilian records and, if necessary, adjusted by death distribution methods.

In recent decades, the quality of mortality data in Brazil has shown significant progress, but with large regional variability[21-23]. For the states, some studies for specific points in time enable an analysis of the evolution of data quality[4,24,25]. However, these studies do not use the same methodology, which makes comparability of results difficult. Thus, it is important to assess and adjust data from the mortality information system, obtain proper estimates for the states in the last decades and analyze the evolution of mortality records. Nevertheless, adopting one single analysis methodology facilitates an appropriate comparison of the evolution of data quality as well as the levels and tendencies of mortality in time and space, with coverage of the death records for both males and females, above 95%[4,23,24]. States in the south and southeast regions have records of 100% of deaths, for both sexes. Some states in the northeast and north regions present lower quality of information, but they have shown recent significant advances compared to the 1991–2000 period[4,21,24,25]. In 2010, all states in the south and southeast regions, as well as some in the northeast and Midwest regions, had complete coverage of the death registry. In addition, there was great progress in the quality of mortality information in poorer states in the northeast and north regions, especially those that had the worst record quality in previous periods.

Although presenting different levels of coverage estimates, other authors' results demonstrate improvements in the quality of mortality data in Brazil in recent decades[23,24]. The differentials of the levels of coverage of death records in each states and period indicated by different studies are due to the adoption of different methods and/or procedures. The comparison of different studies is complicated by method non-uniformity. Other studies use one of the methods of death distribution for one point in time and one region and another for a different state. In addition, the choice of method may vary over time and across regions.[9,24,25].

Regarding mortality estimates for Brazilian regions, the results indicate an improvement in health conditions, as measured by adult mortality. A highlight that needs to be studied further is the non-reduction of the mortality differential between males and females in this period, for which the main reason is deaths caused by violence and traffic accidents[26-28]. There is a probability of adult mortality above 0.200 for males and around 0.120 for females. The highest death risks in the most recent period were observed in Rio de Janeiro, Espírito Santo, Alagoas, and Pernambuco. The sharpest declines in adult mortality were observed in the states with the highest mortality rates in 2000. Female adult mortality is much lower than that of males, and the difference between sexes remained practically constant between 2000 and 2010.

Regarding the application of different methods, there were not many surprises. The results were very close to the problems found in simulation exercises developed by Hill et al[9]. Both the GGB and the variations of the SEG method work very well, when the errors to which they were developed are the only ones in the data, although it is difficult to identify which errors may occur. The GGB offers a certain advantage as it enables the adjustment of a systematic additional error: coverage changes between censuses. A pronounced age pattern of the population coverage (primarily for young adults) has a major adverse effect on GGB results; however, it has a minor impact on the SEG. Therefore, overall, the SEG is less sensitive to the age coverage differential than the GGB. The major problem in the application of methods, especially for the states, is migration flows. In the two cases presented, and for the other states, the analysis of the diagnostic charts shows the effects of migration in the application of methods. Moreover, we must carefully assess the evolution of some states, such as Acre and Rondônia, which have a completeness of coverage greater than 100%. This may indicate serious data problems and limitations derived from the requirements of the applied methods.

Death distribution methods generally work well, but researchers should be aware of model requirements and the most appropriate ways of estimating under-registration, especially when analyzing smaller areas with large migration flows. Murray et al.[11] evaluated variants of death distribution methods in different scenarios, concluding that those presented in this paper are the ones that produce better results.

Studies that assess the quality of mortality data in Brazil and its regions over time are important to evaluate health care policies, but also to analyze the results of the Disease Burden Project[10]. By using methodological alternatives, this study enable future comparative studies on mortality estimates with those used by the project as well as the evaluation of the trend of Brazilian data quality.

The results point to a series of future researches: studies that seek to better understand social and economic determinants of the mortality differential in Brazil, offer more in-depth studies on data quality in the states and provide methodological and substantive studies on the mortality differential between males and females.

CONCLUSION

The results on the evolution of coverage of adult death and mortality records in Brazil show remarkable regional differences regarding quality evolution and trend in time and space. For both sexes, the northeast and north presented the greatest progress in the coverage of the death registry in the last three decades. The areas closer to the capitals had greater coverage throughout the whole period (the results are not shown in this text). The improvements observed appear to be related to investments in the public health care system and administrative procedures to improve the recording of vital events. Thus, the quality of data on adult mortality appears to have improved significantly over the years and in many parts of the country. The analysis suggests that the efforts of central, state, and local governments to improve the quality of vital statistics in Brazil are being successful and will allow a better understanding of the dynamics of health and mortality transition in the country. Ongoing investments in the Family Health Program may have a significant impact on improving the quality of mortality data in Brazil as the program works closely with the community and monitors the health status of several individuals in each location.

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