

Prevalence of Rheumatic Diseases and Quality of Life in the Saraguro Indigenous People, Ecuador

A Cross-sectional Community-Based Study

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Rheumatic diseases are more prevalent and aggressive in indigenous population groups, providing medical attention for which poses a challenge for the rheumatologist.

Objective: To estimate the prevalence of musculoskeletal (MSK) disorders and rheumatic diseases in the Saraguro indigenous people in Ecuador, as well as to identify the main factors associated with the health status in this population.

Methods: This observational, cross-sectional study focused on the community was conducted using the COPCORD (Community-Oriented Program for Control of Rheumatic Diseases) methodology. The required data were obtained using the following instruments: (1) a screening for MSK disorders and rheumatic diseases; (2) a sociodemographic questionnaire; (3) a functional capacity Health Assessment Questionnaire Disability Index questionnaire; and (4) the quality of life EQ-5D-3L (EuroQoL) questionnaire. The rheumatologists working with the indigenous community were responsible for examining and treating study participants suffering from MSK disorders.

Results: The study sample comprised 2687 individuals, with mean age of 44 (SD, 19.9) years, 1690 (62.9%) of whom were women; Kichwa speakers comprised 32.4% (872), and 1244 (46.3%) reported MSK pain. The most prevalent conditions were as follows: low back pain (9.3%), hand osteoarthritis (OA, 7.2%), knee OA (6.5%), rheumatic regional pain syndrome (5.8%), fibromyalgia (1.8%), and rheumatoid arthritis (1.3%). Lower education level, unemployment, cooking with firewood, and rheumatic diseases were associated with a lower quality of life.

Conclusions: Musculoskeletal disorders, rheumatic diseases, and rheumatoid arthritis were found to be highly prevalent in the studied population. Rheumatoid arthritis and hand OA had the most significant impact on the quality of life.

Key Words: COPCORD, Ecuador, quality of life, rheumatic diseases, Saraguro indigenous people

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Rheumatic diseases have a significant impact on the quality of life in indigenous populations and other ethnic groups, mainly affecting functional capacity, which leads to loss of employment and educational opportunities, social isolation, and dramatic life changes.^{1,2} This high impact is further exacerbated by the marginalization of indigenous communities, especially in Latin America, who consequently have limited economic resources while facing higher barriers to public health care and thus have a high prevalence of morbidity and mortality.³

Rheumatic diseases have been reported to be more prevalent and aggressive in indigenous population groups in many countries, including Australia, Canada, New Zealand, and the United States. This disparity has been associated with genetic factors, low socioeconomic status, and discrimination.⁴ Studies on Latin American natives, for example, Mexico's Maya-Yucateco group, revealed a high (34.2%) prevalence of musculoskeletal (MSK) pain and rheumatic diseases.⁵ In the indigenous Qom group (Argentina), rheumatoid arthritis (RA) prevalence was estimated at 2.4%.⁶ The findings reported by the Latin American Lupus Study Group (Grupo Latinoamericano de Estudio del Lupus, GLADEL) indicate that mestizo patients diagnosed with systemic lupus erythematosus suffered greater renal damage and mortality due to infectious processes.⁷

Latin America and the Caribbean are home to some 48 million people who are members of 400 indigenous groups, which represents approximately 10% of the region's population. Most of these individuals are marginalized and sick and have limited access to health care. These ethnic groups perceive the disease in a community sense and follow the ways of traditional medicine for dealing with health problems.⁸

Ever since the demographic collapse brought about by the discovery of America and the subsequent colonization, high maternal and infant morbidity and mortality rates have persisted in Bolivia, along with infectious diseases such as tuberculosis.^{3,9} This suggests that the health care standards among indigenous peoples are low when compared with nonindigenous populations from the same region.

Several strategies have been devised to diagnose rheumatic diseases in the early stages and at the community level. Of particular relevance for the present investigation is the Community-Oriented Program for Control of Rheumatic Diseases (COPCORD) methodology, introduced by the International League of Associations for Rheumatology. The Community-Oriented Program for Control of Rheumatic Diseases was developed in 1981 and has since been used for the recognition, prevention, and control of rheumatic diseases.¹⁰

It is within this context that the Latin American Group for the Study of Rheumatic Diseases in Indigenous Peoples (Grupo Latinoamericano de Estudios de Enfermedades Reumáticas en Pueblos Originarios, GLADERPO) was formed to provide regional information by conducting epidemiological, anthropological, and

genetic studies on the indigenous population of Latin America. The present study was conducted using the COPCORD methodology to gain an in-depth understanding of MSK health problems that affect these isolated and marginalized populations.

Ecuador is a multiethnic country inhabited by approximately 1 million indigenous people (8% of the population), 50.9% of whom are women. The 3 geographical regions of Ecuador are home to 14 indigenous ethnic groups. The largest group, that of Saraguro Indians, resides in the native town of Saraguro, located in the Loja province in the Andean region in southern Ecuador.¹¹ Saraguro is near the city of Cuenca, which is the closest where specialized services for the care of rheumatic diseases can be found.

The aim of the present study was to describe the prevalence of MSK pain and rheumatic diseases, as well as their impact on the quality of life in the adult (age >18 years) members of the indigenous population of Saraguro, Ecuador.

MATERIALS AND METHODS

Design

Community-based analytical cross-sectional study was conducted using the COPCORD methodology. The population of interest were individuals older than 18 years who self-identified as Saraguro and who have lived in the community for at least 6 months.

The Context of the Study

The inhabitants of Saraguro are people from a culture based on respect for life and Earth. The mother tongue of the Saraguro people is Kichwa. The Saraguro people face a sociolinguistic problem evidenced by the loss of the functionality of the mother tongue, as it has become passive in most communities, with Spanish gaining foothold as the first language.¹² The Saraguro are farmers and mainly grow corn, with livestock and handicrafts being other common sources of income.¹¹ They use distinctive clothing prominently featuring the black color. The Saraguro live in rural communities at an altitude of 2552 m above sea level. The climate is cold to temperate, with the temperature ranging between 8°C and 21°C. The group includes 12,200 individuals 18 years or older.^{13,14}

The Ecuadorian health system is divided into public and private tiers. The public health care tier comprised the Ministry of Public Health, the Ministry of Economic and Social Inclusion, the public health services of the Social Security Institute (IESS), the Armed Forces, and the municipalities. Public health care service is utilized by approximately 71% of the population, whereas the IEISS covers 29% of the affiliated workers. Private health care is available from hospitals, health clinics, doctor's offices, and private companies offering prepaid services and caters to 3% of the population.¹⁵

The sample size for the present study was calculated based on a 50% MSK pain prevalence to obtain 95% confidence interval ($\alpha = 0.05$) with an estimated nonresponse rate of 20%. Thus, the sample comprised 2685 indigenous individuals.¹⁶

The sample design was random and mixed (stratified and conglomerate). The primary sampling units constituted of strata (geographic or domain stratification), which were identified using the updated censuses to improve sampling quality, whereby housing was taken as a conglomerate.¹⁷

Before commencing the study, physicians and last-year medical students, who took part in the research project as interviewers, participated in interactive workshops to obtain the necessary training. Briefings were held with the communities and authorities of the Saraguro Health District.

The Study Was Divided Into the Following Phases

Phase I. A pilot study was carried out, whereby 210 subjects drawn from the Saraguro community completed the COPCORD questionnaire to ensure that it is cross-culturally adapted. They were also administered the Health Assessment Questionnaire Disability Index (HAQ-DI) questionnaire to determine their functional capacity, along with the socioeconomic questionnaire, and generic quality of life questionnaire (EuroQoL [EQ-5D-3L]), all of which were utilized in the main study.¹⁸

Phase II. The validated COPCORD questionnaire was administered to all participants who had signed the informed consent, along with the HAQ-DI to evaluate the individual's functional capacity, and the EQ-5D-3L,¹⁹ whereas the socioeconomic information was obtained from the National Institute of Statistics and Census (Instituto Nacional de Estadísticas y Censos [INEC]).¹⁷ The questionnaires were administered in door-to-door visits to the households of Saraguro residents, which were visited up to 5 times before being considered as nonresponders.

Phase III. During a home visit, a rheumatologist assessed patients who were reported having MSK pain in the last 7 days or at some point in life (COPCORD questionnaire positive).

The COPCORD questionnaire was designed to capture demographic data, medical history, work history, MSK pain in the last 7 days, and pain intensity and severity (scored on a 5-point Likert scale), as well as past MSK pain, searching for medical help, and coping with the disease.

Functional capacity was assessed using a validated version of the HAQ-DI, which evaluates daily activities, such as dressing, walking, lying down, eating, or arising, along with the amount of difficulty in performing these activities, ranging from no difficulty to some difficulty.²⁰

The socioeconomic questionnaire included data from the 2010 INEC,¹⁷ namely, (1) health institution of choice (e.g., health clinics of the Social Security system, the Ministry of Public Health, private practice, or no health care coverage); (2) educational attainment (including years of schooling); (3) monthly income, along with whether the home is owned, rented, or provided; home distribution; number of rooms; method of waste disposal; and so on; and (4) household appliances and utilities, such as television, Internet access, and means of transportation.

A generic quality-of-life questionnaire EQ-5D-3L validated for Ecuador was administered to all study participants. The EQ-5D-3L included a descriptive system for measuring health in 5 domains—mobility, personal care, daily activity, pain/discomfort, and anxiety/depression—with scores provided for 3 levels: no problems, some problems, and inability to perform daily activities or higher level of pain or depression. Furthermore, the tool included an evaluation of the health perception on a visual analog scale (EQ-5D VAS) ranging from 0 to 100, where 0 represents the worst and 100 the best imaginable health status.²¹ The mean time of questionnaire administration was 25 minutes.

For the diagnosis of rheumatic diseases, rheumatologists used the American College of Rheumatology classification criteria: RA,²² hand osteoarthritis (OA),²³ knee OA,²⁴ fibromyalgia (FM),²⁵ gout,²⁶ low back pain,²⁷ and systemic lupus erythematosus.²⁸ In addition, if the respondent complained of low back pain, a chronic inflammatory low back pain screening questionnaire was administered,²⁹ along with a specific validated questionnaire for the diagnosis of rheumatic regional pain syndrome (RRPS).³⁰

The participating rheumatologists requested laboratory and radiographic tests according to their clinical evaluation at no cost to the patient. If the rheumatic disease diagnosis was confirmed, the patients received the required medical treatment and were able to join the health system.

Ethical Aspects

The study was approved by the Ethical and Research Institutional Board of the Universidad San Francisco de Quito, on October 14, 2016 (2016-129IN), and was conducted with the support of the Ministry of Health of the District of Saraguro (11D08). Institutional cooperation agreement for the development of the study between the Universidad de Cuenca and the Saraguro Health District was signed on March 27, 2017. The study protocol was further approved by the community and indigenous authorities of Saraguro. After a detailed explanation of the study, each participant gave his/her consent for participation in Spanish language (all participants were bilingual). This consent was recorded and authorized by a signature or fingerprint in a written informed consent form.

Statistical Analysis

In the univariate statistical analysis, discrete variables were operationalized as the number of cases (n) and percentages (%), whereas continuous variables were operationalized as mean and SD for a parametric and median and interquartile range for non-parametric. Prevalence figures were presented with a confidence interval of 95%. For group comparisons, the χ^2 test, Student *t* test, or Mann-Whitney *U* test was conducted. Depending on the variable type, bilateral $p < 0.05$ was accepted as a statistically significant difference.

The influence of socioeconomic variables, the presence of MSK disorders, the presence of any rheumatic disease, and functional capacity as independent variable was assessed after adjusting by sociodemographic characteristics (age, sex) via logistic regressions (model 1) using each of the 5 quality-of-life dimensions (problems with mobility, problems with self-care, pain, daily activities, and anxiety/depression), as well as through linear regression (model 2) using the data captured by the EQ-5D VAS, which were treated as dependent variables. The responses in one of the EQ-5D-3L questionnaire dimensions (0 = no problems, 1 = some problems/moderate, and 3 = unable/extreme) were categorized into 2 groups: 1 = no problems and 2 = moderate and continuous variable. Stata v11 for Mac statistical software (StataCorp LLC, College Station, TX) was used for all analyses.

RESULTS

The study was carried out from December 2016 to January 2018, and 2687 individuals from the Saraguro Canton community took part, 1690 (62.9%) of whom were women and 997 (37.1%) were men. The average age was 44 (SD, 19.9) years, and the average years of schooling was 7.5 (SD, 5.3) years (Table 1).

Nontraumatic MSK pain in the last 7 days was reported by 1244 individuals (46.3%), whereas 1191 (44.3%) reported having such pain in the past. Strong pain was the most prevalent, affecting 448 respondents (36%). Functional capacity score greater than 0.8, as measured by HAQ-DI, was found in 356 (13.2%) of the respondents, whereas 868 (69.7%) of 1244 reported receiving pharmacological treatment, and 1013 (37.7%) of 1244 had some alternative treatment (Table 2).

The age group in which MSK pain was most severe was 50 to 59 years (19% men and 17.1% women), followed by 60 to 69 years (15.1% men and 18.5% women) (Table 3). The most common sites in which pain manifested in the last 7 days were knees (1040 [83.9%]), hands (692 [55.6%]), legs (352 [28.3%]), lumbar region (340 [27.3%]), and shoulders (323 [25.9%]). Pain at some point in life was primarily reported for knees (940 [78.9%]), followed by hands (591 [49.6%]), lumbar region (307 [25.7%]), and shoulders (266 [22.3%]).

TABLE 1. Sociodemographic Characteristics of Saraguro Population, Ecuador

Characteristics	Total (n = 2687)
Demographics	
Sex, n (%)	
Female	1690 (62.9)
Male	997 (37.1)
Age, mean (SD, range), y	44 (19.9, 18–97)
Education, mean (SD, range), y	7.5 (5.3, 0–18)
Marital status	
Single	1148 (42.7)
Married	1539 (57.3)
Language	
Kichwa	871 (32.4)
Employment (yes)	2108 (78.4)
Occupation	
Farm worker	874 (32.5)
Laborer	236 (8.7)
Professionals	204 (7.5)
Businessperson	165 (6.1)
Housemaker	398 (14.8)
Monthly income in US \$, mean (SD)/median (IQR); range	142 (253)/30 (0–200); 0–3200
Housing	
Own	2023 (75.2)
Provided	321 (11.9)
Rented	181 (6.7)
Other	142 (5.2)
Family housing	19 (0.7)

IQR indicates interquartile range.

The most prevalent self-reported comorbidity was anxiety (55.5%), followed by depression (46.8%), gastritis (28.2%) and high blood pressure (11.9%). A higher rate of comorbidities was observed in the participant without MSK pain (COPCORD–) compared with the group with MSK pain (COPCORD+): anxiety (847/645; 68% vs. 44.7%; <0.001), depression (746/512; 59.9% vs. 35.4%; <0.001), gastritis (461/297; 37% vs. 20.5%; <0.001), and high blood pressure (231/89; 18.5% vs. 6.1%; <0.001). People with MSK pain also tended to do higher demanding physical activities, especially picking up objects greater than 20 kg (712/602; 57.2% vs. 41.7%; <0.001) and pushing objects greater than 20 kg (663/566; 53.3% vs. 39.2%; <0.001).

The most prevalent rheumatic diseases were low back pain (251 [9.3%]; 95% confidence interval [CI], 8.2–10.5), hand OA (195 [7.2%]; 95% CI, 6.3–8.3), knee OA (177 [6.5%]; CI, 5.6–7.5), RRPS (156 [5.8%]; 95% CI, 4.9–6.7), FM (50 [1.8%]; 95% CI, 1.3–2.4), and RA (37 [1.3%]; 95% CI, 0.9–1.8), as reported in Table 4.

The HAQ-DI results demonstrated that moderate disability (being able to perform activities with some difficulty) affected the participants' ability to take part in certain daily life activities, such as climbing up 5 stairs (reported by 283 respondents [or 10.5% of the sample]), bending down to pick up objects from the floor (224 [8.3%]), doing household chores such as washing and cleaning (197 [7.1%]), getting in and out of bed (190 [7%]), and standing up from a chair without support (175 [6.5%]). Moreover, severe disability (not being able to perform a particular task) predominated in activities such as bending down to pick up

TABLE 2. Description of Pain Characteristics and Seeking Help for MSK Disorders in the Saraguro Population

Characteristics	Total (n = 2687) (%; 95% CI)
MSK pain 7 d, n (%)	1244 (46.3%; 44.3–48.2)
Trauma-associated pain	201/1244 (15.9)
Pain intensity	
A lot	198 (15.9)
Quite a lot	448 (36.0)
Regular	358 (28.7)
Little	152 (12.2)
None	10 (0.3)
Past MSK pain, n (%)	1191 (44.3; 42.4–46.2)
Trauma-associated pain	192 (16.1)
Pain intensity	1130 (94.8)
A lot	183 (15.3)
Quite a lot	498 (41.8)
Regular	324 (27.2)
Little	119 (9.9)
None	67 (5.6)
Current physical limitation, n (%)	683 (25.4)
Functional capacity (HAQ-DI [0–3], median (IQR))	0 (0–0.3)
HAQ >0.8 ^a	356 (13.2)
HAQ >0.5 ^b	535 (19.9)
Type of health care (n = 1244)	
Private health care	842 (67.6)
Self-care	133 (10.7)
Previous diagnosis of RD ^c	393 (31.5)
Previous illness ^d	200 (16.0)
Treatment (yes), n (%)	868 (69.7)
NSAIDs	803 (92.5)
Painkillers	108 (8.6)
Steroids	27 (2.1)
Unconventional treatment	1013 (81.4)
Family history of rheumatic disease	1036 (83.2)

^aHAQ-DI 0.8 = 0.8 cutoff point established for Latin America.²⁰

^bHAQ-DI 0.5 = 0.5 cutoff point.²

^cRheumatic diseases (RD) by physician, 92 arthritis, degenerative disease, 29 gout, 32 RA.

^dIllness = diagnosis by traditional healer: 75 air in the bones/cold air; 8 evil eye, nerves.

objects from the floor as well as reaching to get a greater than 2-lb object from above the head (affecting 74 individuals [or 2.7% of the sample]), climbing up 5 stairs (63 [2.3%]) and doing house chores (54 [2%]). In addition, significant differences ($p > 0.001$) were observed in all EQ-5D-3L dimensions, as well as in functional capacity, between those whose suffering MSK pain and rheumatic disease and the respondents who do not experience MSK pain (Table 5).

The multiple logistic regression (model 1) analysis revealed that the independent variables associated with having a poorer quality of life across all dimensions of the EQ-5D-3L were lower education level, unemployment, cooking with firewood, MSK pain, and having an RA or hand OA diagnosis (Table 6). Multiple linear regression model (model 2) showed that having a higher health perception (EQ-5D VAS) was significantly associated with

having historic pain ($\beta = 0.5$; 95% CI, 0.4–0.5; $p < 0.001$), having RA ($\beta = 0.6$; 95% CI, 0.4–0.8; $p < 0.001$), having FM ($\beta = 0.3$; 95% CI, 0.1–0.5; $p < 0.003$), and back pain ($\beta = 0.2$; 95% CI, 0.1–0.3; $p < 0.001$) (data not shown).

DISCUSSION

The prevalence of MSK pain and rheumatic diseases in the indigenous population of Saraguro is high, and the rates are even greater among subjects with low education level who speak Kichwa and have physically demanding jobs. This situation is further exacerbated by a dearth of essential services, low income, and a high percentage of disability, all of which affect the quality of life, especially of patients living with rheumatic disease.

The impact on all quality-of-life dimensions considered in the present study was found to be considerable, particularly in important parameters such as pain, mental health, and functional capacity.³¹ The impact was higher in patients with rheumatic diseases, especially in RA, and lesser in those with chronic MSK pain as compared with the disease-free population. More than 50% of the subjects diagnosed with some form of rheumatic disease have reported that the illness has had an adverse impact on all dimensions of quality of life, as well as their current health status, which indicates one more significant impact in the life of these individuals. The most severe effects are related to being unemployed, speaking an indigenous language (Kichwa in this population), cooking with firewood, more significant pain, increased use of traditional medicine, and more years of education, in line with the findings reported for the RA patients in Netherlands and Portugal.^{32,33} However, in linear regression analysis, we observed a paradoxical effect in general health perception, because persons with rheumatic diseases, such as AR, FM, low back pain, and chronic pain, tended to report a better overall perception of health. This paradoxical effect has been documented in the literature as “disability paradox”³¹ in general and has been reported in other epidemiological studies focusing on rheumatic diseases.³⁴ This paradoxical effect can be roughly estimated based on other studies where patients who have a long-lasting disability have a more positive attitude toward their surroundings and have a greater sense of coping of the disease.^{31,34}

We observed a 46.3% prevalence of nontraumatic MSK pain in the last 7 days, a lower figure than reported for the indigenous population of Qom, Argentina (53.7%), and San Juan, Guatemala (61%),^{6,35} but higher than 34.5% observed in 8 indigenous communities in Latin America.³⁶ Because 1 in 3 people worldwide is estimated to live with an MSK disorder, more effort needs to be directed into improving MSK health care at an international level.³⁷

In the population of Saraguro, 83.9% of the reported pain was localized to the knee, which is a higher percentage than reported for the indigenous populations of Qom, Argentina (13%); Chihuahua, Mexico (59.2%); and Venezuela (26.7%).^{6,38,39} This pain localization could be related to the geographical conditions of Saraguro, as it is located in the Andes, which is characterized by a rugged and hilly land, with agriculture as one of the central economic activities of the population.

In terms of self-reported comorbidities, anxiety and depression (68%/59.9%) were more prevalent compared with the Rarámuri (16.8%/21%),³⁸ Mixtec and Chontal (19.5%/17.9%),⁴⁰ and Maya-Yucateco groups in Mexico (27.9%/23.9%).⁵ These results indicate that mental health is a serious issue affecting indigenous Saraguro, a situation that has not been broached by the country's health system. In addition, this high prevalence suggests a high association between mental illness and rheumatic diseases.⁴¹ Consequently, any community-level intervention to address the

TABLE 3. Musculoskeletal Pain in the Last 7 Days by Age and Sex

Age, y	Total (n = 2682 ^a)	Total, n (%)		COPCORD+ (n = 1240 ^b)		COPCORD- (n = 1442 ^b)	
		Male	Female	Male	Female	Male	Female
18–29	809 (30.1)	996 (37.1)	1686 (62.9)	384 (31.0)	856 (69.0)	612 (42.5)	830 (57.5)
30–39	436 (16.2)	343 (34.4)	466 (27.6)	50 (13.0)	83 (9.7)	293 (47.8)	383 (46.1)
40–49	403 (15.0)	160 (16.0)	276 (16.3)	48 (12.5)	115 (13.4)	112 (18.3)	161 (19.4)
50–59	403 (15.0)	130 (13.0)	273 (16.1)	54 (14.0)	147 (17.1)	76 (12.4)	126 (15.7)
60–69	354 (13.2)	134 (13.4)	220 (13.0)	73 (19.0)	147 (17.1)	61 (9.9)	73 (8.8)
70–74	304 (11.3)	99 (9.9)	205 (12.1)	58 (15.1)	159 (18.5)	41 (6.7)	46 (5.5)
75–79	128 (4.7)	41 (4.1)	87 (5.1)	31 (8.0)	71 (8.2)	10 (1.6)	16 (1.9)
>75	248 (9.2)	89 (8.9)	159 (9.4)	70 (18.3)	134 (15.6)	19 (3.1)	25 (3.0)

^aMissing. Of a total of 2687, 5 individuals reported not remembering their age (1 individual from the COPCORD+ group and 4 from the COPCORD- group).

^bCOPCORD+ indicates cases with MSK pain in the last 7 days or at some point in life; COPCORD- = no MSK pain in the last 7 days or at some point in life.

issue of rheumatic diseases should include a comprehensive strategy aimed at detecting and treating mental disorders.

Only 1.3% of the population of Saraguro suffered from RA, compared with 2.4% reported for Qom, Argentina,⁶ and other indigenous groups, such as the Aboriginal Australians (2.7%), Chippewa (6.8%) from the United States, and First Nation group from Canada (1.9%).⁴² At the same time, the percentage is similar to the figures observed in Venezuela (1.1%)³⁹ and Maya-Yucateco (1.1%)⁵ and is higher than that reported in Guatemala (0.8%).³⁵

The present study also revealed a relationship between exposure to the smoke produced by wood stoves and the quality of life of patients living with rheumatic diseases, especially RA. It has been shown that a large number of patients with RA have subclinical inflammation in the lung tissue; smoking in turn seems to be involved in the formation of antibodies to cyclic citrullinated peptide in the respiratory mucous membranes.⁴³ It could thus be posited that wood smoke produces a similar response to cigarette smoke, becoming a risk factor for RA and other autoimmune diseases. Further studies should, however, be conducted to examine this possible association.

The prevalence of FM was high at 1.8%, similar to 1.5% reported for Nigeria⁴⁴ and 2% for the population of Cuenca in Ecuador.⁴⁵ However, it was higher than the rates reported in other indigenous communities of Latin America, namely, Qom (0.1%) and Venezuela (0.5%),^{6,39} while being lower than 2.5% reported for a nonindigenous population of Brazil.⁴⁶ Generalized pain due to FM could be related to the tendency of the Saraguro people to experience sadness about their historic past of living in an inequitable society with limited economic resources, expressed in a

worldview of people who have been marginalized throughout its history.

Notably, anxiety and depression were the most prevalent self-reported comorbidities in the present study. These factors would contribute to the expression of FM.⁴⁷ Gelonch et al.⁴⁸ found a very high prevalence of anxiety and depression in Spanish patients with FM, similar to that observed in the Netherlands, where de Heer et al.⁴⁹ noted that the poor perception of the patient with the disease increases depression and anxiety. Fibromyalgia is likely to be associated bidirectionally; that is, patients with FM develop depression, whereas depressed patients develop subsequent FM.^{50,51} Available evidence shows a high prevalence of psychiatric comorbidity, particularly stress-related disorders, and poor mood.⁵²

In the present study, greater functional limitations were observed in individuals living with MSK pain (13.2%) and rheumatic diseases (16.4%) compared with healthy subjects (10.7%). The disability caused by MSK pain in our study was similar to that reported for the indigenous population of Maya-Yucateco⁵ and was lower than that found in the population of Rarámuris in Mexico (44.2%)³⁸ and Cuenca, Ecuador (71.1%).⁵³ Moreover, the HAQ-DI score for rheumatic diseases in Saraguro was lower than that in Qom, Argentina (64.2%),⁶ and Cuenca, Ecuador (63.9%).⁵³

In a study conducted in Solomon Island using other field instruments, the authors found that low back pain produces 16.8% functional limitations and 10.8% limitations in knees and hips.⁵⁴

Subjects from Saraguro who were positive for rheumatic disease and COPCORD exhibited moderate to severe disability in daily activities, such as climbing stairs, bending over, and picking up objects from the floor, as well as household activities such as

TABLE 4. Prevalence of Rheumatic Diseases by Sex in Saraguro Population

Rheumatic diseases	Male (n = 247), n (%; 95% CI)	Female (n = 623), n (%; 95% CI)	Total (n = 870), n (%; 95% CI)	p value
Back pain	84 (8.4; 6.7–10.3)	167 (9.8; 8.4–11.4)	251 (9.3; 8.2–10.5)	0.2
Hand OA	45 (4.5; 3.3–5.9)	150 (8.8; 7.5–10.3)	195 (7.2; 6.3–8.3)	<0.001
Knee OA	45 (4.5; 3.3–5.0)	132 (7.8; 6.5–9.1)	177 (6.5; 5.6–7.5)	0.001
RRPS	52 (5.2; 3.9–6.7)	104 (6.1; 5.0–7.4)	156 (5.8; 4.9–6.7)	0.3
FM	15 (1.5; 0.8–2.4)	35 (2.0; 1.4–2.8)	50 (1.8; 1.3–2.4)	0.2
RA	3 (0.3; 0.06–0.8)	34 (2.0; 1.3–2.8)	37 (1.3; 0.9–1.8)	<0.001
Gout	2 (0.1; 0.02–0.7)	1 (0.05; 0.005–0.3)	3 (0.01; 0.02–0.3)	0.2
Ankylosing spondylitis	1 (0.1; 0.002–0.5)	—	0.03 (0.00003–0.02)	—

TABLE 5. Disability and EQ-5D-3L in Saraguro Population With Rheumatic Disease Versus No Rheumatic Disease

	Total (2687)	MSK+ (COPCORD+ RD-), n = 603 ^a	RD+ (COPCORD+ RD+), n = 861 (41.3) ^a	RD- (COPCORD- RD-), n = 1223 (58.6) ^a	p value
HAQ-DI, median (IQR) ^b		0 (0–0.4)	0 (0–0.5)	0 (0–0.3)	0.0001
Disability (HAQ-DI > 0.8) ^c		82 (13.6)	142 (16.4)	132 (10.7)	<0.001
Disability (HAQ-DI > 0.5) ^d		124 (20.5)	204 (23.6)	207 (16.9)	<0.001
EQ-5D-3L					
Mobility					<0.001
No problems	1933 (71.9)	421 (69.8)	337 (39.1)	1175 (96.0)	
Some problems	696 (25.9)	169 (28.0)	485 (56.3)	42 (3.4)	
Extreme problems	58 (2.16)	13 (2.1)	39 (4.5)	6 (0.4)	
Self-care					<0.001
No problems	2221 (82.6)	508 (84.2)	513 (59.5)	1200 (98.1)	
Some problems	422 (15.7)	85 (14.1)	318 (36.9)	19 (1.5)	
Extreme problems	44 (1.6)	10 (1.6)	30 (3.4)	4 (0.3)	
Activities					<0.001
No problems	2080 (77.4)	451 (74.7)	440 (51.1)	1189 (97.2)	
Some problems	541 (20.1)	137 (22.7)	376 (43.6)	28 (2.2)	
Extreme problems	66 (2.4)	15 (2.4)	45 (5.2)	6 (0.4)	
Pain/discomfort					<0.001
No problems	1650 (61.4)	317 (52.5)	206 (24.0)	1127 (92.1)	
Some problems	904 (33.6)	261 (43.2)	555 (64.4)	88 (7.2)	
Extreme problems	133 (4.9)	25 (4.1)	100 (11.6)	8 (0.6)	
Anxiety/depression					<0.001
No problems	1808 (67.2)	376 (62.3)	417 (48.3)	1015 (82.9)	
Some problems	780 (29.0)	208 (34.4)	385 (44.7)	187 (15.2)	
Extreme problems	99 (3.6)	19 (3.1)	59 (6.8)	21 (1.7)	
Health					<0.001
Very good	682 (25.3)	113 (18.7)	61 (7.0)	508 (41.5)	
Good	114 (41.4)	255 (42.2)	280 (32.5)	579 (47.3)	
Poor	770 (28.6)	210 (34.8)	431 (50.0)	129 (10.5)	
Very poor	121 (4.5)	25 (4.1)	89 (10.3)	7 (0.5)	

^aUnless otherwise specified, values are depicted as n (%), χ^2 test (dichotomous).

^bKruskal-Wallis test.

^cHAQ-DI 0.8 = 0.8 cutoff point established for Latin America.²⁰

^dHAQ-DI 0.5 = 0.5 cutoff point.²

COPCORD+ indicates cases with MSK pain in the last 7 days or at some point in life; COPCORD-, no MSK pain in the last 7 days or at some point in life; IQR, interquartile range; MSK+ indicates MSK complaint; RD+, with rheumatic disease; RD-, without rheumatic disease.

washing and walking. These results are in line with the findings obtained in the study carried out in Cuenca, Ecuador.⁵³ They are quite remarkable, because the prevalence of rheumatic diseases was not as high as previously reported for other Latin American indigenous groups. Still, physical disability was more prevalent compared with other indigenous populations.

Inequality in public health has been one of the recent concerns in the area of rheumatology, because it occurs in all countries but is particularly problematic in low- and middle-income countries, such as Ecuador. Addressing public health inequality is one of the stated goals of the Healthy People 2020 initiative.⁵⁵

Study Limitations

The main limitation of the present study stems from the difficulty in administering the questionnaires, because some households were located in hard-to-reach areas located far away from other communities or population centers. This project has also

involved a significant human and economic cost due to the dispersed settlement pattern of these communities.

CONCLUSIONS

The present study has revealed a high prevalence of MSK pain, RA, and FM in the indigenous population of Saraguro, with women living on low income being the most affected. These diseases impact their quality of life in a wide range of domains, mental health, pain, and functional capacity in particular. The daily use of firewood for cooking results in a high smoke exposure, which is a risk factor for the development of RA and a lower quality of life.

PRACTICAL POINTS

Some modifiable factors (social determinants of health), such as greater health coverage, better education, and cooking with firewood, were associated with the decrease in the quality of life in individuals living with rheumatic diseases.

TABLE 6. Logistic Regression Analysis (Model 1) of the Variables Associated With Each Dimension of Quality of Life (EuroQoL) as Dependent and Independent Variables (Education, Socioeconomic Status, Health Coverage, Physical Work, Community Type, Work Characteristics), Adjusted by Age and Sex

Independent Variable	Dimension of EuroQoL (Dependent Variable)				
	1. Problems With Mobility, OR (CI 95%; <i>p</i>) <i>R</i> ² = 30.0; <0.001	2. Problems With Self-care, OR (CI 95%; <i>p</i>) <i>R</i> ² = 24.7; <0.001	3. Pain, OR (CI 95%; <i>p</i>) <i>R</i> ² = 27.3; <0.001	4. Daily Activities, OR (CI 95%; <i>p</i>) <i>R</i> ² = 25.0; <0.001	5. Anxiety/Depression, OR (CI 95%; <i>p</i>) <i>R</i> ² = 10.2; <0.001
Education	0.9 (0.8–0.9; <0.001)	0.9 (0.8–0.9; <0.001)	0.9 (0.9–0.9; <0.001)	0.9 (0.9–0.9; <0.001)	0.9 (0.9–0.9; <0.001)
Employment	0.5 (0.4–0.7; <0.001)	0.5 (0.4–0.7; <0.001)		0.6 (0.5–0.8; <0.001)	
Housekeeping					1.8 (1.6–2.2; <0.001)
Speaking Kichwa	1.5 (1.0–2.3; 0.02)			1.4 (1.0–2.1; 0.04)	1.3 (1.1–1.6; <0.001)
Cooking with firewood	1.8 (1.4–2.3; <0.001)			2.7 (2.1–3.5; <0.001)	1.8 (1.3–2.5; 0.001)
Traditional medicine	2.0 (1.4–2.9; <0.001)		3.3 (2.7–4.0; <0.001)	1.6 (1.1–2.3; 0.004)	
MSK disorders 7 d	3.4 (2.6–4.5; <0.001)	4.3 (3.0–6.0; <0.001)		3.0 (1.9–3.4; 0.004)	
MSK disorders history	2.3 (1.7–3.1; <0.001)	2.6 (1.9–3.6; <0.001)			2.5 (2.0–3.0; <0.001)
Blood hypertension					
Mental health					
Gastritis			1.6 (1.3–2.0; <0.001)		
Obesity			1.4 (1.2–1.8; <0.001)		
Hands OA	2.0 (1.4–3.0; <0.001)		2.3 (1.6–3.3; <0.001)		
Knee OA	2.3 (1.5–3.3; <0.001)	1.8 (1.3–2.6; <0.001)	3.5 (2.4–5.0; <0.001)	1.8 (1.3–2.5; 0.001)	
Back pain	2.3 (1.7–3.2; <0.001)		2.6 (1.7–3.9; <0.001)	1.8 (1.3–2.6; <0.001)	
RRPS	1.8 (1.2–2.7; <0.001)		3.0 (2.2–4.2; <0.001)	1.8 (1.3–2.5; <0.001)	
RA	5.5 (2.4–12.2; <0.001)	4.7 (2.2–10.0; <0.001)	2.9 (2.0–4.3; <0.001)	1.8 (1.2–2.6; 0.003)	
FM	2.0 (1.0–3.7; <0.001)		44.4 (10.2–192.7; <0.001)	4.4 (2.1–9.2; <0.001)	
			4.7 (2.3–9.9; <0.001)		

OR indicates odds ratio; *R*², coefficient of linear determination.

Rheumatoid arthritis is a rheumatic disease that tends to decrease the quality of life in affected members of the Saraguro indigenous population of Ecuador.

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REFERENCES

- Cardiel MH. Present and future of rheumatic diseases in Latin America. Are we prepared to face them? *Rheumatol Clin*. 2011;7:279–280.
- Loyola-Sanchez A, Richardson J, Peláez-Ballestas I, et al. The impact of arthritis on the physical function of a rural Maya-Yucateco community and factors associated with its prevalence: a cross-sectional, community-based study. *Clin Rheumatol*. 2016;35:25–34.
- Montenegro RA, Stephens C. Indigenous health in Latin America and the Caribbean. *Lancet*. 2006;367:1859–1869.
- Loyola-Sanchez A, Hurd K, Barnabe C, et al. Healthcare utilization for arthritis by indigenous populations of Australia, Canada, New Zealand, and the United States: a systematic review. *Semin Arthritis Rheum*. 2017;46:665–674.
- Peláez-Ballestas I, Alvarez-Nemegyei J, Loyola-Sánchez A, et al. Prevalence and factors associated with musculoskeletal disorders and rheumatic diseases in indigenous Maya-Yucateco people: a cross-sectional community-based study. *Clin Rheumatol*. 2016;35:15–23.
- Quintana R, Silvestre A, Goñi M, et al. Prevalence of musculoskeletal disorders and rheumatic diseases in the indigenous Qom population of Rosario, Argentina. *Clin Rheumatol*. 2016;35:5–14.
- Pons-Estel B, Catoggio L, Cardiel M, et al. The GLADEL multinational Latin American prospective inception cohort of 1,214 patients with systemic lupus erythematosus: ethnic and disease heterogeneity among “Hispanics”. *Medicine (Baltimore)*. 2004;83:1–17.
- Secretaría Nacional de Planificación y Desarrollo—Senplades. Plan Nacional de Desarrollo / Plan Nacional para el Buen Vivir 2013–2017 [website]. 2013. Available at: www.observatorionplanificacion.cepal.org. Accessed April 3, 2019.
- Valeggia CR, Snodgrass JJ. Health of indigenous peoples. *Ann Rev Anthropol*. 2015;44:117–135.
- Wigley R, Manahan L, Muirden KD, et al. Rheumatic disease in a Philippine village II: a WHO-ILAR-APLAR COPCORD study, phases II and III. *Rheumatol Int*. 1991;11:157–161.
- Sarango F. Los Saraguros. In: Almeida Vinneza J, ed. *Identidades Indias del Ecuador Contemporáneo*. Cayambe, Ecuador: Abya-Yala; 1995:339–363.
- Syring D. *With the Saraguros: The Blended Life in a Transnational World*. Austin, TX: University of Texas Press; 2014.
- Armijos C, Cota I, González S. Traditional medicine applied by the Saraguro *yachakkuna*: a preliminary approach to the use of sacred and psychoactive plant species in the southern region of Ecuador. *J Ethnobiol Ethnomed*. 2014;10:26.
- Schmitz W. Interethnic relations in Saraguro (Ecuador) from the anthropology of communication. *Man Life J Inst Soc Res Appl Anthropol (Calcutta)*. 1983;9:35–52.
- Lucio R, Villacrés N, Henríquez R. Sistema de Salud de Ecuador. *Salud Pública Méx [serial online]*. 2011;53:s177–s187. Available at: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0036-36342011000800013&lng=es. Accessed April 3, 2019.
- Cardiel MH, Rojas-Serrano J. Community based study to estimate prevalence, burden of illness and help seeking behavior in rheumatic diseases in Mexico City. A COPCORD study. *Clin Exp Rheumatol*. 2002;20:617–624.
- Instituto Nacional de Estadísticas y Censos del Ecuador, INEC (2010). Available at: <http://www.inec.gob.ec/tabulados>. Accessed March 8, 2018.
- Peláez-Ballestas I, Sanin LH, Moreno-Montoya J, et al. Epidemiology of the rheumatic diseases in Mexico. A study of 5 regions based on the COPCORD methodology. *J Rheumatol Suppl*. 2011;86:3–8.
- Guevara-Pacheco S, Feicán-Alvarado A, Peláez-Ballestas I, et al. Estudio Descriptivo: Detección del dolor músculo—esquelétrico y Enfermedades Reumáticas aplicando el COPCORD en la población indígena de Saraguro—Ecuador. *Rev Méd Hosp José Carrasco Arteaga*. 2018;10:126–132.
- Moreno-Montoya J, Alvarez-Nemegyei J, Trejo-Valdivia B. Assessment of the dimensions, construct validity, and utility for rheumatoid arthritis screening of the COPCORD instrument. *Clin Rheumatol*. 2014;33:631–636.
- The EuroQoL Group. EuroQoL a new facility for the measurement of health-related quality of life. *Health Policy*. 1990;16:199–208.
- Arnett FC, Edworthy SM, Bloch DA, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum*. 1988;31:315–324.
- Altman R, Alarcon G, Appelrouth D, et al. The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hand. *Arthritis Rheum*. 1990;33:1601–1610.
- Altman R, Asch E, Bloch D, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria of the American Rheumatism Association. *Arthritis Rheum*. 1986;29:1039–1049.
- Wolfe F, Smythe H, Yunus M, et al. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Report of the Multicentric Criteria Committee. *Arthritis Rheum*. 1990;33:160–172.
- Wallace S, Robinson H, Masi A, et al. Preliminary criteria for the classification of the acute arthritis of primary gout. *Arthritis Rheum*. 1977;20:895–900.
- Sieper J, van der Heijde D, Landewé R, et al. New criteria for inflammatory back in pain in patients with chronic back pain: a real patient exercise by experts from the Assessment of SpondyloArthritis International Society (ASAS). *Ann Rheum Dis*. 2009;68:784–788.
- Hochberg MC. Updating the American College of Rheumatology revised criteria for the classification of systemic lupus erythematosus. *Arthritis Rheum*. 1997;40:1725.
- Rudwaleit M, Metter A, Listing J, et al. Inflammatory back pain in ankylosing spondylitis: a reassessment of the clinical history for applications as classification and diagnostic criteria. *Arthritis Rheum*. 2006;54:569–578.
- Alvarez J, Peláez-Ballestas I, Rodríguez-Amado J, et al. Prevalence of rheumatic regional pain syndromes in adults from Mexico: a community survey using COPCORD for screening and syndrome-specific diagnostic criteria. *J Rheumatol*. 2011;38:15–20.
- Albrecht GL, Devlieger PJ. The disability paradox: high quality of life against all the odds. *Soc Sci Med*. 1999;48:977–988.
- Picavet HS, Hoeymans N. Health related quality of life in multiple musculoskeletal diseases: SF-36 and EQ-5D in the DMC3 study. *Ann Rheum Dis*. 2004;63:723–729.
- Ferreira P, Goncalves S, Ferreira L, et al. Assessing the quality of life of self-reported rheumatic patients. *Rheumatol Int*. 2016;36:1265–1274.

34. Esquivel-Valerio JA, Orzua-de la Fuente WM, Vázquez-Fuentes BR, et al. The impact of osteoarthritis on the functioning and health status of a low-income population: an example of a disability paradox. *J Clin Rheumatol*. 2018;24:57–64.
35. Obregón-Ponce A, Iraheta I, García-Ferrer H, et al. A prevalence of musculoskeletal diseases in Guatemala, Central America. The COPCORD study of 2 populations. *J Clin Rheumatol*. 2012;18:170–174.
36. Peláez-Ballestas I, Granados Y, Quintana R, et al. Epidemiology and socioeconomic impact of the rheumatic diseases on indigenous people: an invisible syndemic public health problem. *Ann Rheum Dis*. 2018;77:1397–1404.
37. Briggs A, Woolf A, Dreinhöfer K, et al. Reducing the global burden of musculoskeletal conditions. *Bull World Health Organ*. 2018;96:366–368.
38. Del Rio Nájera D, Santana N, Peláez-Ballestas I, et al. Prevalence of rheumatic diseases in Raramuri people in Chihuahua, México: a community-based study. *Clin Rheumatol*. 2016;35:43–52.
39. Granados Y, Rosillo C, Cedeño L, et al. Prevalence of musculoskeletal disorders and rheumatic disease in the Warao, Kariña, and Chaima indigenous populations of Monagas State, Venezuela. *Clin Rheumatol*. 2016;35:53–61.
40. Julian-Santiago F, García-García C, García-Olivera I, et al. Epidemiology of rheumatic diseases in Mixtec and Chontal indigenous communities in Mexico: a cross-sectional community-based study. *Clin Rheumatol*. 2016;35:35–42.
41. Esen S, Esen İ, Karabulut Y, et al. Effects of the disease characteristics and the treatment on psychological status in patients with rheumatoid arthritis and ankylosing spondylitis. *Curr Rheumatol Rev*. 2018;14:271–278.
42. McDougall C, Hurd K, Barnabe C. Systematic review rheumatic disease epidemiology in the indigenous populations of Canada, the United States, Australia, and New Zealand. *Semin Arthritis Rheum*. 2017;46:675–686.
43. Rydell E, Forslind K, Kenilsson J, et al. Smoking, body mass index, disease activity, and the risk of rapid radiographic progression in patients with early rheumatoid arthritis. *Arthritis Res Ther*. 2018;20:82.
44. Uzunmwangho C, Dungwom S, Imoh L, et al. Prevalence of musculoskeletal diseases in a semi-urban Nigerian community: results of a cross-sectional survey using COPCORD methodology. *Clin Rheumatol*. 2017;36:2509–2516.
45. Guevara S, Feicán A, Peláez-Ballestas I, et al. Prevalence of musculoskeletal disorders and rheumatic diseases in Cuenca, Ecuador. A WHO-COPCORD study. *Rheumatol Int*. 2016;36:1195–2014.
46. Senna ER, De Barros AL, Silva EO, et al. Prevalence of rheumatic diseases in Brazil: a study using the COPCORD approach. *J Rheumatol*. 2004;31:594–597.
47. Vincent A, Lahr B, Wolfe F, et al. Prevalence of fibromyalgia: population-based study in Olmsted County, Minnesota, utilizing the Rochester Epidemiology Project. *Arthritis Care Res*. 2013;65:786–792.
48. Gelonch O, Garolera M, Valls J, et al. The effect of depressive symptoms on cognition in patients with fibromyalgia. *PLoS One*. 2018;13:1–20.
49. De Heer E, Vriezolkolk J, van der Feltz-Cornelis C. Poor illness perceptions and anxious symptomatology in fibromyalgia syndrome: a longitudinal cohort study. *Front Psych*. 2017;8:1–8.
50. Revuelta E, Segura E, Tevar P. Depresión, ansiedad y fibromialgia. *Rev Soc Esp Dolor*. 2010;17:326–332.
51. Chang M, Hsu J, Huang K, et al. Bidirectional association between depression and fibromyalgia syndrome: a nationwide longitudinal study. *J Pain*. 2015;16:895–902.
52. Sancassiani F, Machado S, Ruggiero V, et al. The management of fibromyalgia from a psychosomatic perspective: an overview. *Int Rev Psychiatry*. 2017;29:473–488.
53. Guevara-Pacheco SV, Feican-Alvarado A, Delgado-Pauta J, et al. Prevalence of disability in patients with musculoskeletal pain and rheumatic diseases in a population from Cuenca, Ecuador. *J Clin Rheumatol*. 2017;23:324–329.
54. Hoy DG, Raikoti T, Smith E, et al. Use of the Global Alliance for Musculoskeletal Health Survey module for estimating the population prevalence of musculoskeletal pain: findings from the Solomon Islands. *BMC Musculoskelet Disord*. 2018;19:292.
55. Vilen L, Baldassari A, Callahan L. Socioeconomic burden of pain in rheumatic diseases. *Clin Exp Rheumatol*. 2017;35:26–31.