

Original Research Article

Cardiovascular risk profile in a rural population of Colombia: a descriptive cross-sectional study

Miguel A. Trillos Arias*, Jose M. Alba Maldonado

Department of Ciencias Agropecuarias, Pedagogical and Technological University of Colombia, Tunja, Boyaca, Colombia

Received: 11 June 2026

Accepted: 16 September 2026

*Correspondence:

Dr. Miguel A. Trillos Arias,

E-mail: miguel.trillos@uptc.edu.co

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Cardiovascular disease is the leading cause of mortality in Colombia, and rural populations carry a disproportionate, poorly characterized burden. Evidence on the application of the 2024 Colombian Dyslipidemias Consensus in rural primary care is scarce. This study describes the cardiovascular risk profile of the adult population of Úmbita, Boyacá.

Methods: Descriptive cross-sectional study using secondary data from the institutional information system of the E.S.E. Centro de Salud San Rafael de Úmbita (January 2024 to December 2025). 1,261 adults aged 30 to 75 years without prior cardiovascular events were included. Demographic, anthropometric, comorbidity, and lipid variables were described; ten-year risk was stratified with the four-step Colombian algorithm and the Framingham-Wilson scale recalibrated for Colombia (factor 0.75).

Results: Mean age was 54.8 years (SD 12.2). Abdominal obesity reached 65.9% and excess weight 62.4%. Low HDL-C was present in 83.9% (91.1% in women), and LDL-C of 160 mg/dL or higher in 48.1%. Hypertension affected 30.1% and prediabetes 30.1%. Under the four-step algorithm, 45.6% classified as high or very high risk, including 25.8% of adults aged 30 to 44 years. Mean recalibrated Framingham-Wilson risk was 15.4% (SD 14.6); 27.5% classified as high risk (20% or higher), higher in women (33.8%) than men (18.4%).

Conclusions: Úmbita presents a severe cardiometabolic burden defined by low HDL-C, abdominal obesity, and mixed dyslipidemia, with elevated risk among adults of working age. These findings support primary care interventions articulated with the territorial determinants of health.

Keywords: Cardiovascular risk, Colombia dyslipidemias, Primary health care, Rural health, Rural population

INTRODUCTION

Cardiovascular diseases are the leading cause of death worldwide. The World Health Organization estimates that they account for approximately 32% of all global deaths each year, with most of this burden concentrated in low and middle income countries.¹ In Latin America, the epidemiological transition has shifted the dominant causes of death toward chronic noncommunicable conditions, and cardiovascular disease now leads

mortality across the region.² In Colombia, national statistics place cardiovascular disease among the leading causes of death in every adult age group, and in rural municipalities of Boyacá it accounts for close to half of all deaths, consistent with the advanced stage of the epidemiological transition in the department.³

Diet is one of the principal modifiable determinants of cardiovascular risk. The progressive replacement of traditional diets by energy dense foods rich in refined carbohydrates, added sugars, and low quality fats raises

the prevalence of dyslipidemia, abdominal obesity, and dysglycaemia.^{4,5} In Colombia this process has been described as a nutrition transition that accelerated over recent decades, with rising consumption of ultra-processed products even in low income and rural households.^{6,7} The transformation of agrifood systems under economic globalization has reduced dietary diversity in peasant communities and increased their dependence on industrially processed foods distributed through external supply circuits.⁸

Despite this, the specific cardiovascular burden of rural Colombian populations has historically been underestimated. National epidemiological studies have concentrated on urban settings or on mixed samples that dilute the particularities of rural inhabitants, and very few have applied the current national risk classification tools in a rural primary care setting. The 2024 Colombian Dyslipidemias Consensus introduced a four-step stratification algorithm that incorporates adverse socioeconomic conditions as a risk amplifier, yet evidence on its application to rural populations living under conditions of multidimensional deprivation remains scarce.⁹

Úmbita is a municipality in Boyacá where 82.5% of the population lives in dispersed rural areas, the economy is centered on peasant agriculture, and the rural multidimensional poverty index reaches 53.7%.^{10,11} Its epidemiological profile, although contained in the institutional information system of the local health center, had not previously been analyzed in terms of cardiovascular risk.

The present study describes, for the first time, the cardiovascular risk profile of adults aged 30 to 75 years in Úmbita, using institutional records from the 2024 to 2025 period, the four-step algorithm of the 2024 Colombian Dyslipidemias Consensus, and the Framingham-Wilson scale recalibrated for Colombia, in order to provide local evidence for health planning and primary care intervention.

METHODS

Study design and data source

Descriptive cross-sectional study using secondary data from the institutional information system of the E.S.E. Centro de Salud San Rafael de Úmbita, for January 2024 to December 2025. The period coincided with an active institutional screening effort that extended capture beyond spontaneous consultation, including home visits and field activities in rural settlements (veredas). Information was exported in six independent databases: five laboratory databases (total cholesterol, LDL-C, HDL-C, triglycerides, fasting glucose) and one anthropometric and comorbidity database.

Population, inclusion and exclusion criteria

Databases were integrated through an inner join by identification number. Inclusion criteria were complete data for every variable, age 30 to 75 years calculated on 31 December 2025, and no documented prior cardiovascular event. For patients with repeated measurements, the most unfavorable value was retained to characterize cardiovascular risk at its maximum expression during the period. LDL-C was estimated with the Friedewald equation when triglycerides were below 400 mg/dL. After age filtering, the preliminary database held 1,271 patients. Ten records were then excluded: one with prior acute myocardial infarction, two with HDL-C above 100 mg/dL, one with an incoherent lipid profile (LDL-C 25 mg/dL with triglycerides 1,945 mg/dL), five with BMI above 60 kg/m², and one with total cholesterol of 758 mg/dL. The final sample comprised 1,261 patients.

Variables

Demographic variables were age (continuous and in groups 30 to 44, 45 to 59, 60 to 75 years) and sex. Anthropometric variables were weight, height, BMI (WHO classification), and waist circumference, with abdominal obesity defined by the Colombian cut-points of Buendía et al (91 cm or more in men, 89 cm or more in women).¹² Clinical variables were hypertension, diabetes mellitus, and smoking (by diagnosis or active record), and systolic and diastolic blood pressure. Biochemical variables were total cholesterol, LDL-C, HDL-C (low below 40 mg/dL in men and below 50 mg/dL in women),¹³ triglycerides, and fasting glucose (prediabetes 100 to 125 mg/dL; diabetes 126 mg/dL or higher).

Risk stratification instruments

The primary instrument was the four-step algorithm of the 2024 Colombian Consensus for the Diagnosis and Treatment of Dyslipidemias in Adults.⁹ Step 1 identifies very high risk (diabetes with three or more additional risk factors, or chronic kidney disease). Step 2 identifies high risk (total cholesterol above 310 mg/dL, LDL-C above 190 mg/dL, blood pressure of 180/110 mmHg or higher, diabetes with at least one additional risk factor, or three or more simultaneous risk factors), counting six factors evaluable in the record (age over 65 years, hypertension, smoking, BMI-defined obesity, abdominal obesity, and prediabetes). Step 3 classifies moderate risk and adds amplifiers; only diabetes without risk factors and adverse socioeconomic conditions were evaluable. The socioeconomic amplifier, operationalized through the DANE Multidimensional Poverty Index, was assigned contextually to the whole sample given the documented rural deprivation of Úmbita (Multidimensional Poverty Index 53.7%, labor informality 93.4%, rural water quality risk index 61.45%), an ecological inference acknowledged as a limitation.^{10,11} With at most two amplifiers per patient, all Step 3 patients were moderate risk and Step 4 was not required. As several Consensus

conditions (coronary calcium, lipoprotein(a), familial hypercholesterolemia) were unavailable, the classification may be conservative.

The complementary instrument was the Framingham-Wilson scale with the recalibration factor 0.75 applied universally to the entire sample.^{14,15} As antihypertensive treatment was not available in the anthropometric database, hypertension status was used as a proxy for treated hypertension. The scale estimates the ten-year probability of a broad spectrum of coronary outcomes (myocardial infarction, angina, coronary insufficiency, intermittent claudication).

Ethical considerations

The study used anonymized data from the institutional information system of the E.S.E., within research approved by UPTC, without interventions in human beings. The principal investigator is a physician at the institution, and data access complied with institutional protocols.

Statistical analysis

Descriptive statistics were computed, absolute and relative frequencies for categorical variables and mean

with standard deviation and median with range for continuous variables. No hypothesis testing was performed given the descriptive design. Processing used a reproducible Python 3.9 script with the pandas and numpy libraries.

RESULTS

Demographic and anthropometric characteristics

The sample comprised 1,261 individuals, of whom 745 were women (59.1%) and 516 were men (40.9%). Mean age was 54.8 years (SD 12.2), with a median of 56 years and a range of 30 to 75 years. The 60-to-75-year group was the most represented (39.7%), followed by the 45-to-59-year group (36.6%) and the 30-to-44-year group (23.6%). Men were older on average than women (56.5 versus 53.6 years). Mean BMI was 26.6 kg/m² (SD 4.3), placing the group in the overweight category, with excess weight (BMI 25 or higher) in 62.4% and obesity (BMI 30 or higher) in 19.0%. Mean waist circumference was 93.3 cm (SD 10.7), available in 99.1% of patients, and abdominal obesity reached 65.9%, distributed almost symmetrically between men (66.6%) and women (65.5%) (Table 1).

Table 1: Demographic and anthropometric characteristics of the sample (n=1,261).

Variables	Total (n=1,261)	Men (n=516)	Women (n=745)
Age in years			
Mean±SD	54.8±12.2	56.5±11.6	53.6±12.4
Median [range]	56 [30-75]	57 [30-75]	54 [30-75]
30-44, N (%)	298 (23.6)	91 (17.6)	207 (27.8)
45-59, N (%)	462 (36.6)	193 (37.4)	269 (36.1)
60-75, N (%)	501 (39.7)	232 (45.0)	269 (36.1)
Sex, N (%)			
Distribution	1,261 (100)	516 (40.9)	745 (59.1)
Body mass index (BMI, kg/m²)			
Mean±SD	26.6±4.3	26.0±3.7	26.9±4.7
Underweight (<18.5), N (%)	17 (1.3)	5 (1.0)	12 (1.6)
Normal (18.5-24.9), N (%)	457 (36.2)	209 (40.5)	248 (33.3)
Overweight (25.0-29.9), N (%)	547 (43.4)	228 (44.2)	319 (42.8)
Obesity I (30.0-34.9), N (%)	188 (14.9)	62 (12.0)	126 (16.9)
Obesity II (35.0-39.9), N (%)	39 (3.1)	11 (2.1)	28 (3.8)
Obesity III (≥40.0), N (%)	13 (1.0)	1 (0.2)	12 (1.6)
Excess weight (≥25.0), N (%)	787 (62.4)	302 (58.5)	485 (65.1)
Waist circumference (n=1,250)			
Mean±SD (cm)	93.3±10.7	94.6±9.8	92.4±11.2
Abdominal obesity, N (%) ^a	824 (65.9)	339 (66.6)	485 (65.5)

Note: SD=Standard deviation; BMI=Body mass index; ^aAbdominal obesity defined by the Colombian cut-points of Buendía et al (91 cm or more in men, 89 cm or more in women); BMI percentages computed on n=1,261 and waist circumference on n=1,250. Source: Own elaboration with data from the E.S.E. de Úmbita, 2024-2025

Comorbidities and cardiovascular risk factors

Hypertension was the most frequent comorbidity (30.1%), with a higher prevalence in men (32.9%) than in

women (28.1%). Mean systolic blood pressure was 129.2 mmHg (SD 22.4) and mean diastolic pressure 78.6 mmHg (SD 11.7), at the threshold between high-normal blood pressure and stage 1 hypertension according to

JNC-7.¹⁷ Diabetes mellitus by diagnosis was recorded in 6.9% of the sample; cross-referencing with fasting glucose identified an additional 3.8% meeting the biochemical criterion (126 mg/dL or higher) without a registered diagnosis, raising the estimated prevalence to 10.7% and indicating that 35.6% of cases with a glycemic criterion lacked formal registration. This estimate is

consistent with national and rural Colombian figures, which range between 1.84% and 11.2% nationally and between 1.4% and 7.9% in rural areas.^{20,21,22} Declared smoking reached 0.7%, a figure interpreted with caution given the social desirability bias inherent to the clinical consultation (Table 2).

Table 2: Comorbidities and cardiovascular risk factors (n=1,261).

Variables	Total (n=1,261)	Men (n=516)	Women (n=745)
Comorbidities and risk factors, N (%)			
Arterial hypertension	379 (30.1)	170 (32.9)	209 (28.1)
Diabetes mellitus, by diagnosis	87 (6.9)	37 (7.2)	50 (6.7)
Diabetes mellitus, estimated ^a	135 (10.7)	56 (10.9)	79 (10.6)
Prediabetes (glucose 100-125 mg/dL)	380 (30.1)	173 (33.5)	207 (27.8)
Diabetes by glucose (≥ 126 mg/dL)	91 (7.2)	41 (7.9)	50 (6.7)
Smoking	9 (0.7)	6 (1.2)	3 (0.4)
Blood pressure			
SBP, mean $\pm$ SD (mmHg)	129.2 $\pm$ 22.4	133.3 $\pm$ 23.6	126.3 $\pm$ 21.0
SBP, median [range] (mmHg)	124 [80-230]	130 [80-220]	120 [90-230]
DBP, mean $\pm$ SD (mmHg)	78.6 $\pm$ 11.7	80.6 $\pm$ 12.4	77.3 $\pm$ 10.9
DBP, median [range] (mmHg)	80 [50-130]	80 [50-130]	75 [50-130]

Note: SD=Standard deviation; SBP=Systolic blood pressure; DBP=Diastolic blood pressure; Arterial hypertension is defined by prior diagnosis or use of antihypertensive treatment; ^aEstimated diabetes: sum of cases with prior diagnosis and patients with fasting glucose of 126 mg/dL or higher without a registered diagnosis; Source: Own elaboration with data from the E.S.E. de Úmbita, 2024-2025

Table 3: Lipid profile and fasting glucose (n=1,261).

Variables	Total (n=1,261)	Men (n=516)	Women (n=745)
Total cholesterol (mg/dL)			
Mean $\pm$ SD	236.4 $\pm$ 52.7	229.1 $\pm$ 46.7	241.5 $\pm$ 55.9
High (≥ 240), N (%)	561 (44.5)	212 (41.1)	349 (46.8)
Desirable (<200), N (%)	302 (23.9)	140 (27.1)	162 (21.7)
LDL-C (mg/dL) ^a			
Mean $\pm$ SD	164.6 $\pm$ 47.1	NR	NR
High or very high (≥ 160), N (%)	48.1%	NR	NR
Optimal (<100), N (%)	6.3%	NR	NR
HDL-C (mg/dL)			
Mean $\pm$ SD	35.7 $\pm$ 10.6	35.1 $\pm$ 11.9	36.1 $\pm$ 9.6
Low, N (%) ^c	1,058 (83.9)	379 (73.4)	679 (91.1)
Triglycerides (mg/dL)			
Mean $\pm$ SD	187.8 $\pm$ 111.9	202.1 $\pm$ 119.9	178.0 $\pm$ 104.9
High (200-499), N (%)	376 (29.8)	174 (33.7)	202 (27.1)
Very high (≥ 500), N (%)	31 (2.5)	19 (3.7)	12 (1.6)
Fasting glucose (mg/dL)			
Mean $\pm$ SD	101.2 $\pm$ 36.0	102.8 $\pm$ 36.6	100.1 $\pm$ 35.6
Prediabetes (100-125), N (%)	380 (30.1)	173 (33.5)	207 (27.8)
Diabetes (≥ 126), N (%)	91 (7.2)	41 (7.9)	50 (6.7)

Note: SD=Standard deviation; LDL-C=Low-density lipoprotein cholesterol; HDL-C=High-density lipoprotein cholesterol; NR=Not reported by sex in the source; ^aLDL-C calculated with the Friedewald equation in the 1,203 patients with triglycerides below 400 mg/dL; this subsample is the denominator for the LDL-C mean and category percentages, and sex-disaggregated LDL-C values were not reported in the source thesis; ^cLow HDL-C defined with sex-specific thresholds (below 40 mg/dL in men, below 50 mg/dL in women); Source: Own elaboration with data from the E.S.E. de Úmbita, 2024-2025

Lipid profile and fasting glucose

The lipid profile was altered in all evaluated fractions, configuring a pattern of generalized mixed dyslipidemia.

Mean total cholesterol was 236.4 mg/dL (SD 52.7); 44.5% had high values (240 mg/dL or higher) and only 23.9% had desirable total cholesterol (below 200 mg/dL). Mean LDL-C, calculated in the 1,203 patients with

triglycerides below 400 mg/dL, was 164.6 mg/dL (SD 47.1); 48.1% were in the high or very high range (160 mg/dL or higher) and only 6.3% reached optimal levels (below 100 mg/dL). The most striking finding was the prevalence of low HDL-C, present in 83.9% of the sample, affecting 73.4% of men and 91.1% of women, with a mean HDL-C of 35.7 mg/dL (SD 10.6), well below the cardiovascular protection thresholds for both sexes. Mean triglycerides were 187.8 mg/dL (SD 111.9), with 29.8% in the high range (200 to 499 mg/dL) and 2.5% in the very high range (500 mg/dL or higher). Mean fasting glucose was 101.2 mg/dL (SD 36.0), with 30.1% meeting the prediabetes criterion and 7.2% the biochemical diabetes criterion (Table 3).

Cardiovascular risk stratification

Under the four-step algorithm of the 2024 Colombian Dyslipidemias Consensus, 4.1% (n=52) classified as very high risk and 41.5% (n=523) as high risk, for a combined 45.6% (n=575) in the highest burden categories; the

remaining 54.4% classified as moderate risk, and no patient was placed in the low-risk category, a result attributable to the contextual assignment of the socioeconomic amplifier in Step 3. Women showed a higher concentration of elevated risk (47.4%) than men (43.0%). Among very high-risk patients, the determining criteria were diabetes mellitus with three or more additional risk factors (71.2%, n=37) and chronic kidney disease (28.8%, n=15); among high-risk patients, isolated LDL-C above 190 mg/dL was the most frequent criterion (29.4%, n=154), and severe hypercholesterolemia operated as the determining factor in approximately 62% of cases. The age gradient was pronounced, rising from 25.8% with high or very high risk in the 30-to-44-year group to 39.8% in the 45-to-59-year group and 62.7% in the 60-to-75-year group. The presence of elevated risk in one in four adults under 45 years indicates that the cardiometabolic burden reaches segments of the population in full productive capacity, well before advanced age (Table 4).

Table 4: Cardiovascular risk stratification by sex and age group, Úmbita, 2024-2025.

Variables	Total (n=1,261)	Men (n=516)	Women (n=745)
A. Four-step algorithm (Colombian Consensus 2024), N (%)			
Very high risk (Step 1)	52 (4.1)	20 (3.9)	32 (4.3)
High risk (Step 2)	523 (41.5)	202 (39.1)	321 (43.1)
Moderate risk (Step 3)	686 (54.4)	294 (57.0)	392 (52.6)
High or very high risk (Steps 1+2)	575 (45.6)	222 (43.0)	353 (47.4)
30-44 years, high or very high	77 (25.8)	25 (27.5)	52 (25.1)
45-59 years, high or very high	184 (39.8)	65 (33.7)	119 (44.2)
60-75 years, high or very high	314 (62.7)	132 (56.9)	182 (67.7)
B. Framingham-Wilson recalibrated ($\times 0.75$), N (%)^{d}			
Low risk (<10%)	631 (50.0)	311 (60.3)	320 (43.0)
Moderate risk (10-19.9%)	283 (22.4)	110 (21.3)	173 (23.2)
High risk ($\geq 20\%$)	347 (27.5)	95 (18.4%)	252 (33.8)
Mean $\pm$ SD (%)	15.41 $\pm$ 14.57	11.94 $\pm$ 11.38	17.81 $\pm$ 15.99
Median [range] (%)	9.9 [0.6-73.1]	7.6 [0.6-69.5]	12.1 [0.8-73.1]
High risk by group, 30-44 years (%)	0.3	0.0	0.5
High risk by group, 45-59 years (%)	15.2	7.8	20.4
High risk by group, 60-75 years (%)	55.1	34.5	72.9

Note: SD=Standard deviation; Section A classified according to the four-step algorithm of the 2024 Colombian Dyslipidemias Consensus: Step 1 (very high risk), diabetes with three or more risk factors or chronic kidney disease; Step 2 (high risk), LDL-C above 190 mg/dL, total cholesterol above 310 mg/dL, blood pressure of 180/110 mmHg or higher, diabetes with one or more risk factors, or three or more simultaneous risk factors; Step 3 (moderate risk), patients not meeting the previous criteria; ^dFramingham-Wilson ten-year coronary risk with the 0.75 recalibration factor for Colombia, computed on the verified dataset (n=1,261); Source: Section A own elaboration with data from the E.S.E. de Úmbita; Section B from the verified Framingham recalculation file, 2024-2025

The Framingham-Wilson scale with 0.75 recalibration yielded a mean ten-year coronary risk of 15.4% (SD 14.6) and a median of 9.9%; 50.0% classified as low risk (below 10%), 22.4% as moderate risk (10 to 19.9%), and 27.5% as high risk (20% or higher). This proportion of high risk exceeds those reported in screening studies of other Colombian populations, where high Framingham risk ranges between 5.88% and 9.2%.^{23,24} The pattern by sex was inverse of the conventional male predominance: women classified as high risk far more often than men (33.8% versus 18.4%), with a mean risk of 17.81% (SD

15.99) in women against 11.94% (SD 11.38) in men. By age group, 0.3% of the 30-to-44-year group reached high risk, rising to 15.2% in the 45-to-59-year group and 55.1% in the 60-to-75-year group (Table 4).

DISCUSSION

These results reveal a severe cardiometabolic burden in the adult population of Úmbita, whose dominant feature is the prevalence of low HDL-C in 83.9% of the sample, with a mean HDL-C of 35.7 mg/dL. This deficit far

exceeds the figures reported for Colombian adults in national nutritional surveys and is distributed transversally across age and occupational groups, without concentrating in any segment, which may be consistent with a shared way of life rather than with differentiated individual risk factors.¹⁶ The magnitude of this finding, together with the coexistence of abdominal obesity (65.9%), elevated triglycerides (combined high and very high of 32.3%), and excess weight (62.4%), configures a high underlying prevalence of metabolic syndrome.

Physical activity offers a partial mechanistic reading of the low HDL-C, although it must be advanced as a hypothesis rather than a causal claim. Agricultural work in this population may be high in energy expenditure, yet it follows postural and load patterns that generate musculoskeletal wear without the protective effect on HDL-C associated with moderate aerobic exercise. The expected cardioprotective signal of an active rural lifestyle is therefore not necessarily realized, which helps explain why a physically demanding occupation coexists with an adverse lipid profile.

The dietary pattern of the same population provides direct, population-specific evidence in the same direction. The food frequency data collected in Úmbita show a diet centered on potato (consumed daily by 82.4%), rice, and traditional wheat and maize breads (amasijos, 4.9 days per week on average), with marginal consumption of legumes and Andean tubers, and a marked generational penetration of ultra-processed products: 97.6% of those under 17 years consumed packaged snacks and 95.2% sugar-sweetened beverages, against far lower frequencies in older adults. This profile, rich in refined carbohydrates and poor in protective fats of local origin, is the pattern that the evidence links to reduced HDL-C and elevated triglycerides,^{5,25} and it is consistent with the documented nutrition transition of Colombian rural households.^{6,7} Chronic occupational exposure to organophosphate pesticides, reported by local informants although not quantified through biomarkers in this study, represents an additional plausible contributor to the dysglycemic component.²⁶

Hypertension affected 30.1% of the sample, exceeding previous national estimates, from the 2007 National Health Survey to later studies that placed the prevalence among Colombian adults between 11.5% and 24%.^{18,19} This difference may reflect the case definition used (registered diagnosis or antihypertensive treatment, including cases detected by the screening effort itself), the higher concentration of older age groups in the sample, and the effect of the territory's social determinants. The age gradient in overall cardiovascular risk is equally relevant, with high or very high risk already present in 25.8% of adults aged 30 to 44 years, a finding consistent with the literature on early biological inscription of deprivation and food system change.^{27,28}

A central observation is that this profile coexists with the near absence of the classic behavioral risk factors that conventional preventive medicine prioritizes. The population studied barely smoke (0.7), lives in a rural environment, and works the land physically, so the individual lifestyle model would predict a comparatively favorable profile. That the observed cardiometabolic burden is, on the contrary, severe suggests, as an explanatory hypothesis rather than a causal assertion, that the determinants of this epidemiological profile operate at a level that the individual approach does not capture, closer to the structural conditions of the rural way of life and the territory than to discrete personal behaviors.²⁷

Finally, the two instruments rank cardiovascular risk by sex differently, and the contrast is informative. Both place women above men, but the gap widens substantially under Framingham-Wilson (33.8% versus 18.4% in high risk) compared with the four-step algorithm (47.4% versus 43.0% in high or very high risk). The wider female excess under Framingham is consistent with the very high prevalence of low HDL-C in women (91.1%) and with the sensitivity of the female coefficient of the Wilson 1998 equation to HDL-C, a continuous variable that the scale weighs heavily.¹⁴ The four-step algorithm, in contrast, is driven by severe hypercholesterolemia, marked blood pressure elevation, and the accumulation of categorical risk factors, which narrows the difference between sexes. Each instrument therefore captures a distinct dimension of the same profile, and their joint use offers a more complete characterization than either alone.

Several limitations should be considered when interpreting these results. The cross-sectional design does not allow causal relationships or temporal risk trajectories to be established. The criterion of the most unfavorable value characterizes the maximum risk expressed during the 2024-2025 period and may overestimate the burden at any single point in time. The contextual assignment of the socioeconomic amplifier to the whole sample constitutes an ecological inference that does not allow identification of intra-individual heterogeneity in the degree of deprivation. Hypertension status was used as a proxy for treated hypertension in the Framingham-Wilson calculation, since antihypertensive treatment was not available in the anthropometric database. Smoking may be under registered, given the social desirability bias of the clinical consultation. The clinical dataset contains no direct dietary measurements, so the food frequency data used in the discussion derive from the broader thesis fieldwork rather than from the clinical dataset of this study, and the absence of lipoprotein(a), coronary calcium, and familial hypercholesterolemia measurements prevented complete classification according to the 2024 Consensus, yielding a conservative risk estimate.

The adult population of Úmbita presents a severe cardiometabolic burden defined by low HDL-C, abdominal obesity, and generalized mixed dyslipidemia, with 45.6% classified as high or very high cardiovascular

risk under the 2024 Colombian Consensus algorithm and substantial involvement of adults under 45 years. This profile coexists with a near-absence of classic behavioral risk factors, which points to determinants operating at the level of the rural way of life rather than individual conduct. Reducing this burden requires articulating the primary care level with the territorial determinants of health, so that the local health center, the municipal administration, peasant organizations, and rural development institutions each assume a differentiated and complementary role in transforming the conditions that shape this risk profile.

CONCLUSION

Úmbita presents a severe cardiometabolic burden defined by low HDL-C, abdominal obesity, and mixed dyslipidemia, with elevated risk among adults of working age. These findings support primary care interventions articulated with the territorial determinants of health.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee, E. S. E. Centro de Salud San Rafael de Úmbita

REFERENCES

- World Health Organization. Cardiovascular diseases (CVDs), 2025. Available at: [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)). Accessed 01 June 2026.
- Lindstrom M, DeCleene N, Dorsey H, Fuster V, Johnson CO, LeGrand KE, et al. Global burden of cardiovascular diseases and risks, 1990-2021. *J Am Coll Cardiol*. 2022;80(25):2372-425.
- Departamento Administrativo Nacional de Estadística (DANE). Estadísticas vitales: defunciones no fatales por grupos de causas según sexo y grupos de edad. Bogotá: DANE; 2023. Available from: <https://www.dane.gov.co>
- Hawkes C. Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. *Global Health*. 2006;2:4.
- Popkin BM. Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. *Am J Clin Nutr*. 2006;84(2):289-98.
- Khandpur N, Cediel G, Ayala Obando D, Jaime PC, Parra DC. Sociodemographic factors associated with the consumption of ultra-processed foods in Colombia. *Rev Saude Publica*. 2020;54:19.
- Parra DC, Iannotti L, Gómez LF, Pachón H, Haire-Joshu D, Sarmiento OL, et al. The nutrition transition in Colombia over a decade: a novel household classification system of anthropometric measures. *Arch Public Health*. 2015;73:12.
- McMichael P. A food regime genealogy. *J Peasant Stud*. 2009;36(1):139-69.
- García-Peña AA, Muñoz-Velandia O, Suárez-Obando F, Grupo de Consenso. Consenso colombiano de dislipidemias 2024. *Rev Colomb Cardiol*. 2024;31(Supl 1):1-45.
- Departamento Administrativo Nacional de Estadística (DANE). Índice de pobreza multidimensional 2018 [Internet]. Bogotá: DANE; 2019. Available from: <https://www.dane.gov.co>
- E.S.E. Centro de Salud San Rafael de Úmbita. Análisis de situación de salud con el modelo de los determinantes sociales de salud (ASIS 2024). Úmbita: E.S.E.; 2024.
- Buendía R, Barrera MP, Parra-Cardenal M, Villarraga H, Saldarriaga C, Bernal O. Puntos de corte de cintura en adultos colombianos para el diagnóstico de obesidad abdominal. *Rev Colomb Cardiol*. 2014;21(4):216-22.
- National Cholesterol Education Program (NCEP) Expert Panel. Executive summary of the Third Report of the NCEP Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA*. 2001;285(19):2486-97.
- Wilson PWF, D'Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. *Circulation*. 1998;97(18):1837-47.
- M Muñoz O, I Rodríguez N, Rondón M. Validation of PROCAM and Framingham prediction models as estimators of cardiovascular risk in a Colombian population. *Revis Colomb Cardiol*. 2014;21(4):202-12.
- Instituto Colombiano de Bienestar Familiar (ICBF). Encuesta Nacional de la Situación Nutricional 2015 (ENSIN). Bogotá: ICBF; 2015.
- Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension*. 2003;42(6):1206-52.
- Rodríguez J, Ruiz F, Peñaloza E, Eslava J, Gómez LC, Sánchez H, et al. National Health Survey 2007. Bogotá: Javegraf; 2009.
- Zurique Sánchez MS, Zurique Sánchez CP, Camacho López PA, Sánchez Sanabria M, Hernández Hernández S. Prevalence of arterial hypertension in Colombia. *Acta Med Colomb*. 2019;44(4):20-9.
- Aschner P. Epidemiology of diabetes in Colombia. *Advan Diabetol*. 2010;26(2):95-100.
- Vargas-Uricoechea H, Casas-Figueroa LÁ. An epidemiologic analysis of diabetes in Colombia. *Ann Glob Health*. 2015;81(6):742-53.
- Ruiz LX, Merchán MA, Vargas LO. Type 2 diabetes mellitus: Latin America and Colombia, analysis of the last five years. *Revista Med*. 2023;31(2):35-46.
- Álvarez-Ceballos JC, Álvarez-Muñoz AM, Carvajal-Gutiérrez W, González MM, Duque JL,

- Nieto-Cárdenas OA. Determination of cardiovascular risk in a population. *Colomb J Cardiol*. 2017;24(4):334-41.
24. Navas López JA. Estimation of cardiovascular risk with the calibrated Framingham scale, in the Santander population, 2018. Available at: <https://repository.unab.edu.co/handle/20.500.12749/1732>. Accessed 01 June 2026.
 25. Monteiro CA, Moubarac JC, Cannon G, Ng SW, Popkin B. Ultra-processed products are becoming dominant in the global food system. *Obes Rev*. 2013;14(Suppl 2):21-8.
 26. Mostafalou S, Abdollahi M. Pesticides: an update of human exposure and toxicity. *Arch Toxicol*. 2017;91(2):549-99.
 27. Breilh J. The social determinants of health as a tool for transformation towards a new public health (collective health). *Revista Facultad Nacional de Salud Pública*. 2013;31(1):13-27.
 28. Marmot M. Social determinants of health inequalities. *Lancet*. 2005;365(9464):1099-104.

Cite this article as: Arias MAT, Maldonado JMA. Cardiovascular risk profile in a rural population of Colombia: a descriptive cross-sectional study. *Int J Community Med Public Health* 2026;13:6280-7.