Prevalence of Rheumatic Diseases in Greece: A Cross-Sectional Population Based Epidemiological Study. The ESORDIG Study

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ABSTRACT. ***Objective.*** To assess the prevalence of rheumatic diseases in Greek urban, suburban, and rural adult general populations.

Methods. This cross-sectional population based epidemiological study of rheumatic diseases in Greece (the ESORDIG Study) was conducted on the total adult population of 2 urban, one suburban, and 4 rural communities (8547 subjects), as well as on 2100 out of 5686 randomly selected subjects in one suburban and one rural community. The study, based on a standardized questionnaire and clinical evaluation and laboratory investigation when necessary, was carried out by rheumatologists who visited the target population at their homes. Either established classification criteria or criteria set for the purposes of the study were used for diagnosis.

Results. A total of 8740 subjects participated in the study (response rate 82.1%). The overall age and sex adjusted prevalence ($prevalence_{asa}$) of rheumatic diseases in the total target adult population was 26.9% (95% CI 26.2–27.6), being significantly higher among women (33.7%) than men (19.9%) ($p < 0.0005$). Disease $prevalence_{asa}$ increased significantly with age ($p < 0.0005$). The most common disease group was low back pain, with a $prevalence_{asa}$ of 11.0%, followed by symptomatic peripheral osteoarthritis (7.9%), neck pain (4.8%), miscellaneous rheumatic disorders (4.4%), soft tissue rheumatism disorders (4.3%), and inflammatory rheumatic disease (2.1%). Logistic regression analysis showed a significant positive association of female or male sex, age ≥ 50 years, high body mass index, low level of education, moderate or heavy alcohol consumption, and high socioeconomic level with particular diseases or disease groups.

Conclusion. These findings indicate rheumatic diseases are very common in the general adult population of Greece; 26.9% of adults currently have active or chronic rheumatic disease in remission. (J Rheumatol 2003;30:1589–601)

Key Indexing Terms:
PREVALENCE RHEUMATIC DISEASES GREECE
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Rheumatic diseases could be defined as diseases of the connective tissue and medical disorders of the musculoskeletal system, with pain and/or stiffness as main manifestations, and which may or may not be accompanied by other organ system involvement. They are among the most common diseases managed at the primary health care level, as well as the leading cause of disability in persons aged 15 years and older[1-3]. Although the prevalence of the most common and/or most important rheumatic diseases, such as rheumatoid arthritis (RA)[4-10] and other connective tissue diseases (CTD)[5,7,11], osteoarthritis (OA)[4,7,10,12], low back pain (LBP)[7,10,12,13], and seronegative spondyloarthropathies (SpA)[7,9,14-16], has been studied adequately, few studies to determine the overall prevalence of all rheumatic diseases in the general population have been done. In the latter studies, the prevalence of rheumatic disease in the general population was estimated using a standardized questionnaire-interview administered by health workers or trained interviewers, followed by a clinical evaluation of the posi-

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tive responders by rheumatologists. The reported disease prevalence in such studies ranged broadly from 9.8% to 25%[17-19]. In a Finnish study[20] the prevalence of rheumatic complaints in an adult urban population was found to be 33.2%, while in other studies the prevalence of self-reported rheumatic symptoms or rheumatic conditions in the general adult population has been assessed and estimated to range broadly from 12.4% to 31.3%[1,21,22].

In Greece, epidemiological studies on rheumatic diseases are sparse. The prevalence of Sjögren's syndrome (SS) has been assessed in one study[11] and the incidence and prevalence of RA in another[6]. Population based studies on the prevalence of either rheumatic symptoms or of all rheumatic diseases in the general population are nonexistent.

For these reasons, the Hellenic Foundation for Rheumatological Research took the initiative in carrying out this cross-sectional, population based epidemiological study of rheumatic diseases in Greece (the ESORDIG Study) in order to assess the prevalence of all rheumatic diseases in the general population. The study was conducted exclusively by experienced rheumatologists in urban, suburban, and rural areas located in northern, central, and southern mainland Greece.

MATERIALS AND METHODS

Study population. Two urban areas (Kantza in Pallini of Attica and Pikermi of Attica, main department), 2 suburban areas (Panaetolio in Aetoloakarnania and Thermi in Thessaloniki), and 5 rural areas (Agiasma in Kavalla, Drosato in Kilkis, Nea Pella in Pella, Grammatiko in Attica, main department, and Evrostini in Corinthia, municipal departments of Kallithea, Stomio and Sarantapichiotica), located in northern, central, and southern mainland Greece, were selected for this ESORDIG study (Figure 1). The main selection criteria for these areas were: (1) the widest possible representation of mainland Greece; (2) the practicality of the research being conducted exclusively by rheumatologists, since most of these areas were near their permanent residences; and (3) the possibility of performing complete laboratory tests necessary for supporting the diagnosis of rheumatic diseases at the rheumatological centers where the physicians involved in the study were either working or collaborating.

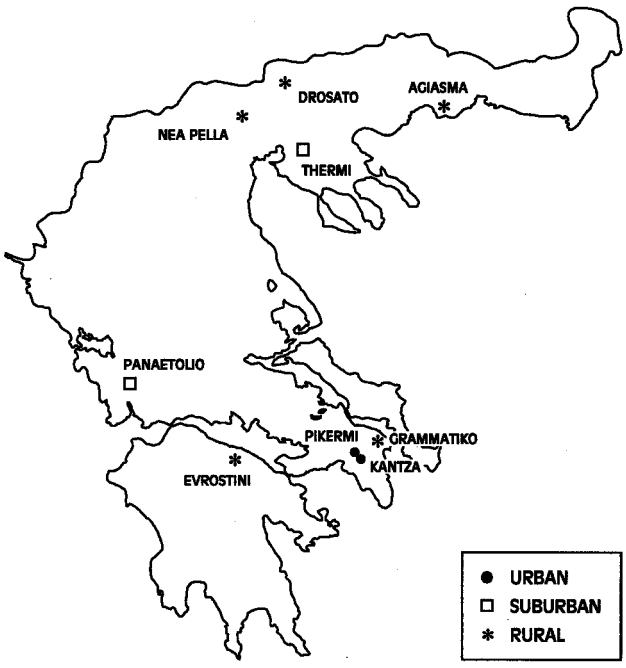

Figure 1. The study areas in mainland Greece.

The study was conducted on the total nonselected adult population ≥ 19 years of age in the above areas with the exception of the Nea Pella community and the Thermi municipality, where every second or third household from a randomly chosen starting point, respectively, was selected (systematic sampling). All adult members of the nonselected and selected households were asked to participate in the study. Based on the 1991 population census[23] and on the calculated yearly increase or decrease rate of the population resulting from the 1991 and 1981 population census data, it was estimated at the beginning of the study (March 1996) that the total population of the study areas came to 20,051 subjects, of whom 14,233 were adults who thus constituted the total target population (Table 1).

To achieve maximum public collaboration and participation in all study areas, one of the authors (AA) made contact with the local authorities and key persons, organized cooperative meetings, gave lectures to the public, and arranged for advertisements in local newspapers to emphasize the purpose and social meaning of the study, prior to its implementation. Additionally, informative letters about the study were sent to all households, pertinent information was also read out by priests to their congregations, and promotional posters were put up at strategic locations throughout the study areas.

Subject evaluation. Sixteen experienced rheumatologists conducted the study by visiting the target population at their homes either door-to-door in most areas, or after arranging appointments in one urban (Kantza) and one suburban area (Thermi). All adults in Kantza and those of the selected households in Thermi were telephoned and invited to participate. Then an appointment was made for a rheumatologist's home visit at a time when all or most of the adult members of the family would be present. If an adult family member was absent during the first visit, a second appointment was arranged.

The home visit involved a 15–20 minute interview for each participant and was based on a standardized questionnaire, labeled as epidemiological form I; its purpose was to obtain a variety of information on (1) sociodemographic characteristics, (2) medical history, and (3) a specific standardized questionnaire for all subjects that potentially had rheumatic disease.

The latter questionnaire was analogous to those used in other studies[17,24] and consisted of 13 questions (Table 2). On completion of the interview, subjects who responded positively to any of these questions were subsequently evaluated by the rheumatologist (complete medical history and careful clinical examination) during the same visit; any available recent and relevant laboratory test results or imaging findings were considered during the diagnostic procedure. In cases where further laboratory investigation was required for confirmation of diagnosis, the requisite laboratory tests or radiographs were performed within the next few days at the rheumatological centers of the participating rheumatologists. This was followed by a second home visit by the rheumatologist to assess the laboratory test results and to reach a definite diagnosis.

To appraise the efficacy of the questionnaire, a pilot study was carried out prior to the start of the ESORDIG study. This study involved 300 individuals without rheumatic disease from the Pallini Workers Housing Settlement, and 200 patients with known rheumatic disease from the outpatient clinics of the participating rheumatologists: 17 with RA, 4 SS, 2 systemic lupus erythematosus (SLE), 2 systemic sclerosis (SSc), 2 polymyalgia rheumatica (PMR), one giant cell arteritis, one Takayasu arteritis, one Behçet's syndrome, 8 ankylosing spondylitis (AS), 4 psoriatic arthritis (PsA), 8 gout, 2 pseudogout, 40 OA, 30 LBP, 25 neck pain, 27 soft tissue rheumatism disorders (STRD), 21 osteoporosis, 3 Paget's disease of bone, and 2 diffuse idiopathic skeletal hyperostosis (DISH).

Finally, a random sample of nonresponders (one out of 6 persons who refused to participate in the study) in Kantza and Pikermi (a total of 60 subjects) was telephoned and a home visit was arranged. A short question-

Table 1. Study population and participation rate in urban, suburban, and rural areas.

Area	Population All	Target Adult Total	Target Adult Final	Target Adult M	Target Adult F	Participants (Participation Rate, %) M	Participants (Participation Rate, %) F	Participants (Participation Rate, %) Total
Urban								
Kantza	3695	2587	2587	1252	1335	1120 (89.5)	1191 (89.2)	2311 (89.3)
Pikermi	741	482	482	235	247	188 (80.0)	213 (86.2)	401 (83.2)
Suburban								
Panaetolio	3249	2274	2274	1085	1189	882 (81.3)	885 (74.4)	1767 (77.7)
Thermi	6445	4458	1486*	732	754	591 (80.7)	614 (81.4)	1205 (81.1)
Rural								
Agiasma	1047	781	781	388	393	313 (80.7)	332 (84.5)	645 (82.6)
Drosato	1119	854	854	465	389	345 (74.2)	337 (86.6)	682 (79.9)
Nea Pella	1654	1228	614†	295	319	236 (80.0)	265 (83.1)	501 (81.6)
Grammatiko	1172	846	846	443	403	318 (71.8)	350 (86.8)	668 (79.0)
Evrostini	929	723	723	360	363	276 (76.7)	284 (78.2)	560 (77.5)
Total	20,051	14,233	10,647	5255	5392	4269 (81.2)	4471 (82.9)	8740 (82.1)

* Randomly selected adults at a ratio 1:3. † Randomly selected adults at a ratio 1:2.

Table 2. Standardized questionnaire for identifying potential subjects with rheumatic disease.

Have you ever had:

a. Pain, swelling or stiffness, not due to trauma, in any joint?
b. Pain or difficulty in walking or going up and down stairs?
c. Back pain, persistent or recurrent, or pain along any extremity, aggravated by movement or exercise?
d. LBPor back stiffness on awakening which lasted over a period of at least 3 months, and which improved by exercise?
e. A persistent, daily sensation of dry eyes and/or mouth which lasted over a period of at least 3 months or a repeated sensation of sand or gravel in your eyes or frequent need to drink liquids to aid in swallowing dry foods?
f. Pain, swelling and redness in one or 2 joints, particularly in those of the big toe, with complete remission within 1–2 weeks?
g. Pain and morning stiffness in the pelvic, shoulder or neck regions or headache or jaw pain on chewing? (addressed to subjects ≥ 50 years old)
h. Shoulder and/or pelvic muscle weakness?
i. Widespread musculoskeletal pain?
j. Any problem in the shoulders, elbows, hands, hips, knees or feet?
k. A physician tell you that you have had arthritis or rheumatism?
l. An examination by a physician or been admitted to hospital due to any joint or spinal problem, but not due to trauma?
m. An intense pallor in any finger followed by cyanosis after exposure to cold or stress, any skin rash, photosensitivity, hair loss, chest pain intensified by deep inhalation, or have you ever been told that you have had anemia, leukopenia, thrombocytopenia or protein in your urine?

naire on sociodemographic characteristics, medical history, previous rheumatic disease diagnosis, and the reasons for nonparticipation in the study was completed.

Definitions and case identification. For the purposes of this study, rheumatic diseases were classified into 6 groups: inflammatory rheumatic diseases (IRD), symptomatic peripheral osteoarthritis (SPOA), LBP, neck pain, STRD, and miscellaneous rheumatic disorders (MRD).

IRD were further classified into 3 subgroups: (1) CTD, including RA, SS, SLE, SSc, vasculitis, PMR, CTD overlap syndromes and polymyositis-dermatomyositis; (2) seronegative SpA, including AS, PsA, reactive arthritis, enteropathic arthritis, and undifferentiated SpA; and (3) crystal arthropathies (CrA), including gout and pseudogout. The diagnosis of IRD, either active or in remission, was made on the basis of the American College of Rheumatology (ACR, formerly the American Rheumatism Association) criteria[25-29], the criteria of other international study groups[30–32], or internationally used criteria[33,34].

Concerning SPOA, active or in remission, symptomatic knee, hip, and hand OA were diagnosed according to the ACR criteria[35-37], while OA at other sites was diagnosed based on clinical manifestations and radiological findings.

LBPwas defined as pain localized in the back area between the lower limits of the chest and the gluteal folds, either radiating or not along a lower extremity. Neck pain was defined as pain localized in the neck either radiating or not along an upper extremity. To determine the etiology of LBPor neck pain, various imaging techniques were used including at least radiographs of the spine. The diagnosis of radiological spinal OAwas based on Kellgren and Lawrence criteria[38]. A patient was diagnosed and recorded as having LBPor neck pain when the respective pain was present either at the time of the interview or in the past, provided that it was recurrent and associated with spinal OA, intervertebral disc herniation, spondylolisthesis, or any other chronic cause.

The STRD group included fibromyalgia (FM) and localized regional

pain syndromes of the shoulder, elbow, wrist and hand, hip, knee, ankle and foot such as tenosynovitis, calcific tendinitis, adhesive capsulitis of the shoulder, enthesopathy, bursitis, palmar or plantar fasciitis, carpal or tarsal tunnel syndrome present at the time of the interview. The rest of the regional pain syndromes were not investigated, with the exception of LBP and neck pain, which were studied and classified separately, as described. The diagnosis of FM was made according to ACR criteria[39], while for the remaining STRD separate classification criteria based on the main clinical manifestations and in some instances on radiological findings were set for the purposes of this study.

All rheumatic diseases falling into any of these 5 groups, as well as the classification or diagnostic criteria, were listed on specific tables, a copy of which was given to and used by all the participating rheumatologists.

The MRD group included all other nonsurgical or nontraumatic musculoskeletal disorders that could not be classed in the 5 groups and that were found to be active or chronic in remission at the time of the study. Except for OP, these disorders were diagnosed on the basis of clinical features and laboratory or radiological findings. The diagnosis of OP was made by lumbar spine or hip bone mineral density (BMD) measurement and according to WHO criteria[40]. This diagnostic procedure was applied to individuals with back pain and radiological evidence of OP in the spine, in postmenopausal women with unexplained LBP or a history of bone fracture, as well as to women who, prior to the ESORDIG study, had had a spine or hip BMD measurement that showed osteopenia or OP. Therefore, BMD was not measured, as a rule, in all postmenopausal women who might have had at least one additional risk factor for developing OP. However, in one rural community (Grammatiko) and the 2 urban study areas, every second woman ≥ age 50 was invited to participate in a separate study assessing the prevalence of OP in this particular population group, by lumbar spine and/or hip BMD measurement with dual-energy x-ray absorptiometry (DEXA).

In the rare instances of diagnostic difficulties, the final diagnosis was reached in cooperation with 3 of the participating rheumatologists. The diagnosis of each rheumatic disease and the criteria on which it was based were recorded on epidemiological form II.

Quality control. Prior to the start of the ESORDIG study, all participating rheumatologists attended a training course that covered the study protocol, how to conduct the interview, assessment of musculoskeletal symptoms, and standardizing the use of the rheumatic disease classification criteria. Throughout the duration of the study, all the regularly submitted epidemiological forms I and II were centrally controlled and checked for any controversial or missing data. Such observations led to the organization of in-study investigators' meetings and subsequent written guidelines, as required. The effect of the investigator on diagnosing rheumatic disease as well as the effect of nonselection and random selection of suburban and rural populations on the study results were tested in a logistic regression model, in which the dependent variable was the diagnosis of disease and the independent variables were the observer and the selected/nonselected populations.

Protocol approval. The study protocol was evaluated and approved by appropriate local and central committees and was conducted under the auspices of the Greek Ministry of Health and the Greek Central Union of Municipalities and Communities of Greece.

Statistical analysis. All data were analyzed by SPSS v. 11.0 for Windows and AnswerTree v. 3.0 for Windows. The study population was weighted for sex and age to the total adult population of the studied areas. This was done with the appropriate SPSS procedure using a weighted coefficient calculated on the basis of sex and age distribution in each area of both the total adult population and the participant study population. Pearson correlation coefficients were used to compare the age distribution between the study participants, the total target adult population, and the total adult population of Greece based on sex and on urban, suburban, and rural residence. Student t test or one-way analysis of variance (ANOVA) was used to compare mean values, while the comparison of prevalences was by chi-square test, and a probability value of $p < 0.05$ was considered significant; 95% confidence intervals (CI) were given where relevant. A variety of factors shown by chi-square automatic interaction detection[41] to be significantly associated with any disease groups or subgroups were included in a forward conditional logistic regression model for further analysis. Such factors were sex, age, residence in urban, suburban or rural areas, body mass index (BMI), level of education, manual or nonmanual occupation, cigarette smoking pack-years, alcohol consumption, and socioeconomic status. BMI was defined as low or high based on its third quartile. Alcohol consumption was defined on a daily basis as none, usual (up to 0.5 l of wine or 2 beers), moderate (> 0.5 to 1.0 l of wine or 3–4 beers), or heavy (> 1.0 l of wine or > 4 beers). Level of education was defined as low or high on the basis of school attendance up to 9 years and > 9 years, respectively. Socioeconomic status was defined as low or high, based on the level of education and the occupation of the family breadwinner.

RESULTS

This ESORDIG study was conducted from March 1996 to April 1999 on a total target adult population of 14,233 individuals (Table 1). The target nonselected urban, suburban, and rural population totalled 3069, 2274, and 3204 subjects, of whom 2712 (88.4%), 1767 (77.7%), and 2555 (79.7%), respectively, agreed to participate. Of the total selected suburban (1486 subjects) and rural (614 subjects) adult population, 1205 (81.1%) and 501 (81.6%), respectively, agreed to take part. Thus, of the final target population of 10,647 subjects, 8740 (response rate 82.1%), 4% of whom were of island descent, took part in the study. Among the participants 4269 (48.8%) were men and 4471 (51.2%) were women; age range was 19–99 years, mean 46.95 years (SD ± 17.74) (Table 3). In the age groups 59–68 and ≥ 69 years, there were significantly more people in the rural compared to urban and suburban areas ($p < 0.0005$ for all comparisons), as well as in the suburban compared to the urban regions ($p < 0.001$ and $p < 0.0005$, respectively). Therefore, the mean age (yrs ± SD) of the rural population (49.64 ± 18.28) was significantly higher than that of urban (44.65 ± 17.03) or suburban dwellers (46.30 ± 17.45) ($p < 0.0005$), while the mean age of the urban population was significantly lower than the suburban ($p < 0.001$). However, there was a similarity in the age distribution between the study participants and the total target adult population ($r = 0.87$, $p < 0.01$), as well as between both the above and the total adult population of Greece according to the 1991 population census[23] ($r = 0.88$ and $p < 0.01$, $r = 0.99$ and $p < 0.01$, respectively) (Table 3). There was also a similarity in the age distribution among urban, suburban, and rural populations that participated in the study and the respective total adult Greek urban, suburban, and rural populations ($r = 0.85$ and $p < 0.01$, $r = 0.83$ and $p < 0.01$, $r = 0.79$ and $p < 0.01$, respectively). It is important to note that an analogous similarity was found in the age distribution for each sex separately, between the urban, suburban, and rural populations in the study and the respective total Greek urban, suburban, and rural populations (data not shown).

The sensitivity and specificity of the standardized specific questionnaire, of which the aim was to identify

Table 3. Age distribution of the study population and comparison with the adult population (AP) of Greece (1991 census).

Age, yrs	Participants				Target Population	APof Greece
	Urban (%)	Suburban (%)	Rural (%)	Total (%)	Total (%)	Total (%)
19–28	588 (21.7)	558 (18.8)	505 (16.5)	1651 (18.9)	2859 (20.1)	1,528,751 (19.9)
29–38	471 (17.4)	590 (19.8)	466 (15.2)	1527 (17.5)	2577 (18.1)	1,415,254 (18.4)
39–48	540 (19.9)	552 (18.6)	438 (14.3)	1530 (17.5)	2573 (18.1)	1,269,945 (16.6)
49–58	525 (19.4)	436 (14.7)	518 (17.0)	1479 (16.9)	2522 (17.7)	1,287,409 (16.8)
59–68	321 (11.8)*†	442 (14.9)*†	619 (20.3)*	1382 (15.8)	2027 (14.2)	1,150,979 (15.0)
≥ 69	267 (9.8)*†	394 (13.2)*†	510 (16.7)*	1171 (13.4)	1675 (11.8)	1,020,983 (13.3)
Total	2712 (100.0)	2972 (100.0)	3056 (100.0)	8740 (100.0)	14,233 (100.0)	7,673,321 (100.0)

* Rural > urban, and rural > suburban ($p < 0.0005$). † Suburban > urban ($p < 0.001$).

subjects potentially affected by rheumatic disease, as tested in the pilot study among 200 patients with known disease and 300 individuals without disease, were 99% and 91.7%, respectively. It is also of interest that, as shown by logistic regression, there was no significant interinvestigator variation in diagnosing rheumatic disease nor any effect of nonselection and random selection of suburban and rural populations on the study results. Moreover, analysis of data of the random sample of nonresponders showed no significant difference from responders with respect to age, sex, and prevalence of rheumatic symptoms or disease. Those who did not wish to participate expressed various personal reasons for not taking part and these reasons were unrelated to having or not having rheumatic disease.

Of the 8740 participants, 2393 (1518 women, 875 men) were diagnosed as having had rheumatic disease, active or chronic in remission, at the time of the study. Subjects who had had rheumatic symptoms in the past (pain, etc), not due to a chronic rheumatic disease, were not included in the assessment of disease prevalence. Thus, the overall prevalence of disease in the study population was 27.4% (95% CI 26.5–28.3), while in the total target adult population the overall age and sex adjusted prevalence (prevalence$_{asa}$) of rheumatic disease was 26.9% (95% CI 26.2–27.6), which was significantly higher among women (33.7%) compared to men (19.9%) in this population ($p < 0.0005$), with a ratio of 1.7:1, as well as in all population subgroups ($p < 0.0005$) (Table 4). However, there was no significant difference in the prevalence of disease among the urban, suburban, and rural populations (Table 4), nor between the selected and nonselected population, nor even between the northern, central, and southern areas of the country (data not shown). The disease prevalence$_{asa}$ increased with age from 3.9% in the 19–28 age group to 51.6% in the group aged ≥ 69 in the total target population ($p < 0.0005$). A similar increase was noted among both men and women and all population subgroups ($p < 0.0005$) (Table 4). Of note, among subjects with rheumatic disease there were 504 (21.1%) who had more than one rheumatic disorder.

Concerning the 6 major rheumatic disease groups, the most common was LBP with a prevalence$_{asa}$ in the total target adult population of 11.0% (95% CI 10.5–11.5), followed by SPOA with 7.9% (95% CI 7.5–8.3), neck pain with 4.8% (95% CI 4.4–5.2), MRD with 4.4% (95% CI 4.0–4.8), STRD with 4.3% (95% CI 4.0–4.6), and IRD with 2.1% (95% CI 1.9–2.3). However, it should be emphasized that 48.4% of the subjects with LBPor neck pain had radiological findings of spinal OAwith no other evident cause for back pain. Although it is difficult to prove a relationship of cause and effect between radiological OA of the spine and back pain, when we consider that spinal OA might be the cause of back pain in these individuals, then the prevalence$_{asa}$ of symptomatic peripheral and spinal OA increases to 13.1% (95% CI 12.5–13.7) (data not shown).

The IRD group consisted of 3 subgroups: CTD, seronegative SpA, and CrA, with an overall prevalence$_{asa}$ in the total

Table 4. Age and sex adjusted prevalence (%) of rheumatic diseases in Greek urban, suburban, and rural population.

Age, yrs	Urban			Suburban			Rural			Total		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
19–28	3.7	4.8	4.3	3.6	4.7	4.1	2.4	4.3	3.3	3.3	4.6	3.9
29–38	9.3	16.4	13.1	9.6	14.2	12.0	9.1	13.3	11.1	9.4	14.4	12.0
39–48	24.2	30.1	27.2	23.0	29.8	26.3	18.9	22.7	20.7	22.0	27.9	24.9
49–58	27.8	39.2	33.4	24.6	56.5	41.3	25.7	45.1	35.2	25.7	49.0	37.5
59–68	40.5	60.6	50.5	31.1	54.9	43.2	34.3	64.6	49.8	34.1	59.6	47.0
≥ 69	42.9	66.3	56.2	39.0	61.0	51.8	33.5	63.1	49.3	37.6	62.8	51.6
Total	21.8	31.3*	26.7	19.0	33.5*	26.4	19.9	35.8*	27.8	19.9	33.7*	26.9

* Significantly higher prevalence among women than men ($p < 0.0005$).

target adult population of 1.08% (95% CI 0.91–1.25), 0.49% (95% CI 0.38–0.60), and 0.51% (95% CI 0.39–0.63), respectively (Table 5). Although there was a tendency for the urban population to have a higher prevalence of all subgroups of IRD than the suburban and rural populations, it reached statistical significance only for CrA in the urban population as compared to the suburban ($p < 0.002$). The latter finding is related to the fact that gout was significantly more common in the urban (0.75%) than in suburban areas (0.37%) ($p < 0.013$). CTD were significantly more common among women compared to men in the total target population ($p < 0.0005$), with a ratio of 3.3:1, as well as in all study areas ($p < 0.003$). By contrast, the prevalence$_{asa}$ of SpA was significantly higher among men compared to women in the total target population ($p < 0.0005$), with a ratio of 5.5:1, as well as in all population subgroups ($p < 0.017$). Similarly, the prevalence$_{asa}$ of CrA was significantly higher among men compared to women in the total target population ($p < 0.0005$), with a ratio of 3.25:1, as well as in urban, suburban, and rural areas ($p < 0.012$). Since pseudogout was found only in 5 women, the male:female ratio for gout in the total population was 4.6:1.

The prevalence$_{asa}$ of CTD and CrA increased significantly with age in the total target population ($p < 0.0005$) (Figure 2) as well as in the urban, suburban, and rural populations ($p < 0.005$) (data not shown). In contrast, the prevalence$_{asa}$ of SpAin the total target population increased up to and including the group aged 59–68 years ($p < 0.009$), and then decreased ($p < 0.008$) (Figure 2).

Logistic regression analysis showed a significant positive association of female sex and age ≥ 50 years with CTD as a group, a similar association of male sex with SpA, and a significant negative association of usual alcohol consumption with SpA. Moreover, a significant positive correlation of male sex, age ≥ 50 years, high BMI, high socioeconomic status, and moderate or heavy alcohol consumption, with gout was also found (Table 6).

The most common CTD was RA, with a prevalence$_{asa}$ in

Table 5. Age and sex adjusted prevalence (%) of connective tissue diseases (CTD), seronegative spondyloarthropathies (SpA), crystal arthropathies (CrA), symptomatic peripheral osteoarthritis (SPOA), low back pain (LBP), neck pain (NP), soft tissue rheumatism disorders (STRD), and osteoporosis (OP) in Greek urban, suburban, and rural populations.

	Urban			Suburban			Rural			Total		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
CTD	0.67	1.90*	1.30	0.49	1.42*	0.97	0.40	1.78*	1.08	0.50	1.65*	1.08
SpA	1.01†	0.32	0.65	0.91†	0.14	0.52	0.58†	0.05	0.32	0.83†	0.15	0.49
CrA	1.28†	0.44	0.85††	0.58†	0.17	0.37††	0.80†	0.18	0.50	0.78†	0.24	0.51
SPOA	3.30	9.80*	6.65§	3.60	11.79*	7.80§	4.10	14.00*	8.98§	3.69	12.02*	7.92
LBP	9.95	13.15*	11.60††	8.81	10.40*	9.61††§	9.93	15.37*	12.64§	9.41	12.51*	10.98
NP	3.36	6.19*	4.86	3.23	6.43*	4.87	3.21	6.18*	4.65	3.25	6.29*	4.79
STRD	3.70	6.32*	5.02††	3.99	4.58	4.28	3.03	4.71*	3.86††	3.61	4.99*	4.31
OP	0.34	5.25*	2.87	0.30	6.09*	3.27	0.27	5.22*	2.71	0.30	5.65*	3.01

* Significantly higher prevalence among women than men ($p < 0.027$). † Significantly higher prevalence among men than women ($p < 0.017$). †† Significantly higher prevalence among urban than suburban or among urban than rural populations ($p < 0.015$). § Significantly higher prevalence among rural than suburban or urban populations ($p < 0.027$).

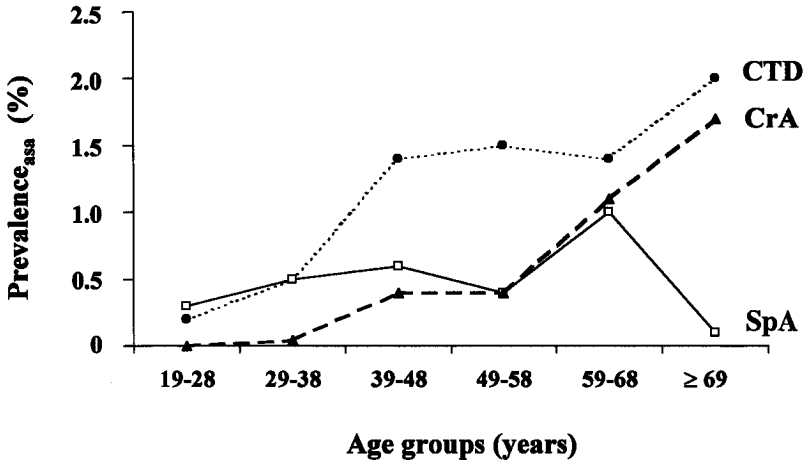

Figure 2. Age and sex adjusted prevalence (prevalence$_{asa}$) of connective tissue diseases (CTD), seronegative spondyloarthropathies (SpA), and crystal arthropathies (CrA) in the total target adult population by age group.

Table 6. Estimated adjusted effects (OR with 95% CI) of risk factors on the prevalence of certain rheumatic diseases or rheumatic disease groups.

	CTD OR (95% CI)	SpA OR (95% CI)	Gout OR (95% CI)	SPOA OR (95% CI)	LBP OR (95% CI)	NP OR (95% CI)	STRD OR (95% CI)	OP OR (95% CI)
Female sex	3.30 (2.25–4.82)	—	—	3.38 (2.91–3.94)	1.27 (1.14–1.42)	1.77 (1.50–2.10)	1.34 (1.13–1.58)	19.09 (11.68–31.20)
Male sex	—	6.52 (3.40–12.49)	4.14 (2.11–8.11)	—	—	—	—	—
Age ≥ 50 years	2.38 (1.71–3.31)	—	7.54 (3.86–14.71)	13.13 (10.34–16.67)	1.93 (1.70–2.19)	3.39 (2.78–4.13)	1.76 (1.44–2.13)	18.87 (12.01–29.63)
Body mass index								
High	—	—	2.34 (1.43–3.84)	2.13 (1.86–2.44)	1.62 (1.44–1.82)	—	1.81 (1.52–2.16)	—
Low	—	—	—	—	—	—	—	1.87 (1.47–2.39)
Low level of education	—	—	—	2.25 (1.82–2.79)	1.79 (1.55–2.06)	—	—	2.75 (1.94–3.88)
Alcohol consumption								
Usual	—	0.19 (0.07–0.51)	—	—	—	—	—	—
Moderate	—	—	3.67 (1.72–7.81)	—	—	—	—	—
Heavy	—	—	7.79 (2.60–23.28)	—	—	—	—	6.40 (1.82–22.45)
Nonmanual occupation	—	—	—	—	—	1.87 (1.52–2.30)	—	—
High socioeconomic status	—	—	3.02 (1.72–5.32)	—	—	—	—	—
Rural residence	—	—	—	—	—	—	0.58 (0.46–0.73)	0.56 (0.41–0.76)

CTD: connective tissue diseases, SpA: seronegative spondyloarthropathies, SPOA: symptomatic peripheral osteoarthritis, LBP: low back pain, NP: neck pain, STRD: soft tissue rheumatism disorders, OP: osteoporosis.

the total target adult population of 0.67% (95% CI 0.54–0.80), followed by SS with 0.15% (95% CI 0.09–0.21), and PMR with 0.15% (95% CI 0.09–0.21), but in subjects aged ≥ 50 years its prevalence was 0.37% (95% CI 0.22–0.52), SLE with 0.05% (95% CI 0.01–0.09) (Figure 3), and giant cell arteritis with 0.035% (95% CI 0.005–0.065), but in subjects aged ≥ 50 years prevalence of GCA was 0.08% (95% CI 0.01–0.15). Three of the 4 cases with giant cell arteritis also had PMR. Three cases with Behçet's syndrome and 2 with systemic sclerosis were also found. The most common SpA was AS, with a prevalence$_{asa}$ of 0.24% (95% CI 0.16–0.32), followed by PsAwith 0.17% (95% CI 0.10–0.24) and reactive arthritis with 0.04% (95% CI 0.01–0.07), while 3 cases with undifferentiated SpAwere observed. Gout was the most common CrA, with a prevalence$_{asa}$ of 0.47% (95% CI 0.36–0.58), followed by pseudogout with 0.038% (95% CI 0.004–0.070). Since pseudogout was only found in subjects over age 65, its prevalence$_{asa}$ in this age group was 0.23% (95% CI 0.03–0.43).

The prevalence$_{asa}$ of SPOA was significantly higher in the rural (8.98%) compared to the urban (6.65%) and suburban (7.80%) populations ($p < 0.027$), while STRD were more common in urban (5.02%) than rural (3.86%) areas ($p < 0.015$) (Table 5). SPOA, LBP, neck pain, and STRD were significantly more common among women than men in the total target population ($p < 0.0005$) as well as in the 3 population subgroups ($p < 0.027$), with the exception of STRD in suburban areas.

SPOA was rare under the age of 39 years, as were neck pain and STRD under the age of 29 years. The prevalence$_{asa}$ of SPOA, LBP, neck pain, and STRD increased with age in the total target population ($p < 0.0005$), although LBP reached a plateau after age 68 years, while neck pain and STRD prevalence rates reached their peak in the age group of 59–68 years and then declined slightly (Figure 4).

Logistic regression analysis showed a significant positive association of female sex, age ≥ 50 years, high BMI, and a low level of education with SPOA and with LBP (Table 6). Moreover, a similar association of female sex, age ≥ 50 years, and a nonmanual occupation with neck pain, as well as of female sex, age ≥ 50 years, and high BMI with STRD were also found, while there was a significant negative association between rural residence and STRD.

The most common site of SPOA was the knee, with a prevalence$_{asa}$ of 6.0% (95% CI 5.4–6.4), followed by the hands (2%, 95% CI 1.8–2.2), hip (0.91%, 95% CI 0.71–1.1),

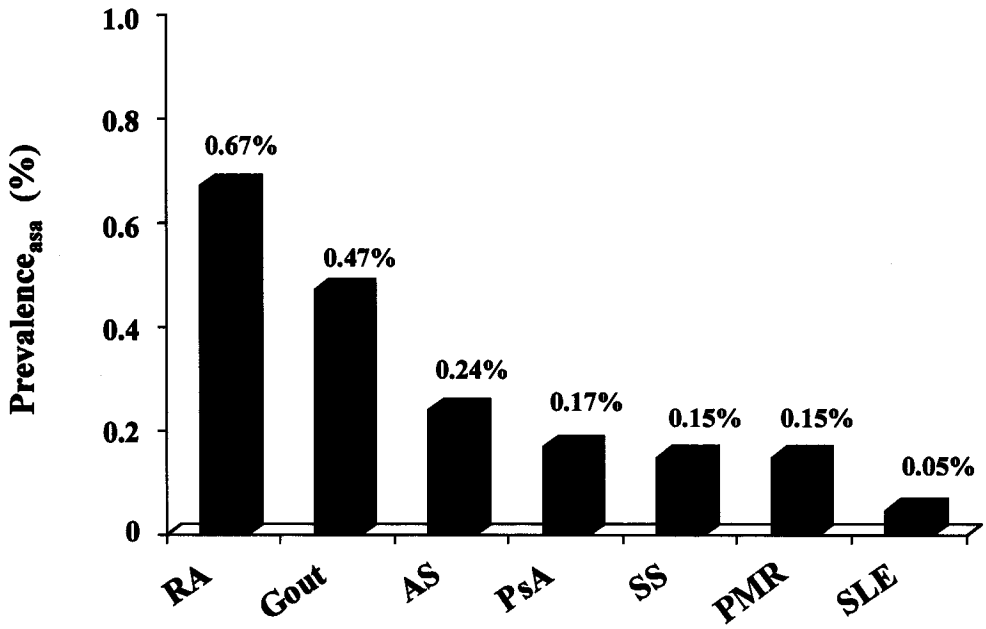

Figure 3. Age and sex adjusted prevalence (prevalence$_{asa}$) in the total target adult population of the most common inflammatory rheumatic diseases: rheumatoid arthritis (RA), gout, ankylosing spondylitis (AS), psoriatic arthritis (PsA), Sjögren's syndrome (SS), polymyalgia rheumatica (PMR), and systemic lupus erythematosus (SLE).

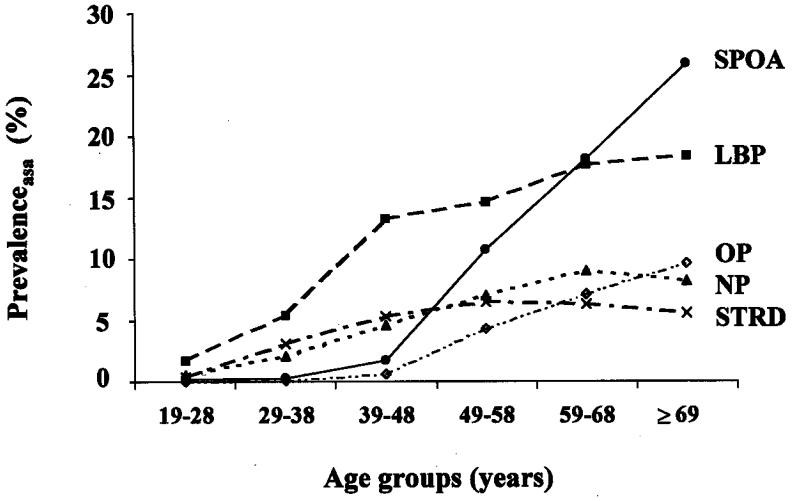

Figure 4. Age and sex adjusted prevalence (prevalence$_{asa}$) of symptomatic peripheral osteoarthritis (SPOA), low back pain (LBP), neck pain (NP), soft tissue rheumatism disorders (STRD), and osteoporosis (OP) in the total target adult population by age group.

and first metatarsophalangeal joint (0.77%, 95% CI 0.63–0.91). It is notable, however, that 19.2% of the SPOA patients presented with it in more than one site.

Rotator cuff tendinitis was the most common STRD, with an overall prevalence$_{asa}$ in the total target population of 1.1% (95% CI 0.9–1.3), followed by bicipital tendinitis with 0.77% (95% CI 0.63–0.91), lateral epicondylitis with 0.67% (95% CI 0.54–0.80), carpal tunnel syndrome with 0.50% (95% CI 0.38–0.62), FM with 0.44% (95% CI 0.33–0.55), de Quervain's tenosynovitis with 0.36% (95% CI 0.26–0.46), tenosynovitis at other sites with 0.30% (95% CI 0.21–0.39), adhesive shoulder capsulitis with 0.17% (95% CI 0.10–0.24), Dupuytren's contracture with 0.16% (95% CI 0.09–0.23), plantar fasciitis with 0.11% (95% CI 0.06–0.16), bursitis at various sites with 0.09% (95% CI 0.04–0.14), and medial epicondylitis with 0.05% (95% CI 0.01–0.09).

Regarding MRD, the most common were OP, with an

overall prevalence$_{asa}$ in the total target population of 3.0% (95% CI 2.7–3.3), symptomatic Paget's disease of bone with 0.48% (95% CI 0.37–0.59), and symptomatic DISH with 0.33% (95% CI 0.24–0.44). Chondromalacia patellae prevalence$_{asa}$ was 0.15% (95% CI 0.09–0.21), while for posttraumatic arthritis, reflex sympathetic dystrophy, and hallux valgus without secondary OA prevalence$_{asa}$ was 0.11% (95% CI 0.06–0.16), 0.09% (95% CI 0.04–0.14), and 0.06% (95% CI 0.02–0.10), respectively. Secondary SS was found in 5 patients with RA(8.5%) and in one with SSc. Two cases of erythema nodosum, 2 cases of Raynaud's phenomenon and positive antinuclear antibodies, 2 of palindromic rheumatism, one case of septic arthritis, one of sarcoid arthritis, one of hypertrophic osteoarthropathy, and one case of aseptic osteonecrosis were also found.

As anticipated, the prevalence$_{asa}$ of OP was significantly higher among women (5.65%) compared to men (0.30%) in the total target population ($p < 0.0005$) with a ratio of 19:1, and in all population subgroups (Table 5) ($p < 0.0005$), and it increased with age (Figure 4) ($p < 0.0005$). OP in women was almost exclusively postmenopausal; its age adjusted prevalence among postmenopausal women was 13.1% (95% CI 12.5–13.7), while that among premenopausal women was only 0.12% (95% CI 0.06–0.18) ($p < 0.0005$). Logistic regression analysis showed a significant positive association of female sex, age ≥ 50 years, low BMI, a low level of education, and heavy alcohol consumption with OP, whereas there was a significant negative association between rural residence and OP(Table 6). Paget's disease of bone and DISH were more common among men (0.66% and 0.37%, respectively) compared to women (0.32% and 0.29%), with a ratio in the total target population of 2:1 and 1.3:1, respectively, but the difference was significant only in the case of Paget's disease of bone ($p < 0.004$). All patients with Paget's disease of bone and DISH were over 50 years of age. Thus, the prevalence$_{asa}$ of these diseases among subjects over the age of 50 was 1.2% (95% CI 0.9–1.5) and 0.85% (95% CI 0.70–1.0), respectively.

DISCUSSION

This population based cross-sectional epidemiological study provides the first data on the prevalence of all rheumatic diseases in a Greek general population. An overall disease prevalence of 27.4% was found in the study population, while the overall prevalence$_{asa}$ of rheumatic diseases in the total target general adult population was 26.9%; there was no significant difference between the 3 population subgroups. Rheumatic diseases were more common among women than men, with a ratio of 1.7:1, while their prevalence increased with increasing age. Greece, located in southeastern Europe, has ethnic homogeneity, since the majority of inhabitants (98.3%) are Caucasian Greeks[23]. The studied regions were located in northern, central, and southern mainland Greece and their adult population was representative of the total Greek adult population in terms of age and sex distribution; 4% of those who participated in the study were of Greek-island descent. The participation rate of the target population in the study was quite high (82.1%) and it is important that in a sample of nonresponders no differences were found with regard to disease prevalence compared with the responders. Moreover, the sensitivity and specificity of the standardized specific questionnaire used for identifying subjects with rheumatic disease were very high, 99% and 91.7%, respectively, while as shown by logistic regression there were neither interinvestigator differences in diagnosing rheumatic disease nor any population selection or nonselection effects on the study results. Thus, the prevalence$_{asa}$ in the total target general adult population in the study could be considered representative of the overall prevalence of rheumatic diseases in the general adult population of Greece.

For various reasons, it is difficult to compare these results to those of other researchers who reported rheumatic disease or symptom prevalence in different general adult populations ranging from 9.8% to 33.2%[1,17-22,42]. Certainly, genetic factors, nongenetic host factors, and environmental factors may influence the prevalence of at least some distinct rheumatic diseases. However, the broad range in rheumatic disease or symptom prevalence might be explained mainly by methodological differences among the studies. For example, the age of the adult study population influences disease prevalence, while different definitions of positive responders coupled with variable applications of the questionnaires by nonmedical interviewers may interfere with identifying subjects with rheumatic disease. In 2 recent studies, one from the Philippines[18] and the other from Thailand[19], the prevalence of rheumatic disease was remarkably lower (9.8% and 17.6%, respectively) than in our study, while the 25% disease prevalence in a study from Taiwan[17] was quite similar to that of this ESORDIG study. At the interview-screening phase, the above studies were conducted by health workers or trained interviewers, and at the clinical examination and disease diagnosis phase by rheumatologists; our ESORDIG study was conducted by rheumatologists at both phases. Moreover, in the Filipino urban population study[18], the mean age of the study population was very low, at only 35.3 years, apparently critically influencing disease prevalence, since it increases with age[7,10]. In the Thailand rural population study[19] the reported disease prevalence (17.6%) referred only to subjects with current self-reported musculoskeletal pain, who were examined by rheumatologists who confirmed the presence of rheumatic disorders; however, other subjects with self-reported past musculoskeletal pain (18.6%) were not evaluated by rheumatologists. It is therefore quite possible that patients with chronic rheumatic disease in remission were not included in the estimate of the overall prevalence. In our study, to avoid bias in the assessment of overall prevalence,

subjects with active disease or chronic disease in remission were diagnosed by rheumatologists, irrespective of whether they had had symptoms in the past or at the time of the interview. Subjects with LBP or neck pain in the past were also included provided it was recurrent and associated with a chronic cause. Sievers, *et al*[43] reported a much higher overall rheumatic disease prevalence in Finland (41%), but the study population was aged 30 years or older. Other studies[10,13] have investigated the prevalence of the major rheumatic diseases; their study designs, however, did not encompass an estimate of the overall prevalence of the total disease spectrum in the general population. On the other hand, the prevalence of rheumatic complaints documented by physicians in Finnish adults[20] was found to be 33.2%, while the prevalence of self-reported rheumatic symptoms or rheumatic conditions has been estimated in other studies as ranging from 12.4 to 31.3% in various adult populations[1,21,22]; a recent Italian study[42] found a 27% prevalence of self-reported joint pain based on a postal questionnaire.

Concerning the individual disease groups, the prevalence$_{asa}$ of total IRD was estimated at 2.1% of the total target adult population of our study. The RA prevalence$_{asa}$ in our study (0.67%) was close to that indicated in studies from other European (0.5–0.8%)[4,8-10,24] and some Asian countries (0.55–0.65%)[13,17], but higher than that found in other Asian (0.12–0.34%)[5,18,19] and African countries[44], and lower than the estimated level of roughly 1% in the USA[7]. However, this latter estimate was based on data collected before 1976 that may no longer be accurate, as stated by the authors[7], since more recent evidence suggests a declining incidence of RA in the USA[45]. The previous reported RA prevalence of 0.33% in northwestern Greece[6] may be underestimated, since it was based on reviewing the medical records of cases diagnosed and followed either at the rheumatology units of the 2 hospitals or at private rheumatology clinics of a city in that area, and not on a population sample; additionally, mild cases may have been treated by other medical specialties and thus not recorded; also, other RA patients could have moved and sought healthcare in other cities, as is sometimes the case in our country. The estimated SS prevalence$_{asa}$ of 0.15% was much lower than that reported by other population based studies. SS prevalence, for example, was found to be 0.6% among women in a Greek village[11] and 3.3% in a general population sample in the UK[46]. Such large variation in results of studies that use the same classification criteria is difficult to explain. Moreover, the prevalence of secondary SS among RA patients in the present study was estimated to be 8.5%, while in a previous cohort study it was found to be at the level of 31%[47]. However, the latter study was not population based, but relied on reviewing the medical records of patients followed at a hospital rheumatology unit. SLE prevalence$_{asa}$ (0.05%) in our study was similar to that estimated in the USA (0.04–0.05%)[7], but higher than in Denmark (0.03%)[48]. The prevalence$_{asa}$ of PMR and giant cell arteritis in our study population aged ≥ 50 years (0.37% and 0.08%, respectively) was almost equal to those found in the Scottish Highlands[4], but half of those estimated in the USA[7,49]. The overall prevalence$_{asa}$ of SpA (0.49%) was almost identical to that found in a recent French study[9], but much lower than in Alaskan Eskimos (2.5%)[14]. Most of our SpA cases had AS or PsA (prevalence$_{asa}$ 0.24% and 0.17%, respectively), while very few cases of reactive arthritis and undifferentiated SpA were found in our study population. Population based estimates for PsAprevalence vary from 0.02 to 0.1%[50], while those for AS vary even more, from rare in sub-Saharan Africa[15] and Japan[51] to 0.03–0.37% in some other Asian countries[5,17,18], to 0.4% in Alaskan Eskimos[14], to 1.8% in Norwegian Lapps[16]. Beyond the differences in methodology and classification criteria used for both diseases, the large prevalence variation of AS may also be related to different frequencies of HLA-B27 and its subtypes among various populations. The frequency of HLA-B27 in the Greek population (5.4%) is about the same as in other southern European populations[52,53]. Our study's gout prevalence$_{asa}$ (0.47%) was very close to that found in the Scottish Highlands[4] and Taiwan[17], but higher than in other Asian countries (0.13–0.16%)[13,18,19] and lower than in the USA (0.84%)[7]; the latter figure, however, as the authors state, may be overestimated, since it was derived from self-reported data.

Our estimated overall prevalence$_{asa}$ of SPOA(7.9%) was close to that found in the Scottish Highlands (6.5% of the total population, not only the adult population)[4], but higher than in the Philippines (4.1%)[18] and Taiwan (5.7%)[17]; nevertheless, it was lower than that in the USA (12.1%)[7] and Thailand (11.3%)[19]. Knee or hand symptomatic OA prevalence$_{asa}$ (6% and 2%, respectively) in our study was much lower than those (10.2% and 6.2%) reported in a recent Spanish study[10].

LBPprevalence$_{asa}$ (11%) in our study was lower than that in other European countries (varying from 14% to 39%)[10,54], whereas in Asian countries it has been reported at lower levels: from 1.95% in north Pakistan[13] to 4.0% in Thailand[19]. This broad variation in LBPprevalence could be partly explained by different definitions of this disorder. Our estimated prevalence$_{asa}$ of neck pain (4.8%) was slightly higher than that in Thailand (3.4%)[19], but much lower than reported in Finland (9.5% in men, 13.5% in women)[55], although the latter study included only subjects ≥ age 30.

The overall 4.3% prevalence$_{asa}$ of STRD (localized regional pain syndromes and FM) that we found is difficult to compare with that of other studies because of the diversity of disorders included in the STRD in each individual study. Nonetheless, shoulder and elbow STRD prevalence$_{asa}$, at 2.0% and 0.72% respectively, was much lower than in Indonesia (14.8% and 6.1%)[56], whereas carpal tunnel syndrome with a prevalence$_{asa}$ of 0.50% in our study was less common than in Sweden (2.7%)[57] or USA (3.72%)[58],

but more frequent than in the Philippines (0.17%)[18]. The reasons for these differences are unknown, but may be related to differences in study methodology as well as to occupational and/or non-occupational factors. Our FM prevalence$_{asa}$ of 0.44% was at least 5-fold lower than that reported from the USA[7], Spain[10] and Pakistan[13]. We are at a loss to explain this striking finding; however, differences in precipitating factors considered to initiate neuroendocrine and psychosocial dysfunction associated with FM[59] may exist among various populations.

Our estimate of OP prevalence at 13.1% in postmenopausal women is rather an underestimate, since BMD was not routinely measured in all subjects, but only in those with unexplained back pain or a history of bone fracture or a previous BMD measurement suggestive of osteopenia or OP, as well as in subjects with back pain and radiological evidence of OP in the spine. However, in an additional survey of 320 selected women aged ≥ 50 years done within the framework of the ESORDIG study, lumbar spine BMD measurement by DEXA revealed a 28.4% prevalence of OP[60]. This estimate is comparable with that of 26% in women over 50 in southern England[61], but higher than that of 22% in white women aged 50 years and over in USA[62], based upon femoral neck BMD measurement in both studies.

Although there was no significant difference in overall rheumatic disease prevalence among the 3 subpopulations, gout was significantly more prevalent in urban areas, while SPOA was more prevalent in rural regions. The higher prevalence of gout in urban areas appears to be at least partly related to a higher socioeconomic level in these areas, since as shown by logistic regression there was a significant positive association of higher socioeconomic level with gout. The significantly higher prevalence of SPOA in the rural versus urban and suburban areas could be explained by the significantly higher mean age of rural residents versus urban or suburban, given that SPOA prevalence increases with increasing age[7] and, as shown by logistic regression in this study, the age of 50 years and over is a significant predictor of SPOA. Even so, the higher prevalence of SPOA in rural areas may also be related in part to the high frequency of farming or other hard manual occupational activities that result in repetitive laborious use of peripheral joints[63], although we found no association between SPOA and occupation, assessed either as manual or nonmanual or individually by job title. In addition, logistic regression showed a significant negative association between rural residence and OP as well as STRD, findings that may be related to increased physical activities and muscle strengthening of both men and women in rural areas.

Rheumatic diseases in total as well as all disease groups, with the exception of seronegative SpA and gout, were significantly more common among women than men in the total population and all subpopulations, with an overall female:male ratio of 1.7:1. Female preponderance in rheumatic disease prevalence is common in the literature, although the ratio varies from 1.3:1 to 2.4:1[7,13,17-19,43]. In contrast, we found a roughly 5-fold higher SpA prevalence$_{asa}$ among men compared to women, whereas a recent study from France indicated the opposite trend[9] and among Eskimos there was an almost equal SpA sex prevalence[14]. This difference cannot be easily explained, but our SpA group did consist of mainly AS and PsA, and AS has a known male preponderance[4,7]. Similarly, an almost 4-fold higher prevalence of gout was found among men compared to women, which concurs with the findings of other investigators[4,7,17].

In accord with previous studies[7,10,18], the overall prevalence$_{asa}$ of rheumatic diseases increased significantly with age in the total population and in both sexes, as well as in all population subgroups, rising from 3.9% in subjects aged 19–28 years to 51.6% in those ≥ 68 years in the total population. Similarly, all disease categories showed an increasing prevalence with age in our study, while as shown by logistic regression, age of 50 years and over was a significant risk factor for certain diseases and for all disease groups (except for SpA), and especially for OP, SPOA, and gout. However, the prevalence$_{asa}$ of LBP, neck pain, and STRD increased with age, either reaching a plateau or showing a slight decline at ages ≥ 69 years. Although the reason for this prevalence plateau or decline is unclear, it might be related to the decreased physical and/or occupational activities of subjects at these ages. Similar findings concerning LBP and neck pain age prevalence have been documented by others[7,55]. In contrast, the SpA prevalence$_{asa}$ decreased significantly after the age of 68 years; this finding may be explained in part by potentially higher than expected mortality rates at these ages of patients who have such chronic IRD, especially AS.

Logistic regression showed that in addition to sex, age, and area of residence as discussed, several other factors had a positive or negative association with particular diseases or disease groups. As expected, heavy alcohol consumption and low BMI, known risk factors for development of OP[64], were significantly associated with its presence. In accord with other studies[65-67], a high BMI was significantly associated with gout, SPOA, and LBP, but it was also significantly correlated with STRD. Although alcohol intake has been recognized as a risk factor for hyperuricemia[68], there are contradictory data on its relationship with gout[69,70]; we observed significant positive associations between moderate, or more so, heavy alcohol consumption and gout, as well as between high socioeconomic level and gout. The significant positive relationship of nonmanual occupations with neck pain that we found may be related to a potentially increased frequency of neck muscle spasm and strain among individuals in such occupations. In keeping with this hypothesis, there was also our finding of a decreased preva-

lence of neck pain in subjects aged 68 years and over, since the age of 65 is the usual age of retirement in our country. This is the first time that a significant negative correlation of usual alcohol consumption with SpA has been reported, so further study is merited. Low level of education has been suggested as a risk factor for LBP[71]; in this study a significant positive association of low level of education was found not only with LBP, but also with SPOA and OP. The underlying mechanisms for these associations remain unclear, but with OP they may be related to unawareness of preventive measures among women with a low level of education.

Our findings show that rheumatic diseases are very common in the general population of Greece; almost one in 4 adults suffers from rheumatic disease.

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