|  |
| --- |
| Additional File, Table 1. Characteristics of Included Studies |
| Author, year, and (country of study) | Type of Study | Population | Demographics | % of women | Results stratified by gender | Type of Job Tasks specified | Confounders Adjusted | Description and measures Exposures | Description and Measures of outcome |
| Alzahrani 2019[1](England & Scotland) | Cross-sectional Study | Adults >/ 16 years. 32,087 women  | Mean age=45.7years,BMI, smoking status, education, ethnicity, employment status | Yes50% | No | Tidying, cleaning, scrubbing and gardening | Age, Sex, smoking status, ethnicity, BMI, education, occupation, employment status, other physical activities (exercise) | OR, Low (<3.8) versus high (>=12.1) domestic activity (MET h/week). Low versus high/**Work intensity** | Chronic back pain |
| Ahlgren, 2012[2](Sweden) | Cross-sectional Study | Working women in blue-collar (253) and white-collar jobs (262) | Mean age=40.7 years (white collar), 44.3 years (blue-collar), education, family situation, employment status and working hours | Yes | Yes | Cleaning, carrying children, coking, washing clothes, regular shopping, washing dishes | Age, smoking, number of children, employment hours, blue collar work | OR, High versus low Engagement in domestic chores and caring for children/ **Work frequency** | Three months prevalence of Self-reported low back disorders  |
| Fong, 2008[3] (Hong Kong) | Cross-sectional Study | 153 full time homemakers  | Mean age=41.7 years, marital status, education, years in household work, number of children | Yes, 100 | NA | Carrying children, washing clothes, washing dishes, shopping | Demographics, other daily recreational activities  | OR, Domestic activity (mean hours spent shopping& washing utensils)/ **Time** | 12-months prevalence of Self-perceived discomfort in the lower back  |
| Geere, 2018[4] (South Africa, Ghana and Vietnam)  | Cross-sectional Survey | 789 women  | Mean age= 29.7 years, type of water supply, general health functioning and disability  | Yes53.6 | No | Carrying water | Age and Sex | RR, History of water carriage (No history versus currently carries water)/**Biomechanical**  | Upper back pain |
| Habib, 2012[5] (Lebanon)  | Cross-sectional Study | 331 full time homemakers  | Age, education, household income, size, number of children, smoking status | Yes, 100 | NA | Cleaning, carrying children, cooking, shopping | Age, education, paid work, income, household size  | OR, working occasionally in Non-neutral versus Working all the time in Non-neutral postures (bending, kneeling and squatting) /**Biomechanical** | 12-months prevalence of low back pain |
| Habib, 2015[6] (Bangladesh) | Cross-sectional Study | 73 housewives  | Age=20-45 years, education, | Yes, 100 | NA | Cooking, washing dishes, sweeping, collecting /carrying water. | None | OR, Trunk Flexion >45 degrees for more than 2 hours total per day/**Biomechanical** | 12-months prevalence of low back pain |
| Hubscher, 2014[7] (Australia) | Cross-sectional Study | 486 twins (277 females), ages 18-65 years. | Age, sex, smoking history | Yes, 57 | No | Vigorous gardening or heavy work around the yard | Age, Sex and smoking history | **OR, Total time** spent in domestic PA dichotomized as (more than 2 hours, less than 2 hours) | 1-month prevalence of self-reported Low Back pain  |
| Josephson2003[8] (Sweden) | Case-Control Study | 320 cases with low back pain873 controls | Age, number of children, income, type of occupation, number of children | Yes, 100 | NA | Cleaning, carrying children, maintenance work, care of elderly parents | Psychosocial and physical factors of paid work, socio-demographic factors, and previous symptoms of LBP in the past three months | RR, Far too much and too little time on domestic work per day/**Time** | Clinically diagnosed low back pain |
| Rosano, 2004[9] (Italy) | Cross-sectional | 317 people, mean age=48.7 years, education, occupation | Sex, age, education | Yes, 96 | No | Making beds sewing cooking, cleaning, washing clothes/utensils, care giving, pet care | Age, education and occupation | OR, Self-reported frequency of domestic task per week/ **Frequency** | Self-reported low back pain |
| Malta(2017)[10]Brazil | Cross-sectional | 64,348 households | Age, education, race, residence, smoking, alcohol, BMI | No (can’t tell)  | Yes | Heavy physical work at home, time spent on heavy physical activity at home | Age and education | OR, heavy physical domestic activity (Yes or No), /**work intensity** | Self-reported chronic back pain |
| Ranasinghe (2016)[11]Sri Lanka | Cross-sectional | 1102 housewives | Age, marital status, number of children under-5, house ownership status,  | Yes, 100 | NA | Cooking, handwash clothes, ironing, sweeping, shopping, childcare, cleaning | Child <5, married more than 10years, family income, self-rated health, psychosocial factors, long term illness  | OR, working occasionally awkward versus working all the time in awkward postures/ **Biomechanical**  | Self-reported low back pain |

**Additional File, Table 2.** Risk of Bias and Overall Quality Rating using the New Castle Ottawa Scale

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Study design** | **Selection** | **Comparability** | **Exposure/outcome** | **Overall score** | **Quality** |
| Alzaharani 2019  | Cross-sectional | \*\*\*\* | \*\* | \*\* | 8 | High |
| Geere 2018  | Cross-sectional | \*\*\* | \*\* | \*\* | 7 | Moderate |
| Ahlgren 2012 | Cross-sectional | \*\*\*\* | \*\* | \*\* | 8 | High |
| Hubscher 2014  | Cross-sectional | \*\*\*\* | \*\* | \*\* | 8 | High |
| Habib 2015  | Cross-sectional | \*\*\* | None | \*\* | 5 | Low |
| Habib 2012  | Cross sectional | \*\*\*\* | \*\* | \*\* | 8 | High |
| Josephson 2003  | Case-Control | \*\*\* | \*\* | \*\* | 7 | Moderate |
| Fong 2008  | Cross-sectional | \*\* | \*\* | \*\* | 6 | Moderate |
| Rosano 2004  | Cross-sectional | \*\*\*\* | \* | \*\* | 7 | Moderate |
| Malta 2017  | Cross-sectional | \*\*\*\* | \*\* | \*\* | 8 | High |
| Ranasinghe 2016  | Cross-sectional | \*\*\*\* | \*\* | \*\* | 8 | High |

**Additional File, Table 3.**  Quantifying Heterogeneity Between Study Sub-Groups

|  |  |  |
| --- | --- | --- |
| **Sub-Groups** | **Q-Statistic** | ***p*-value** |
| Country Status | 11.16 | 0.0008 |
| Exposure Definition | 7.48 | 0.02 |
| Women-Specific Population | 0.54 | 0.46 |

**Additional File, Table 4.** Excluded Studies

|  |  |
| --- | --- |
| **Excluded Studies** | **Reason for Exclusion** |
| Apostoli et al. 2012[12]; Sanders and Morse, 2005[13]; Vincent and Hocking 2013[14] | Did not present means to calculate effect estimates |
| Backhausen et al. 2019[15]; Biglarian et al. 2012[16] | Only pregnant women |
| Mundt et al. 1993[17] | Included a sample of women comprising <50% of the total sample |
| Altinel et al. 2008[18]; Fazli et al. 2016[19]; Gupta and Nandini 2015[20]; Kalra and Bhatnagar 2017[21] | Defined exposures based on a women’s role but not the PDDW |
| Croft et al. 1999[22]; Takahashi et al. 2018[23]; Yip et al. 2004[24] | Focused on or included elderly women |
| Cavallari et al. 2016[25]; Cheung et al. 2006[26]; Krause et al. 2005[27] | Focused on paid housekeeping |
| Kopec et al. 2004[28]; Picavet and Schouten 2000[29] | Did not describe the types of domestic tasks |
| Cezar-Vaz et al. 2015[30]; Fernández et al. 2000[31] | Focused on other health outcomes |
| S. Mattioli et al. 2009[32]; Tang et al. 1999[33] | Focused on MSDs besides BP |

**Additional File, Figure 1.** Baujat Plot showing significant contribution to heterogeneity by Alzaharani 2019 (top-right corner)



**Additional File, Figure 2.** Forest Plot with each study’s contribution to heterogeneity, omitted one at a time.



**Additional File, Figure 3.** Forest plot showing sensitivity analysis of high-quality studies, investigating the association between physically demanding domestic work and back pain in women



**Additional File, Figure 4.** Funnel plot



**Additional File, Appendix**

**PubMed**

**Population:** Housekeepers [All Fields] OR ("housekeeping"[MeSH Terms] OR "housekeeping"[All Fields] OR "housework"[All Fields]) OR homecare [All Fields] OR "domestic"[All Fields]) OR housewives [All Fields]

**Outcome:**(Musculoskeletal[All Fields] AND ("injuries"[Subheading] OR "injuries"[All Fields] OR "wounds and injuries"[MeSH Terms] OR ("wounds"[All Fields] AND "injuries"[All Fields]) OR "wounds and injuries"[All Fields])) OR ("musculoskeletal diseases"[MeSH Terms] OR ("musculoskeletal"[All Fields] AND "diseases"[All Fields]) OR "musculoskeletal diseases"[All Fields] OR ("musculoskeletal"[All Fields] AND "disorders"[All Fields]) OR "musculoskeletal disorders"[All Fields]) OR ("occupational injuries"[MeSH Terms] OR ("occupational"[All Fields] AND "injuries"[All Fields]) OR "occupational injuries"[All Fields]) OR (("upper extremity"[MeSH Terms] OR ("upper"[All Fields] AND "extremity"[All Fields]) OR "upper extremity"[All Fields]) AND ("injuries"[Subheading] OR "injuries"[All Fields] OR (("lower extremity"[MeSH Terms] OR ("lower"[All Fields] AND "extremity"[All Fields]) OR "lower extremity"[All Fields]) AND ("injuries"[Subheading] OR "injuries"[All Fields] OR "pain"[All Fields]) OR ("back pain"[MeSH Terms] OR ("low"[All Fields] AND "back"[All Fields] AND "pain"[All Fields]) OR "low back pain"[All Fields])

**Exposure:**(("ergonomics"[MeSH Terms] OR "ergonomics"[All Fields] OR "ergonomic"[All Fields]) AND ("risk"[MeSH Terms] OR "risk"[All Fields])) OR (("physical examination"[MeSH Terms] OR ("physical"[All Fields] AND "examination"[All Fields]) OR "physical examination"[All Fields] OR "physical"[All Fields]) AND load[All Fields]) OR ("lifting"[MeSH Terms] OR "lifting"[All Fields]) OR ("lifting"[MeSH Terms] OR "lifting"[All Fields] OR "carrying"[All Fields]) OR (("manuals as topic"[MeSH Terms] OR ("manuals"[All Fields] AND "topic"[All Fields]) OR "manuals as topic"[All Fields] OR "manual"[All Fields]) AND task[All Fields]) OR (("physical examination"[MeSH Terms] OR ("physical"[All Fields] AND "examination"[All Fields]) OR "physical examination"[All Fields] OR "physical"[All Fields]) AND ("risk"[MeSH Terms] OR "risk"[All Fields])) OR ("posture"[MeSH Terms] OR "posture"[All Fields])

**Embase:**

('housewife'/exp OR housewife OR 'housekeeping'/exp OR housekeeping OR 'cleaning'/exp OR cleaning OR 'household'/exp OR household OR 'home care'/exp OR 'home care' OR 'caregiver burden'/exp OR 'caregiver burden') AND ('musculoskeletal disease'/exp OR 'musculoskeletal disease' OR 'musculoskeletal pain'/exp OR 'musculoskeletal pain' OR 'injury'/exp OR injury OR 'occupational disease'/exp OR 'occupational disease' OR 'ergonomics'/exp OR ergonomics OR 'physical load'/exp OR 'physical load' OR (physical AND ('load'/exp OR load)) OR 'weight bearing'/exp OR 'weight bearing' OR 'manual labor'/exp OR 'manual labor' OR 'biomechanics'/exp OR biomechanics OR 'load carrying capacity'/exp OR 'load carrying capacity') AND 'human'/de AND ('cohort analysis'/de OR 'cross-sectional study'/de OR 'longitudinal study'/de OR 'prospective study'/de OR 'questionnaire

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