

# Dyslipidemia and cardiovascular risk in Afro-descendants: a study of the Quilombola communities in Maranhão, Brazil

Dislipidemia e risco cardiovascular em afrodescendentes: um estudo em comunidades quilombolas do Maranhão, Brasil

*La dislipidemia y el riesgo cardiovascular en los afrodescendientes: un estudio sobre comunidades quilombolas de Maranhão, Brasil.*

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## Abstract

**Objective:** to evaluate the prevalence of cardiovascular risk factors associated with dyslipidemia in Quilombola communities in Maranhão, Brazil. **Methods:** a cross-sectional study was performed from February 2010 to November 2011. A total of 202 individuals belonging to the Quilombola communities in Codó, Maranhão were assessed. Risk factors associated with dyslipidemia and metabolic syndrome (MS) were evaluated. **Results:** the results showed a high prevalence of dyslipidemia (72.28%) and hypertension (43.07%). Isolated hypertriglyceridemia (38.61%) with normal levels of high-density lipoprotein cholesterol and low-density lipoprotein cholesterol was present in most individuals. Furthermore, the prevalence of MS and the estimated cardiovascular risks were low in this population. **Conclusion:** dyslipidemia, at the expense of triglycerides, and hypertension was highly prevalent. However, the frequency of other risk factors for cardiovascular events was low. A low prevalence of MS and cardiovascular risk according to the Framingham score for cardiovascular diseases was also identified.

## Keywords:

Dyslipidemias  
Cardiovascular Diseases  
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## Resumo

**Objetivos:** avaliar os fatores de risco cardiovascular associados à dislipidemia em comunidades quilombolas do Maranhão, Brasil. **Métodos:** um estudo transversal foi realizado no período de fevereiro de 2010 a novembro de 2011 em 202 indivíduos pertencentes às comunidades quilombolas de Codó-MA. Avaliaram-se os fatores de risco associados à dislipidemia e síndrome metabólica (SM). **Resultados:** o estudo mostrou alta prevalência de dislipidemia (72,28%) e de hipertensão arterial (43,07%). Houve predomínio de hipertrigliceridemia isolada (38,61%) com valores de lipoproteína de alta densidade e lipoproteína de baixa densidade normais na maioria dos indivíduos. A prevalência de síndrome metabólica e o risco cardiovascular estimado foram baixos nesta população. **Conclusão:** houve grande prevalência de dislipidemia, à custa de triglicédeos, e hipertensão; entretanto, a frequência de outros fatores de risco para eventos cardiovasculares foi baixa. Uma baixa prevalência de SM e de risco cardiovascular, segundo o escore de Framingham para doenças cardiovasculares, também foi identificada.

### Palavras-chave:

Dislipidemias  
Doenças Cardiovasculares  
Grupo com Ancestrais  
do Continente Africano  
Origem Étnica e Saúde

## Resumen

**Objetivos:** evaluar los factores de riesgo cardiovascular asociados con dislipidemia en comunidades quilombolas de Maranhão, Brasil. **Métodos:** un estudio transversal se realizó entre febrero del 2010 hasta el noviembre del 2011 en 202 individuos pertenecientes a comunidades quilombolas de Codó-MA. Se evaluaron los factores de riesgo asociados con la dislipidemia y el síndrome metabólico (SM). **Resultados:** el estudio mostró una alta prevalencia de la dislipidemia (72,28%) y de la hipertensión (43,07%). Hipertrigliceridemia aislada (38,61%) con valores de lipoproteínas de alta densidad y lipoproteínas de baja densidad normales estuvieron presentes en la mayoría. La prevalencia del síndrome metabólico y riesgo cardiovascular estimado fue bajo en esta población. **Conclusión:** hubo una alta prevalencia de dislipidemia, a expensas de los triglicéridos e hipertensión, no obstante, la frecuencia de otros factores de riesgo de eventos cardiovasculares fue baja. Una baja prevalencia de SM y el riesgo cardiovascular según la puntuación de riesgo de Framingham para la enfermedad cardiovascular también se ha identificado.

### Palabras clave:

Dislipidemias  
Enfermedades  
Cardiovasculares  
Grupo de Ascendencia  
Continental Africana  
Origen Étnico y Salud

## Introduction

Quilombolas are descendants of enslaved Africans in Brazil who have preserved their traditions over time.<sup>1</sup> These traditions include kinship practices; culinary tradition; religiosity; artistic expression; and political, economic, and social organization.<sup>2</sup> According to the Black Culture Center (*Centro de Cultura Negra*), there are 527 Quilombola communities in the state of Maranhão, concentrated mainly in the regions of Baixada Ocidental, Baixada Oriental, Munin, Itapecuru, Mearim, Gurupi, and Baixo Parnaíba.<sup>3</sup>

In the secular domain, the Quilombola communities survive through babassu agroextractivism and animal husbandry.<sup>4</sup> The Quilombola diet includes milk and babassu oil extracted from palm seeds.<sup>5-7</sup> The communities are impoverished and face challenges in accessing health and education services,<sup>8</sup> conditions that threaten the survival of this population.

A recent study evaluated the effects of babassu oil on microvascular permeability and leukocyte-endothelial interactions induced by ischemia/reperfusion using hamster cheek pouch microcirculation as an experimental model. The results suggested that unrefined babassu oil reduced microvascular leakage and protected against histamine-induced effects in postcapillary venules.<sup>9</sup>

Excess weight and dyslipidemia are well-established risk factors for developing cardiovascular disease (CVD).<sup>10,11</sup> Coronary artery disease (CAD) is associated with increased serum concentrations of total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-c) as well as reduced serum high-density lipoprotein cholesterol (HDL-c) concentrations.<sup>12,13</sup>

Recent changes in the lifestyle and diet of the Quilombola communities have increased the risk of such diseases as hypertension, obesity, and dyslipidemia.<sup>14</sup>

Our group has developed a study in these communities to evaluate the cardiovascular risk factors, lifestyle habits, and influence of babassu product consumption in their diet. Because these rural communities have unique characteristics, it will also be important, in the future, to obtain specific information regarding their genetic and environmental predisposition to cardiovascular risk factors.

Therefore, the purpose of the present study was to evaluate, for the first time, the factors associated with dyslipidemia in a rural Quilombola population in the state of Maranhão.

## Methods

A cross-sectional study was conducted following approval by the research ethics committee of the University Hospital of the Federal University of Maranhão (*Hospital Universitário da Universidade Federal do Maranhão - UFMA*), protocol nº 403/09. We evaluated individuals who participated in the Maranhão Outreach Project from February 2010 to November 2011. The project was named "Promotion and Prevention in Health: Comprehensive Care for the Quilombola Communities of Codó-MA". It was implemented in the communities of Santo Antônio dos Pretos, Mocarongo, and Cipoal dos Pretos, located approximately 330 km from São Luis, the capital of Maranhão. This study used a convenience sample. The population of the three Quilombola communities consists of 161 families with a total of 322 individuals aged 20 to 70 years.<sup>1,3</sup> The following were considered as inclusion criteria: being black, belonging to one of the black communities in the study, being between 20 and 70 years of age, and having daily supplements of almond coconut and babassu oil derivatives for at least 10 years. The final sample consisted of 202 individuals who came to the health clinic during the study field surveys.

All individuals were given an informed consent form, and signatures and fingerprints were obtained for consent to participate in the study. Clinical and anthropometric evaluation data and blood biochemical analyses were examined. The name, gender, age, skin color, education, personal medical history, smoking status, alcohol use, blood pressure, abdominal circumference, weight, body mass index (BMI), fasting blood sugar, triglycerides (TG), TC, HDL-c, and LDL-c were recorded for each participant.

The blood collection, normalization parameters, and diagnostic criteria of dyslipidemias were according to the norms of the IV Brazilian Guidelines on Dyslipidemia and Prevention of Atherosclerosis.<sup>11</sup> The biochemical analyses were performed using ADVIA 1650 equipment. The LDL-c concentrations were calculated using the Friedewald formula.<sup>11</sup>

The dependent variable was the lipid profiles of the participants. The participants were categorized into two groups, one consisting of individuals with dyslipidemia and the other consisting of those with normal lipid profiles. The independent and categorical variables included age (<30, 30-39, 40-49, 50-59, 60-69, 70-79, or >80 years), gender (male and female), education in years of study: illiterate, up to 5 years, up to 9 years, or more than 9 years), alcohol use (yes or no), smoking status (nonsmoker, ex-smoker, or smoker), hypertension (yes or no), BMI (low weight, normal weight, overweight, or obese), waist circumference (normal or abnormal), and fasting blood sugar (normal or abnormal).

Individuals who reported alcohol consumption, regardless of the type or amount of alcohol consumed, were considered alcohol users. Individuals who reported smoking were considered to be smokers regardless of the number of cigarettes smoked. Passive smokers were not considered to be smokers.

Blood pressure was measured according to the VI Brazilian Guidelines on Hypertension.<sup>15</sup> Individuals who used antihypertensive medications and those with a systolic blood pressure  $\geq 140$  mmHg and/or a diastolic blood pressure  $\geq 90$  mmHg were considered to have hypertension.

A portable, platform-style Plenna digital scale with a 150-kg capacity was used to measure body weight. All participants were weighed on an empty stomach and wearing only underwear. A portable Altura Exata stadiometer with a scale from 0 to 220 cm and divisions of 0.1 cm was used to measure height. All participants were barefoot during this measurement.

BMI (weight/height<sup>2</sup>) was calculated according to the World Health Organization recommendations for evaluating nutritional status.<sup>16</sup> The participants were categorized as follows: low weight (BMI less than 18.5 kg/m<sup>2</sup>), normal weight (BMI between 18.5 kg/m<sup>2</sup> and 24.9 kg/m<sup>2</sup>), overweight (BMI between 25 kg/m<sup>2</sup> and 29.9 kg/m<sup>2</sup>), and obese (BMI greater than 30 kg/m<sup>2</sup>).<sup>17</sup>

The abdominal circumference, which reflects visceral fat, was measured using the median point between the outer side of the final rib and the iliac crest as reference. The circumference was measured using an inelastic measuring tape. The measurement was taken with the participant in an upright standing position, chest uncovered, at the end of exhalation.<sup>18</sup> Men were considered to be at risk when the abdominal circumference was  $\geq 90$  cm, and women were considered to be at risk when the circumference was  $\geq 80$  cm. These cutoff values were proposed for the people of South America by the International Diabetes Federation (IDF).<sup>19</sup> A Cescorf inelastic measuring tape was used to measure the circumference. The tape could measure up to 150 cm. The fasting blood sugar was considered to be abnormal when it was  $\geq 100$  mg/dL.<sup>19</sup>

Metabolic syndrome (MS) was diagnosed based on the guidelines from the National Institute of Health in the National Cholesterol Education Program, the Adult Treatment Panel III report, and the IDF. Abdominal circumference, TG, HDL-c, blood pressure, and fasting blood sugar were considered to be risk factors.<sup>11</sup> The IDF criteria were adopted in the present study.

The statistical analyses were performed using Stata/SE 9.0 for Windows (Stata Corporation, College Station, Texas, USA). A  $\chi^2$  test was employed to analyze the relationship between two categorical variables. If the resulting p value was  $< 0.05$ , we subsequently applied a partitioning  $\chi^2$  test. The coefficient of correlation was categorized as weak if it was between 0.1 and 0.3, moderate if it was between 0.31 and 0.6, and strong if it was greater than 0.61. A t-test for independent samples was used to compare the numerical variables between groups. A Poisson regression model was used for the multivariate analysis.<sup>20</sup> In this analysis, all independent variables associated with the dependent variable ( $p < 0.20$ ) in the univariate model were considered in the multivariate model. The Poisson regression was performed using the stepwise with backward elimination technique. In the final adjusted model, a p value  $< 0.05$  and a confidence interval of 95% were considered significant.

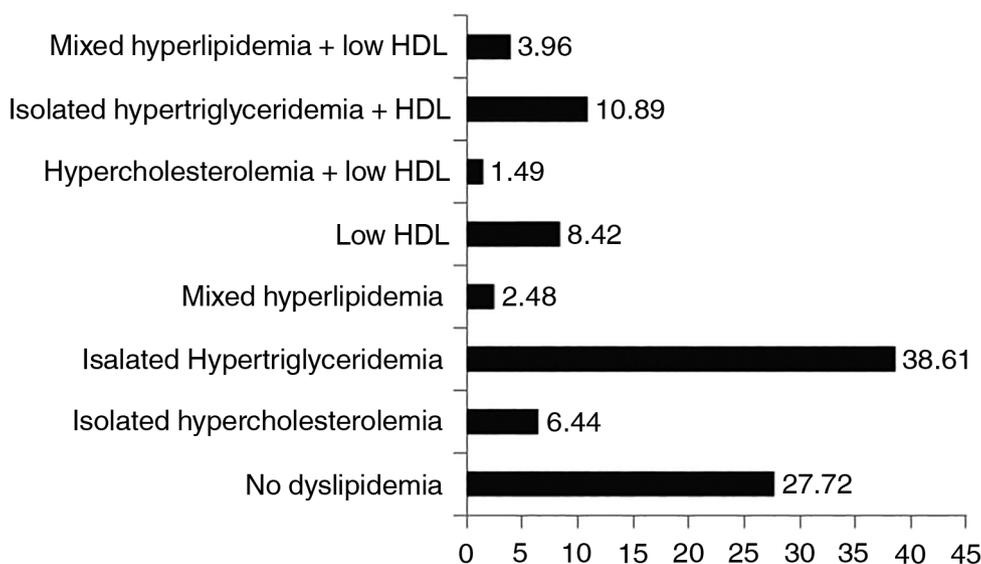
## Results

First, we analyzed the sociodemographic characteristics and life habits of the sample. Of the 202 participants, 119 (58.91%) were female, and 83 (41.09%) were male. The participants had an average age of 51.14 years. Individuals with no education were predominant within our sample (79.70%). Many had a history of smoking (52.48%) and consumed alcoholic beverages (59.20%). According to our data, 72.86%

belonged to the quilombola community of Santo Antonio dos Pretos; 16.83%, the community of Cipoal dos Pretos; and 10.89%, the community of Mococongo.

The anthropometric evaluation showed that 48.02% of the participants were of normal weight. In addition, 34.65% were overweight, and 12.87% were obese. The analyses also revealed that 55.94% of the participants had increased abdominal circumference. Hypertension (43.07%) and dyslipidemia (72.28%) were highly prevalent in the sample; 17.33% exhibited hyperglycemia. None of them were under antihypertensive, antidiabetic or lipid-lowering treatment.

The lipid profiles of the participants are shown in Graph I. Individuals with dyslipidemia had a high prevalence of isolated hypertriglyceridemia (38.61%). The mean values of the lipid measures were as follows: TG,  $163\pm 60$ ; TC,  $206\pm 0.5$ ; HDL-c,  $50.64\pm 11.16$ ; LDL-c,  $121.67\pm 49$ ; VLDL-c,  $33.06\pm 14.75$ ; TG/HDL-c,  $3.35\pm 1.55$ ; and TC/HDL-c,  $4.21\pm 1.10$ . The serum concentrations of HDL-c and LDL-c were normal in most individuals (73.27% and 85.64%, respectively). Most individuals (73.76%) did not meet the IDF criteria for MS.



**Graph 1.** Classification of the lipid profile of the participants according to the IV Brazilian Guidelines on Dyslipidemia.

The non-adjusted results of the association between sociodemographic factors and lifestyle with dyslipidemia and of the association between the physiological factors and the presence of dyslipidemia demonstrate that the chance of having dyslipidemia was greater among individuals who smoked (21%) and had hypertension (25%) than among individuals without these risk factors.

Table 1 shows the adjusted results of the association between the socioeconomic, lifestyle, and physiological factors with the presence of dyslipidemia. The results show a significant association between MS and dyslipidemia (odds ratio (OR)=1.55; confidence interval (CI) 1.10-1.28). Dyslipidemia was not significantly associated with hypertension, smoking, or education.

The association between the presence of MS and the socioeconomic and lifestyle factors was also analyzed. In the adjusted analysis, male were less likely to have MS, and advanced age was associated with a higher chance of this syndrome (Table 2). In these communities, the majority of the individuals had a low chance of myocardial infarction and death within 10 years, according to the Framingham assessments (Graph 2).

**Table 1.** Multivariate analysis. Factors associated with the presence of dyslipidemia.

Characteristics	Dyslipidemia	Adjusted OR (95% CI)	p
<b>Metabolic syndrome</b>			<0.01
No	94 (64.38)	1.00	
Yes	52 (35.62)	1.55 (1.10-2.18)	
<b>Arterial hypertension</b>			0.81
No	75 (51.37)	1.00	
Yes	21 (48.63)	1.04 (0.72-1.51)	
<b>Smoking</b>			0.78
Nonsmoker	65 (44.52)	1.00	
Ex-smoker	17 (11.64)	0.92 (0.54-1.59)	
Current smoker	64 (43.84)	1.20 (0.74-1.71)	
<b>Education</b>			0.80
Incomplete primary education	14 (9.59)	1.00	
Complete/half complete primary education	8 (5.48)	1.11 (0.76-2.47)	
No education	124 (84.93)	1.33 (0.76-2.34)	

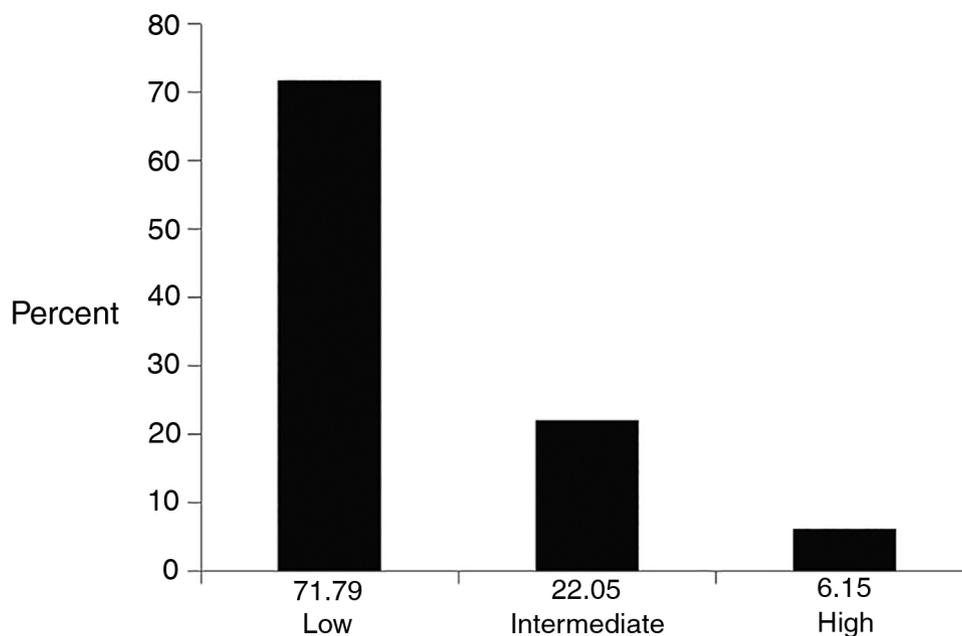
**Table 2.** Multivariate analysis. Factors associated with the presence of metabolic syndrome.

Characteristics	Nonadjusted OR (95% CI)	Adjusted OR (95% CI)	p
<b>Gender</b>			0.001
Female	1.00		
Male	0.42 (0.23-0.74)	0.32 (0.16-0.63)	
<b>Alcohol use</b>			0.63
No	29 (54.72)	1.00	
Yes	24 (54.28)	0.86 (0.47-1.57)	
<b>Age</b>			<0.001
20-39 years	1.00		
40-49 years	3.60 (1.28-10.12)	3.91 (1.29-11.81)	
50-59 years	3.34 (1.15-9.62)	4.10 (1.31-12.78)	
60-69 years	3.24 (1.08-9.70)	3.98 (1.22-12.99)	
70-79 years	5.76 (1.98-16.78)	6.87 (2.06-22.91)	
>80 years	8.75 (3.05-25.06)	13.76 (3.62-52.27)	

## Discussion

The present study evaluated the factors associated with dyslipidemia and cardiovascular risk in the Quilombola communities of Codó in the state of Maranhão. The representation of the study sample reinforces the internal validity of the study. Our sample comprised 202 individuals from small black communities (161 registered families). The community of Santo Antonio dos Pretos is the largest expansion in terms of area and number of families.<sup>1,3</sup> Thus, the general applicability of the results for the Quilombola population in the studied municipality is also ensured.

The current study is relevant because it describes a population of Brazilian Afro-descendants with a rural and homogenous lifestyle. One of the main risk factors for CVD is hypercholesterolemia.



**Graph 2.** Distribution of the individuals according to the Framingham score.

Hypercholesterolemia is potentiated by obesity, sedentary lifestyle,<sup>21</sup> and other factors such as smoking, hypertension, poor eating habits, and family history.<sup>11</sup>

Dyslipidemia was primarily associated with isolated hypertriglyceridemia (mean,  $163 \pm 60$  mg/dL). It was not associated with an increased prevalence of hyperglycemia or obesity. The serum concentrations of HDL-c and LDL-c were normal in most individuals (73.27% and 85.64%, respectively). There was no significant association between dyslipidemia and hypertension, smoking, and education. Thus, 71.79% of the individuals had a low risk of myocardial infarction and death within 10 years according to the Framingham score. This analysis excluded individuals older than 79 years. According to Lotufo,<sup>22</sup> the Framingham score is useful in CVD prevention practices within the clinical and epidemiological contexts. However, it does not take diet, weight, and physical activity into consideration, and this analysis was not considered in our study.

The low cardiovascular risk of the sample and the HDL-c levels presented are similar to those found in the literature.<sup>23</sup> There is evidence that risk factors for CVD, such as hypertension and smoking, are present in Afro-descendants. However, Afro-descendants, especially male afro-descendants, did not show a larger difference in mortality as a result of coronary disease. The increase in HDL-c may be protective against cardiovascular risk. In the present study, the main difference concerning lipid pattern was the presence of hypertriglyceridemia.<sup>23</sup>

It is difficult to compare our data with the prevalence of MS in other Afro-descendant communities in Brazil. These studies, particularly lipid profile studies, are scarce. Medeiros is one of the few studies that have examined the remaining Quilombola communities in the state of Amapá.<sup>24</sup> They found a low prevalence of MS and fewer independent CVD risk factors among Quilombolas than among non-Quilombolas.

Barbosa et al., in 2010, studied MS in 719 patients at the Outpatient Cardiology Care in the city of São Luís, the capital of the state of Maranhão and found an elevated prevalence of MS. The prevalence

was higher among individuals with low income and advanced age.<sup>25</sup> The study sample had a different sociodemographic profile than that in our study. Barbosa et al. evaluated an urban population.<sup>25</sup> In contrast, the Quilombola communities reported here are essentially rural. This may explain the difference in the identified prevalence of MS. Lifestyle and eating habits may contribute to these differences.

The data on hypertension in our study did not differ from those in the literature. The prevalence of hypertension was high. Lopes analyzed hypertension as one of the risk factors for CVD.<sup>26</sup> He showed that several international and Brazilian studies consistently reported a greater prevalence of hypertension in the black population than in the white population. Another cross-sectional study was conducted by the Brazilian Surveillance System of Chronic Disease Risk Factors and Protection in 2006 using a telephone survey approach (Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por inquérito telefônico; VIGITEL). The frequency of self-reported arterial hypertension was 21.6%. This frequency increased with age, decreased with higher education, and was elevated in individuals with dark skin.<sup>27</sup>

Otherwise, studies have shown that physical activity is an important protective factor against CVD.<sup>28,29</sup> Physical activity increases adiponectin concentrations in the plasma, which, in turn, increases insulin sensitivity and decreases the levels of interleukin 6 and tumor necrosis factor- $\alpha$ .<sup>30,31</sup> In Quilombola communities, women perform agroextractivism, and men are responsible for farming activities. However, we do not quantify the energy expense demanded by these activities.

## Conclusions

This study has shown that the Afro-descendants of the Quilombola communities in the Maranhão countryside showed a high prevalence of hypertension and dyslipidemia characterized by increased TG. The frequency of other independent risk factors for cardiovascular events was low, as well as the prevalence of MS and cardiovascular risk according to the Framingham score for cardiovascular diseases.

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