

ORIGINAL RESEARCH

# Pay Matters: The Piece Rate and Health in the Developing World



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## Abstract

**BACKGROUND** Piece rate pay remains a common form of compensation in developing-world industries. While the piece rate may boost productivity, it has been shown to have unintended consequences for occupational safety and health, including increased accident and injury risk.

**OBJECTIVES** This paper explores the relationship between worker pay and physical and emotional health, and questions the modern day business case for piece rate pay in the developing world.

**METHODS** The relationship between piece rate and self-reported measures of physical and emotional health is estimated using a large survey of garment workers in 109 Vietnamese factories between 2010 and 2014. A random effects logit model controls for factory and year, predicting worker health as a function of pay type, demographics, and factory characteristics.

**FINDINGS** Workers paid by the piece report worse physical and emotional health than workers paid by the hour (OR = 1.38-1.81). Wage incentives provide the most consistently significant evidence of all demographic and factory-level variables, including the factory's own performance on occupational safety and health compliance measures.

**CONCLUSIONS** These results highlight the importance of how workers are paid to understanding the variability in worker health outcomes. More research is needed to better understand the business case supporting the continued use of piece rate pay in the developing world.

**KEY WORDS** emotional health, occupational health, performance pay, physical health, piece rate, wages  
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“Workmen...when they are liberally paid by the piece, are very apt to overwork themselves, and to ruin their health and constitution in a few years.” (Adam Smith, 1776).<sup>1</sup>

## INTRODUCTION

Performance-based pay systems such as the piece rate are frequently used to encourage workers to be more productive on the job. Piece rate pay rewards speed and intensity at the expense of health-promoting behaviors such as machine safety

maintenance, work breaks, and medical visits.<sup>2</sup> It has been associated with increased job injury and accident risks,<sup>3</sup> and negative effects on worker physical and emotional well-being.<sup>4-9</sup>

Modern manufacturing in the developed world has gradually moved away from the piece rate. In the US manufacturing industry, piece rate pay has gone from being the dominant form of compensation a century ago to less than 5% in 2003.<sup>10</sup> Despite being on the decline in comparatively wealthy countries, the piece rate is still common among low-wage industries in the developing world. It

continues to represent an important pay mechanism in industries where output is easily measurable, such as agriculture (by the bushel) or apparel (by the garment). The presence of exploitative wages further complicates the role of the piece rate in the developing world, since the piece rate incentive may be needed to balance out the loss of intrinsic motivation to work for extremely low wages.<sup>11</sup> For this reason, the ill effects of piece rate pay and worker health outcomes remain a relevant and timely question for much of the world's lowest-paid workers.

This paper explores the relationship between piece rate and a range of self-reported physical and emotional health symptoms among a large cohort of garment workers across 109 factories in Vietnam between 2010 and 2014. This work represents an important contribution to the literature, adding to the small but convincing body of evidence highlighting the negative health effects of piece rate pay. This paper further explores the policy implications of piece rate pay in the developing world, and suggests important areas of future research.

**Vietnamese Apparel.** The apparel industry represents the largest formal business sector in Vietnam, employing over 2.5 million people. Vietnam is also a sizeable player in the global apparel market, with exports valued at over \$17 billion per year (15% of the country's total exports); Vietnam is the fifth largest supplier of apparel worldwide, and the second largest supplier to the US market.<sup>12</sup> In regard to the health of the Vietnamese workforce, workers and employers pay into a series of mandatory nationalized insurance programs, including health, social, and unemployment. Health insurance coverage is mandated for workers in the formal sector and paid for through payroll deductions that represent a percentage of worker salary.<sup>13</sup> Under the labor code, employers are responsible for providing worker compensation for injuries and illnesses suffered by their employees on the job, including medical treatment and paid leave during recovery. Employers are also required to provide routine medical treatment and care to all employees on an annual basis.<sup>14</sup>

In response to growing international concern over working conditions in the global apparel sector, a program known as Better Work was founded in 2007 as a joint initiative of the International Finance Corporation and the International Labour Organization. Better Work provides monitoring and assistance on compliance with international and national labor laws in participating countries, and has been operating in Vietnam since 2009. As part of their effort to improve working conditions in the

global apparel industry, Better Work publicly reports factory-level compliance statistics with national and international labor laws on an annual or bi-annual basis for those factories participating in the program.

## MATERIALS AND METHODS

A list of the relevant questions from these Better Work worker surveys is provided in [Supplementary Table 1](#). The collected data include information on worker demographic characteristics, factory operations, and worker compensation, which is further broken down by production quota and piece rate pay. The survey protocol for collecting these data was approved by the Tufts University Institutional Review Board.

More specifically, workers at 109 factories were surveyed between 2010 and 2014, with a target sample of 30 workers per factory per year. However, not all factories were available during all years, resulting in an unbalanced panel of data across factories. Despite the original intent of the study design to resurvey the same workers every year, turnover was a major challenge and it is unclear from the available data whether a worker represents a repeated observation.

As noted previously, Better Work monitors and reports working conditions in the participating apparel factories. More specifically, they assess compliance with eight broad 'compliance clusters,' one of which is occupational safety and health (OSH).<sup>12</sup> The OSH cluster is further broken down into a series of 'compliance points,' each dealing with a separate OSH-related concern in the factories. Compliance (or non-compliance) with any of these OSH points are determined by a series of onsite checks conducted by Better Work staff. The checklist of questions related to OSH in the sub-set of factories with matching worker survey data is provided in [Supplementary Table 2](#). These factory-level compliance data were matched by year and factory to the worker surveys to assess the extent to which compliance with national and international labor laws at the factory level impact self-reported health outcomes at the worker level. Various specifications of this relationship were tested, including performance on the individual compliance points, such as ergonomic stressors and the availability of worker protective equipment, as well as based on a composite index of average non-compliance across all the checklist questions.

**Analytical Approach.** A logit model was used to predict worker physical and emotional health

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