

# Risk of Musculoskeletal Disorders from Concrete Formwork Construction

## Identification and Assessment of Musculoskeletal Disorders (MSDs) Risk for Concrete Formwork Systems

*John Gambatese and Ziyu Jin. CPWR Small Study, 2021.*

### Overview

Work-related musculoskeletal disorders (MSDs) account for more than half of all the injuries and illnesses in the construction industry. Concrete formwork construction is recognized as one of the tasks in which workers have a high risk of developing work-related MSDs, and previous research has focused on the use of conventional job-built formwork. Given the growing use of prefabricated/engineered (including modular) formwork systems, this study investigated the differences in work tasks and activities for different types of formwork systems, assessed work-related MSD risks associated with different types of formwork systems, and determined the prevalence and nature of MSDs in concrete formwork construction. A mixed-methods research approach was adopted that included surveys of form workers, site observations, and worker posture evaluations using the Rapid Entire Body Assessment (REBA) method.

#### For more information, contact:

John Gambatese: [John.Gambatese@oregonstate.edu](mailto:John.Gambatese@oregonstate.edu)

#### Read the report:

<https://bit.ly/3GMRxdb>

©2021, CPWR-The Center for Construction Research and Training. All rights reserved. CPWR is the research and training arm of NABTU. Production of this document was supported by cooperative agreement OH 009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

### Key Findings

- A high prevalence of work-related musculoskeletal disorders (MSD) symptoms exists among form workers regardless of the types of formwork systems they use.
- Most formwork tasks impose medium to high MSD risk on workers, particularly in the lower back, upper back, neck, and shoulder.
- Form workers rated repetition, awkward working postures, and use of force as the three factors contributing the most to the development of work-related MSD-related symptoms.
- The work tasks and activities for conventional job-built and prefabricated/engineered (including modular) formwork systems are similar; however, prefabricated/engineered formwork requires less work or effort during many tasks and may create less ergonomic exposure because modular forms are pre-assembled and relatively lightweight.
- The study's suggestions for work-related MSD prevention and improvements associated with form construction include four levels of control: (1) substitution—for example, using modular formwork systems, (2) engineering improvements—for example, using lift assists and/or lifting devices (e.g., forklifts, hoists, cranes), (3) administrative controls—for example, rotating form workers through several different tasks during a shift, and (4) work practice modifications—for example, using a two-person lift team when handling components that are heavier than 51 pounds).



THE CENTER FOR CONSTRUCTION  
RESEARCH AND TRAINING

[WWW.CPWR.COM](http://WWW.CPWR.COM)