International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

Protocol: Women, work and heat: a systematic review and meta-analysis of occupational heat exposure of women

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 June 2023 and was last updated on 12 June 2023.

INTRODUCTION

Review question / Objective There is minimal evidence of current levels of heat exposure for female workers and what the health impacts of this may be. Specific review questions include:
1. What environmental conditions are female workers exposed to?
2. What is the documented effect of heat on health in the occupational setting?
3. Is there evidence of a difference in exposure or health outcomes by gender?.

Rationale Global heating is recognized as one of the greatest health challenges of this century. Average global temperature for 2020 was 1.2°C above pre-industrial times. The heterogeneity of warming means that there is inequality in the distribution of climate change-related weather extremes including both temperature extremes (heatwaves) and variability (increasing day and night time temperatures), with tropical regions at higher risk than temperate. Those at increased risk of the health impacts of heat include those that perform manual labour (both indoor and outdoor). International trade, which comes with many benefits, results in goods, food, clothes and many more items being produced in tropical regions and exported. The health of workers in the tropics and the future impact of climate change on these individuals are important in this globalized setting. Women make up a significant percentage of this workforce and are often missing from physiology studies, intervention studies and policy setting. Yet climate change is and will continue to disproportionately affect women. Therefore, this review aims to determine the level of documented exposure, the health outcomes associated with occupational heat exposure and highlight ongoing knowledge gaps in this area.

Condition being studied Occupational heat strain in female workers.

METHODS

Search strategy A systematic search of PubMed and Medline databases were conducted on 21-May-2023. References of those studies included in the systematic review were manually examined for potential eligibility. The following search strategy was used:

PubMed

("heat stress"[Title/Abstract] OR "heat exposure"[Title/Abstract] OR "thermal stress"[Title/Abstract] OR "heat strain"[Title/Abstract] OR "hot condition*"[Title/Abstract] OR "hot temperature*"[Title/Abstract] OR "high temperature*"[Title/Abstract] OR "hot temperature"[MeSH])

AND

("female*"[Title/Abstract] OR "girl*"[Title/Abstract] OR "gender*"[Title/Abstract] OR "sex"[Title/Abstract] OR "sexes"[Title/Abstract] OR "women"[Title/Abstract] OR "woman"[Title/Abstract] OR "pregnan*"[Title/Abstract] OR "female"[MeSH] OR "women"[MeSH])

AND

("work*"[Title/Abstract] OR "labor*"[Title/Abstract] OR "labour*"[Title/Abstract] OR "employer*"[Title/Abstract] OR "occupation*"[Title/Abstract] OR "industr*"[Title/Abstract] OR "job"[Title/Abstract] OR "jobs"[Title/Abstract] OR "work"[MeSH] OR "labor"[MeSH])

AND

("core temperature*"[Title/Abstract] OR "rectal temperature*"[Title/Abstract] OR "gastrointestinal temperature*"[Title/Abstract] OR "esophageal temperature*"[Title/Abstract] OR "body temperature*"[Title/Abstract] OR "skin temperature*"[Title/Abstract] OR "heart rate*"[Title/Abstract] OR "blood flow*"[Title/Abstract] OR "heat shock*"[Title/Abstract] OR "urine specific gravity"[Title/Abstract] OR "hydration state"[Title/Abstract] OR "cardiovascular strain" [Title/Abstract] OR "health"[Title/Abstract] OR "physiology"[MeSH] OR "health"[MeSH])

Medline

(heat stress OR heat exposure OR thermal stress OR heat strain OR hot condition* OR hot temperature* OR high temperature*).ti,ab.

AND

(female* OR girl* OR gender* OR sex OR sexes OR women OR woman OR pregnant*).ti,ab.

AND

(work* OR labor* OR labour* OR employer* OR occupation* OR industr* OR job OR jobs).ti,ab.

AND

(core temperature* OR rectal temperature* OR gastrointestinal temperature* OR esophageal temperature* OR body temperature* OR skin temperature* OR heart rate* OR blood flow* OR heat shock* OR urine specific gravity OR hydration state OR cardiovascular strain OR health).ti,ab.

Duplicates were removed and then Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines were followed. Two independent reviewers screened and extracted data from the eligible studies, with disagreements being solved by consensus or by discussion with an independent author.

Participant or population Female workers with no age restriction.

Intervention This systematic review is not specifically focused on interventions. However, if studies do include interventions, we will take the details of both control and intervention health outcomes to help estimate future impacts with and without adaptation.

Comparator None.

Study designs to be included Original studies of occupational heat exposure by gender will be included. These may be observational, interventional or quasi-experimental designed studies.

Eligibility criteria Inclusion criteria: 1) Studies documenting detailed occupational heat exposure by gender will be included. 2) Studies documenting physiological evidence of heat strain and/or surveys of symptoms related to heat illness by gender will be included. 3) Full journal articles only. 4) English language restriction. Exclusion criteria: 1) Modelling studies. 2) Studies without gender breakdown of exposure or health outcome, or only male participants. 3) Non-human studies. 4) Heat studies not related to occupational heat exposure.

Information sources A comprehensive literature search was carried out in PubMed and Medline databases. References from papers selected for inclusion were also searched.

Main outcome(s) The main outcome of interest is development of heat strain (defined by physiological parameters or through heat illness symptoms).

Additional outcome(s) Secondary outcomes include renal disease, long-term health outcomes linked to occupational heat exposure and mental health impacts of occupational heat exposure.

Data management Database searches were conducted by one author (LGI) and titles and abstracts screened for eligibility by two

independent reviewers (LGI, AB). Any disagreement will be resolved by consensus or by a third researcher. Data extraction will be undertaken onto a bespoke extraction form to include details on study population, setting, demographics, occupational setting, outcome measures and all results relevant to the review questions.

Quality assessment / Risk of bias analysis Methodological quality of the included studies will be assessed by two independent reviewers based on relevant critical appraisal checklists (e.g. STROBE checklist for observational studies). Studies will be categorized as high (75% consensus with checklist), moderate (50-74% consensus), or low (<50% consensus) quality.

Strategy of data synthesis Data from all included studies will be extracted into a database. Summary statistics for each study will be presented. Where available, effect estimates will be mapped and presented by geographical region/country. Where there is similarity of methodology a meta-analysis with weighted estimates of effect will be conducted and presented.

Subgroup analysis Female versus male (if possible). Outdoor versus indoor workers (if possible).

Sensitivity analysis: Not applicable.

Language restriction English.

Country(ies) involved Gambia and Greece.

Keywords heat stress, heat, occupational heat, female, women, worker, work.

Contributions of each author

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