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Prevalence of musculoskeletal disorders and rheumatic diseases in Cuenca, Ecuador: a WHO-ILAR COPCORD study

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Abstract The aim of this study was to determine the prevalence of musculoskeletal pain and rheumatic diseases in subjects over 18 years of age from the canton of Cuenca, Ecuador. Cross-sectional analytical community-based study was conducted in subjects over 18 years of age using the validated Community-Oriented Program for the Control of Rheumatic Diseases (COPCORD) questionnaire. Random sampling was used. The questionnaire was administered by standardized health workers. Subjects were visited house by house. Subjects positive for musculoskeletal (MSK) pain in the last 7 days and at some point in life were assessed by rheumatologists to confirm the diagnosis. A total of 4877 subjects participated, with an average age of 42.8 (SD 18.8) years of age; 59.7 % were women; 69.7 % lived in urban areas. 32.5 % reported MSK pain in the last 7 days and 45.7 % at some point in life. The prevalence of knee osteoarthritis was 7.4 %, hand osteoarthritis 5.3 %, low back pain 9.3 %, rheumatoid arthritis 0.8 %, fibromyalgia 2 %, gout 0.4 %, and lupus 0.06 %. Subjects from rural areas reported experiencing more MSK pain in the last 7 days and at some point in life, lower income, poorer health-care coverage, and increased physical activity involving repetitive tasks such as lifting weights or cooking with firewood. MSK pain prevalence was high. Osteoarthritis and low back pain were the most common diseases. Age, sex, physical activity, repetitive tasks, living in a rural area, and lack of health-care coverage were found to be associated with MSK pain.

Keywords Prevalence · Rheumatic diseases · COPCORD · Ecuador

Introduction

Rheumatic diseases are a heterogeneous group of disability-causing chronic conditions that occur across all ethnic and age groups. These conditions are generally characterized by musculoskeletal (MSK) pain, swelling, and decreased mobility and can lead to multisystemic conditions that compromise the patient's functional capacity and can be potentially life-threatening [1].

Community-Oriented Program for the Control of Rheumatic Diseases (COPCORD) methodology is a basic screening questionnaire introduced in 1981 by International League of Association for Rheumatology (ILAR), which identifies musculoskeletal disorders such as pain, swelling, stiffness, and trauma, functional and behavioral disability as well as treatment received in the last 7 days or in the past. The instrument is useful for the diagnosis, prevention, and control of rheumatic diseases [2].

The prevalence of MSK pain varies in different regions of the world. In developed countries, it ranges from 14 to 36 % [3–5], and in South India it is 26.8 % [6], while in Latin America the prevalence ranges from 23 to 45 % [7].

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However, this range may be even wider; such as the case when we contrast results from Peru (50.1 %) [8] to Mexico (17 %) [9]. Osteoarthritis is reported as the most prevalent, with the prevalence ranging from 5.5 % in Australia [10] to 17.3 % in northern Mexico [11]. Rheumatoid arthritis is the most rare in Shanghai with 0.28 % [12] and most prevalent in five regions of Mexico with 1.6 % [13].

Epidemiological information on rheumatic diseases in Ecuador is scarce. There are few descriptions of MSK disorders conducted in small population groups; there have been no epidemiological studies using standardized methods to describe the situation in Ecuador. This dearth of data has spurred us to conduct studies on the prevalence of MSK pain and rheumatic diseases in the Cuenca, Ecuador, using the COPCORD methodology. Our goal was to lay the technical foundations for the state health-care policies benefitting patients suffering from these debilitating diseases which come at a great economic and social cost.

Materials and methods

A cross-sectional community-based study was conducted using COPCORD methodology. The protocol was approved by the Ethics Committee of the School of Medical Sciences, University of Cuenca. All subjects who completed the questionnaire had signed informed consent. The study was conducted from October 10, 2014, to September 2, 2014.

The city of Cuenca is located in southern Ecuador and is home to 505,585 inhabitants. Women account for 52.62 % and men for 47.37 % of the population; 65.25 % reside in urban and 34.74 % in rural areas [14].

Cuenca is the capital of the province, located in the southern Ecuador, at 2500 m above sea level, has spring weather. It is made up of 15 urban and 22 rural parishes; economic growth comes from small industry, specifically handicraft and companies exporting different products internationally. Nulti is a rural parish of the Cuenca Canton, located northeast of the city at 2577 m above sea level, with agriculture and handicraft as main economic activities. Bellavista is an urban parish of the Cuenca Canton, with temperatures ranging from 8 and 21 °C, located 2650 m above sea level and surrounded by one of the Cuenca's four rivers, the Machángara [14].

The Ecuadorian health-care system includes public and private sectors. The public sector consists of the Ministry of Public Health (MSP, Spanish acronym), which is the governing body of the health-care system; the Ministry of Economic and Social Inclusion (MIES, Spanish acronym), responsible for the inclusion of the vulnerable population; and Ecuadorian Social Security Institute (IESS, Spanish acronym), which provides health-care services to the working population of the country. Public health-care covers 71 % of the Ecuadorian population. IESS is a health-care system for the salaried population with specialty hospitals, basic hospitals, and health centers. IESS covers 28.4 % of the affiliated working population; a small percentage of the working population has private insurance. [14].

A sample size of 5000 subjects older than 18 years of age from urban and rural areas of Cuenca was calculated to give a 50 % prevalence of MSK pain (95 % confidence interval), with an estimated non-response rate of 20 % [15]. Sampling was mixed multistage and random, without replacement, by stratum (urban and rural) and conglomerate (household). Parishes were chosen as the primary sampling unit. Census clusters were randomly selected within each parish. Their sizes were proportional to the probabilities calculated after a pilot study conducted to determine the percentage of inhabited households.

The updated national census data were used to improve sample quality. Before proceeding with the study, we contacted each cluster's health care and community authorities to explain the objectives of the study and muster support of the cluster dwellers. When administering the survey, each household was visited three times before being considered a non-responder.

Field strategy comprised the following steps: (1) A group of medical students and general physicians together with support staff received training to administer the questionnaire. (2) Study population was invited to participate and participants signed informed consent forms. (3) Pilot tests were conducted: one to cross-validate the questionnaires [16], standardize the survey staff, and make adjustments in the field strategy. (4) Individuals over 18 years of age who had lived at their current address for at least 6 months by the time of the interview were selected. (5) The following questionnaires were administered: the validated COPCORD and a socioeconomic questionnaire. (6) The surveys were cross-checked by the interviewers on the day of administration and were later verified by the coordinators. (7) COPCORD-positive patients (cases with MSK pain in the last 7 days or at any point in life) were assessed by rheumatologists at their homes (Fig. 1).

We used the COPCORD questionnaire [17] validated for detecting MSK pain to assess sociodemographic data, past history of diseases, employment history, MSK pain in the last 7 days, MSK pain at any time in the past, and for measuring pain intensity and severity on a 0–10 scale. The questionnaire also assessed functional ability using a validated version of the Health Assessment Questionnaire Disability Index (HAQ-DI), especially concerning daily activities such as dressing, walking, lying down, getting up, determining whether such an activity could be performed without any difficulty, with some difficulty, with considerable

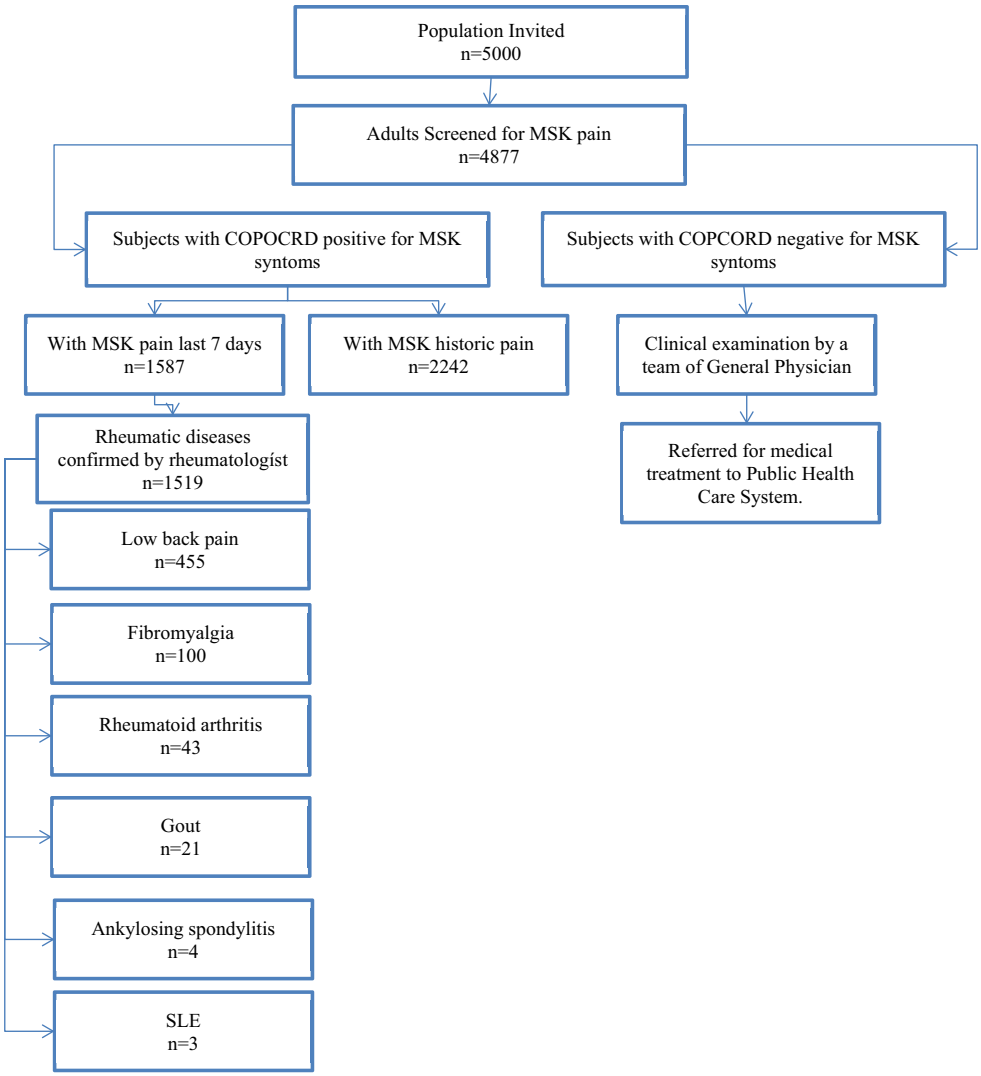

Fig. 1 Study stages and participants' flowchart

difficulty, or could not be performed. These stages were based on COPCORD phase one methodology, as described elsewhere [18] (www.copcord.org).

The socioeconomic part of the questionnaire was based on the data from INEC [14], including variables such as type of health care received (social security, public health care, private health care, or no health care), education (years of study), occupation (employer, employee, day laborer, student, domestic worker, or self-employed), income level (basic salary less than or equal to 340 U.S. Dollars), housing data (owned or rented, number of rooms, sanitary facilities including the type of human waste disposal, indoor tap water, etc. on a scale from 0 to 5, with 5 being the worst), household assets and equipment (television, internet access, automobile) and kitchen type (wood stove or other).

The average questionnaire administration time in house visits was 8 min.

The criteria of the American College of Rheumatology were used for diagnosing rheumatic diseases: rheumatoid arthritis (AR) [19], hand and knee osteoarthritis (OA) [20, 21], fibromyalgia [22], gout [23], low back pain [24], and systemic lupus erythematous (SLE) [25]. In addition, in cases of low back pain we administered a chronic inflammatory low back pain screening questionnaire [26] and a specific validated questionnaire for diagnosing rheumatic regional pain syndromes (RRPS) [27].

Patients with a confirmed diagnosis received the appropriate guidance. Laboratory tests and/or X-rays were requested at the discretion of the rheumatologist at no cost to the respondent.

Statistical analysis

In the univariate statistical analysis, discrete variables were operationalized as number of cases (n) and percentages (%) and continuous variables were operationalized as averages,

Table 1 Sociodemographics characteristics of Cuenca population

Demographics	$n = 4877$
Gender, *n* (%)	
Female	2916 (59.8)
Male	1961 (40.2)
Age, mean (SD, range)	42.8 (17.8; 18-97)
Education (SD, range)	10.2 (5.3; 0–28)
Marital status (4866)	[11 missing]
Single	1235 (25.4)
Married	2756 (56.6)
Widowed	290 (6.0)
Free union	264 (5.4)
Separated	87 (1.8)
Divorced	230 (4.7)
Other	4 (0.1)
Residence	
Urban	3400 (69.7)
Rural	1477 (30.3)
Employment (yes)*	3091 (63.3)
Formal employment	
Professional	793 (16.6)
Clerk	496 (10.3)
Trader	417 (8.7)
Laborer	383 (8.0)
Craftsperson	436 (9.3)
Agricultural worker	111 (2.3)
Domestic employee	117 (2.4)
Activities: 4 + kg load	1774 (36.3)
Repetitive activities	2402 (49.2)
Income	
<USD 340	1262 (37.9)
USD 341–700	1092 (32.8)
USD 701–1500	565 (16.5)
Not income	92 (2.7)
Did not answer	315 (9.4)
Health-care type	
Regional hospital/health center	
Private	2016 (42.0)
Social security	1493 (31.1)
None	1167 (24.3)
Other	122 (2.5)
Housing	
Own	3152 V(65.1)
Provided	594 (12.2)
Rented	1049 (21.6)
Method of waste disposal	
Sewerage system	3756 (77.01)
Septic tank	974 (19.97)
Latrine	111 (2.28)
No answer	36 (0.74)

* 2753/3091 (89.0 %) formal employment; 338/3091 (10.9 %) informal employment

Table 2 Pain characteristics and help seeking for musculoskeletal (MSK) disorders in Cuenca population

Characteristics	$n = 4877$
MSK pain 7 days, *n* (%)	1587 (32.5)
Trauma-associated pain	50 (15.7)
Pain intensity VAS, *m* (SD)	5.4 (2.2)
Coping with pain 7 days, *n* (%)	
Very good coping	278 (17.8)
Good coping	692 (44.5)
Some coping	521 (33.5)
No coping	50 (3.2)
Historical MSK pain, *n* (%)	2242 (45.9)
Trauma-associated pain	616 (21.5)
Pain intensity VAS, *m* (SD)	5.6 (2.4)
Coping with historical pain, *n* (%)	
Very good coping	426 (20.1)
Good coping	906 (42.8)
Some coping	715 (33.8)
No coping	68 (3.2)
Physical impairment	
Currently limited	451 (9.5)
No current limitation, past limitation	532 (11.2)
Never had limitations	1287 (27.1)
Mean functional capacity (HAQ), (0–3), (IQR)	0.2 (0–2.9)
Type of health care	
Hospital	1543 (39.8)
Private health care	621 (16.0)
Health clinic	156 (4.0)
Self-care	99 (2.5)
Traditional medicine	81 (2.0)
Alternative medicine	22 (0.5)
Health center	243 (6.2)
None	1017 (26.2)
Treatment (yes), *n* (%)	1315 (27.6)
NSAIDs	480 (42.0)
Analgesics	115 (10.0)
Steroids	13 (1.1)
Muscle relaxants	22 (1.9)
DMARDs	14 (1.2)
Other	369 (32.3)
Does not remember	
Physiotherapy	394 (8.5)
Surgery	67 (1.4)
Unconventional treatment	184 (4.0)
Other	88 (1.9)

standard deviation (X, SD) for parametric and median and interquartile range (IQR) for nonparametric. Prevalence figures are presented with a confidence interval of 95 %. For group comparison we used Chi-square test, Student's

Table 3 Prevalence of rheumatic diseases in rural and urban population of the Cuenca, Ecuador

Rheumatic diseases	Rural $n = 1477$ (%; 95 % CI)	Urban $n = 3400$ (%; 95 % CI)	Total n (%; 95 % CI)	p
Knee osteoarthritis	126 (8.5; 7.1–10.0)	235 (6.9; 6.0–7.8)	361 (7.4; 6.6–8.1)	0.04
Hand osteoarthritis	82 (5.5; 4.5–6.0)	178 (5.2; 4.5–6.0)	260 (5.3; 4.7–6.0)	0.6
Low back pain	136 (9.2; 7.7–10.7)	319 (9.3; 8.4–10.4)	455 (9.3; 8.5–10.1)	0.3
Inflammatory back pain	29 (1.9; 1.3–2.8)	50 (1.4; 1.0–1.9)	79 (1.6; 1.2–2.0)	0.2
Rheumatic regional pain syndromes	37 (2.5; 1.7–3.4)	99 (2.9; 2.3–3.5)	136 (2.7; 2.3–3.2)	0.2
Fibromyalgia	37 (2.5; 1.7–3.4)	63 (1.8; 1.4–2.3)	100 (2.0; 1.6–2.4)	0.3
Rheumatoid arthritis	29 (0.8; 0.5–1.2)	14 (0.9; 0.5–1.5)	43 (0.8; 0.6–1.1)	0.7
Gout	1 (0.06; 0.001–0.3)	20 (0.5; 0.3–0.9)	21 (0.4; 0.2–0.6)	0.01
Ankylosing spondylitis	1 (0.06; 0.001–0.3)	3 (0.08; 0.01–0.2)	4 (0.08; 0.02–0.2)	0.6
SLE	0	3 (0.08; 0.01–0.2)	3 (0.06; 0.01–0.1)	–
Specific MSK pain	81 (5.4; 4.3–6.7)	217 (6.3; 5.5–7.2)	298 (6.1; 5.4–6.8)	0.2
Non-specific MSK pain	101 (6.8; 5.6–8.2)	243 (7.1; 6.3–8.0)	344 (7.0; 6.3–7.8)	0.3

MSK Musculoskeletal * Non-specific pain: any musculoskeletal pain not associated with any disease or trauma

t test or Mann–Whitney *U* test, as well as Kruskal–Wallis test for the nonparametric variables. Bilateral $p < 0.05$ was accepted as significant difference. Stata version 11 statistical software was used.

Results

The response rate was 97.5 % (4877/5000). Table 1 shows the sociodemographic characteristics of the population.

MSK pain in the last 7 days was reported in 1587 (32.5 %; 95 % CI 31.2–33.8) and historical pain in 2242 (45.9 %; 95 % CI 44.5–47.3). Mean pain intensity (VAS 0–10) was 5.4 with a SD of 2.2. Respondents with good pain coping were 692 (44.5 %).

Of all respondents, 1315 (27.6 %) received some type of treatment (see Table 2).

Among habits and self-reported comorbidities, the following stand out: smoking in 1473 (30.2 %), gastritis in 1165 (23.8 %), peripheral vascular disease in 755 (15.4 %), blood hypertension in 732 (15.0 %), hyperlipidemia in 682 (13.9 %), depression in 421 (8.6 %), anxiety in 373 (7.6 %), respiratory infections in 327 (6.7 %). 1698 (34.8 %) had relatives with a rheumatic disease, of which 1170 (70.4 %) were of first degree of consanguinity. A total of 911 (23.6 %) respondents saw a doctor, of which 478 (52.4 %) reported having been diagnosed with osteoarthritis.

The sites most frequently affected by pain in the last 7 days were: knees in 601 (37.4 %), lower back in 433 (27.3 %), hands in 348 (21.7 %), shoulders in 290 (18.2 %), ankles in 168 (10.5 %), elbows in 150 (9.4 %), legs in 146 (9.2 %), upper back in 141 (8.8 %), neck in 126 (7.9 %).

The most prevalent rheumatic diseases encountered by rheumatologists were knee osteoarthritis in 361 (7.4 %; 6.6–8.1), hand osteoarthritis in 260 (5.3 %; 4.7–6.0), low back pain in 455 (9.3 %, 8.5–10.1), fibromyalgia in 100 (2.0 %; 1.6–2.4), rheumatoid arthritis in 43 (0.8 %; 0.6–1.1), gout in 21 (0.4 %; 0.2–0.6), ankylosing spondylitis in 4 (0.08 %; 0.02–0.2 %), SLE in 3 (0.06 %; 0.01–0.1 %), with statistical differences between rural and urban areas in the prevalence of knee osteoarthritis and gout (Table 3).

The differences between urban and rural population are shown in Table 4, which highlights significant differences in education (11.4 vs. 7.4 years) and income (54.6 vs. 30.8 % with income < US$340). There were small but significant differences in the average age.

Most rural patients (824 or 55.7 %) and 1192 (35.8 %) in urban areas visited health centers and hospitals ($p < 0.01$). Occupations involving handling loads >4 kg were reported in 658 (44.5 %) in rural areas vs 1116 (32.8 %) in urban areas ($p < 0.01$). Work activities involving repetitive physical tasks were reported in 868 (58.7 %) in rural areas and 1534 (45.1 %) in urban areas ($p < 0.01$). MSK pain in the last 7 days was reported in 635 (42.9 %) and 952 (28 %) patients from urban and rural areas, respectively ($p < 0.01$). Pain intensity on a visual analog scale (VAS) was 5.6 (SD 2.2) in urban areas and 5.1 (SD 2.2) in rural areas.

There are no differences between the participating population and the individuals with MSK pain regarding the use of public health service, but it is an important trend when compared to the general population of Ecuador. There are significant differences when comparing individuals with MSK pain vs. the general population of Ecuador: more frequent use of the private health services (31.1 vs. 10 %; <0.01) and less frequent use of the social security (24.3 vs. 36.8 %; < 0.01), in addition to having no coverage (2.5 vs. 7.1 %; < 0.01).

Table 4 Comparison of urban and rural populations of Cuenca, Ecuador

Variables	Urban $n = 3400$	Rural $n = 1477$	*P*
Sociodemographic			
Mean age (SD)	42.7 (17.3)	43.2 (19.0)	<0.01
Gender (Female), *n* (%)	2008 (59.0)	908 (61.4)	0.22
Mean education (SD)	11.4 (5.2)	7.4 (4.5)	<0.01
Income	$n = 2335$	$n = 991$	
<USD 340	720 (30.8)	542 (54.6)	<0.01
USD 341–700	868 (37.1)	224 (22.6)	<0.01
USD 701–1000	320 (13.7)	31 (3.1)	<0.01
USD 1001–1500	153 (6.5)	6 (0.6)	<0.01
>USD 1500	46 (1.9)	9 (0.9)	<0.01
Not income	15 (0.6)	77 (7.7)	<0.01
Did not answer	213 (9.1)	102 (10.2)	0.23
Mean possession of assets $, (SD)	6.4 (2.5)	4.5 (2.1)	<0.01
Cooking with wood	86 (2.5)	674 (45.6)	<0.01
Employment (yes), *n* (%)	2202 (64.7)	889 (60.1)	0.002
Health care			
Hospital/health center	1192 (35.8)	824 (55.7)	<0.01
Private	1122 (33.7)	371 (25.1)	<0.01
Social security	959 (28.8)	208 (14.0)	<0.01
None	48 (1.4)	74 (5.0)	<0.01
Physical activity			
Load 4 kg	1116 (32.8)	658 (44.5)	<0.01
Repetitive tasks	1534 (45.1)	868 (58.7)	<0.01
Median functional capacity (HAQ), (IQR) & MSK pain	0 (0–0.2)	0 (0–0.3)	<0.01
7-days pain	952 (28.0)	635 (42.9)	<0.01
Mean intensity (VAS), (SD)	5.6 (2.2)	5.1 (2.2)	0.01
Historical pain	1525 (55.1)	717 (48.5)	0.01
Median intensity (VAS), (IQR)	0 (0–6)	0 (0–5)	0.09
Non-specific pain*	243 (7.1)	101 (6.8)	0.38

MSK Musculoskeletal * Non-specific pain: any musculoskeletal pain not associated with any disease or trauma. & Kruskal–Wallis test. $ Sum of assets (washing machine, TV, phone, etc.) as proxy for socio-economic status

A comparison was made of the distribution of the prevalence of MSK diseases and rheumatic diseases by gender. Differences in hand and knee osteoarthritis were found, as well as in fibromyalgia, rheumatoid arthritis, and gout. These were more prevalent in women except in patients with gout, which predominated in men (see Table 5).

Discussion

Our study is the first representative and community-based epidemiological study focusing on MSK disorders and rheumatic diseases in Ecuador. A high prevalence of MSK disorders and rheumatic diseases was observed in both rural and urban populations.

MSK pain prevalence in the last 7 days excluding trauma was 32.5 %. Globally, reported ranges varied amply between 13.3 and 66.0 % [8, 11, 26, 28–35]. This study's results concerning MSK pain were higher than reported in several Latin American countries: 25.5 % in five regions of Mexico [13], 17.0 % described by Cardiel et al. [9] in a suburban town in Mexico, 19.9 % in Venezuela [36], 19.6 % in a Northeast region in Mexico [11], and 9.3 % in Guatemala [37]; and in other countries like China with 13.3 % [38], India with 11.5 % [39] and lower than the 50.1 % reported in Peru [8] and 43.9 % Cuba [40], 41.9 % in Iran [41], and slightly below Lebanon with 32.9 % [42].

Low back pain was present in 9.3 %, same as reported in Nuevo Leon in Mexico [11] and higher than described by Gamboa in Peru (7.07 %) [8], China 5.6 % [38], India 4.6 % [39] , and lower than reported for Iran 21.7 % [41] and Lebanon 11.3 % [42]. Fibromyalgia affected 2 % of the participants, slightly lower than the figures obtained by Rodriguez-Sena in Brazil (2.5 %) [43] and higher than reported in Peru (1.58 %) [8], Venezuela (0.2 %) [36], and in five regions of Mexico (0.68 %) [13].

This variability in the prevalence of MSK pain highlights the benefits of using the COPCORD strategy as a standardized methodology to delineate epidemiological profiles specific to each region or country, which may be caused by genetic, cultural, or socioeconomic factors rather than influenced by methodological differences.

The sites most commonly affected were the knees, low back, and hands, similar to those found in several studies in Latin America that used the COPCORD instrument [8, 11, 34].

Of the population sample, 42.0 % were treated with non-steroidal anti-inflammatory drugs (NSAIDs) and to a lesser degree with analgesics, muscle relaxants, and disease-modifying antirheumatic drugs (DMARDs). Other publications [11, 13] reported that NSAIDs were the most used drugs for MSK pain management. The most important self-reported comorbidities were gastritis (23 %), possibly associated with a higher intake of NSAIDs, often followed by blood hypertension, peripheral vascular disease, hyperlipidemia, and depression. Similar conditions were reported in a study of five regions of Mexico [13] and all of them age related (as also has been reported for the MSK pain).

Regarding rheumatic diseases, osteoarthritis was the most prevalent. The condition has been observed in a number of studies worldwide with widely varying prevalences [7, 9, 10, 27, 38]. Compared with other similar COPCORD studies, we noted that this figure was lower than that reported in Venezuela (15.0 %) [36]and higher than described in Mexico (10.5 %) [13] and Rodriguez-Sena in Brazil (4.14 %) [43].

Table 5 Prevalence of musculoskeletal disorders and rheumatic diseases in Cuenca, Ecuador

Rheumatic diseases	Female n = 2916 (%; 95 % CI)	Male n = 1961 (%; 95 % CI)	Total n = 4877 (%; 95 % CI)	P*
Knee osteoarthritis	272 (9.3; 8.2–10.4)	89 (4.5; 3.6–5.5)	361 (7.4; 6.6–8.1)	<0.01
Hand osteoarthritis	217 (7.4; 6.5–8.4)	43 (2.1; 1.5–2.9)	260 (5.3; 4.7–6.0)	<0.01
Low back pain	238 (8.1; 7.1–9.2)	138 (7.0; 5.9–8.2)	455 (9.3; 8.5–10.1)	0.1
Inflammatory back pain	55 (1.8; 1.4–2.4)	24 (1.2; 0.7–1.8)	79 (1.6; 1.2–2.0)	0.06
Rheumatic regional pain syndromes	88 (3.0; 2.4–3.7)	48 (2.4; 1.8–3.2)	136 (2.7; 2.3–3.2)	0.2
Fibromyalgia	94 (3.2; 2.6–3.9)	6 (0.3; 0.1–0.6)	100 (2.0; 1.6–2.4)	<0.01
Rheumatoid arthritis	35 (1.2; 0.8–1.6)	8 (0.4; 0.1–0.8)	43 (0.8; 0.6–1.1)	0.004
Gout	2 (0.06; 0.008–0.2)	19 (0–9; 0.5–1.5)	21 (0.4; 0.2–0.6)	0.004
Ankylosing spondylitis	2 (0.06; 0.008–0.2)	2 (0.1; 0.01–0.3)	4 (0.08; 0.02–0.2)	0.5
SLE	2 (0.06; 0.008–0.2)	1 (0.05; 0.002–0.2)	3 (0.06; 0.01–0.1)	0.6
Specific MSK pain	203 (6.9; 6.0–7.9)	95 (4.8; 3.9–5.8)	298 (6.1; 5.4–6.8)	0.003
Non-specific MSK pain	225 (7.7; 6.7–8.7)	119 (6.0; 5.0–7.2)	344 (7.0; 6.3–7.8)	0.02

* Chi-square test (dichotomous) $p < 0.05$

Fibromyalgia affected 2 % of the participants, slightly lower than the figures obtained by Rodriguez-Sena in Brazil (2.5 %) [43] and higher than reported in Peru (1.58 %) [8], Venezuela (0.2 %) [36], and in five regions of Mexico (0.68 %) [13]. RA was found in 0.8 %, which is higher than reported in Venezuela (0.4 %) [36], Peru (0.51 %) [8], Brazil (0.46 %) [43], Iran 0.33 % [41], China 0.28 % [38], India 0.19 % [39], Nuevo Leon in Mexico (0.4 %) [11], and lower than the results from the study the in five regions of Mexico (1.49 %) [13] and Lebanon 1 % [42].

The regional appendicular pain syndrome (soft tissue rheumatism) was present in 6.1 % of all respondents, which is close to the results in Mexico [11, 13], but lower than in Peru (14.9 %) [8]. Three cases (0.1 %) of systemic lupus erythematosus were identified, along with 21 cases of gout (0.4 %) and four cases of ankylosing spondylitis (0.1 %). This is comparable to other open population studies [11, 13, 34].

Regarding health care, it was observed that 42.0 % of respondents visited state-run hospitals and health clinics, which differs from the situation observed in Venezuela [36], where about 90 % of the population used the public health-care service and a small percentage attended private health clinics. In Cuba, where the entire population enjoys universal health care, <1 % did not seek medical care and 40 % of patients were treated by a rheumatologist [40]. Even though the government health-care coverage in Ecuador has improved, there is still a segment of the population including the elderly, children, and domestic workers that has not been integrated into the health care not the social security systems. Is it noteworthy, on the other hand, that a higher percentage of rural population seeks medical attention? This may be construed in the sense that health care is relatively accessible for the population [39].

Individuals with MSK pain in Cuenca as compared with the general population in Ecuador use public health care and social security less frequently, preferring private health care. This may be because the private care is faster and specialists are more readily accessible, which saves times as opposed to the public care which is more time-consuming for the patient.

As for handling physical loads >4 kg, it was more consistent with other studies, with 44.5 % in the rural sector. Repetitive activities were similar. These two elements were associated with an increase in the MSK pain prevalence. A comparison with the study in Nuevo Leon, Mexico [11] reveals that 46.9 % of the total study population had a job involving managing loads >4 kg. Although not significant, this situation probably contributes to a higher incidence of hand and knees osteoarthritis in the rural sector.

Regarding monthly income, 54.6 % of rural participants had an income of <USD 340 and a higher prevalence of MSK pain. The study by Alvarez et al. in the southeastern Mexico showed that 56.8 % of the urban and rural population had a monthly income below USD 250 [17], while Rodriguez in Brazil [43] reported that rheumatic disorders occurred more frequently in patients from lower socioeconomic groups. These results clearly show that poverty is a key determinant of MSK pain and rheumatic diseases, because this population group has less access to public health-care services and, consequently, the timely and effective medical care.

There were significant differences between the urban and rural populations. In terms of income, rural patients had lower salaries; the rural population used public health providers more often than did the urban population, while the latter visited private health care and social security providers more frequently. Patients from rural and urban areas engaged more frequently in physical activities involving

handling loads > 4 kg and doing repetitive task [39]. MSK pain is more common in rural versus urban areas; this was associated with such indirect indicators of the social gap as is cooking food with firewood and having fewer household appliances in the rural population. This association between the social gap and MSK pain and rheumatic diseases, especially OA, has been previously reported [29].

Strengths and limitations

The benefits of having a methodology like COPCORD are already becoming tangible, as it makes it possible to draw comparisons in time and space, to evaluate early symptoms such as pain. Its findings serve as a starting point for assessing health interventions. COPCORD-based instruments are also a bargaining chip to demonstrate to the decision-makers the real extent of the problem within the national and international context.

It becomes clear from our study that the variable of living in a rural area includes several sociodemographic factors that have been reported as predictors or at least as being associated with most OA conditions and/or that may cause worsening of some conditions predicted by most constitutional and unchangeable factors like age and genetics.

Previous studies have shown that up to 63 % of patients with current pain may have some MSK problem. Pain is an important sentinel event for making early diagnosis and controlling the damage from these disorders. Pain is also easy to detect in primary care, which may improve monitoring of at-risk populations.

If rural areas are considered at risk, pain monitoring can be increased in these regions by primary care health workers, since pain is a sentinel event detectable at low cost and can be used as cause for referral to a rheumatologist. This can mitigate the damage and the economic and social costs of rheumatic diseases.

The limitations of this study include certain difficulties we faced in the course of research, particularly in surveying the population living in exclusive, well-off areas, who chose not to participate probably due to security concerns. However, this small group did not affect the study results.

Conclusions

MSK pain prevalence was high. The most common diseases were osteoarthritis and low back pain. Age, sex, handling loads, repetitive tasks were found to be associated with MSK pain. Individuals from rural areas exhibited more MSK pain behavior, lower income, poorer healthcare coverage were shown to prepare food using firewood.

Data demonstrate that pain is a critical point for medical attention and intervention and can serve as a basal point for measuring the effectiveness of any taken actions, from attention to health promotion to prevention. Our results lay the technical groundwork informing the approach aimed at lowering individual and social costs of this group of diseases.

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Compliance with ethical standards

Conflict of interest The authors have no conflicts of interest to disclose.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The protocol was approved by the Boethics Committee of the School of Medical Sciences, University of Cuenca. All subjects who completed the questionnaire had signed informed consent.

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