ORIGINAL ARTICLE

High burden of rheumatic diseases in Lebanon: a COPCORD study

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Abstract

Aim: To estimate the prevalence of rheumatic diseases in Lebanon and to explore their distribution by geographic location, age, and gender.

Method: Using the Community Oriented Program for the Control of Rheumatic Diseases (COPCORD) methodology, a random sample of 3530 individuals aged 15 and above was interviewed from the six Lebanese governorates. Positive respondents were evaluated by rheumatologists using the internationally accepted classification criterion of the American College of Rheumatology for the diagnosis of rheumatic diseases.

Results: Prevalence rates of current and past musculoskeletal problems were 24.4% and 8.4%, respectively. Shoulder (14.3%), knee (14.2%) and back (13.6%) were the most common pain sites. Point prevalence of rheumatic diseases was 15.0%. The most frequent types of rheumatic diseases were of mechanical origin, namely soft tissue rheumatism (5.8%) and osteoarthritis (4.0%). Rheumatoid arthritis (1.0%) and spondylathropathies (0.3%) constituted the most common inflammatory diseases. Coastal areas had the lowest prevalence of all diseases except for fibromyalgia. All diseases showed an increasing prevalence pattern with age and a higher prevalence among women than men.

Conclusion: This is the first study to give population-based estimates of rheumatic diseases in Lebanon. The high burden calls for public health attention for early detection, control and prevention of these conditions. Point prevalence of individual diseases was within the range of results from other COPCORD surveys with some variations that can be attributed to differences in methodology and geo-ethnic factors.

Key words: COPCORD, health seeking behaviors, Lebanon, prevalence, rheumatic diseases.

INTRODUCTION

Rheumatic diseases are considered a significant public health problem because of their high prevalence worldwide and their pervasive impact on quality of life.[1] In recognition of their impact, the Bone and Joint Decade (BJD) 2000–2010, initiated in Lund, Sweden, has been renewed for another 10 years. The mission of BJD 2010–2020 is to help reduce the personal as well as the societal burden and cost of rheumatic diseases.[2]

Because of lack of data in developing countries, the Community Oriented Program for the Control of Rheumatic Diseases (COPCORD) was established as an international collaborative effort[3] to gain insight into the epidemiology of rheumatic conditions. Still, in western Asia, knowledge of the epidemiology of

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rheumatic diseases remains insufficient. Furthermore, rheumatology is not a well-established medical specialty, which further exacerbates the deficiency of data.[4] The only two Arab countries to have applied the COPCORD model are Egypt and Kuwait and results indicated differences in the prevalence of rheumatic diseases.[5,6]

Until now, Lebanon has lacked population-based studies describing the prevalence, distribution and determinants of rheumatic diseases. In 1987, a case–control study investigated risk factors contributing to the development of rheumatoid arthritis (RA) in the capital city, Beirut, which limits its representativeness of the Lebanese population.[7] More recent studies have addressed specific rheumatic diseases and were based on patient populations.[8–10]

These studies provide some baseline data on rheumatic diseases in Lebanon, yet they are limited by substantive methodological issues. These limitations cast doubt upon the true figure of rheumatic diseases in Lebanon and prevent international comparisons. To fill in the gap and to locate Lebanon on the map of COPCORD for international comparisons, we performed a population-based study on a national scale, applying the COPCORD model. Our objectives were to estimate the prevalence of specific rheumatic diseases in Lebanon and to explore their distribution by age, gender and geographic location.

MATERIALS AND METHODS
Setting

Lebanon is a small country in the Middle East, on the eastern shore of the Mediterranean Sea with a total area of 10 452 km^2. The total population is estimated to be around 4 000 000 with the largest proportion of inhabitants living in urban areas.[11] Lebanon is divided into six governorates which are further subdivided into 26 districts. Most of Lebanon's area is mountainous terrain, except for the narrow coastline and the Beqaa Valley. Lebanon is characterized by the diversity of its population. It is a mosaic of religious groups. The principal ethnic majority is the Lebanese Arabs, followed by the Palestinians Arabs. The rest are comprised of Armenians, Assyrians, Kurds, Jews, Turks, and Greeks.

Design

Our cross-sectional study consisted of two phases. Phase I, initiated in 2007, consisted of a household survey to screen for musculoskeletal problems. A nationally representative sample of 3530 participants aged 15 and above was proportionally selected from the 26 districts (Qaza) of the six governorates (Mouhafazat), based on the Lebanese population distribution data of the Central Administration for Statistics (CAS).[11] The main center of each district was chosen along with a random sample of villages that were selected through multistage cluster sampling and were weighted according to their respective sizes. Systematic sampling was used to select households in the selected villages. Recruitment efforts targeted a sample with an age and sex distribution proportionate to that of the baseline population. Twelve field workers conducted face-to-face interviews with one randomly chosen individual from each household to collect screening data.

In Phase II, three Fellows in rheumatology affiliated with the American University of Beirut Medical Center (AUBMC) examined the respondents who answered positively to the screening question in Phase I: 'Have you suffered from pain/swelling/stiffness in the joints or musculoskeletal soft tissues within the last 7 days or sometime in the past with pain intensity on the visual analogue scale (VAS) ≥ 4'. These were called 'positive respondents.' Rheumatologists conducted door-to-door visits during which clinical interviews and physical examinations were performed. Around 10% of the randomly selected negative respondents were called to ascertain the reported lack of musculoskeletal problems. When recommended by the clinicians, serological examinations were carried out by a licensed nurse whereby 10 cc of blood were collected. Blood samples were preserved and sent to one laboratory to do the following tests: complete blood count (CBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), RA latex, anti-cyclic citrullinated protein antibodies (anti-CCP), antinuclear antibodies (ANA) and serum uric acid. Sixty-one participants needed laboratory tests and 12 needed X-rays. Fifty participants underwent the blood tests and three participants had X-rays, yielding a response rate of 82% and 25%, respectively. Consequently, only 2% (n = 20) of the positive respondents had undefined rheumatic disorders. Laboratory evaluations were not performed in the two southern governorates.

The study was approved by the Institutional Review Board (IRB) at the American University of Beirut. Prior to questionnaire administration and medical examination, written informed consent was obtained from each person aged 18 years and above, or from the parent/guardian of younger respondents.

Questionnaire

The Arabic version of the World Health Organization – International League of Associations for Rheumatology (WHO–ILAR) COPCORD Core Questionnaire (CCQ) validated in Kuwait was used in the study.[12] Some of the questions underwent few dialectical changes to suit the Lebanese culture. The main section in the COP-CORD core questionnaire aimed at detecting musculoskeletal (MSK) problems (positive respondents) through questions on current and past MSK complaints (including pain, pain upon pressure, swelling and stiffness) at nine body locations. New questions were added on work absence due to MSK problems, coping mechanisms, name of medications and their side-effects. Questions were also added on behavioral risk factors, such as smoking cigarettes and arghile (water pipe), alcohol consumption, mental distress (General Health Questionnaire [GHQ]-12), and physical activity, in addition to weight and height measurements. The questionnaire was pilot-tested on 20 individuals to check for clarity, efficacy and flow of questions.

A standard examination sheet was developed to be used by the Fellows in rheumatology during medical evaluation. The sheet was based on the classification criteria of the American College of Rheumatology (ACR). It included questions on the location, duration and pattern of pain, number of involved joints, past medical history, drug usage and any other systematic findings. Also, a body manikin drawing was used to mark the joints affected by any type of MSK problems. Rheumatic diseases were classified into three sections: mechanical, inflammatory and needing further evaluation, that is blood tests and X-rays.

Measurements

Rheumatic diseases were diagnosed clinically. However, the internationally accepted classification criteria of the ACR were used for disorders such as RA, osteoarthritis (OA), spondyloarthropathies (SPA) and fibromyalgia (FM).[13]

Socio-demographic characteristics included age categorized into 5-year age groups, gender, marital status (single *vs.* ever married) and work status. Geographic location was categorized into coastal, mountainous or valley. The height variation in Lebanon ranges 400–3088 m; mountainous areas are those situated at ≥ 400 m, while areas below this height are considered coastal. Elongated lowland areas that are situated between ranges of mountains or hills were considered valleys.

Pain severity was assessed by a self-reported question on whether the pain was mild, moderate, severe or very severe and by VAS (0 for no pain and 10 for very severe pain). Lifetime and current functional disability due to MSK problems were defined as experiencing difficulty in performing daily activities.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS v.16; SPSS Inc., Chicago, IL, USA). The distribution of participants by socio-demographic characteristics of the sample was reported. Using the rheumatologists' diagnoses, the national prevalence of rheumatic disorders was calculated. Percentages, means and standard deviations were computed to describe the pain and disability among participants with rheumatic diseases. Prevalence of selected diseases by geographic location, age and gender was calculated. Statistical testing (independent sample *t*-test for continuous variables and Chi-square tests for categorical variables) were conducted to compare the characteristics of examined and non-examined patients.

RESULTS

Profile of participants

The study sample consisted of 3530 participants with a response rate of 83% in Phase I. The age and sex distribution was similar to the Lebanese population with a male to female ratio of 1.04 : 1.00 and age range between 15 and 90 years (mean 38.22 ± 16.91). Socio-demographic characteristics of the study sample are summarized in Table 1.

Lifetime MSK problems were reported by 1160 participants (32.9%). The prevalence rates of current and past MSK problems were 24.4% and 8.4%, respectively. Table 2 shows the prevalence of current pain by site. Shoulder, knee and back were the most frequently reported pain sites, with females reporting higher prevalence at all sites.

Of the respondents, 944 (26.7%) screened positive and thus were scheduled for medical examination. However, 338 (35.8%) did not respond to appointments, yielding a response rate of 64%. The most common reason for non-response was unavailability at home, even after agreeing on an appointment. Examined participants were similar to non-examined in terms of gender ($P = 0.543$), marital status ($P = 0.159$), self-reported pain description ($P = 0.197$), disability ($P = 0.335$) and presence of current

Table 1 Demographic characteristics of the sample (*n* = 3530) in the Lebanon cross-sectional study (2007–2009)

Variables	*n*	%
Governorate		
North	740	21.0
Mount Lebanon	1459	41.3
Bekaa	457	12.9
Beirut	374	10.6
Al Nabatieh	177	5.0
South	323	9.2
Age		
15–24	970	27.5
25–34	741	21.0
35–44	640	18.1
45–54	488	13.8
55–64	342	9.7
≥ 65	349	9.9
Gender		
Male	1804	51.1
Female	1726	48.9
Marital status		
Single	1457	41.3
Ever-married	2068	58.5
Work status		
Current worker	1502	42.5
Previous worker	237	6.7
Never worked	1291	36.6

MSK problem (*P* = 0.565). However, examined participants were significantly more likely to be of slightly older age (mean ± SD = 45.7 ± 16.4) (*P* = 0.004) than those who were not examined (42.4 ± 16.8). Of those who required further laboratory and radiological assessment (*n* = 73), 73% underwent the laboratory tests and X-rays.

Prevalence of rheumatic diseases

The point prevalence of rheumatic diseases was 15.0% (529/3530). A negligible number (*n* = 18) of individuals had unconfirmed rheumatic diseases because they did not undergo further serological and radiological examinations. The distribution pattern of those with rheumatic diseases is shown in Figure 1. Soft tissue rheumatism (STR), OA and back pain constituted the largest bulk of cases of rheumatic diseases (37.6%, 25.9% and 19.5%, respectively).

Table 3 shows the sex-specific prevalence rates of rheumatic diseases grouped into mechanical and inflammatory diseases. The most common types of diseases were of mechanical origin and mainly included STR and OA. Knee OA constituted three quarters of the total OA. The most common inflammatory disease was RA, followed by SPA. Other rheumatic diseases of very low prevalence included pseudo-gout (0.1%), meniscal tear (0.1%), gout (0.01%), Behcet's disease (0.1%), and familial Mediterranean fever (0.1%). All diseases except for SPA were found to be more prevalent among females.

Coastal areas had the lowest prevalence of all diseases except for FM. All diseases showed a similar pattern of increasing prevalence with age; however, they differed by the age at which prevalence declined or leveled off. For example, OA prevalence increased up to the age of 64 years and decreased thereafter, while other prevalence rates increased up to the age of 54 years, after which they showed a decline (data not shown).

DISCUSSION

This cross-sectional study reveals a considerable burden of MSK problems in Lebanon with one in four reporting current problems. Comparing our results to the other COPCORD surveys revealed significant variations in the prevalence of current MSK problems. Our figure is significantly lower than that in urban Iran (41.9%), higher than those reported in India and close to the ones reported in Mexico.[14–16,19] This variation

Table 2 Prevalence of current musculoskeletal problems at various sites in the Lebanon cross-sectional study (2007–2009)

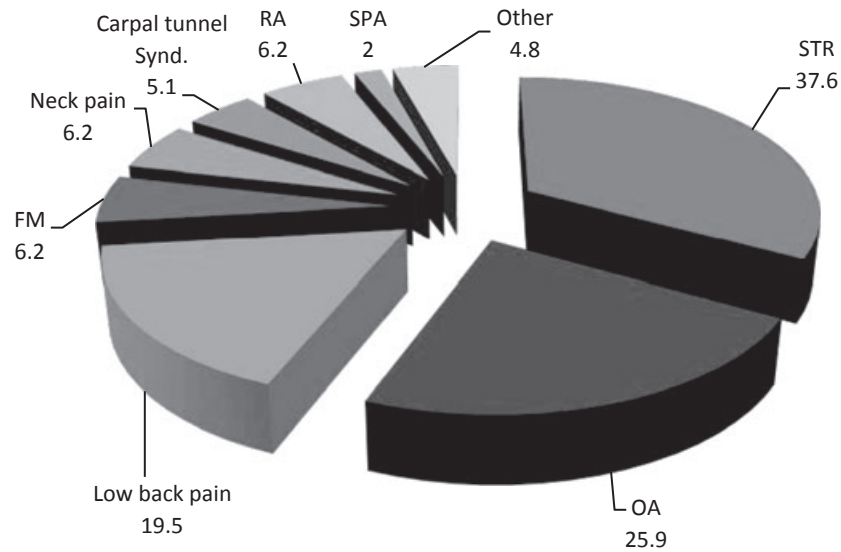| Category	Total % (95% CI)	Male % (95% CI)	Female % (95% CI)
Shoulder	14.3 (13.1, 15.5)	8.6 (7.3, 9.9)	20.2 (18.3, 22.1)
Wrist	9.8 (8.8, 10.8)	4.8 (3.8, 5.8)	15.0 (13.3, 16.7)
Hands	11.3 (10.2, 12.3)	5.8 (4.7, 6.9)	17.0 (15.2, 18.8)
Hips	7.6 (6.7, 8.4)	4.3 (3.3, 5.2)	11.1 (9.6, 12.5)
Knee	14.2 (13.1, 15.4)	10.6 (9.2, 12.0)	18.1 (16.2, 19.9)
Ankle	7.4 (6.5, 8.2)	4.7 (3.6, 5.6)	10.3 (8.9, 11.7)
Toes	4.4 (3.7, 5.1)	1.7 (1.1, 2.3)	7.2 (5.9, 8.4)
Neck	13.3 (12.1, 14.3)	7.8 (6.5, 9.0)	19.0 (17.1, 20.8)
Spine	13.6 (12.5, 14.7)	8.7 (7.4, 10.0)	18.8 (16.9, 20.6)

Figure 1 Distribution (%) of some major rheumatic disorders in the Lebanon cross-sectional study (2007–2009). FM, fibromyalgia; RA, rheumatoid arthritis; SPA, spondyloarthropathies; STR, soft tissue rheumatism; OA, osteoarthritis.

Table 3 Total and sex-specific prevalence of musculoskeletal (MSK) diseases in Lebanon cross-sectional study (2007–2009)

MSK diseases (*n*)	Total % (95% CI)	Male % (95% CI)	Female % (95% CI)
Mechanical MSK diseases (484)	13.7 (12.5, 14.8)	9.3 (7.9, 10.6)	18.3 (16.4, 20.1)
Soft tissue rheumatism (205)	5.8 (5.0, 6.6)	4.3 (3.3, 5.2)	7.4 (6.2, 8.6)
Osteoarthritis (141)	4.0 (3.3, 4.6)	3.3 (2.5, 4.2)	4.7 (3.7, 5.7)
Low back pain (106)	3.0 (2.4, 3.6)	2.2 (1.5, 2.8)	3.9 (3.0, 4.8)
Fibromyalgia (34)	1.0 (0.6, 1.3)	0.0	2.0 (1.3, 2.6)
Neck pain (34)	1.0 (0.6, 1.3)	0.3 (0.1, 0.6)	1.6 (1.0, 2.2)
Carpal tunnel syndrome (28)	0.8 (0.5, 1.1)	0.3 (0.0, 0.5)	1.3 (0.8, 1.9)
Pseudo-gout (2)	0.1 (0.0, 0.1)	0.1 (0.0, 0.2)	0.0
Meniscal tear (2)	0.1 (0.0, 0.1)	0.1 (0.0, 0.3)	0.0
Gout (1)	0.01 (0.0, 0.1)	0.1 (0.0, 0.2)	0.0
Inflammatory MSK diseases (61)	1.7 (1.3, 2.1)	1.0 (0.5, 1.4)	2.5 (1.7, 3.2)
Rheumatoid arthritis (34)	1.0 (0.6, 1.3)	0.2 (0.0, 0.3)	1.8 (1.2, 2.4)
Spondylathropathies (11)	0.3 (0.1, 0.5)	0.5 (0.2, 0.8)	0.1 (0.0, 0.3)
Connective tissue disease (7)	0.2 (0.0, 0.3)	0.1 (0.0, 0.3)	0.3 (0.0, 0.5)
Undifferentiated arthritis (8)	0.2 (0.0, 0.4)	0.1 (0.0, 0.3)	0.3 (0.0, 0.6)
Behcet's disease (3)	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)	0.1 (0.0, 0.3)
Familial Mediterranean fever (3)	0.1 (0.0, 0.2)	0.1 (0.0, 0.3)	0.1 (0.0, 0.2)

could be attributed to differences in age, gender and ethnic population distribution among countries.

Apart from the confounding effect of age, gender and ethnicity, some basic differences in the methodology exist, as COPCORD studies still do not follow a uniform standardized protocol. In some COPCORD studies, using the fast-track model, rheumatology evaluation was performed immediately or within a few days of questionnaire administration.[14,15,17,18] In our

study, the subsequent medical examination was done within an average of 4 weeks, which might have reduced our estimates of prevalence rates. In addition, no widely accepted definition of positive respondents has been used among the several COPCORD studies. For example, in the Malaysia COPCORD study, only participants with current pain were clinically examined, which ultimately may have overlooked some cases that were in a remission state.[19] On the other

hand, in the Bhigwan model, the definition included current and past pain.[15] A different definition was used in our study, whereby participants with MSK problems within the last 7 days or sometime in the past with pain severity on VAS ≥ 4 were examined. Consequently, it is very important to standardize the COPCORD protocol to ensure valid comparison among studies.

In Lebanon, rheumatic diseases are also of significant magnitude with one in seven individuals currently affected. Compared to other COPCORD studies, this figure is substantially higher than in Kuwait (3%), close to Egypt (16.2%), but lower than rural (24.8%) and urban areas (22.6%) in Bangladesh.[17,20,21] Table 4 provides a glimpse of the prevalence rates of rheumatic disorders from different countries in South America, western Asia and the Middle East and North Africa (MENA) region. However, it is important to standardize these rates, especially considering that each country has a different age and gender distribution and these factors do influence the occurrence of rheumatic diseases.

Soft tissue rheumatism and OA, specifically knee OA, were the two most prevalent rheumatic diseases in Lebanon. These conditions could be related to aging of the population and obesity, two consistently reported risk factors for STR and OA.[21] Lebanon is witnessing a rapid demographic transition with 7.4% of the population aged 65 years or more and is estimated to reach 10% by 2025.[22,23] Furthermore, obesity is an emerging public health problem among Lebanese, with 53% of the adult population overweight and 17% obese.[24]

Significant as well was the relatively high prevalence of RA (1%) which is the same as the prevalence (1%) reported in Iraq.[25] Despite being consistent with the international estimate reported to be about 1%, our RA figure is in the upper range of other COPCORD studies. Rates reported in other COPCORD studies ranged from 0.33% in Tehran (Iran), 0.54% in Bhig-

wan (India), to the highest range 2.8% in the Mexican state of Yucatán.[14,15,26] The high prevalence of RA in Lebanon may be attributed to our rigorous sampling method, the use of laboratory and radiological tests to confirm RA cases, and the comprehensive definition of positive respondents. Moreover, the prevalence of Behcet's disease was high with approximately 0.1% of the sample (85 in 100 000 inhabitants), a figure close to Turkey,[27] Druze and Arab communities in Israel,[28,29] but lower than that of other Arab countries.[30,31]

Our study is population-based which provides an accurate estimate of the burden of rheumatic diseases and symptoms at a national level. The sample (n = 3530) is large enough to determine the prevalence of most rheumatic diseases and to capture some of the rare conditions, such as Behcet's disease and familial Mediterranean fever. Interviewing one randomly chosen household member might have introduced selection bias; however, interviewers were instructed to collect data at different times of day so that the sample would not include only one profile of participants. Moreover, the definition of positive respondents was comprehensive enough to capture incident MSK problems as well as prevalent ones, where they were in remission during the survey. As in most COPCORD studies, the response rate of the first phase was good (83.0%) and was higher than the response rate of the second phase (64.0%). A comparison of the characteristics of the examined and non-examined participants showed no differences between the two groups in terms of MSK pain and disability. Therefore, it is highly unlikely that selection bias occurred. However, the low response rate of the second phase may have led to an underestimate of the prevalence figures.

The results of the study call for better recognition of MSK diseases by the Ministry of Public Health. The study provides good reasons for why these diseases should compete for resources and be a major focus on the agenda of the Ministry to allocate funds for research and subsidizing expensive drugs. The findings

Table 4 Prevalence (%) of selected disorders in some COPCORD population surveys

	Lebanon	Egypt	Mexico (5 regions)	Iran (urban)	India	Indonesia	Bangladesh
Sample size	3530	5120	19 213	10 291	4100	4683	2635
STR	5.8	6.6	NA	4.6	3.2	15	2.6
Knee OA	3.0	8.5	NA	15.3	5.8	5.1	7.5
FM	1.0	1.3	0.7	0.69	NA	NA	4.4
Gout	0.01	NA	0.3	0.13	0.1	0.1	NA
RA	1.0	0.29	1.6	0.33	0.55	0.2	0.7
AS	0.1	0.09	0.1	0.12	0.1	NA	NA

AS, ankylosing spondylitis; FM, fibromyalgia; NA, not available; OA, osteoarthritis; RA, rheumatoid arthritis; STR, soft tissue rheumatism.

support the need for updating rheumatologists' knowledge, and training primary health care physicians for early detection. The high magnitude necessitates a future plan to proceed with the interventional and preventive stages of the COPCORD protocol, particularly patient treatment and education. As our study has demonstrated variations by age, gender and geographic areas, this warrants more research via analytical studies to explore the different factors contributing to such variations.

ACKNOWLEDGMENTS

REFERENCES

1 Woolf AD, Pfleger B (2003) Burden of major musculoskeletal conditions. *Bull World Health Organ* **81**, 646–56.

2 Atik OS (2010) Is the bone and joint decade over? *Joint Dis Related Surg* **21**, 123.

3 Minaur N, Sawyers S, Parker J, Darmawan J (2004) Rheumatic disease in an Australian Aboriginal community in North Queensland, Australia. A WHO-ILAR COPCORD survey. *J Rheumatol* **31**, 965–72.

4 Lau C-S, Kim H-Y, Nishioka K (2007) Rheumatology in the Asia Pacific region-opportunities and challenges. *Nat Clin Pract Rheumatol* **3**, 119.

5 Chopra A, Abdel-Nasser A (2008) Epidemiology of rheumatic musculoskeletal disorders in the developing world. *Best Pract Res Clin Rheumatol* **22**, 583–604.

6 Al-Awadhi AM, Olusi SO, Al-Saeid K, et al. (2005) Incidence of musculoskeletal pain in adult Kuwaitis using the validated Arabic version of the WHO-ILAR COPCORD Core Questionnaire. *Ann Saudi Med* **25**, 459–62.

7 Darwish M, Armenian H (1987) A case–control study of rheumatoid arthritis in Lebanon. *Int J Epidemiol* **16**, 420–4.

8 Awada H, Baddoura R, Okais J, Habis A, Attoui S, Abi Saab M (1995) Prevalence of Spondyloarthropathies in a rheumatology practice. *Arthritis Rheum* **38** (Suppl), S203.

9 Uthman I, Kassak K, Sanjakdar R, Mendelek V, Masri AF, Nasr FW (1997) Letter from Lebanon. *Br J Rheumatol* **36**, 806–7.

10 Baddoura R, Haddad S, Awada H, et al. (2006) Severity of rheumatoid arthritis: the SEVERA study. *Clin Rheumatol* **25**, 700–4.

11 Central Administration for statistics (2006) *Living Conditions of Households*. Ministry of Social Affairs, Beirut, Lebanon. Available from URL: http://www.cas.gov.lb/addsearch_en.asp

12 AL-Awadhi A, Olusi S, Moussa M, et al. (2002) Validation of the arabic version of the WHO-ILAR COPCORD core questionnaire for community screening of rheumatic diseases in Kuwaitis. *J Rheumatol* **29**, 1754–9.

13 Klippel JH (ed.) (2001) *Primer on the Rheumatic Diseases*. Arthritis Foundation, Atlanta.

14 Davatchi F, Jamshidi A, Banihashemi A, et al. (2008) WHO-ILAR COPCORD study (Stage 1, urban study) in Iran. *J Rheumatol* **35**, 7.

15 Lagu Joshi V, Chopra A (2009) Is there an urban-rural divide? population surveys of rheumatic musculoskeletal disorders in the Pune region of India using the COPCORD Bhigwan model. *J Rheumatol* **36**, 3.

16 Pelaez-ballestas I, Sanin LH, Moreno-montoya J, Alvarez-nemegyei J, Burgos-vargas R, Garza-elizondo M (2011) Epidemiology of the rheumatic diseases in Mexico. A study of 5 regions based on the COPCORD methodology. *J Rheumatol* **38**, 3–6.

17 Atiqul Haq S, Darmawan J, Islam M, et al. (2005) Prevalence of rheumatic diseases and associated outcomes in rural and urban communities in Bangladesh: a COPCORD study. *J Rheumatol* **32**, 348–53.

18 Davatchi F, Banihashemi AT, Gholami J, et al. (2009) The prevalence of musculoskeletal complaints in a rural area in Iran: a WHO-ILAR COPCORD study (stage 1, rural study) in Iran. *Clin Rheumatol* **28**, 1267–74.

19 Veerapen K, Wigley RD, Valkenburg H (2007) Musculoskeletal pain in Malaysia: a COPCORD survey. *J Rheumatol* **34**, 207–13.

20 Al-Awadhi AM, Olusi SO, Moussa M, et al. (2004) Musculoskeletal pain, disability, and health seeking behaviors in adult Kuwaitis using a validated Arabic version of the WHO-ILAR COPCORD Core Questionnaire. *Clin Exp Rheumatol* **22**, 177–83.

21 Reijman M, Pols H, Bergink A (2007) Body mass index associated with onset and progression of osteoarthritis of the knee but not of the hip: the Rotterdam Study. *Ann Rheum Dis* **66**, 158–62.

22 Economic and Social Commission for Western Asia (ESCWA) (2004) Ageing in the Arab countries: regional variations, policies and programs. ESCWA, Beirut Available online at http://www.escwa.org.lb/information/publications/sdd/docs/04-wg-1–2.pdf [Accessed 11 February 2009].

23 Sibai A, Sen K, Baydoun M, Saxena P (2004) Population ageing in Lebanon: current status, future prospects and implications for policy. *Bull WHO* **82**, 219–25.

24 Sibai A, Hwalla N, Adra N, Rahal B (2003) Prevalence and covariates of obesity in Lebanon: findings from the first epidemiological study. *Obesity Res* **11**, 1353–61.

25 Al-rawi ZS, Alazzawi AJ, Alajili FM, Alwakil R (1978) Rheumatoid arthritis in population samples in Iraq. *Ann Rheum Dis* **37**, 73–5.

26 Alvarez-nemegyei J, Peláez-ballestas I, Sanin LH, Cardiel MH, Ramirez-angulo A, Goycochea-robles M-V (2010) Prevalence of musculoskeletal pain and rheumatic diseases in the Southeastern region of Mexico. A COPCORD-based community survey. *J Rheumatol* **37**, 21–5.

27 Azizlerli G, Akdağ Köse A, Sarıca R, et al. (2003) Prevalence of Behçet's disease in Istanbul, Turkey. *Int J Dermatol* **42**, 803–6.

28 Klein P, Weinberger A, Altmann VJ, Halabi S, Fachereldeen S, Krause I (2010) Prevalence of Behcet's disease among adult patients consulting three major clinics in a Druze town in Israel. *Clin Rheumatol* **29**(10), 1163–6.

29 Jaber L, Milo G, Halpern GJ, Krause I, Weinberger A (2002) Prevalence of Behcet's disease in an Arab community in Israel. *Ann Rheum Dis* **61**, 365–6.

30 Al-Dalaan A, AlBallaa S, AlSukait M, Mousa M, Bahabri SA, Biyari T (1997) The prevalence of Behcet's disease in Al Qassim region of Saudi Arabia. In: Hamza M (ed.) *Behcet's Disease*, pp 170–2. Pub Adhouva, Tunisia.

31 Assaad-Khalil SH, Kamel FA, Ismai EA (1997) Starting a regional registry for patients with Behçet's disease in North West Nile Delta region in Egypt. In: Hamza M (ed.) *Behcet's Disease*, pp 173–6. Pub Adhouva, Tunisia.