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Musculoskeletal Disorders Among Full-Time Homemakers in Poor Communities

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Abstract

Objective—To examine factors associated with self-reported musculoskeletal disorders (MSD) among full-time female homemakers.

Methods—Data on socio-demographic characteristics, lifestyle and health were collected on 1266 married women aged 15–59 years living in poor suburbs in the outskirts of Beirut, Lebanon. Independent associations with MSD of factors and characteristics were examined using odds ratios (ORs) derived from multiple logistic regression.

Results—Women's age, weight, and number of children were significantly, positively, independently associated with self-reported MSD, while women's conduct of specific household tasks were not. Women with MSD were more likely to be stressed than women without MSD (OR = 1.5).

Conclusion—A major finding of this study was the positive association between distress and musculoskeletal disorders. The measures used to assess women's involvement in housework did not account for the duration of time spent performing each household task. Better measures of domestic labor, including housework and childcare, are required to understand better their impact on the health of full-time homemakers and on MSD in particular. Intervention programs to alleviate MSD in full-time homemakers should address psychosocial factors.

Keywords

Homemakers; currently married; women; musculoskeletal disorders; distress

Musculoskeletal disorders (MSD) are a significant public health problem due to their high impact on disability, personal suffering, absence from work, disability, and their direct and indirect costs to the health care system (Picavet & Shouten, 2003). Data on the prevalence of MSD have been collected for several decades in Western countries. Studies on the epidemiology of low-back pain, for example, are mostly restricted to high-income countries, comprising less than 15% of the world population (Volinn, 1997). Figures from developing countries are not abundant. However, a number of studies in countries such as Indonesia (Darmawan, Valkenburg, Muir, & Wigley, 1995; Darmawan, Muir, Valkenburg, & Wigley, 1995), Thailand (Chaiamnuay, Darmawan, Muir, & Assawatnabodee, 1998), Vietnam (Minh Hoa, Darmawan, Shun Le, Van Hung, Thi Nhi, & Ngoc, 2003), Pakistan (Farooqi & Gibson, 1998), Oman (Pountain, 1992) and Lebanon (Armenian, Halabi, &

Khlat, 1989) have shown that MSD are quite prevalent with the proportion of the population affected ranging from 14 to 42%. Studies carried out in Lebanon showed a higher prevalence among women than men of all ages for several types of MSD, such as arthritis and back pain (Baddoura, 2000; MOPH, 2001).

Personal and behavioral risk factors, including increased age, female sex, increased weight, and lifestyle factors, such as tobacco smoking and physical activity, in addition to psychological factors affect the musculoskeletal system (Palmer, Syddall, Cooper, & Coggon, 2003; Peltonen, Lindroos, & Torgerson, 2003; Cassou, Derriennic, Monfort, Norton, & Touranchet, 2002; Tsuritani, Honda, Noborisaka, Ishida, Ishizaki, & Yamada, 2002; Malchaire, Roquelaure, Cock, Piette, Vergracht, & Chiron, 2001; Kaergaard & Anderson, 2000; Barnekow-Bergkvist, Hedberg, Janlert, & Jansson, 1998). Recent research reported a positive association between MSD and depression in women (Dionne & Chénard, 2004; Réthelyi, Berghammer, Ittész, Szumska, Purebl, & Csoboth, 2004).

The epidemiology of women's occupational health has so far focused primarily on hazardous physical and psychosocial exposures in the workplace. Nurses, industrial workers, sewing machines operators, and cleaners have been extensively studied (Alexopoulos, Burdorf, & Kalokerinou, 2003; Björkstén, Boquist, Talbäck, & Edling, 2001; Kaergaard & Anderson, 2000; Messing, 1998). Women's domestic labor remains largely unexplored in the literature on women's health.

Nearly 15% of women in Lebanon suffer from MSD (MOPH, 2001). Since a large majority of women in Lebanon (80%) are not involved in paid labor (UNFPA, 2003), we conducted an analysis of full-time homemakers aged between 15 and 59 years, to study the personal and behavioral factors associated with MSD. All of the women were married, not involved in the labor force, and living in nuclear families in poor areas where domestic help was not available for economic reasons.

METHODS

Data and Sample

Data on 1869 ever-married women aged 15-59 years were collected in a survey of 2797 households randomly selected from three communities in the outskirts of Beirut, Lebanon. The three communities mainly consisted of rural immigrants and displaced individuals who moved to the Beirut outskirts at the time of the civil war (1975-1990). Data were collected in two phases by a team of researchers from the Faculty of Health Sciences at the American University of Beirut in 2002-2003. In the first phase, a household survey collected information about the demographic characteristics and socioeconomic status of households, in addition to the involvement of household members in domestic labor. In the second phase, all ever-married women aged 15-59 years were interviewed in-depth, using a face-to-face structured questionnaire. A non-response was confirmed following 5 separate visits to the household. The overall response rate was 88.3% and 77.8% in the first and second phases, respectively. The data included information on women's socio-demographic characteristics, lifestyle and health. Out of the total sample, all 1266 married women living in nuclear families, and not participating in the labor force at the time of the survey, were selected for this analysis.

Measures

Similar to what has been published in the literature, the measures used in this study were related to socio-demographic characteristics and mental health (Statistics Canada, 2000, Quebec Health Survey and the Center for Health and Social Surveys of Quebec, 1998). Measures on socio-demographic and lifestyle factors included age in years (15-29, 30-44,

45-59), self-reported weight in Kg (35-60, 61-75, 76+), number of children (0, 1-2, 3-4, 5+), education (< intermediate which is equivalent to less than 8 years of schooling, intermediate + which is equivalent to 8 years of schooling or more), monthly household income in 1000 Lebanese Pounds (LP) (< 300, 300-499, 500-749, 750) where 1500 LP are equivalent to 1 U.S. dollar, and current tobacco smoking (yes, no).

Mental health was assessed by measuring distress, using the 12-item version of the General Health Questionnaire (Goldberg & Williams, 1988), which has been validated in Arab countries (El Rufaie & Daradkeh, 1996). Women scoring 3 and above on the scale were considered psychologically distressed.

To study the relation of domestic labor to MSD, women's level of involvement in seven household tasks, including cleaning rooms, kitchens, and bathrooms, washing dishes and clothes, preparing food, and ironing, was also assessed. Involvement in each task was coded 0 for no involvement in the task and 1 for involvement in the task. A simple scale was then constructed through summing the scores. The scale was categorized as 0-5 for low to medium level of involvement and 6-7 for high level of involvement in household tasks. A sensitivity analysis showed similar results to when the level of involvement in household tasks was assessed using all values of the scale.

The dependent variable considered in this study was "*reporting one or more musculoskeletal disorders*." The survey questionnaire included a question on whether or not women suffered from any health problem in the past two months. Women who answered this question affirmatively were asked to list up to three health problems from which they suffered, each of which was categorized into musculoskeletal, cardiovascular, gastrointestinal or others. Women were then asked to select their most important health problem from those they listed and to give the reason behind this health problem.

A number of women used the term "pain" (back pain, limb pain and joint pain) to refer to MSD. Women's response regarding MSD included: back/neck problems, limb/joint/knee problems, osteoporosis, rheumatic diseases and bone problems.

Data Analysis

The Statistical Package for Social Sciences SPSS version 10 was used for data analysis. Women who reported one or more MSD were compared to those who did not report a musculoskeletal disorder. Unadjusted prevalence odds ratios were used to evaluate the association between MSD and the independent variables of housework, as well as various potential covariates including age, weight, educational level, number of children, distress, level of involvement in household tasks, tobacco smoking and household monthly income. A manual stepwise multiple logistic regression model was used to find the most parsimonious model. All variables that showed a significant association with the dependent variable in the bivariate analysis were entered in the regression model. Variables that did not show a significant association with the dependent variable were dropped from the regression model. Statistical significance was set at 5%. The adjusted prevalence odds ratios (OR) with 95% confidence intervals (CI) indicated the strength of the association between MSD and the independent variables.

RESULTS

The characteristics of the study sample are summarized in Table 1. More than half of the women were between 30 and 44 years of age, had three or more children, weighed more than 60 Kg, and had not completed an intermediate level of education. For about 40% of

women, the monthly household income was less than 500,000 LP. The majority of women were highly involved in household tasks (92%); 44% of women were distressed.

Of the 1266 married women living in nuclear families and not involved in the labor force, 19% reported suffering from at least one musculoskeletal disorder. About one-third of women aged 45-59 years and 25% of those weighing more than 76 Kg reported a MSD. Nearly 50% of women with 3 or more children also reported MSD. Furthermore, 22% of women who had not completed an intermediate level of education and 40% of those with a monthly household income of less 500,000 LP reported a MSD. One-third of women with low to medium involvement in household tasks and 21% of those who smoked reported a MSD. Of those who were distressed, 24% complained of a MSD. The unadjusted odds ratios revealed that all the independent variables considered were significantly associated with MSD, except for income and tobacco smoking (Table 1).

The stepwise multiple logistic regression resulted in a best model that included age, weight, number of children, and distress, all showing significant independent associations with musculoskeletal disorders (Table 2). The relative odds of reporting a MSD was 1.8 for women aged 30 and 44 years (95% CI: 1.13-2.95) and 3.6 for women aged 45-59 years (95% CI: 2.18-5.98) compared to those aged 15-29 years. The prevalence odds ratio for women weighing 76 Kg or more was 1.5 for reporting a MSD, compared to women weighing 35-60 Kg. A positive gradient was observed with the increase in the number of children; women with five children had an odds ratio of 2.7 for reporting a MSD (95% CI: 1.14-6.49) compared to women with no children. Finally, the odds ratio for distressed women was 1.5 for reporting a MSD compared to non-distressed women (95% CI = 1.09-1.99). Education and level of involvement in household tasks were not associated with reporting a MSD once other variables were controlled in the multiple regression.

DISCUSSION

Our research focused on full-time, female homemakers aged 15-59 years who were not involved in the formal labor force. We found that 19% had MSD and that increased age, parity, weight, and distress were independently associated with MSD. A major finding was the positive association between distress and MSD in the study group, which persisted even when controlling for the effect of age, weight and the number of children.

Our results indicated that age and weight were positively associated with musculoskeletal disorders. This was in accordance with the literature reporting on the degeneration of physical function with increased age and weight (Guo, Chang, Yeh, Chen, & Guo, 2004; Alexopoulos et al., 2003; Gunnarsdottir, Gudbjorg, Rafnsdottir, & Tomasson, 2003; Peltonen et al., 2003; Woolf & Pfleger, 2003; Tsuritani et al., 2002; Pountain, 1992). In addition, age has been strongly associated with chronic complaints (Alexopoulos et al., 2003), which was also shown in our study group. Being overweight has been reported to apply an overload on human muscles and increase the risk of MSD (Peltonen et al., 2003).

Our results confirmed the association established in previous research between the number of children and MSD. Women with children have been reported to develop more neck and shoulder problems than single women with no children due to an increase in home strains (Björkstén et al., 2001; Yun, Yun, Hong, & Sang, 2001; Fredriksson, Alfredsson, Köster, & Thorbjörnsson, 1999). An increase in the number of dependants may lead to a decrease in women's leisure time and an increase in responsibilities and stress level, which could be manifest in increased prevalence of MSD (Fredriksson et al., 1999).

Our results indicated an association of MSD with self-reported distress. They concurred with previous reports in the literature on the association between mental health and MSD

(Carroll, Cassidy, & Côté, 2004; Dionne & Chénard, 2004; Réthelyi et al., 2004; Dersh, Gatchel, Polatin, & Mayer, 2002; Feldman, Shrier, Rossignol, & Abenhaim, 2002; Geenen & Jacobs, 2001; Brulin, Winkvist, & Langendoen, 2000; Linton, 2000). Depression and stress play an important role in the onset and persistence of musculoskeletal pain (Carroll et al., 2004; Réthelyi et al., 2004), frequently reported by women in our study population. In fact, chronic pain was an on-going problem for 66% of women with MSD in the study group. While the comorbidity of depression and chronic pain has been established in previous research (Réthelyi et al., 2004), we cannot discern the temporal relation of MSD and distress in our study due to its cross-sectional design.

Low education showed a significantly positive association with MSD at the bivariate level; however, it was not related in the multivariate model. Several studies have reported a non-significant association between education and MSD (Alexopoulos et al., 2003; Barnekow-Bergkvist et al., 1998), while Guo et al. (2004) found an inverse association between education and MSD in Taiwanese women.

Although tobacco smoking damages musculoskeletal tissues (Palmer et al., 2003; Malchaire et al., 2001; Kaergaard & Anderson, 2000), our results, similar to those by Tsuritani et al. (2002) in Japanese women, did not show a significant association between tobacco smoking and MSD. However, since our research did not discriminate between light/occasional smokers and heavy smokers, and did not examine the potential role of passive exposure cigarette smoke, this result should be interpreted with caution.

The study population was poor by Lebanese standards if judged by household income. The average yearly household income was about \$5,899 compared to a national average of about \$12,300 according to the latest published figures in 1997 (Administration Centrale de la Statistique, 1998).

Responsibility for domestic tasks was not significantly associated with reporting a MSD. The results of the bivariate analyses showed an inverse association between the level of involvement in housework and MSD; however, this association disappeared in the multivariate analyses. Previous research has reported that cleaning jobs requiring unnatural positions and static and repetitive work tasks cause backache and other types of musculoskeletal disorders (Laursen, Sjøgaard, & Sjøgaard, 2003; Messing, 1998; Gongxia, 1992). Our finding could be an artifact of the cross-sectional study design such that women suffering from MSD may have decreased their level of involvement in domestic labor due to their health condition.

LIMITATIONS

The cross-sectional nature of our study did not permit inferences on the direction of causality for the relationship with distress. In addition, the use of odds ratios was another limitation in the analysis, since they are not good estimates of the relative risk when the outcome is not rare, as was the case with MSD in the studied population (Sistrom & Garvan, 2004; Rigby, 1999). Further, the data obtained was self-reported; women may have provided answers that did not accurately characterize their health condition or behaviors, which may have led to a reporting bias. Since a measure of women's height was not included, we were not able to compute body mass index, which would have been a better measure of overweight and obesity. Additionally, the measures used to assess housework did not take into account the time spent performing household tasks (Escribà-Agüir & Tenías-Burillo, 2004; Bird, 1999; Noor, 1997), nor did they capture the problematic practices encountered in performing these tasks such as twisting and bending. The double burden of women participating in the labor force involves several important social and physical implications; these were not addressed as they are beyond the scope of this paper, which was limited to

women not engaged in the labor force outside the home. While this limited the sample and its implications to such women, it also minimized the influence of labor force activities on MSD. Finally, the non-respondents in the selected sample may have produced a selection bias if their baseline characteristics were different from those of the respondents; this may have affected the generalizability of the study results. However, since the response rate was around 78%, it is unlikely that selection bias played an appreciable role.

CONCLUSION

This study provides useful information on musculoskeletal disorders among full-time homemakers in poor communities in the suburbs of Beirut, Lebanon. Research on domestic labor, including housework and childcare, using ergonomic and qualitative methods may help to understand better women's health in general and the health of full-time homemakers in particular. Future interventions designed to alleviate musculoskeletal disorders would benefit from directing efforts at weight loss and psychosocial factors.

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REFERENCES

- Administration Centrale de la Statistique. Etudes statistiques: Conditions de vie des ménages en 1997. Beyrouth, Liban: Publications de L'Administration Centrale de la Statistique; 1998. (Etudes Statistiques No.9)
- Alexopoulos EC, Burdorf A, Kalokerinou A. Risk factors for musculoskeletal disorders among nursing personnel in Greek hospitals. *International Archives of Occupational and Environmental Health*. 2003; 76(4):289–294. doi: 10.1007/s00420-003-0442-9. [PubMed: 12739172]
- Armenian HK, Halabi SS, Khlat M. Epidemiology of primary health problems in Beirut. *Journal of Epidemiology and Community Health*. 1989; 43(4):315–318. [PubMed: 2533238]
- Baddoura, R. Low back pain in Lebanon: A hint on the magnitude of the problem. Annual Scientific Meeting of the Lebanese Medical Association; 2000 Nov 25; Saint Joseph University, Medical Faculty. 2000.
- Barnekow-Bergkvist M, Hedberg GE, Janlert U, Jansson E. Determinants of self-reported neck-shoulder and low back symptoms in a general population. *Spine*. 1998; 23(2):235–243. doi: 10.1097/00007632-199801150-00017. [PubMed: 9474732]
- Björkstén MG, Boquist B, Talbäck M, Edling C. Reported neck and shoulder problems in female industrial workers: The importance of factors at work and at home. *International Journal of Industrial Ergonomics*. 2001; 27(3):159–170. doi:10.1016/S0169-8141(00)00047-0.
- Bird CE. Gender, household labor, and psychological distress: The impact of the amount and division of housework. *Journal of Health and Social Behavior*. 1999; 40(1):32–45. [PubMed: 10331320]
- Brulin C, Winkvist A, Langendoen S. Stress from working conditions among home care personnel with musculoskeletal symptoms. *Journal of Advanced Nursing*. 2000; 31(1):181–189. doi:10.1046/j.1365-2648.2000.01209.x. [PubMed: 10632807]
- Statistics Canada. Household component Cycle 3 1998-1999 questionnaire. National Population Health Survey (NPHS); 2000. Accessed from: <http://www.statcan.ca/english>.
- Carroll LJ, Cassidy JD, Côté P. Depression as a risk factor for onset of an episode of troublesome neck and low back pain. *Pain*. 2004; 107(1–2):134–139. doi:10.1016/j.pain.2003.10.009. [PubMed: 14715399]
- Cassou B, Derriennic F, Monfort C, Norton J, Touranchet A. Chronic neck and shoulder pain, age, and working conditions: Longitudinal results from a large random sample in France. *Occupational and Environmental Medicine*. 2002; 59(8):537–545. doi:10.1136/oem.59.8.537. [PubMed: 12151610]

- Chaiamnuay P, Darmawan J, Muirden KD, Assawatanabodee P. Epidemiology of rheumatic disease in rural Thailand a WHO-ILAR COPCORD study. *The Journal of Rheumatology*. 1998; 25(7):1382–1387. [PubMed: 9676773]
- Darmawan J, Muirden KD, Valkenburg HA, Wigley RD. The epidemiology of rheumatoid arthritis in Indonesia. *British Journal of Rheumatology*. 1993; 32(7):537–540. [PubMed: 8339121]
- Darmawan J, Valkenburg HA, Muirden KD, Wigley RD. The prevalence of soft tissue rheumatism. A WHO-ILAR COPCORD study. *Rheumatology International*. 1995; 15(3):121–124. doi: 10.1007/bf00302129. [PubMed: 8588122]
- Dersh J, Gatchel RJ, Polatin P, Mayer T. Prevalence of psychiatric disorders in patients with chronic work-related musculoskeletal pain disability. *Journal of Environmental and Occupational Medicine*. 2002; 44(5):459–468.
- Dionne CE, Chénard M. Back-related functional limitations among full-time Homemakers: A comparison with women employed full-time outside the home. *Spine*. 2004; 29(12):1375–1383. doi:10.1097/01.BRS.0000128593.15674.EF. [PubMed: 15187643]
- El Rufaie OE, Daradkeh TK. Validation of the Arabic version of the thirty and twelve item general health questionnaires in primary care patients. *British Journal of Psychiatry*. 1996; 162(5):662–664. [PubMed: 8932899]
- Escribà-Agüir V, Tenías-Burillo JM. Psychological well-being among hospital personnel: The role of family demands and psychosocial work environment. *International Archives of Occupational and Environmental Health*. 2004; 77(6):401–408. doi: 10.1007/s00420-004-0525-2. [PubMed: 15338225]
- Farooqi A, Gibson T. Prevalence of the major rheumatic disorders in the adult population of north Pakistan. *British Journal of Rheumatology*. 1998; 37(5):491–495. doi:10.1093/rheumatology/37.5.491. [PubMed: 9651074]
- Feldman DE, Shrier I, Rossignol M, Abenhaim L. Work is a risk factor for adolescent musculoskeletal pain. *Journal of Environmental and Occupational Medicine*. 2002; 44(10):956–961.
- Fredriksson K, Alfredsson L, Köster M, Thorbjörnsson CB, Toomingas A, Torgén M, Kilbom Å. Risk factors for neck and upper limb disorders: Results from 24 years of follow up. *Occupational and Environmental Medicine*. 1999; 56(1):59–67. [PubMed: 10341748]
- Geenen R, Jacobs JWG. Fibromyalgia: Diagnosis, pathogenesis, and treatment. *Current Opinion in Anesthesiology*. 2001; 14(5):533–539. doi:10.1097/00001503-200110000-00012. [PubMed: 17019142]
- Goldberg, D.; Williams, P. A user's guide to the General Health Questionnaire. Windsor: NFER-Nelson; 1988.
- Gongxia Y. Ergonomics of the home. *Impact of Science on Society*. 1992; 165:23–34.
- Gunnarsdottir HK, Rafnsdottir BH, Helgadóttir B, Tomasson K. Psychosocial risk factors for musculoskeletal symptoms among women working in geriatric care. *American Journal of Industrial Medicine*. 2003; 44(6):679–684. doi: 10.1002/ajim.10279. [PubMed: 14635245]
- Guo HR, Chang YC, Yeh WY, Chen CW, Guo YL. Prevalence of musculoskeletal disorder among workers in Taiwan: A nationwide study. *Journal of Occupational Health*. 2004; 46(1):26–36. doi: 10.1539/joh.46.26. [PubMed: 14960827]
- Quebec Health Survey and the Center for Health and Social Surveys of Quebec. Lifestyle and health questionnaire. 1998.
- Kaergaard A, Anderson JH. Musculoskeletal disorders of the neck and shoulders in female sewing machine operators: Prevalence, incidence, and prognosis. *Occupational and Environmental Medicine*. 2000; 57(8):528–535. doi: 10.1136/oem.57.8.528. [PubMed: 10896959]
- Laursen B, Sjøgaard K, Sjøgaard G. Biomechanical model predicting electromyographic activity in three shoulder muscles from 3D kinematics and external forces during cleaning work. *Clinical Biomechanics*. 2003; 18(4):287–295. doi:10.1016/S0268-0033(03)00004-4. [PubMed: 12689778]
- Linton SJ. A review of psychological risk factors in back and neck pain. *Spine*. 2000; 25(9):1148–1156. doi:10.1097/00007632-200005010-00017. [PubMed: 10788861]
- Malchaire JB, Roquelaure Y, Cock N, Piette A, Vergracht S, Chiron H. Musculoskeletal complaints, functional capacity, personality and psychosocial factors. *International Archives of Occupational*

- and Environmental Health. 2001; 74(8):549–557. doi: 10.1007/s004200100264. [PubMed: 11768043]
- Messing, K. Indoor cleaning services. In: International Labor Organization. , editor. Encyclopedia of Occupational Health and Safety. Vol. III. Geneva: ILO; 1998.
- Minh Hoa TT, Darmawan J, Shun Le C, Van Hung N, Thi Nhi C, Ngoc An T. Prevalence of the rheumatic disease in urban Vietnam: A WHO-ILAR COPCORD study. *The Journal of Rheumatology*. 2003; 30(10):2252–2256. [PubMed: 14528525]
- MOPH. National Household Health Expenditure and Utilization Survey 1999. Ministry of Public Health in Lebanon; 2001.
- Noor NM. The relationship between wives' estimates of time spent doing housework, support and wives' well-being. *Journal of Community and Applied Social Psychology*. 1997; 7(5):413–423.
- Palmer KT, Syddall H, Cooper C, Coggon D. Smoking and musculoskeletal disorders: Findings from a British national survey. *Annals of Rheumatic Diseases*. 2003; 62(1):33–36.
- Peltonen M, Lindroos AK, Torgerson JS. Musculoskeletal pain in the obese: A comparison with a general population and long-term changes after conventional and surgical obesity treatment. *Pain*. 2003; 104(3):549–557. doi:10.1016/S0304-3959(03)00091-5. [PubMed: 12927627]
- Picavet HSJ, Shouten JSAG. Musculoskeletal pain in the Netherlands: Prevalence, consequences, and risk groups, the DMC₃-study. *Pain*. 2003; 102(1-2):167–178. doi:10.1016/s0304-3959(02)00372-x. [PubMed: 12620608]
- Pountain G. Musculoskeletal pain in Omanis and the relationship to joint morbidity and body mass index. *British Journal of Rheumatology*. 1992; 31(2):81–85. [PubMed: 1737235]
- Réthelyi JM, Berghammer R, Itzész A, Szumska I, Purebl G, Csoboth C. Comorbidity of pain problems and depressive symptoms in young women: Results from cross-sectional survey among women aged 15-24 in Hungary. *European Journal of Pain*. 2004; 8(1):63–69. doi:10.1016/S1090-3801(03)00074-0. [PubMed: 14690676]
- Rigby AS. Statistical methods in epidemiology. III. The odds ratio as an approximation to the relative risk. *Disability and Rehabilitation*. 1999; 21(4):145–151. doi: 10.1080/096382899297756. [PubMed: 10390080]
- Sistrom CL, Garvan CW. Proportions, odds, and risk. *Radiology*. 2004; 230(1):12–19. doi: 10.1148/radiol.2301031028. [PubMed: 14695382]
- Tsuritani I, Honda R, Noborisaka Y, Ishida M, Ishizaki M, Yamada Y. Impact of obesity on musculoskeletal pain and difficulty of daily movements in Japanese middle-aged women. *Maturitas*. 2002; 42(1):23–30. doi:10.1016/S0378-5122(02)00025-7. [PubMed: 12020976]
- United Nations Population Fund. UNFPA country profile. Retrieved November 202003From <http://www.unfpa.org.lb/UNFPALebanon/profile.htm>
- Volinn E. The epidemiology of low back pain in the rest of the world: A review of surveys in low and middle-income countries. *Spine*. 1997; 22(15):1747–1754. doi: 10.1097/00007632-199708010-00013. [PubMed: 9259786]
- Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bulletin of the World Health Organization*. 2003; 81(9):646–656. [PubMed: 14710506]
- Yun MH, Yun GL, Hong JE, Sang HL. Results of a survey on the awareness and severity assessment of upper-limb work-related musculoskeletal disorders among female bank tellers in Korea. *International Journal of Industrial Ergonomics*. 2001; 27(5):347–357. doi:10.1016/S0169-8141(00)00062-7.

TABLE 1

Characteristics of the study population (currently married women aged 15-59 years), percentages of women reporting MSD and unadjusted odds ratios and 95% confidence intervals (CI) for MSD.

	N (%)	% Reporting MSD	Unadjusted OR (95% CI)	p-value
Age (years)				
15-29	322 (25.4)	9.6	1	
30-44	674 (53.2)	18.2	2.09 (1.38 to 3.19)	0.001
45-59	270 (21.3)	32.6	4.54 (2.89 to 7.11)	0.000
Weight (Kg)				
35-60	377 (29.8)	14.3	1	
61-75	506 (40.0)	20.2	1.51 (1.05 to 2.16)	0.025
76+	272 (21.5)	24.6	1.95 (1.31 to 2.91)	0.001
Education				
< Intermediate	815 (64.4)	22.2	1.81 (1.32 to 2.48)	0.000
Intermediate+	448 (35.4)	13.6	1	
Household monthly income in 1000 LP*				
< 300	238 (18.8)	21	1	
300-499	264 (20.9)	17	0.77 (0.49 to 1.21)	0.259
500-749	290 (22.9)	15.2	0.67 (0.43 to 1.05)	0.082
750	363 (28.7)	19.6	0.91 (0.61 to 1.37)	0.665
Tobacco smoking				
Yes	500 (39.5)	21	1	
No	766 (60.5)	17.9	0.82 (0.17 to 1.09)	0.169
Number of children				
0	82 (6.5)	8.5	1	
1-2	455 (35.9)	15.8	2.01 (0.89 to 4.55)	0.092
3-4	512 (40.4)	20.3	2.73 (1.22 to 6.10)	0.014
5+	217 (17.1)	27.2	4.00 (1.74 to 9.18)	0.001
Distress				
No	710 (56.1)	15.6	1	
Yes	551 (43.5)	23.8	1.68 (1.27 to 2.23)	0.000
Level of involvement in household tasks				
Low to medium	98 (7.7)	28.6	1	
High	1168 (92.3)	18.3	0.56 (0.35 to 0.89)	0.014

* 1500 LP are equivalent to 1 U.S. dollar.

TABLE 2

Factors associated with MSD by stepwise multiple regression

	Adjusted OR (95% CI)	p-value
Age (years)		
15-29	1	
30-44	1.82 (1.13 to 2.94)	0.014
45-60	3.61 (2.18 to 5.98)	0.000
Weight (Kg)		
35-60	1	
61-75	1.32 (0.91 to 1.91)	0.145
76+	1.55 (1.02 to 2.34)	0.040
Number of children		
0	1	
1-2	1.79 (0.77 to 4.16)	0.176
3-4	2.07 (0.89 to 4.79)	0.090
5+	2.71 (1.13 to 6.49)	0.025
Distress		
No	1	
Yes	1.47 (1.08 to 1.99)	0.013