



The Impact of Wages and Turnover on Security and Safety in Airports: A REVIEW OF THE LITERATURE

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Introduction

This literature review was undertaken at the request of the San Francisco Airport Commission to aid in the evaluation of a proposal to increase wages for those covered under the airport's Quality Standards Program (QSP). The QSP mandated higher minimum compensation and training standards for airport workers whose jobs impact safety and security. Workers covered by the QSP include screeners, skycaps, baggage handlers, fuelers, customer services agents, airline cleaners and catering workers and other workers with access to secure areas of the airport.

Wages increased for thousands of employees by an average of 22 percent when the policy was implemented in early 2000. A 2003 study by the UC Berkeley Institute of Industrial Relations (now the Institute for Research on Labor and Employment) found that turnover fell by an average of 34 percent and worker performance improved along a range of metrics. Since then, the cost of living in the Bay Area has risen sharply, and the minimum wage in San Francisco has been increased to the point that it is on track to surpass the QSP minimum wage by July, 2018. If no further action is taken, turnover rates at SFO can be expected to increase as a result.¹

This paper summarizes the literature on the dynamics of wages, turnover, and performance, and how increased wages and lower turnover effect security and public safety outcomes at airports. The first section lays out the empirical evidence of a connection between higher wages and lower turnover in general, followed by specific examples of wages affecting turnover in the aviation industry. The next section draws on the literature examining the effects of higher wages on improved employee performance, again examining evidence from across industries and then focusing on aviation. The final section describes how higher wages, lower turnover, and better job performance lead to improved security and public safety. This section provides evidence from the aviation industry as well as other fields with related public safety and security concerns, including trucking and transportation, food safety, and nursing and nursing home care.

Overall, the evidence indicates that higher wages leads to reduced turnover and better performance by employees, which in turn leads to a safer and more secure environment for both airport employees and the public.

¹ Facing higher turnover, some of the ground handling contractors at SFO began raising wages in 2017 under the understanding that a policy change would be forthcoming.

Wages and Turnover

General

There is an extensive body of research that establishes a correlation between higher wages and lower turnover across industries. Reich et al. (2016) summarize much of this literature in their study on minimum wage increases in New York State. Cotton and Tuttle (1986) performed a meta-analysis of turnover studies, finding that higher pay and lower turnover are significantly correlated. Dube, Naidu, and Reich (2007) find that after San Francisco raised the minimum wage by 26 percent in 2003, the restaurant industry saw decreased turnover and an increase in worker tenure. Dube, Lester, and Reich (2016) use national data and find that for a 10 percent increase in the minimum wage, turnover rates decline 2.2 percent for teens and 2.1 percent for restaurant workers. Estimations of cost savings generated from decreased turnover can be found in several studies as well (Boushey and Glynn 2012; Fairris 2005; Hirsch, Kaufman, and Zelenska 2015; Pollin and Wicks-Lim 2016; Jacobs and Graham-Squire 2010).

Some studies consider the effect of larger wage increases in the form of mandated living wage increases. These policies set minimum compensation conditions on firms doing business with public entities. Fairris (2005) finds that when Los Angeles implemented its living wage ordinance, the businesses subject to the ordinance had turnover rates 35 percent lower than the businesses not subject to the ordinance. Similarly, Howes (2005) finds an increase in In Home Supportive Service (IHSS) worker retention after San Francisco adopted a living wage policy. Turnover of IHSS workers fell 17 percent following a wage increase of 13 percent in 2000. Howes (2014) examined IHSS retention rates in the subsequent years during which time San Francisco first implemented a local minimum wage law. Controlling for the unemployment rate and worker and client characteristics, Howes found that the retention rate for IHSS workers was affected by the relative difference between the IHSS wage and the lowest 10th percentile of all wages.

Wages and Turnover in Airports

Reich, Hall, and Jacobs (2003) conducted the first impact assessment of the wage increase mandated by the Quality Standards Program on labor conditions and security performance at the San Francisco International Airport (SFO). The Quality Standards Program (QSP) was established in 2000 with the goal of improving airport safety and security. Specifically, the QSP mandated higher wages and established uniform recruitment and training standards (e.g., increasing security training requirements for screeners from eight hours to forty hours). The QSP wage and training mandates applied to workers at SFO performing services that impact airport safety and security. The Reich, Hall, and Jacobs study relied on interviews with and surveys of airport employers and employees, as well as security badge data and FAA security data.

The QSP initially covered 8,300 ground-based non-management workers at SFO working for airlines or airline service contractors. These included customer service employees, ramp agents, cabin cleaning workers, fuelers and security screeners. The average increase in pay for workers was 22 percent. Entry-level wages rose 33 percent for workers covered by the QSP compared to 10 percent for non-QSP workers. Security screeners' wages rose from \$13,400 on average to \$20,800 per year on average after QSP.

After the QSP was implemented, turnover fell by an average of 34 percent overall and by 60 percent, from an average of 50 percent a year to 20 percent, in firms where total wage costs increased 10 percent or more. The authors note that "larger increases in wages are clearly associated with greater reductions in turnover." For example, after entry-level screeners received a 69 percent wage increase, their turnover declined by 80 percent, while entry-level ramp workers, whose wages increased by 27 percent, experienced a 25 percent reduction in turnover.

Productivity and Performance

Beyond exploring the relationship between wages and turnover, many studies consider the effects wages and turnover have on worker productivity and performance.

In Reich, Hall, and Jacobs's study of the impact of the QSP at SFO, employees and employers alike reported improved job performance as a result of the increase in wages. Workers felt that more skills were required of them, that they worked harder at their jobs, and that the pace of work had increased. Employers reported improvements in work performance (35%), morale (47%) and customer service (45%). They also reported reductions in absenteeism (29%), fewer disciplinary issues (44%) and problems with equipment maintenance (29%). Some employers noted they had increased skill requirements and had stricter hiring policies. Lower turnover and increased performance helped to defray the increased labor costs at the affected firms.

There are studies of better job performance due to higher wages in other industries as well. Howes (2014) notes that high turnover among home care workers likely leads to a lower quality of care for elderly patients. Another study (Mas 2006) compares the performance of police officers who received raises after a union negotiation process and those who did not. Mas finds that not just higher wages, but whether wages are perceived as fair by the worker relative to a reference point or expected wage value, affected productivity. Those officers who had more successful collective bargaining experiences performed better, while those who did not maintained the same level of performance.

Hirsch, Kauffman, and Zelenska (2015) examine the employment effects of an increase in the minimum wage in fast food restaurants in Georgia and Alabama. Rather than finding lower rates of employment, as conventional economic theory would suggest, they find that businesses offset the costs of increased wages through various "channels of adjustment." These channels included reduced turnover, increased job performance standards, morale, and customer service – all of which provide cost savings to businesses.

Wolfers and Zilinsky (2015) provide a comprehensive summary of studies that link higher wages to higher productivity and cost savings. The studies reviewed collectively find that higher wages reduce turnover and related costs, motivate employees to work harder, attract more productive workers, reduce disciplinary problems and absenteeism, and allow firms to put fewer resources towards employee monitoring. Other studies reviewed by Wolfers and Zilinsky find that worker performance is negatively affected by the stress of income insecurity.

Finally, David Levine's work provides evidence for the idea of efficiency wages: when wages are higher, workers are less likely to quit, are willing to work harder, and are more committed to the firm, and these effects often pay for the wage increase by reducing costs related to turnover and absenteeism (Levine 1991; Levine 1992). This suggests that raising wages above the market price may be beneficial because workers will value that job for its relatively high wage, and will therefore work harder to retain that position and be less likely to voluntarily quit. Maintaining high-performing employees is important for any industry, but may be especially important in the aviation industry, where staff performance impacts not just customer service but also operations, safety, and security for all customers and staff.

Security and Public Safety

There is some general agreement that worker safety and job performance are impacted by wages and rates of turnover (see Rinefort and Van Fleet 1998; Shannon, Mayr, and Haines 1997). There is also growing evidence from across several industries that *public* safety and security are impacted by wages and turnover. This is especially relevant for airports and aviation, as worker performance impacts in security operations, ramp work, and other airport operations directly or indirectly affects passenger and crew safety—both on the ground and in the air.

Other industries with significant public safety and security concerns include: trucking and transportation; nursing and nursing homes; food safety and HAACP (hazard analysis and critical control point) implementation; private security firms; and mining. Below is a discussion of the literature examining the relationship between wages, turnover, and public safety in each of these industries.

Airports and Aviation Safety

Airport employees provide an important line of defense against aviation-based terrorism, but also against incidences such as in-flight emergencies, crashes, and runway collisions. The set of employees responsible for airport security and safety includes not only security screeners, but also positions such as ground handling and ramp operations, skycaps, food handlers, and a number of other positions that come in regular contact with security check points, passengers, and equipment.

High turnover in the aviation industry has long been troubling to industry experts. In 2000, the GAO released a report, "Long Standing Problems Impair Airport Screeners' Performance," that examines the causes of chronically poor performance by airport screeners on screening tests, and discusses FAA efforts to improve performance. The GAO specifies high turnover rates in the industry—which at the time generally ranged from 100 percent to as high as 400 percent per year—as one of the two main causes of impaired screener performance, due to the fact that rapid turnover results in "few experienced personnel at checkpoints." In its report, the GAO cites low wages, few benefits and high job stress, as major contributing factors to these high turnover rates.

In the area of Airport safety, a 2007 report by GAO examines aviation runway and ramp safety procedures, in part as a response to the consistently high incursion rates that peaked in 2001 and remained constant from 2002 to 2006. Incursions are when aircraft enter the runway without permission. Drawing on an aviation industry report from 2004 and interviews with industry experts and officials, the 2007 report points to low wages and high turnover for ramp and fuel workers as major factors in ramp accidents.

In their 2003 study of the effects of implementing a living wage at SFO, Reich, Hall, and Jacobs find that employees and employers alike observed better worker performance as a result of higher wages, including areas that affect safety and security. This includes fewer issues with absenteeism, fewer disciplinary issues, and fewer problems with equipment maintenance. In 2001, only 2 percent of new hires failed training, compared to 13 percent prior to the mandated wage increase under the QSP.

The authors also find direct empirical evidence of the negative impacts of turnover on aviation security performance. The number of detected security breaches was found to fall by 0.62 percent for every percentage point increase in security screener turnover. The authors conclude, "In general, the longer the airports are able to retain pre-board screeners, the more likely they are to detect security breaches." This study found a strong link between higher wages and lower turnover rates of security screeners, which in turn led to improved security.

The Port of Seattle (2014) conducted a six-month study of safety and security at the Seattle-Tacoma International Airport; their report provides additional evidence of interconnections between wages, turnover, and security at airports. The study included a survey of airport workers who are responsible for security and safety, testimony from stakeholders, and analyses of the wage, benefit, and turnover rates at the airport. Much like at SFO, the list of positions Sea-Tac considers to be related to safety and security included passenger and facility security; passenger check-in activities; checkpoints screening; skycap and baggage handling; perimeter control; wheelchair attendant services; baggage and cargo handling; and ground support and equipment maintenance.

At Sea-Tac, turnover was found to vary by employer, and rates ranged from 25 percent to 80 percent per year. The study cites pay as one of the most important factors in the high turnover, with employees switching among contractor positions at the airport for as little as 50-cent raises. In addition, most of the turnover was found to occur at the entry level, meaning workers were not staying long enough to achieve "mastery" in their jobs, with deleterious effects on safety, security, and efficiency. The report also finds that newer workers are much more likely to receive citations for security violations; from 2010-2014, there were 12.7 violations out every 1,000 new workers, compared to 7.1 violations out of 1,000 workers with a tenure of one year or longer. And, while only 14 percent of workers with security badges were new hires in a given year, 24 percent of violations cited that year were new workers. Through interviews with employers and workers, the memorandum finds that the main drivers of turnover were job-quality, including low-wages and benefits, and the lack of career advancement opportunities.

Skorupski and Uchroński (2015) provide additional evidence of the importance of experience and lower turnover to job performance of security screeners. Their study of security screeners at a Polish airport found that on-the-job experience was one of the most important variables for predicting effective screening. They found that longer job tenure resulted in fewer errors and better job performance, defined as fewer objects missed during security screening. Similarly, a South Korea study of the obstacles to effective security screening found both screeners and managers pointing to the lack of work experience for screeners, as caused by high turnover, to be a paramount factor (Yoo and Choi 2006). Screeners and security planners surveyed for this study also cited low wages as a reason for less effective screening.

In addition to these studies, multiple articles in airport and air services trade industry publications emphasize a connection between wages, worker turnover, and safety and security. These publications include *Ground Support Worldwide*, *Airport Business Magazine*, *Airport Security Report*, and *Aviation Week & Space Technology*. In general, most magazines focus on the connection between worker safety and public safety. For example, an article in *Airport Business Magazine* discussing the importance of ramp safety cited a 2004 Airport Operations Safety Panel report that said "ill-trained and poorly paid workers [are a] potentially lethal hazard with enormously expensive consequences" (Kortokrax and Charboneau 2008). The article links wages and turnover with safety, explaining that "low salaries fail to attract experienced workers and contribute to high turnover."

A recent "editor's note" in *Ground Support Worldwide* considers whether pay and productivity are linked in the aviation industry. The author concludes his brief article by tying together the themes of wages, turnover, and safety and productivity:

Simply put, an increase in wage could reduce employee turnover. As a result, more satisfied workers may be more inclined to stay in a position for a longer period of time, gather valuable on-the-job experience and impart their years of knowledge on new employees. Moreover, employees with years of experience may be less prone to mistakes

and accidents, helping create safer working conditions. Safer working conditions could mean quicker turnarounds on the ramp and more productivity (Smith 2016).

Other publications, Richards (2006) and Johnson (2011) discuss training and turnover among airport ground workers, and make the point that all employees, including ramp workers and others, are responsible for overall safety and security. *Air Safety Week* (2000) and Romeo (2004) discuss the difficulties that high turnover causes in maintaining better-trained staff, while Davidson (2006) explains the negative impacts of low wages and high turnover on job performance. These and the above examples, along with many other articles from industry magazines, show that the industry well recognizes the connection between wages, turnover, and safety and security at airports.

Trucking and Transportation

One of the more robust areas of study of the correlation between wages, turnover, and public safety is in the trucking and transportation industry. Trucking, like aviation, impacts not just worker safety, but also public safety, as it relates to other motorists and travelers. Issues with turnover and crashes peaked after deregulation in 1980s, leading to an expanded interest in studying turnover rates as well as the factors affecting safety (Corsi and Fanara 1988).

Rodríguez, Targa, and Belzer (2005) studied crash rates for drivers employed by a specific firm before and after a change in compensation policies. Looking at drivers who remained employed at that firm before and after the pay increase, the study found the probability of being involved in a crash fell with the increase in pay (Rodríguez, Targa, and Belzer 2005). This same study also found that higher wages resulted in lower turnover probability in a company with a 105 percent turnover rate at the beginning of the study. There was a significant impact of lower turnover on crash rates only when the firm retained older drivers with more experience. They could not establish a precise causal chain, but suggested that the pay increase may have led to more careful driving out of a greater desire to retain employment. However, others have shown a direct correlation between driver turnover and the likelihood of crash involvement (Corsi and Fanara 1988; Cantor et al. 2010). A study by Rodríguez, Rocha, Khattak, and Belzer (2003) found that factors including pay and tenure are strong predictors of crash frequency. In their model, higher pay rates and pay raises correlated with a higher likelihood of zero-crash counts and lower crash frequency.

Food Safety

Turnover is also of concern to public health and safety in the food industry. Specifically, there is some literature that examines the implementation of the Hazard Analysis Critical Control Point (HACCP) method to food safe handling, which is "a systematic approach to the identification, evaluation and control of hazards (whether biological, physical or chemical) in a particular food operation." (Panisello and Quantick, 2001).

The goal of HACCP is to prevent finished food products from being unsafe or presenting foodborne hazards and illness; HACCP is applied across the industry from food processing to catering to retail. Several articles point to widespread high turnover in the food service industry as one of several obstacles to successfully training employees to implement the HACCP system (Panisello and Quantick, 2001; Forsythe and Hayes 2000; McSwane and Linton 2000).

Nursing and Nursing Homes

In clinical settings and nursing homes, turnover among nurses and other caregiving staff is shown to affect the cost efficiency as well as the quality of care and health outcomes of patients.

A study by Castle and Engberg (2005) finds the average one-year turnover rate for nursing staff in nursing home settings is 55.4 percent for registered nurses (RNs), and 85.8 percent for nursing assistants (NAs) and licensed practical nurses (LPNs). The authors define "high turnover" to be above 50 percent. The study finds that for RNs, there is a negative relationship between turnover and quality indicators, and that quality continuously decreases with increases in turnover up to 50%, after which the effects do not appear statistically significant, although quality still appears to decrease at this higher level. Meanwhile, turnover of NA and LPN positions above 50 percent, but not necessarily below 50 percent, are associated with lower quality.

Nursing home patients have high rates of infection that can lead to hospitalization and even death. Zimmerman, Gruber-Baldini, Hebel, Sloane, and Magaziner (2002) find that higher RN turnover leads to higher rates of infection and hospitalization: for every loss of an RN at full-time employment per 100 beds, risk of infection increased 30 percent and risk of hospitalization increased 80 percent. The authors theorize that the relationship between turnover and infection could be related to lack of consistency in training and supervision, or due to the lack of established patient-caregiver relationships that make detection of infection more difficult.

Another study considers the impact of nursing unit turnover on the processes of the workgroup, and the impacts of workgroup processes on patient outcomes (Bae, Mark, and Fried 2010). The authors find that that units with higher turnover experience lower group learning and effectiveness, which in turn impacts patient satisfaction as well as the number of medication errors made by the nursing unit.

Nursing turnover has also been found to affect cost and efficiency. A 1994 study of 333 hospitals finds a positive correlation between turnover and hospital inefficiency (cost inefficiency) for RNs (Alexander, Bloom, and Nuchols 1994). In their discussion, the authors note that turnover has an important effect on productivity, and that as such, managing human resources and preventing problematic levels of turnover should be considered an important part of managing cost efficiency.

Conclusion

The literature covered in this review suggests that higher wages leads to lower turnover, which in turn leads to better safety and security performance among airport workers. At SFO, positive outcomes in lowering turnover and improving security practices were found to be correlated with the QSP, which raised wages for the express purpose of improving turnover and performance across airport employees and contractors. Beyond SFO, raising wages has been shown empirically to decrease turnover and increase performance. A number of studies from across industries, from aviation to transportation, have shown that lower turnover, and the more experienced and better trained workforce that results from it, is correlated with more effective safety and security performance. This is corroborated by observations of aviation industry professionals as discussed in trade publications. In order to maintain the high levels of safety and security at SFO, the San Francisco Airport Commission is committed to advancing wages that will ensure the maintenance of an experienced, well-trained, and high-performing workforce.

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San Francisco International Airport

San Francisco International Airport (SFO), United's principal gateway to the Pacific, is a world-class airport. Serving over 53 million domestic and international passengers in 2016, SFO is among the 10 largest airports in the U.S. and one of the world's 25 busiest airports. SFO is also the largest airport in the Bay Area and the second busiest in California. SFO has received local, national, and global recognition for its achievements. The SkyTrax Passengers' Choice Awards for 2015 named SFO the top airport in North America for customer service.

The analyses, interpretations, conclusions, and views expressed in this report are those of the author and do not necessarily represent the UC Berkeley Center for Labor Research and Education, the Regents of the University of California, the San Francisco International Airport, or collaborating organizations or funders.