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Premature mortality in the elderly due to non-communicable chronic diseases

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ABSTRACT

OBJECTIVE

To describe and analyze premature mortality (PM) in the elderly due to non-communicable chronic diseases (NCDs) in Brazil, the State of São Paulo (ESP), and the Municipality of São Paulo (MSP).

METHODS

This is a quantitative, descriptive, and cross-sectional study conducted through the Elderly Policy Indicators and Monitoring System. Data on PM in the elderly for four NCDs from 2000 to 2019 were extracted, categorized by sex and location, and analyzed using statistical tests.

RESULTS

PM due to cardiovascular disease and neoplasia was higher than PM due to chronic respiratory disease and diabetes mellitus, regardless of location ($p<0.001$). Gender analysis revealed that PM in elderly men is significantly higher than in women, independent of location ($p<0.001$).

CONCLUSIONS

Despite efforts by Primary Health Care, PM rates for NCDs remain high. Health promotion and prevention actions must be emphasized by the Family Health Strategy, considering the specificity and needs of the population.

DESCRIPTORS

Elderly, Premature mortality, Primary health care, Non-communicable diseases.

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INTRODUCTION

Population aging is a phenomenon of great significance in developing countries, and in Brazil, there are approximately 20 million people aged 60 years or older. According to estimates, this population will reach 32 million by 2025, placing the country in 6th place worldwide in terms of elderly population, and by 2050, Brazil's elderly population may equal or surpass the number of children and young people between 0 and 15 years old[1,2].

According to 2022 Census, Brazil's elderly population was 32.113.490 people, an increase of 56% compared to 2010[3].

Among the most critical public health issues are Non-Communicable Chronic Diseases (NCDs), which constitute the largest global burden of morbidity and mortality, regardless of age. NCDs are responsible for 63% of deaths and incur high treatment and control costs for the complications they cause in individuals[4]. Among elderly individuals, the mortality rate is high, especially at more advanced ages, and is associated with low education and income[5].

Diabetes mellitus (DM), cardiovascular diseases (CVD), chronic respiratory diseases (CRD), and neoplasms are classified as the four main NCDs and can lead to a loss of quality of life, disabilities, and premature death, especially among the elderly population[4].

NCDs have various causes, typically developing gradually and asymptomatically, resulting in late diagnoses. This contributes to poor prognoses, increasing the rates of sequelae, morbidity, and mortality due to these condition.

The World Health Organization (WHO) defines premature mortality (PM) as death occurring between the ages of 30 and 70 years, and for the elderly, PM occurs between the ages of 60 and 69[4].

In 2011, at the United Nations High-Level Meeting, the Strategic Action Plan for Tackling NCDs in Brazil (2011-2022) was presented. This plan outlined three key guidelines for action: (1) surveillance, evaluation, and monitoring; (2) health promotion; and (3) comprehensive care[6].

In 2013, at the World Health Assembly, the Global Action Plan for the Prevention and Control of NCDs was approved, establishing global targets on the topic, including a 25% reduction in the risk of PM due to CVD, neoplasms, DM, or CRD[4].

There are various aspects that NCD patients face after diagnosis, which influence their acceptance and adoption of healthy lifestyle changes, such as everyday experiences, feelings, beliefs, and behaviors that extend throughout treatment[7].

Primary Health Care (PHC), especially Basic Health Units (UBS), plays a crucial role in the treatment and care of these patients. PHC must develop strategies to establish a strong bond between the multidisciplinary health team and the patient and their family, enabling efficient actions and minimizing the harm caused by NCDs[7].

Additionally, PHC is responsible for health actions that reduce the risk of these diseases, providing comprehensive care by addressing biopsychosocial aspects[7].

Studying PM in the elderly is of utmost importance as it highlights the impact of public policies on the prevention and control of NCDs across the country. This analysis drives the evaluation of current action plans, aiming to create new, more effective strategies to reduce risk factors (RF) for NCDs, lower morbidity and mortality caused by these conditions, and align with the needs of the elderly population[8].

In this context, the objective of this study was to describe and analyze PM in the elderly due to NCDs in Brazil, the State of São Paulo (ESP), and the Municipality of São Paulo (MSP).

METHODS

This is a quantitative, descriptive, cross-sectional, and retrospective study[9-13] that used data from the Elderly Policy Indicators and Monitoring System (SISAP-Idoso), a system developed in partnership with the Ministry of Health and the Oswaldo Cruz Foundation, which provides elderly health indicators at the federal, state, and municipal levels[14].

For this study, the selection of indicators was done based on convenience and consulted through the Health Policy Matrix, selecting the Strategic Action Plan for Tackling NCDs and subsequently premature mortality indicators. The definition of variables collected from SISAP-Idoso is described in Table 1.

Frame 01 - Characterization of variables by definition and calculation method. São Paulo, 2023.

VARIABLE	DEFINITION	METHOD
PM rate for the elderly (60 to 69 years old) by the set of the four main NCDs	Number of deaths due to the four main NCDs, in the population aged 60 to 69 years, per 100 thousand inhabitants, residing in a given geographic space, in the year considered	(Total number of deaths of elderly people aged 60-69 by the group of four main NCDs/Total population of elderly people aged 60-69) x 100000
PM rate of elderly people (60 - 69 years old) due to Diabetes Mellitus	Number of deaths from diabetes, in the population aged 60 to 69 years, per 100 thousand inhabitants, residing in a given geographic space, in the year considered	(Total number of deaths of elderly people aged 60-69 years due to Diabetes Mellitus / Total population of elderly people aged 60-69 years) x 100000
PM rate of elderly people (60 - 69 years old) due to Cancer	Number of deaths from cancer, in the population aged 60 to 69 years, per 100 thousand inhabitants, residing in a given geographic space, in the year considered	(Total number of deaths of elderly people aged 60-69 due to Cancer / Total population of elderly people aged 60-69) x 100000
Rate of PM in the elderly (60 - 69 years old) due to Cardiovascular Diseases	Number of deaths from CVD, in the population aged 60 to 69 years, per 100 thousand inhabitants, residing in a given geographic space, in the year considered	(Total number of deaths of elderly people aged 60-69 due to CVD / Total population of elderly people aged 60-69) x 100000
PM rate of elderly people (60 - 69 years old) due to Chronic Respiratory Diseases	Number of deaths due to CRD, in the population aged 60 to 69 years, per 100 thousand inhabitants, residing in a given geographic space, in the year considered	(Total number of deaths of elderly people aged 60-69 by CRD / Total population of elderly people aged 60-69) x 100000

Source: SISAP, 2023[14]

Data on PM due to DM, CVD, CRD, and cancer were collected between April and July 2021, considering a retrospective timeframe from 2000 to 2019, categorized by sex and location. This data was compiled and tabulated in an Excel® spreadsheet, and later exported to Biostat version 05 software.

For the analysis, Mann-Whitney tests were applied to compare sexes for all studied variables, and Kruskal-Wallis Analysis of Variance was used to compare variables for each sex by location.

This study was conducted using secondary public domain data, available and published online, exempting the need for Research Ethics Committee approval.

RESULTS

A comparison between Brazil, ESP, and MSP (Table 1) shows that the PM rate in the elderly due to the four main NCDs does not differ among locations (p=0.1423).

Table 1 - Characterization of variables by definition and calculation method. São Paulo, 2023.

Year	Brazil	ESP*	MSP**
2000	1252,26	1514,9	1598,63
2001	1216,26	1420,9	1471,89

2002	1196,91	1385	1417,25
2003	1187,95	1366,9	1375,16
2004	1194,07	1363,1	1380,1
2005	1147,03	1265,2	1274,43
2006	1153,89	1242,9	1251
2007	1136,56	1208,5	1230,58
2008	1136,62	1212,3	1211,93
2009	1096,94	1152,8	1148,83
2010	1086,76	1157	1147,06
2011	1083,96	1124,1	1123,41
2012	1055,32	1092,9	1077,16
2013	1042,31	1075,1	1080,49
2014	1015,38	1047,7	1015,11
2015	1020,14	1059,4	1034,05
2016	1032,92	1076,7	1056,27
2017	1011,88	1039,5	997,77
2018	995,65	1025,1	1002,51
2019	987,68	1021,4	975,33
Mean	1102,53	1192,57	1193,45
Median	1091,85	1154,90	1147,95
Kruskal-Wallis test (Brazil X ESP X MSP) *H calc*= 3,90 (*p*=0,1423)			

Source: SISAP, 2023[14]

In all three governmental levels, CVD represented the highest rate of PM in the elderly, followed by cancer (Table 02). When comparing Brazil, ESP, and MSP, DM is the most prevalent cause of PM in Brazil (Hcalc. 36.46 - p<0.0001) compared to ESP and MSP, while cancer is more prevalent (Hcalc. 42.00 - p<0.0001) in MSP and ESP compared to Brazil. Furthermore, CVD and CRD showed no significant variance.

Table 02 - PM in the elderly due to the four main NCDs by location. São Paulo, 2023.

Brazil				
NCDs	**Median**	**Mean**	**H calc**	**P value**
DM	102,55	102,21	67,45	p<0,0001
CA	356,06	356,93		
CVD	541,50	545,05		
CRD	91,4	98,33		
ESP				
NCDs	**Median**	**Mean**	**H calc**	**P value**
DM	83,56	83,56	68,56	p<0,0001
CA	400,75	410,69		
CVD	583,75	597,91		
CRD	93,21	100,36		
MSP				
NCDs	**Median**	**Mean**	**H calc**	**P value**
DM	72,13	71,01	68,27	p<0,0001
CA	426,56	434,33		
CVD	576,79	597,66		
CRD	82,71	90,44		

Subtitle:
NCDs: Non-communicable chronic diseases
DM: Diabetes Mellitus
CA: Cancer
CVD: Cardiovascular diseases
CRD: Chronic respiratory disease
ESP: State of São Paulo
MSP: Municipality of São Paulo
H calc: Kruskal-Wallis test

Source: SISAP Idoso, 2023[14].

Regarding sex, in ESP and MSP, it was observed that for all conditions, PM rates are significantly higher in men than in women. In both sexes, CVD rates are higher than those for DM, cancer, and CRD, and cancer rates are higher than DM and CRD (Table 03).

Table 03 - PM in the elderly due to the four main NCDs, by sex and location. São Paulo, 2023.

ESP					
NCDs	**Median**		**Mean**		**TMW**
	Male	**Female**	**Male**	**Female**	
DM	92,85	75,86	91,86	76,72	z= 2,92 (p=0,0035)
CA	505,04	316,94	519,08	319,86	z= 3,44 (p=0,0006)
CVD	775,26	423,53	792,03	435,26	z=5,41 (p<0,0001)
CRD	120,27	70,45	131,16	74,52	z= 5,41 (p<0,0001)
MSP					
NCDs	**Median**		**Mean**		**TMW**
	Male	**Female**	**Male**	**Female**	
DM	88,78	57,45	87,34	58,79	z= 4,22 (p<0,0001)
CA	543,86	340,05	554,19	344,54	z= 5,41 (p<0,0001)
CVD	817,41	405,86	836,77	418,49	z=5,41 (p<0,0001)
CRD	108,95	63,24	124,02	65,25	z= 5,41 (p<0,0001)

Subtitle:
NCDs: Non-communicable chronic diseases
DM: Diabetes Mellitus
CA: Cancer
CVD: Cardiovascular diseases
CRD: Chronic respiratory disease
ESP: State of São Paulo
MSP: Municipality of São Paulo
TMW – Mann-Whitney test

Source: SISAP-Idoso, 2023[14].

DISCUSSION

This study found that among the four main NCDs, CVD is the leading cause of premature death among the elderly in Brazil, ESP, and MSP. This finding is consistent with the study by Malta *et al.*[15], which also identified CVD as the top cause of death, followed by neoplasms. Between 1997 and 2007, the primary causes of mortality were CVD (42.2%), neoplasms (17.1%), and CRD (15.4%)[15,16].

According to Maia[15], in 2005, the mortality rate from CVD increased with age, with coronary heart disease, stroke, hypertension, heart failure, and vascular dementia being the most common CVDs causing death worldwide. Among neoplasms, the deadliest cancers are malignant tumors of the trachea, bronchi, and lungs in both sexes; however, prostate cancer is more prevalent in men, while breast cancer leads in women. The most prevalent CRDs are chronic obstructive pulmonary diseases (COPD)[15].

Regarding the comparison between sexes in elderly PM, this study demonstrated that in all four major NCDs, the mortality rate for men was significantly higher than for women. This difference is attributed to the way men and women seek healthcare services. Women tend to seek preventive and health promotion services, whereas men primarily seek healthcare in urgent and emergency situations, explaining the higher PM rate among elderly men[16].

Additionally, this mortality rate reflects lifestyle choices made by individuals earlier in life, such as smoking, alcohol consumption, poor diet, and physical inactivity, which increase the likelihood of developing NCDs in old age[17-18].

A study by Lima *et al.* (2019) showed that between 2010 and

2014, mortality from DM among the elderly in Ribeirão Preto was higher in women. However, in our study, DM mortality was more prevalent in men in ESP and MSP[19]. A study conducted in Germany with about 840,000 elderly individuals aged 80 and above found that heart failure and coronary artery disease were more prevalent in women, while heart failure, chronic kidney disease, and osteoporosis were more prominent in men[20].

According to Kazemi *et al*. (2020), the number of NCD-related deaths has decreased over time in the Islamic Republic of Iran. If the country meets the targets of its health programs, these rates will drop even further. However, in Brazil, this number has been rising, with 55,620 more deaths from the four main NCDs in 2019 compared to 2000[21].

Moreover, Malta *et al*. (2023) found declining overall mortality rates for NCDs in both Portugal and Brazil, highlighting those countries like Timor-Leste, Cape Verde, São Tomé and Príncipe, and Mozambique are more concerning, as they exhibit high NCD mortality rates[22].

NCDs are more prevalent in low-income countries due to limited access to quality healthcare services and greater vulnerability to risk factors. In Brazil, in 2019, the factors influencing the increase in mortality rates from the four main NCDs were tied to demographic, epidemiological, and nutritional transitions, urbanization, and social-economic growth[23].

Treatments for NCDs are long-term, leading to high costs and burdening families, which reduces available resources for housing, food, and education. This also puts pressure on the healthcare system. The WHO estimates that each year, 100 million people fall into poverty due to healthcare-related expenses in countries where individuals must pay for services directly[4-6].

In response to the challenges posed by the four major NCDs, Brazil's Ministry of Health (MS) has implemented various policies, including (I) NCD Surveillance Organization, (II) the National Health Promotion Policy (PNPS), (III) the Health Academy Program, (IV) the Popular Pharmacy/Health Without Price initiative, (V) the Brazil Without Misery program, (VI) anti-smoking actions, with warnings on cigarette packages about the health risks of smoking, and (VII) the Healthy Eating Guide. These efforts are complemented by the expansion of primary care services, focusing on health promotion, disease prevention, and continuous monitoring of patients. It is crucial that these initiatives target NCD patients to improve treatment outcomes[6].

Efforts to reduce premature mortality (PM) rates among elderly individuals due to NCDs must align with the Global Action Plan for the Prevention and Control of Noncommunicable Diseases. The plan sets specific targets, including: (I) a 25% relative reduction in risk factors for NCD mortality among people aged 30 to 70, (II) a 10% reduction in alcohol abuse, (III) a 10% decrease in physical inactivity, (IV) a 30% reduction in tobacco use among individuals aged 15 and above, (V) a 30% reduction in salt and/or sodium intake, (VI) a 30% reduction in the prevalence of hypertension (≥140mmHg / ≥90mmHg) among those aged 18 and above, (VII) addressing overweight and obesity (BMI over 25kg/m^2) in adolescents and adults aged 18 and above, and the incidence of diabetes in these populations, (VIII) ensuring 50% of patients with NCDs receive medication therapy, glycemic control, and counseling to prevent CVD, and (IX) providing at least 80% of essential technologies and affordable medications in public and private healthcare services[23].

In the municipality of São Paulo (MSP), the Municipal Health Department has established the "Caring for Everyone: NCDs in Primary Care" program. This program outlines the main strategies for planning NCD-related actions at Basic Health Units (UBS), including (I) holding technical meetings at the UBS to discuss the issue, (II) understanding the main aspects of NCDs, (III) planning the roles of UBS professionals, (IV) addressing common NCD risk factors, (V) monitoring and tracking blood pressure and blood glucose, (VI) planning screening and active case-finding strategies for NCDs, (VII) conducting risk stratification for NCDs through medical and nursing consultations, detecting early signs and symptoms, and (VIII) providing guidance on the prevention of complications and NCD treatment[4].

This program is supported by a care pathway and clinical protocol that guide UBS staff in patient care and define the healthcare flow within MSP's health network[6].

FINAL CONSIDERATIONS

This study identified an increase in premature mortality (PM) due to non-communicable diseases (NCDs) among the elderly between 2000 and 2019. This finding may indicate the need for healthcare professionals and policymakers to give more attention to strategies for reducing the risk factors (RF) for developing these diseases and the complications arising from these comorbidities. It was observed that among the four main NCDs, cardiovascular diseases (CVDs) are the leading cause of death in the population, followed by neoplasms, regardless of location.

Regarding gender, in the state of São Paulo (ESP), CVDs are the leading cause of death for both sexes, followed by neoplasms. However, in women, the third leading cause of PM due to NCDs is diabetes mellitus (DM), with chronic respiratory diseases (CRD) in fourth place. In men, CRD ranks third, followed by DM. In the municipality of São Paulo (MSP), for both women and men, CVDs are the primary cause of death, followed by neoplasms, CRD, and DM.

For the actions aimed at reducing morbidity and mortality from NCDs to achieve the established goals, it is crucial that primary healthcare (PHC), especially professionals working in Basic Health Units (UBS), take the lead in guiding these actions by following the protocols proposed by the state and municipality of São Paulo.

The proactive planning of healthcare actions is a fundamental tool to enable changes in lifestyle, progressively eliminating bad habits and meeting the needs of patients. The multidisciplinary team plays a key role in ensuring commitment to and monitoring of the implemented actions, offering positive reinforcement regarding adherence to both pharmacological and non-pharmacological treatments, as well as maintaining a strong relationship between patients and the UBS.

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