

Profile of Notifications of Deaths Due to Acute Myocardial Infarction in the I GERES Municipalities of Pernambuco, 2018-2021

Perfil das Notificações das Mortes por Infarto Agudo do Miocárdio nos Municípios da I GERES de Pernambuco, 2018-2021

Matheus Vinicius Barbosa da Silva^a; Gustavo Baroni Araujo^b; Augusto César Barreto Neto^a

^aUniversidade Federal de Pernambuco, Centro Acadêmico de Vitória. PE, Brazil.

^bUniversidade Estadual de Londrina, Programa de Pós-Graduação em Educação Física. PR, Brazil.

*E-mail: enfmatheusvinicius@outlook.com

Abstract

In Brazil and around the world, cardiovascular diseases are responsible for thousands of deaths every year. Among these, those related to ischemic heart disease stand out. From this perspective, to assist in the development of effective and timely health strategies and policies, this study aimed to analyze deaths from Acute Myocardial Infarction (AMI) reported in municipalities belonging to the I Regional Health Management (GERES) of Pernambuco in the years 2018 to 2021. This is a retrospective ecological study, carried out using data from the Mortality Information System. The variables used to describe deaths from AMI were: municipality of coverage, sex, age, color/race, education, marital status and place of death. The results showed a reduction in deaths due to heart attacks in the municipalities and years investigated. The variables studied showed a statistically significant association with the rates of deaths from AMI. The predominant profile of deaths from heart attacks was among residents of the reef, male, mixed race, with one to three years of education, aged 75 and over and married. This study makes important contributions by describing the profile of deaths due to AMI in the I GERES municipalities of Pernambuco and can help guide public health strategies.

Keywords: Acute Myocardial Infarction. Mortality. Public Health.

Resumo

No Brasil e no Mundo, as doenças cardiovasculares são responsáveis por milhares de mortes todos os anos. Entre tais, destacam-se aqueles relacionados à doença isquêmica do coração. Nesta perspectiva, para auxiliar na elaboração de estratégias e políticas de saúde eficazes e oportunas, este estudo teve como objetivo analisar as mortes por Infarto Agudo do Miocárdio notificadas nos municípios pertencentes à I Gerência Regional de Saúde (GERES) de Pernambuco nos anos de 2018 a 2021. Trata-se de um estudo ecológico retrospectivo, realizado através de dados do Sistema de Informação de Mortalidade. As variáveis utilizadas para a descrição das mortes por IAM foram: município de abrangência, sexo, idade, cor/raça, escolaridade, estado civil e local de ocorrência do óbito. Os resultados mostraram redução dos óbitos por Infarto nos municípios e anos investigados. As variáveis estudadas apresentaram associação estatisticamente significativa com as taxas de mortes por IAM. O perfil predominante das mortes por infarto foi entre os residentes do Recife, sexo masculino, pardos, escolaridade de um a três anos, com faixa etária de 75 anos e mais e com estado civil casado. Este estudo traz contribuições importantes ao descrever o perfil dos óbitos por IAM nos municípios da I GERES de Pernambuco, podendo auxiliar no direcionamento de estratégias em saúde pública.

Palavras-chave: Infarto Agudo do Miocárdio. Mortalidade. Saúde Pública.

1 Introduction

In Brazil and around the world, cardiovascular diseases (CVDs) are responsible for thousands of deaths every year^{1,2}. It is estimated that this scenario could be even more worrying in the future, with an increase in mortality rates, possibly related to the rapid increase in the burden of cardiometabolic risk factors, such as obesity and diabetes^{3,4}.

Among CVDs, estimates from the Global Burden of Disease 2019 showed that ischemic heart disease affects approximately 197 million people worldwide and represents a threat to global public health⁵. Among CVDs, Acute Coronary Syndrome (ACS) stands out as one of the leading causes of death⁶. Among the clinical presentations of ACS, acute myocardial infarction (AMI) with or without ST-segment elevation stands out⁷.

According to the fourth universal definition of myocardial infarction, AMI is the description of an event in which there is an acute myocardial injury with clinical evidence of acute myocardial ischemia and with detection of an increase and decrease in cardiac troponin values with at least one value above the 99th percentile and at least one of the following conditions: typical ischemic symptoms, new ischemic changes on the electrocardiogram, development of pathological Q waves, imaging examination demonstrating new loss of myocardium and having an ischemic pattern or identification of a coronary thrombus by angiography or autopsy⁸.

From an epidemiological point of view, data from the Department of Informatics of the Unified Health System (DATASUS) demonstrate that between 2011 and 2021, 992,787 deaths were recorded in Brazil due to AMI⁹. Among

the main risk factors for the occurrence of an AMI, the following stand out: a sedentary lifestyle, abusive use of alcohol, drugs, and tobacco, being over 45 years old, being male, and diseases such as systemic arterial hypertension, diabetes, dyslipidemia, and obesity¹⁰. CVDs, including ischemic heart disease, recent estimates demonstrate that at a global level, economic solid impacts are generated by these, resulting from hospitalizations, treatments, revascularization procedures, clinical visits, emergency visits, and treatments with prescribed medications¹¹, where in 2010 alone it generated costs of approximately 863 billion dollars, and which is expected to increase to more than one billion dollars by 2030¹².

Despite the high prevalence and impacts generated by CVDs, such as AMI, few local studies have been conducted to investigate this complication's local epidemiological trends. From this perspective, to assist in the development of effective and timely health strategies and policies, this study aimed to analyze deaths from Acute Myocardial Infarction reported in municipalities belonging to the I Gerência Regional de Saúde (GERES) of Pernambuco in the years 2018 to 2021.

2 Material and Methods

An ecological, retrospective, quantitative study was carried out using secondary data from notifications of AMI deaths in the I GERES municipalities in Pernambuco between 2018 and 2021.

GERES, or health regions, are administrative units characterized as continuous geographic spaces formed by the grouping of neighboring municipalities, which are delimited based on cultural, economic, and social identities, as well as shared communication networks and infrastructure to integrate the organization, planning, and execution of health actions and services¹³.

Notifications of deaths belonging to the 19 municipalities and one state district belonging to the I GERES of Pernambuco were used in the study. I GERES has a population of approximately 4,234,546, corresponding to 44.3% of the general population, distributed over 3,721.3 km² of territorial extension. The following municipalities are part of it: Abreu e Lima, Aracoiaba, Cabo de Santo Agostinho, Camaragibe, Chã Grande, Chã de Alegria, Glória de Goitá, Igarassu, Ipojuca, Itamaracá, Itapissuma, Jaboatão dos Guararapes, Moreno, Olinda, Paulista, Pombos, Recife, São Lourenço da Mata e Vitória de Santo Antão, beyond the distrito estadual de Fernando de Noronha^{14,15}.

The collection of variables used to describe deaths from AMI were municipality of coverage, sex, age, color/race, education, marital status, and place of death.

The information was collected between October and November 2023 through the DATASUS Sistema de Mortalidade (SIM), available on TabNet (<http://tabnet.datasus.gov.br/>). The system aims to group data related to describing

deaths occurring throughout Brazil.

The collected data was entered into a database and tabulated. Subsequently, the relative and absolute frequencies of the variables were calculated. Furthermore, Pearson's chi-square test was used to investigate the association of the variables studied. $P < 0.05$ was adopted as significant. Microsoft Excel 2013 and GraphPad Prism software in version 8.0.1 were used for data analysis and interpretation.

This is research carried out with secondary data in the public domain without identifying the participants involved. Therefore, submitting this study for consideration by a Research Ethics Committee was optional.

3 Results and Discussion

Regarding the occurrence of deaths due to AMI in the municipalities of I GERES of Pernambuco between 2018 and 2021, the highest notification rates were observed between Recife with 2828 (38.64%), Jaboatão dos Guararapes with 1053 (14.39%) and Olinda with 730 (9.97) deaths from AMI. The places with the lowest values were Fernando de Noronha, with 0.21% of deaths, followed by Chã de Alegria, with 0.25% (Table 1). Still, in Table 1, the total number of deaths from AMI between the years investigated showed a decline.

Table 1 - Municipality in which deaths due to acute myocardial infarction occurred in the municipalities of the 1st Regional Health Management of Pernambuco, 2018 to 2021

Counties (GERES I)	2018 (n)	2019 (n)	2020 (n)	2021 (n)	Total (n)	(%)
Abreu e Lima	53	71	28	47	199	(2,72)
Aracoiaba	6	14	5	2	27	(0,37)
Cabo de Santo Agostinho	121	120	67	53	361	(4,93)
Camaragibe	92	110	55	46	303	(4,14)
Chã de Alegria	10	0	5	3	18	(0,25)
Chã grande	16	4	16	12	48	(0,66)
Fernando de Noronha	2	13	0	0	15	(0,21)
Glória do Goitá	18	11	14	10	53	(0,72)
Igarassu	67	54	28	32	181	(2,47)
Ipojuca	45	44	16	32	137	(1,87)
Ilha de Itamaracá	17	5	8	9	39	(0,53)
Itapissuma	9	10	10	9	38	(0,52)
Jaboatão dos Guararapes	341	390	172	150	1053	(14,39)
Moreno	33	33	22	27	115	(1,57)
Olinda	225	259	143	103	730	(9,97)
Paulista	185	173	118	73	549	(7,50)
Pombos	11	20	10	10	51	(0,70)
Recife	828	950	539	511	2828	(38,64)
São Lourenço da Mata	64	66	37	33	200	(2,73)
Vitória de Santo Antão	91	90	91	102	374	(5,11)
Total	2234	2437	1384	1267	7319	100

Source: research data.

Table 2 shows the variables related to deaths, in which color/race, education, and age group showed a significant association with the rates of deaths from AMI. Concerning sex, it was clear that deaths predominated among males in all years evaluated. About color/race, the rates among browns were higher (56.47%), followed by whites with 34.81%. With regard to education, the highest proportions were found in

those with 1 to 3 years of study and lower proportions in those with 12 years or more.

About the age group, those aged 45 years or over had the highest frequencies, with the highest proportion observed in those aged 75 or over (36.47%). Regarding marital status, the highest records were identified as married with 35.21%, followed by singles with 33.94%.

Table 2 - Characteristics of deaths due to acute myocardial infarction in the municipalities of the I Regional Health Management of Pernambuco, 2018 to 2021

Characteristics of Deaths	2018 (n = 2234)	2019 (n = 2437)	2020 (n = 1384)	2021 (n = 1267)	Total (n = 7319)	(%)	p-value*
Sex							(<0,1604)
Feminine	944	1049	609	602	3204	(43,78)	
Masculine	1290	1358	815	662	4115	(56,22)	
Color/race							(<0,0001)
White	716	840	549	443	2548	(34,81)	
Black	168	196	113	103	580	(7,92)	
Yellow	0	4	0	0	4	(0,06)	
Brown	1342	1376	708	707	4133	(56,47)	
Indigenous	0	1	1	1	3	(0,04)	
Ignore	8	0	13	10	51	(0,7)	
Education							(<0,0001)
None	483	451	212	187	1333	(18,21)	
1 a 3 years old	695	758	396	344	2166	(29,59)	
4 a 7 years old	381	450	289	213	1333	(18,21)	
8 a 11 years old	409	496	290	270	1465	(20,02)	
12 years or more	133	161	107	119	520	(7,11)	
Ignore	133	121	117	131	502	(6,86)	
Age group							(<0,0001)
15 a 29	6	9	1	3	19	(0,26)	
25 a 34	17	29	10	2	58	(0,79)	
35 a 44	96	89	37	39	261	(3,56)	
45 a 54	290	281	137	107	815	(11,14)	
55 a 64	448	567	289	268	1572	(21,48)	
65 a 74	565	648	376	334	1923	(26,27)	
75 and more	811	813	534	511	2669	(36,47)	
Ignore	1	1	0	0	2	(0,03)	
Marital status							(0,1384)
Single	768	866	459	391	2484	(33,94)	
Married	805	852	485	435	2577	(35,21)	
Widower	460	499	297	298	1554	(21,23)	
Separate	134	154	100	112	500	(6,83)	
Other	38	41	16	15	110	(1,50)	
Ignored	29	25	27	13	94	(1,29)	

*Pearson's chi-square test.

Source: research data.

Table 3 shows where AMI deaths occurred in the investigated municipalities. It was evident that the hospital, in all years, was where most deaths occurred, with 47.2% of total deaths. Soon after, there is the household with 27.93% of the total deaths recorded between the years studied.

Table 3 - Place of occurrence of deaths due to acute myocardial infarction in the municipalities of Regional Health Management I of Pernambuco, 2018 to 2021

Place of Occurrence	2018	2019	2020	2021	Total (%)
Hospital	923	633	733	832	3454 (47,2)
OHE	519	583	226	145	1473 (20,12)

Residence	689	765	361	220	2044 (27,93)
Public road	36	29	11	14	90 (1,23)
Others	56	91	53	52	252 (3,44)
Ignored	2	3	0	1	6 (0,08)
Total	2234	2437	1384	1267	7319 (100)

OHE: Other healthcare establishment.

Source: research data.

The results of the present study showed that mortality from AMI in the I GERES municipalities of Pernambuco showed a decline. This finding is similar to global and Brazilian estimates of morbidity and mortality for ischemic heart diseases, where such percentages have been decreasing^{11,16},

possibly due to growing awareness about lifestyle factors, such as smoking, obesity, and exercise¹¹. However, the accentuated population aging still contributes to the increased burden of these diseases.

Among the places with the highest number of deaths from AMI, Recife, the capital of the state of Pernambuco, stood out. This relationship can be partially explained by the city being the largest in terms of population in the state of Pernambuco¹⁴, followed by Jaboatão dos Guararapes, which, according to the results of this study, was the second largest in terms of number of deaths.

In terms of gender, men had the highest proportions of deaths from AMI in all years investigated in the study. This is similar to what was found in a previous study with data from all over Brazil, which showed that the mortality rate from AMI was higher among men in all regions of the country¹⁷.

Still concerning sex, this fact can be explained by men being more exposed to risk factors for cardiovascular diseases, such as smoking, physical inactivity, sedentary behavior, abusive alcohol consumption, inadequate eating habits, and overweight/obesity, as well as seeking fewer health services due to conditions inherent to masculinity¹⁸.

In relation to color/race, the results of this study showed a predominance of deaths from AMI in brown individuals. This finding agrees with a previous study, which showed a higher prevalence of coronary artery disease in the population who declare themselves mixed race¹⁹.

However, previous studies have demonstrated that socioeconomic factors such as income, education, and housing conditions have a pertinent correlation with adverse outcomes due to CVDs^{20,21}.

A lower level of education can result in less knowledge about the prevention of chronic diseases and consequently compromise the effectiveness of primary prevention strategies²². Similarly, the results found in this study demonstrated that, among individuals with a lower level of education, there is a higher proportion of deaths, the opposite occurring among those with a more significant number of years of study, showing a reduction in this proportion.

Regarding the age group of deaths, it was evident that from the age of 45, there is an increasing increase in the proportions of deaths, with the peak being in individuals aged 75 years or over. Our results are in line with other studies, which showed a similar age range in patients with coronary artery disease¹⁹ and mortality due to AMI in Brazil^{17,23}.

The analysis of marital status demonstrated that the highest proportions of deaths from AMI were identified among married individuals. This is similar to what was found in another study²², which showed that there is a higher prevalence of chronic non-communicable diseases and cardiovascular risk factors in married individuals.

Finally, the hospital environment was highlighted regarding the place where death occurred. This may be related to the expansion and importance of mobile emergency

components, which can stabilize and transport the individual to definitive treatment in a timely manner²⁴. However, there are still obstacles related to the activation of mobile emergency services by individuals affected by AMI, partly related to the lack of knowledge of the symptoms related to the event and the trivialization of the pain experienced²⁵.

4 Conclusion

A higher proportion of deaths was observed in the cities of Recife and Jaboatão dos Guararapes among men, those aged 75 years or over, with low levels of education and with married marital status. Regarding the central location of deaths, the hospital stood out, followed by the home.

Although deaths from AMI have shown a drop between the years investigated, a sharp reduction is noted compared to that observed in previous years, in the initial years of the coronavirus disease 2019 (COVID-19) pandemic, which may have interfered with the attribution of the cause of AMI notification deaths.

This study has limitations, both because it is an ecological study, which does not allow the inclusion of relevant individual clinical variables, and, therefore, it is not possible to establish a definitive causal relationship, and because it is a study carried out with secondary data, which are subject to underreporting. However, it makes essential contributions when describing the profile of AMI deaths in the I GERES municipalities of Pernambuco and can help guide public health strategies.

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