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ORIGINAL ARTICLE

Assessment of the potential for morbidity and mortality from COVID-19 in rural quilombola communities in Goiás, Brazil

Avaliação do potencial de morbimortalidade por COVID-19 em comunidades quilombolas rurais de Goiás, Brasil

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ABSTRACT

Objective: to analyze the potential for morbidity and mortality from COVID-19 in rural quilombola communities. **Methods:** cross-sectional study, with 26 communities in the State of Goiás. The Analytic Hierarchy Process (AHP) method was used, which ranks criteria to estimate the COVID-19 morbidity and mortality priority index, namely: male gender, age ≥ 60 years, diabetes, cancer, hypertension, smoking, dyslipidemia and obesity. **Results:** among the 1,672 respondents, 52.0% were men, 19.0% ≥ 60 years, 5.5% self-reported diabetes, 19.6% hypertension, 9.2% dyslipidemia, 1.3% obesity, 0.4% cancer and 13.9% smoking. There was a lower priority index in the Engenho 2 community, and higher in the Buracão; where: age ≥ 60 years in the Quilombo do Magalhães; male gender in the Kalunga dos Morros; diabetes and hypertension in the Tomás Cardoso; dyslipidemia in the Almeidas; obesity in the Buracão; cancer in the Água Limpa; smoking in the José de Coleto. **Conclusion:** there were different potential for morbidity and mortality from COVID-19, demonstrating which community has the highest/lowest priority for strategic actions to face the pandemic.

Descriptors: Coronavirus Infections; Rural Population; Indicators of Morbidity and Mortality; Vulnerable Populations.

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RESUMO

Objetivo: analisar o potencial de morbimortalidade por COVID-19 em comunidades quilombolas rurais. **Métodos:** estudo transversal, com 26 comunidades do Estado de Goiás. Utilizou-se o método *Analytic Hierarchy Process* (AHP) que hierarquiza critérios para estimar o índice de prioridade de morbimortalidade por COVID-19, sendo eles: sexo masculino, idade ≥ 60 anos, diabetes, câncer, hipertensão, tabagismo, dislipidemia e obesidade. **Resultados:** de 1.672 entrevistados, 52,0% eram homens, 19,0% ≥ 60 anos, 5,5% autor referiram diabetes, 19,6% hipertensão, 9,2% dislipidemia, 1,3% obesidade, 0,4% câncer e 13,9% tabagismo. Houve menor índice de prioridade na Comunidade Engenho 2, e maior em Buracão; sendo: idade ≥ 60 anos em Quilombo do Magalhães; sexo masculino em Kalunga dos Morros; diabetes e hipertensão em Tomás Cardoso; dislipidemia em Almeidas; obesidade em Buracão; câncer em Água Limpa; tabagismo em José de Coleto. **Conclusão:** houve diferentes potenciais de morbimortalidade por COVID-19, demonstrando qual comunidade apresenta maior/menor prioridade para ações estratégicas para enfrentamento da pandemia.

Descritores: Infecções por Coronavírus; População Rural; Indicadores de Morbimortalidade; Populações Vulneráveis.

INTRODUCTION

COVID-19 is a disease caused by the new coronavirus, the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), and its rapid spread has represented a threat to global public health[1]. It is estimated that until the completion of this manuscript, 155,506,494 cases of COVID-19 had been reported, resulting in 3,247,228 deaths worldwide[2].

Studies have shown that some conditions increase the risk of severe cases and mortality from COVID-19, including: male gender, advanced age, smoking and some comorbidities, such as arterial hypertension, diabetes mellitus, obesity and cancer[3-5].

In this sense, the occurrence of COVID-19 is particularly worrying in Brazil. Because in addition to being a country with a high proportion of elderly people, as age increases, the prevalence of multiple diseases including arterial hypertension, diabetes and obesity increases[6].

Despite the speed of studies on the spread of COVID-19, and the evidence already generated on risk factors, data on its spread in rural communities are still scarce[7-8]. In North Carolina (United States of America), the average mortality rate per 100,000 population was 89.9 in rural regions and 58.5 in urban regions. In addition, four of the five main regions with the highest number of deaths were rural, which can be attributed to life expectancy and lower care capacity, increasing mortality rates in the rural population[7]. In the counties of the United States of America, classified as rural and urban, there was a high lethality rate in rural regions, when compared to urban areas[8].

In Brazil, no studies on the epidemiology of COVID-19 in rural populations were identified. However, in general, the living conditions of the population in rural areas are characterized by worse socioeconomic indicators, sanitation, lower access to health services[9], high prevalence of chronic non-communicable diseases (NCDs), which are associated with increased morbidity and mortality from COVID-19.

Given the progression of COVID-19 in Brazil, and its impact on rural populations, which is considered a vulnerable population, the objective of this study was to analyze the potential for morbidity and mortality from COVID-19 in rural quilombola communities in the State of Goiás. Developed from the analysis of demographic characteristics, such as gender, age and comorbidities. The results of this investigation will contribute to decision-making and the elaboration of care strategies to protect the health of this group, in addition to highlighting conditions that may be used in future care protocols for users exposed to respiratory diseases.

METHODS

Cross-sectional study, with data from the Sanitation and Environmental Health Project in Rural and Traditional Communities in Goiás (SanRural Project)[10]. The primary objective of this study was to evaluate the health and sanitation situation in the population of quilombola communities, rural and riverside settlements residing in 47 of the 256 municipalities in the state of Goiás, aged 18 years or older.

For the present research, data from quilombola communities were analyzed. There are 58 quilombola communities certified by the Palmares Foundation in the state of Goiás. These communities may be located in rural and/or urban areas, thus presenting different characteristics in terms of distance between households and access to health services. According to Decree No. 4,887 of 2003, ethnic-racial groups are considered to be remnants of quilombo communities, according to self-attribution criteria, with their own historical trajectory, endowed with specific territorial relations, with presumption of black ancestry related to resistance to oppression history suffered[11]. Thus, the quilombola communities located in rural areas of the state of Goiás, certified by the Palmares Foundation until December

2017, when the information collection began, were selected, totaling 26 communities investigated (Figure 1).

The number of households visited was dimensioned so that the interval estimates of proportions were obtained with a confidence level of 95%, and the maximum error of the estimates varied according to the different levels of geographic coverage. Thus, the lowest level of coverage with precision control of the estimates considered was per community, with a maximum error margin of 10% and, for all communities of the same type, with a maximum error of 2%. To calculate the samples, Equation 1 was used,

$$n = \frac{Nz_{\gamma}^2 p(1-p)}{(N-1)e^2 + z_{\gamma}^2 p(1-p)}$$

Equation 1

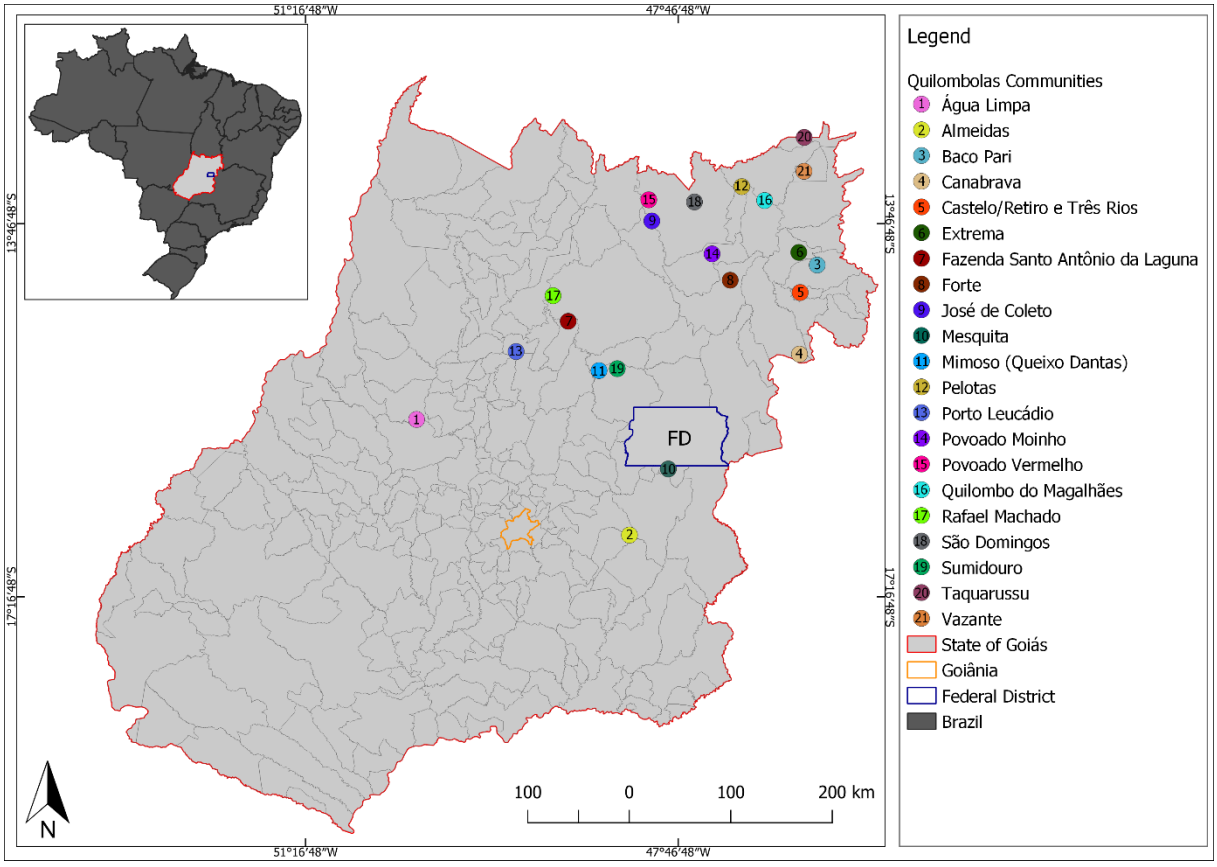
where "N" is population size, "z_{γ}" is the standard normal distribution score referring to the confidence level ", "p" is the population proportion to be estimated, and "e" is the maximum error of the estimate[12]. In the calculations, the maximum variability was considered to estimate the proportion (p=0.5).

Prior to data collection, a community mobilization was carried out with an agreement on the dates and organization of logistics for their participation in the research. Trained researchers performed data collection on-site. The interview was carried out using an electronic HP-Ipaq Pocket PC device, called "pocket", with daily backup of information. The form was divided into five blocks to characterize the sociodemographic profile and health conditions. Regarding health conditions, they were asked about the presence of comorbidities.

O The questionnaire was applied and directed to the respondent (a person over 18 years old), recognized as responsible for the family information, and to the family members who had their data answered by the person responsible.

The variables analyzed in this study were: male gender, age ≥ 60 years, diabetes mellitus, cancer, arterial hypertension, smoking, dyslipidemia and obesity, with self-reported morbidities. Smoking was assessed by reference to systematic consumption of tobacco products (non-smoker/ex-smoker and current smoker). The presence of diseases was estimated in a self-reported way through the question: *"What diseases has the doctor already said that you have?"*[6]

Figure 1. Location of the quilombola communities



Source: Elaborated by authors.

The Analytic Hierarchy Process (AHP) method was used to carry out the study. Which aims to prioritize the criteria defined according to their degree of significance, thus collaborating with managers in making strategic decisions. The application of the AHP method followed the steps recommended by Saaty (1987)[13], starting with the hierarchical structuring, considering the objective of this research, and adopting the analysis variables. Then, the judgment of each criterion was performed using a spreadsheet in Excel software developed by Goepel (2013)[14]. With the attribution of weights and analysis of their consistency by the authors of this work, ranging from 1 to 9 (1=equally important to 9=extremely important).

The validation of the assigned weights considered the Consistency Ratio (CR), obtained through the CR = ($\lambda_{máx}$-N)/((N-1)(RI)), where RI is the average random consistency index[13]. In this study, the CR obtained in the judgment of the weights assigned by the experts in the criteria was 10%, the limit recommended by Saaty (1987)[13]. Thus, the weights resulted in: age ≥ 60 years (24.8%), diabetes mellitus (17.7%), cancer (16.8%), arterial hypertension (16.4%), obesity (15.8%), dyslipidemia (4.7%), smoking (2.2%), and male gender (1.6%).

After assigning the weights, the parity comparison matrix was constructed, where Equation 2 was defined to objectively assign the weights for parity comparisons between communities for the same criterion. Thus, reflecting the judgment scale attributed by Saaty (1987)[13], according to the weights obtained,

$$f(x) = \left(\frac{8\left(e^{0,5(x_2-x_1)}-1\right)}{e^{0,5}-1}\right)^{sign(x_2-x_1)}$$

Equation 2

where and are the values of the criteria in communities C_1 and C_2, respectively, and the sign (x) is equal to *1* if and *-1* otherwise. If the criterion had not been evaluated in the interval [0.1], a transformation of maximum and minimum given by $x_T = (x\text{-}x_{min})/(x_{max}\text{-}x_{min})$ where x_{max} and x_{min} are the maximum and minimum of the criterion among the 26 communities. After determining the parity comparisons, the ahpsurvey package of the R software was used to apply the AHP method, from which the priorities (pr) of the communities in each criterion were obtained. The final priority (prf) for each community considering all criteria together was obtained by averaging the priorities of the criteria weighted by their weight, also obtaining the CR.

The results of the hierarchical data were analyzed and the ranking of communities were tabulated in order of priority so that managers can plan the necessary control measures to reduce the potential for morbidity and mortality from COVID-19.

A cluster analysis was applied with the objective of grouping the quilombola communities according to similar characteristics based on the final priority obtained by the AHP. Community groups were constructed with homogeneity within the group and heterogeneity between groups as a result of the cluster analysis, graphically indicating that closer communities have greater similarity according to the AHP. The hierarchical clustering procedure was adopted, establishing a tree-like structure. In which each community starts as a cluster and then they are compared. The graphical representation of this procedure is called a dendrogram. Among the methods available in the literature to group communities, the Ward method was adopted to form clusters. The method aims to group by similarity, seeking to agglomerate clusters that minimize the sum of squares of errors "within the groups"[15].

The Research Ethics Committee (CEP) of the Federal University of Goiás (UFG) approved the project, according to the Protocol No. 2,886,174/2018. Written consent was obtained for all participants.

RESULTS

Table 1 shows the 26 communities studied in this research, with the total number of households, totaling 1,679 people interviewed in 532 households visited. Also in Table 1, there are the relative frequencies of the priority criteria for each quilombola community. As well as the results for each community of the priorities of the criteria adopted as the potential for morbidity and mortality from COVID-19 and the final priority index (Indpri) obtained with the application of the Analytic Hierarchy Process.

The general results show that 52.0% of the residents were male, 19.0% were ≥ 60 years old, 5.5% self-reported diabetes mellitus, 19.6% arterial hypertension, 9.2% dyslipidemia, 1,3 % obesity, 0.4% cancer and 13.9% smoking.

Figure 2a shows the variation of frequencies for each criterion. Among the eight criteria analyzed, Age ≥ 60 years and arterial hypertension showed greater variations between the minimum and maximum (excluding outliers). Thus, showing that there are communities with a small and large percentage of the population aged ≥ 60 years, as well as with arterial hypertension, reflecting in the Prioritization Index (Indpri).

The application of the AHP showed that Engenho 2 community had a lower final priorizarion index for morbidity and mortality from COVID-19 (Indpri = 15.16 x 10-3). The Buracão community had the highest index (Indpri = 89.62 x 10-3) (Table 1; Figure 3).

Analyzing the prioritization of each criterion individually, the Quilombo do Magalhães community presented the

Table 1. Relative frequency of criteria and priorities of the final priority criteria (Indpri) obtained with the application of the Analytic Hierarchy Process

Community	Number of households visited	Number of individuals interviewed	Criteria																Priority (Indpri (x10^{-3})
			Frequency (%)								Prioritization (x10^{-3})								
			Age > 60 years	Male gender	Diabetes mellitus	Arterial Hypertension	Dyslipidemia	Obesity	Cancer	Smoking	Age >60 years	Male gender	Diabetes mellitus	Hypertension	Dyslipidemia	Obesity	Cancer	Smoking	
1	16	40	42.5	45.0	5.0	30.0	10.0	0.0	2.5	17.5	99.3	11.6	26.4	56.9	30.7	21.1	200.5	32.7	78.0
2	25	72	26.4	51.4	8.3	23.6	22.2	4.2	1.4	16.7	40.8	25.3	45.0	33.3	129.4	61.3	91.8	30.6	55.8
3	26	117	8.5	53.8	3.4	8.5	5.1	0.0	0.0	11.1	11.9	33.6	18.8	9.9	15.1	21.1	18.2	18.3	15.9
4	4	14	28.6	57.1	14.3	35.7	21.4	14.3	0.0	21.4	46.2	49.7	98.4	84.4	122.5	229.3	18.2	48.2	89.6
5	42	124	22.6	48.4	6.5	21.0	15.3	0.8	0.8	10.6	28.7	16.8	32.0	25.8	65.9	23.2	49.7	18.3	32.8
6	23	57	28.1	61.4	7.0	24.6	5.3	0.0	0.0	26.3	46.2	79.8	35.9	36.1	15.7	21.1	18.2	67.0	33.6
7	35	86	26.7	47.7	8.1	39.5	20.9	1.2	0.0	10.5	41.8	15.5	43.9	110.6	115.9	34.4	18.2	18.3	50.9
8	36	156	6.3	50.9	3.2	6.4	2.6	0.6	0.0	9.6	10.7	23.3	18.2	8.6	10.5	22.7	18.2	17.1	15.2
9	24	88	19.3	52.3	4.5	25.0	9.1	1.1	0.0	10.2	25.2	28.2	21.3	38.1	26.7	24.0	18.2	17.8	25.2
10	12	33	27.3	51.5	3.0	18.2	9.1	0.0	0.0	15.2	43.5	25.5	18.1	20.9	26.7	21.1	18.2	28.2	26.1
11	23	52	21.2	63.5	13.5	21.2	5.8	5.8	1.9	13.5	28.0	97.8	89.1	27.6	15.7	86.6	134.3	23.5	66.3
12	9	23	13.0	56.5	4.3	8.7	4.3	0.0	0.0	43.5	16.0	48.0	20.5	9.9	13.3	21.1	18.2	170.8	20.7
13	11	32	31.0	69.0	0.0	3.1	0.0	0.0	0.0	25.0	53.4	147.3	11.1	7.0	7.9	21.1	18.2	60.6	26.8
14	14	63	4.8	55.6	9.5	11.1	4.8	0.0	0.0	11.1	10.1	44.3	51.0	11.1	14.3	21.1	18.2	18.3	21.5
15	20	73	21.9	50.7	1.4	16.4	8.2	4.1	1.4	20.5	28.0	22.7	12.5	17.7	25.0	61.3	91.8	43.0	39.6
16	29	68	25.0	52.9	2.9	20.6	5.9	1.5	0.0	17.6	36.6	29.6	17.2	24.2	16.2	35.2	18.2	32.7	26.6
17	10	40	25.0	62.5	5.0	20.0	12.5	0.0	0.0	30.0	36.6	89.1	26.4	23.4	44.0	21.1	18.2	85.1	29.3
18	13	50	28.0	42.0	4.0	30.0	8.0	0.0	0.0	12.0	46.2	8.8	20.5	56.9	24.0	21.1	18.2	19.3	32.5
19	28	101	14.9	42.6	4.0	17.8	6.9	1.0	1.0	4.1	17.0	9.1	20.5	20.4	18.7	24.0	68.7	10.9	27.8
20	20	46	23.9	50.0	0.0	39.1	13.0	0.0	0.0	23.9	32.6	20.1	11.1	107.8	45.8	21.1	18.2	54.6	37.8
21	7	16	56.3	56.3	0.0	31.3	6.3	0.0	0.0	6.3	169.4	47.4	11.1	60.3	17.1	21.1	18.2	12.5	62.1
22	13	41	22.0	48.8	9.8	26.8	12.2	2.4	0.0	22.0	28.0	18.0	55.3	43.5	43.5	41.1	18.2	49.3	36.8
23	36	121	14.0	56.2	1.7	16.5	5.8	0.8	0.0	9.1	16.4	47.4	14.7	17.7	15.7	23.2	18.2	16.5	18.1
24	26	75	12.0	53.3	12.0	12.0	13.3	4.0	0.0	13.3	15.0	30.5	76.2	12.7	48.6	59.5	18.2	21.8	35.0
25	19	66	12.1	50.0	6.1	18.2	7.6	0.0	0.0	3.0	15.2	20.1	31.1	20.9	22.5	21.1	18.2	10.4	20.7
26	11	25	32.0	44.0	20.0	40.0	16.0	0.0	0.0	28.0	57.2	10.5	173.7	114.6	68.5	21.1	18.2	74.4	75.1
CR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.24	1.46	1.41	1.85	1.49	0.68	0.40	1.27	NA
Total	532	1.679	19.2	52.0	5.5	19.6	9.2	1.3	0.4	13.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mean	20.4	64.5	22.8	52.8	6.8	21.7	10.1	3.2	1.5	16.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

Legend: Community name - 1= Água Limpa; 2=Almeidas; 3=Baco Pari; 4=Buracão; 5=Canabrava; 6=Capela; 7=Castelo, Retiro/Três Rios; 8=Engenho 2; 9=Extrema; 10=Fazenda Santo Antônio da Laguna; 11=Forte; 12=José de Coleto; 13=Kalunga dos Morros; 14=Mimoso; 15=Pelotas; 16=Pombal; 17=Porto Leucádio; 18=Povoado Levantado; 19=Povoado Moinho; 20=Povoado Vermelho; 21=Quilombo do Magalhães; 22=Rafael Machado; 23=São Domingos; 24=Sumidouro; 25=Taquarussu; 26=Tomás Cardoso; CR= Consistency Ratio; NA= Not applicable

Source: Elaborated by authors.

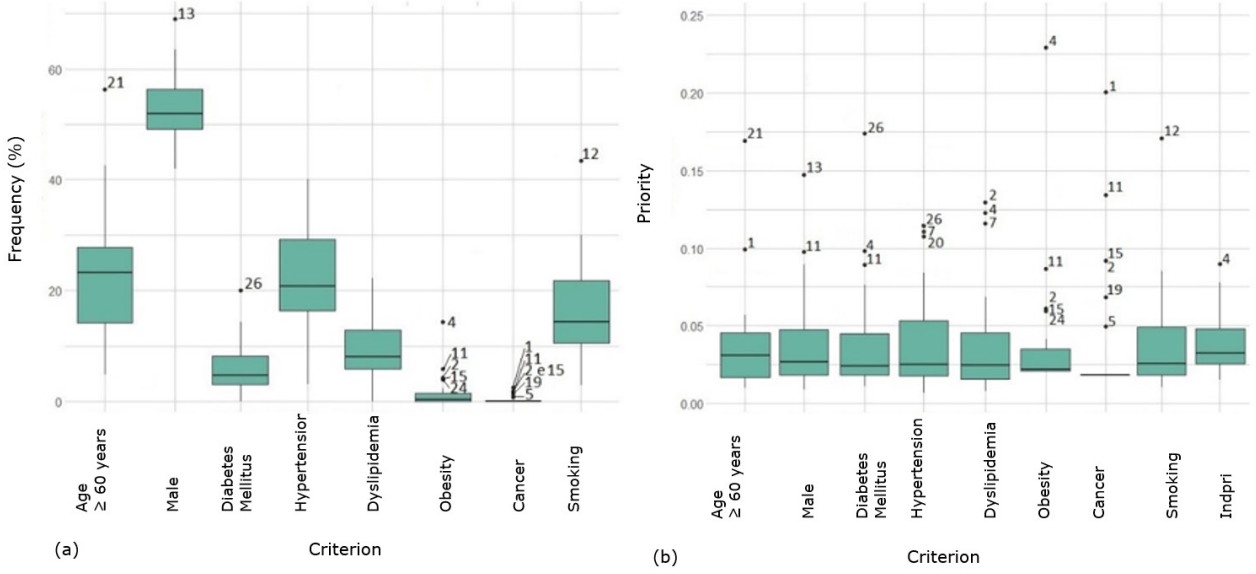
highest priority for the criterion age ≥ 60 years; the Kalunga dos Morros community for the male gender criterion. The community Tomás Cardoso presented the highest priority for the criteria of diabetes mellitus and arterial hypertension; the Almeidas community for the dyslipidemia criterion; the Buracão community for the obesity criterion; the Água Limpa community for the cancer criterion; and the José de Coleto Community for the smoking criterion (Table 1).

In Figure 2b, a boxplot of the prioritization index of each criterion is presented, as well as of Indpri. From one outliers (Smoking and Indpri) to six outliers (cancer) were observed for the analyzed criteria. The range of data variation in the interquartile range (around the median) was lower in the cancer criterion (zero), followed by obesity (13.9x10-3), evidencing greater homogeneity. In addition, the greatest range of variation was found for hypertension (35.9x10-3), followed by smoking (30.8x10-3), which reflects a lower homogeneity of the values found. The other criteria presented intermediate values, and the age ≥ 60 criterion presented greater symmetry in the distribution of prioritization values in each criterion.

Considering the Indpri, the cluster analysis allowed the grouping into five groups, as shown in the dendrogram presented in Figure 4. Groups 1 and 2 with the lowest probability of potential for morbidity and mortality from COVID-19, Group 3 with an intermediate degree, and Groups 4 and 5 with the highest probability, allowing communities to prioritize any intervention.

Figure 3 shows that the communities in group 5 (Buracão, Água Limpa and Tomás Cardoso) and Group 4 (Forte, Quilombo do Magalhães, Almeidas and Castelo, Retiro/Três Rios) had a higher priority index in mortality from COVID-19 in relation to groups 1, 2 and 3. The communities in Groups 5 and 4 presented a greater number of outliers in the boxplot, also called discrepant data, which together add up to 17 outliers, representing 68% of the total (Figure 2b), which justifies the greater prioritization of these communities. Groups 3, 2 and 1 presented 20.0%, 8.0% and 4.0% of outliers.

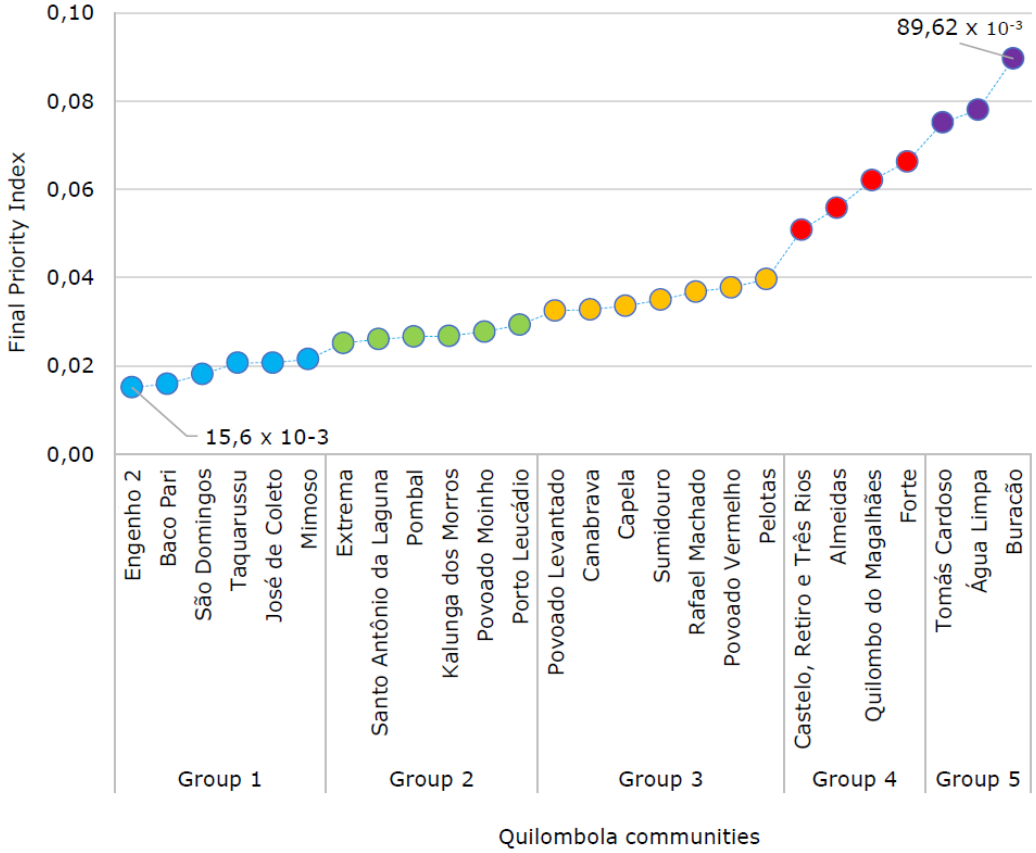
Figure 2. Boxplot of the number of self-reported diseases by quilombola communities, used as criteria (a) and the Prioritization Index (Indpri) of each criterion in relation to mortality from COVID-19 (b)



Legend: 1=Água Limpa; 2=Almeidas; 3=Baco Pari; 4=Buracão; 5=Canabrava; 6=Capela; 7=Castelo, Retiro/Três Rios; 8=Engenho 2; 9=Extrema; 10=Santo Antônio da Laguna; 11=Forte; 12=José de Coleto; 13=Kalunga dos Morros; 14=Mimoso; 15=Pelotas; 16=Pombal; 17=Porto Leucádio; 18=Povoado Levantado; 19=Povoado Moinho; 20=Povoado Vermelho; 21=Quilombo do Magalhães; 22=Rafael Machado; 23=São Domingos; 24=Sumidouro; 25=Taquarussu; 26=Tomás Cardoso; Indpri = Prioritization index; NA=Not applicable.

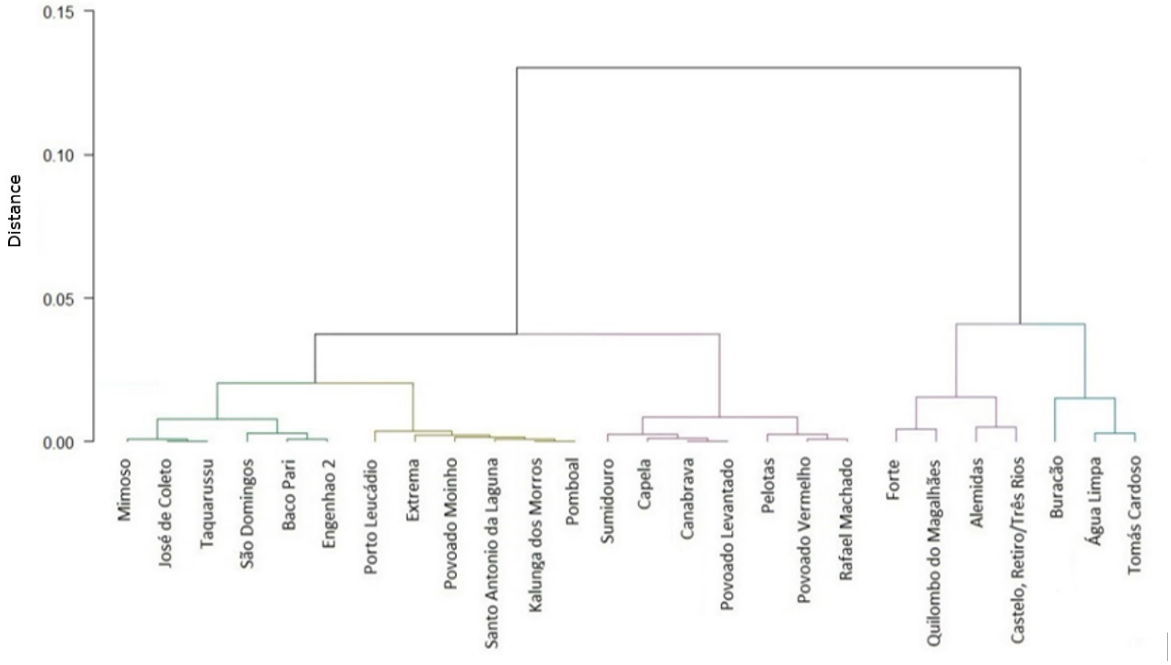
Source: Elaborated by authors.

Figure 3. Final Priority Index (Indpri) of the communities in relation to the potential for morbidity and mortality from COVID-19



Source: Elaborated by authors.

Figure 4. Dendrogram of the Final Priority Index (Indpri)



Source: Elaborated by authors.

DISCUSSION

This is the first study to analyze the potential for morbidity and mortality from COVID-19 in rural quilombola communities. Based on the health conditions at risk for COVID-19 available to date in the literature, the results of the present research showed that communities have different potential for morbidity and mortality for COVID-19. This can direct strategic actions to face the pandemic in quilombola communities in Goiás.

Regarding the criteria adopted to define the priority index, male gender, age ≥ 60 years, arterial hypertension and smoking were the most frequent in the communities. However, the highest weights were attributed to age ≥ 60 years, and to chronic conditions (diabetes mellitus, cancer, hypertension, obesity and dyslipidemia). Smoking and gender had lower weights, but with high proportions in the communities.

Age ≥ 60 years had the greatest impact on defining the priority index for COVID-19 mortality in communities (24.8%), and its overall frequency was 19.2%. Advanced age is one of the main risk factors for COVID-19[16-18]. In Brazil, since the beginning of the pandemic, the proportion of deaths among the elderly may be greater than 25.0% in relation to the adult population[16]. The elderly are considered a vulnerable group to COVID-19 because it is a group with a high burden of disease, and a greater number of functional limitations. In addition, changes typical of aging, such as a decrease in the immune system response and in the efficiency of gas exchange increase the susceptibility of the elderly to infectious diseases, and, therefore, with a worse prognosis for COVID-19. Considering that Brazil is an aging country, and that these projections reach different population strata, which includes quilombola communities, in this scenario, communities with a high number of elderly people are more susceptible to COVID-19. This can be observed in the communities Quilombo do Magalhães, Água Limpa and Tomás Cardoso, and, conversely, a younger population in the communities Mimoso, Engenho 2 and Baco Pari.

The male gender presented an overall frequency of 52.2%, with relevance in defining the prioritization index of 1.6%[19-20], which may be 1.3 times higher compared to women[20], which it may occur because male germ cells have fewer antibodies against infections[20]. The communities Kalunga dos Morros, Forte and Porto Leucádio presented the largest male populations, which can lead to higher mortality. In the opposite situation, the communities Povoado Moinho and Tomás Cardoso presented a lower presence of males, which can lead to a lower mortality rate.

In this study, following the criterion: age ≥ 60 years, the highest weights in the definition of the priority index were attributed to chronic diseases diabetes mellitus, cancer, hypertension and obesity (17.7%, 16.8%, 16.4% and 15.8%, respectively). On the other hand, the prevalences were 19.6% for hypertension, 5.5% for diabetes mellitus, 1.3% for obesity and 0.4% for cancer.

Arterial hypertension, diabetes mellitus, obesity and cancer are among the most prevalent chronic non-communicable diseases in the Brazilian population[6], and the first three have been reported as important risk factors for the severity of COVID-19[4,21].

In general, studies suggest that these diseases are associated with a strong expression of the angiotensin-converting enzyme (ACE) receptor, which, when stimulated, increases the production of inflammatory cytokines (IL-6 and TNF-α) leading to systemic inflammation and multiple organ dysfunction syndrome[4,21-22].

People with obesity are able to host a greater amount of virus, because the body adipose tissue has a high rate of expression of ACE 2[22]. Furthermore, it is hypothesized that the reduction in the inhibitory processes of acute inflammation in obese individuals is associated with prolonged viral dissemination[4]. People with diabetes and unstable blood glucose are at increased risk for viral infections. However, in the case of COVID-19, the evidence is still not conclusive whether the state of hyperglycemia or hypoglycemia during hospitalization alters the virulence of SARS-COv-2, or if the virus interferes with insulin secretion and glycemic control. Both insulin resistance and diabetes mellitus are associated with endothelial dysfunction and increased platelet aggregation, which favor a hypercoagulable prothrombotic state, a common condition in people hospitalized for COVID-19. These clinical changes, in addition to vascular inflammation, are part of the pathogenesis of other chronic diseases such as arterial hypertension, another important risk factor for COVID-19.

Therefore, considering the interrelationship between these diseases, and considering the prevalence in communities and impacts during hospitalization, residents of communities 4 and 5 have a higher probability of mortality from COVID-19. It is noteworthy that the prevalence of obesity in this study was estimated in a self-reported way, which may explain the low prevalence found (1.3%). A study with quilombolas in the state of Bahia[23], analyzed based on the body mass index (BMI), showed a prevalence of overweight of 31.8% and obesity of 10.2%. That is, the potential for the spread of COVID-19 may be even greater in the communities evaluated, given the measurement adopted in this study.

Regarding cancer, studies have shown that the susceptibility of acute infection by the SARS CoV-2 virus is associated with the fragility that already exists in the body[21-22]. The hospitalization rate for patients with COVID-19 and cancer with recent diagnoses (47.76%) were higher than for patients with COVID-19 (24.26%)[21]. These authors also found that the hospitalization rate was higher for African Americans (150 of 270 [55.56%]) than for white patients

(160 of 370 [43.24%]). In this scenario, special measures must be taken for the residents of communities where cases of cancer were self-declared, being Água Limpa (2.5%), Almeidas (1.4%), Canabrava (0.8%), Forte (1.9%), Pelotas (1.4%) and Povoado Moinho (1.0%).

Smoking was the only lifestyle criterion listed as a potential for the spread of COVID-19 in this study. Its weight for defining the priority index was 2.2% and its frequency was 13.9%, which was similar to the previous study with a population in rural areas[24]. Considered the main preventable cause of illness and early mortality in Brazil, smoking reduces lung capacity and contributes to the need for mechanical ventilation. In addition, it presents a higher risk of admission to Intensive Care Units (ICU) and for the development of acute respiratory distress syndrome, a frequent complication in severe cases of COVID-19[5].

This study has some limitations. First, the variables were investigated in a self-reported way, and despite their validation for epidemiological surveys, for some conditions such as obesity, this measure may be underestimated. On the other hand, considering that this is a statewide study, with a high number of quilombola communities that are difficult to access, this brings important contributions to the knowledge of the health situation. In addition, all researchers were previously trained to avoid bias.

CONCLUSION

In conclusion, quilombola communities showed different priority rates mortality from COVID-19. The Buracão community presented a possibility of higher mortality from COVID-19, as the disease spreads, requiring greater attention. This and the other communities in Group 5 and 4 require greater attention from managers regarding intervention actions, followed by Groups 3, 2 and 1. In view of this, it is recommended that preventive actions for the transmission of COVID-19 be reinforced in all communities, prioritizing the groups that had the highest priority rate for mortality.

Although in the state of Goiás, Law No. 20880/2020, which establishes the Emergency State Policy to Combat COVID-19 within the scope of indigenous and quilombola communities, with action guidelines aimed at the health care of these communities in relation to the disease (including guaranteeing access to health services, vaccination in priority groups, and specific prevention measures)[25], the application of this index indicates that some communities have higher priority due to the potential for morbidity and mortality from COVID-19..

It is recommended that this study be replicated in other scenarios involving quilombola communities, to guide decision-making by managers from other municipalities and states in the country. In addition, there is a need for future research that analyzes seroreactivity to SARS-CoV-2 in populations of vulnerable communities, such as quilombolas, so that the incidence of exposure to the virus during the pandemic is recognized.

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