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Association of Paid Sick Leave Laws on Foodborne Illness Rates

Charleen Hsuan, JD, PhD¹, Suzanne Ryan-Ibarra, MS, MPH², Kat DeBurgh, MPH³, and Dawn M Jacobson, MD, MPH²

¹Department of Health Policy and Administration, College of Health and Human Development, Pennsylvania State University, University Park, Pennsylvania

²Public Health Institute, Oakland, California, Sacramento, California

³Health Officers Association of California, Sacramento, California

Abstract

Introduction—Previous studies suggest an association between paid sick leave (PSL) and better population health, including fewer infectious disease outbreaks and nosocomial gastrointestinal disease. Yet few studies examine whether laws requiring employers to offer PSL demonstrate a similar association. This mixed-methods study examined whether laws requiring employers to provide PSL are associated with decreased foodborne illness rates, particularly laws that are more supportive of employees taking leave.

Methods—The four earliest PSL laws were classified by whether they were more or less supportive of employees taking leave. Jurisdictions with PSL were matched to comparison jurisdictions by population size and density. Using difference-in-differences, monthly foodborne illness rates (2000–2014) in implementation and comparison jurisdictions before and after the laws were effective were compared, stratifying by how supportive the laws were of employees taking leave, and then by disease. The empirical analysis was conducted from 2015–2017.

Results—Foodborne illness rates declined after implementation of the PSL law in jurisdictions with laws more supportive of employees taking leave, but increased in jurisdictions with laws that are less supportive. In adjusted analyses, PSL laws that were more supportive of employees taking sick leave were associated with an adjusted 22% decrease in foodborne illness rates ($p=0.005$). These results are driven by campylobacteriosis.

Conclusions—Although the results suggest an association between more supportive PSL laws and decreased foodborne illness rates, they should be interpreted cautiously because the trend is driven by campylobacteriosis, which has low person-to-person transmission.

Address correspondence to: Charleen Hsuan, JD, PhD, Department of Health Policy and Administration, College of Health and Human Development, Pennsylvania State University, 604 Ford Building, University Park PA 16802. charhsuan@gmail.com.

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INTRODUCTION

Working adults with paid sick leave (PSL) are more likely to access preventive care, such as influenza vaccinations¹ and cancer screenings,^{2,3} and are less likely to work while sick or injured.^{4,5} Thus, having PSL has been associated with decreased nosocomial respiratory and gastrointestinal disease outbreaks.⁶ Despite this association, 39% of civilian employees in the U.S. do not receive PSL.^{7,8} Access to such leave varies by job, industry, firm size, and average wages; 53% to 83% of civilian employees working for small employers (1–99 workers), versus large (≥ 500), have access to PSL, and 46% and 89% of service workers versus management, business, and financial workers.⁶ Access to PSL is particularly low for low-income workers; only 25% of part-time employees and 21% of employees making the lowest 10% of wages for their occupation have PSL, whereas 90% of employees making the highest 10% do.⁸

In 2006, San Francisco passed the nation's first mandatory PSL law, requiring employers to provide employees with PSL.⁹ Since then, a growing number of jurisdictions have passed their own laws, including Arizona, Connecticut, California, Massachusetts, Oregon, Vermont, and Washington.¹⁰ Proponents of PSL laws claim that the laws encourage ill workers to stay home or seek healthcare services by providing workers with greater financial and employment security when sick. Thus, they suggest that these laws improve population health.

However, even if workers voluntarily provided PSL by their employers have better health outcomes and fewer infectious disease outbreaks, laws requiring employers to provide PSL may not have the same effect.

The study poses two questions. First, are laws requiring employers to provide PSL associated with improved health, specifically foodborne illnesses? Over 50% of foodborne illness outbreaks originate from food and beverage establishments (“food establishments”).^{11,12} Forty-six percent of restaurant-associated outbreaks implicate an infected food worker,^{13,14} which tend to infect a median of twice as many people than other outbreaks.¹³ Some pathogens are even more highly associated with infectious food workers: 70% of foodborne norovirus outbreaks with an identified source originate from infectious food workers.¹⁵ Sick food workers may be a large contributor to these outbreaks because about 50% of food service workers work while ill,¹⁶ and 11% work even while experiencing vomiting or diarrhea.⁴ Yet, only 26% of food service workers have PSL.¹⁷ Thus, the first hypothesis is that PSL laws would improve foodborne illness rates. This hypothesis is consistent with previous research showing fewer nosocomial gastrointestinal disease outbreaks in nursing homes with PSL.⁶

Second, are differences in the design of PSL laws associated with differences in foodborne illness rates? Specifically, the second hypothesis is that laws that provide more support to food service workers to actually take PSL have larger effects on foodborne illnesses than laws that provide less support.

METHODS

Study Sample

This mixed-methods study consisted of two phases:

1. a qualitative legal/policy scan evaluating key differences between the four earliest PSL laws (San Francisco, California; Washington, DC; Connecticut; and Seattle, Washington) and classifying them by how empowered employees were to take the leave provided; and
2. a quantitative analysis examining the association between these laws and foodborne illness rates (comparing jurisdictions with PSL laws with matched comparisons before and after the PSL laws were in effect), and how supportive the laws were of employees taking the leave affected this association.

This study focused on the earliest laws effective before December 2013 to have >1 year of data for the “post” period in the empirical analysis. All of the laws were of general applicability, i.e., none were specific only to food establishments/workers.

The authors examined the research literature for factors related to food service workers being engaged in “presenteeism” (i.e., knowingly coming to work sick), then reviewed the laws (including administrative rules/guidance) and classified each element of the laws into three of the factors identified from previous literature^{4,18,19}: financial concerns, job insecurity, and workplace policies (Appendix Table 1). The 14 elements were:

1. financial concerns: part-time workers included, minimum wage required for tipped employees, employers may set minimum increment of PSL to be used, financial penalty if the employer unlawfully denies paid PSL, whether a collective bargaining agreement is exempted if the agreement is less generous than the law;
2. job insecurity: employees specifically protected from discipline if PSL is requested/used in accordance with the law, financial penalty if the employer discharges a worker for lawful use of PSL, uses of PSL time; and
3. workplace policies: schedule of accrual of PSL, whether employers must notify employees of available PSL time, notice required before employees use sick time, whether employers may require employees to find a substitute when the employee takes leave, whether employers may require documentation of illness, if documentation is required, whether employers pay for the cost.

The authors also determined the approximate percentage of food establishments required to offer PSL based on how many food establishments were considered small businesses not required to offer this leave (Appendix).²⁰

The authors examined each provision described above and gave a law one point if it was the most supportive of employees taking PSL. Because penalties contained two legal standards, one based on finding any violation and one (more stringent) requiring “willful” violation, the law under each legal standard predicted to be the most supportive was given one point. The

maximum number of points a law could earn was 19—one for each provision and penalty, and one point if the law required the highest percentage of food establishments to provide PSL. Appendix Table 1 summarizes which points were awarded to each law. Based on the number of points awarded, laws were classified as more or less supportive of employees taking PSL.

Measures

The four jurisdictions with PSL laws were matched to comparisons based on the Community Health Status Indicators peer county framework's²¹ recommendations and the following factors: population density,²² population size, and not being contiguous.

The matched implementation–comparison jurisdiction pairs were: San Francisco with Sacramento, California; Washington, DC with Hudson County, New Jersey; Connecticut with Pennsylvania; and Seattle, Washington with Portland, Oregon.

The four outcome variables of interest were monthly rates per 100,000 people of confirmed cases of campylobacteriosis, salmonellosis, and shigellosis, and these diseases aggregated into one rate. These diseases had comparable clinical descriptions, lab criteria for diagnosis, and confirmed case classification across jurisdictions and time. The analysis excluded shiga toxinogenic *Escherichia coli* infections because the case definition changed over time, and norovirus because individual cases are not reportable. These rates are jurisdiction-level, and include foodborne illnesses contracted outside food establishments.

Although aggregated foodborne illness rates are submitted to the Centers for Disease Control and Prevention through the National Notifiable Diseases Surveillance System, disaggregated rates are available to researchers only by permission. Thus, the authors approached health departments in each jurisdiction and requested monthly foodborne illness rates from 2000 to 2014. Some jurisdictions provided a subset of requested data because of recordkeeping procedures. In all analyses, the same years of data were used for the implementation and matched comparison jurisdictions. Because this paper was focused on the effects of the original PSL law, data after a jurisdiction amended its law were excluded.

One comparison jurisdiction (pair 3) only provided annual foodborne illness rates, so this pair was included only in the unadjusted analyses.

Statistical Analyses

Difference-in-differences (DD) examined the association of PSL laws on monthly foodborne illness rates. DD compares the actual difference in rates before and after the law with the expected difference in rates (the difference in these rates in the matched comparison jurisdiction). Thus, the DD analysis compared: (1) the difference in foodborne illness rates before and after the PSL in implementation jurisdictions (“pre” vs “post”) with (2) the difference in these rates in matched comparison jurisdictions (“implementation” vs “comparison”).

Linear regression with random effects (adjusting for correlation of SEs using an autoregressive [AR] model of order 1 [AR(1)]) examined foodborne illness rates, with the

primary variable of interest the DD (the interaction between pre–post and implementation–comparison). The analysis additionally controlled for the main effects; the percentage of the population by age and food establishments by number of employees, both obtained from the U.S. Census Bureau,²⁰ month, and year. Age (<5, 5–24, 25–64, ≥65 years) was included in order to account for differences in susceptibility to foodborne illnesses within different age groups. The analysis used crude foodborne-illness rates and controlled for population age, rather than using age-adjusted foodborne-illness rates, to avoid bias from not age-adjusting other covariates.²³ The regression controlled for the percentage of food establishments by number of employees because PSL requirements varied based on employee number, so cut-points reflected this: <5, 5–19, 20–49, 50–99, and ≥100 employees.

The sample for the adjusted DD analyses on monthly and annual foodborne illnesses was (1) among all jurisdictions and then (2) stratified by whether the laws were either more or less supportive of employees taking PSL (i.e., based on the analysis from the legal and policy scan).

This study was exempt under categories 2 and 4 of 45 CFR 46.101(b) (Public Health Institute IRB #113-033) The empirical analysis was conducted from 2015 to 2017.

RESULTS

San Francisco and Seattle had laws that were more supportive, at 10 and 8 points (of 17), whereas Washington, DC and Connecticut had laws that were less supportive, at 6 and 5 points, respectively. Foodborne illnesses declined after PSL implementation in jurisdictions with laws that are more supportive of employees actually taking PSL, but increased in jurisdictions with laws that are less supportive (Table 1).

In the unadjusted DD analyses, more supportive laws were associated with a larger decrease in foodborne illness rates, compared to the less supportive laws. In jurisdictions with more supportive laws, foodborne illnesses decreased by 0.49–0.68 fewer monthly cases/100,000 after the law was implemented, after accounting for rates in the matched comparison jurisdictions. By contrast, in jurisdictions with less supportive laws, foodborne illnesses decreased by 0.10 fewer cases/100,000 and increased by 0.59 more cases/100,000, after accounting for rates in the matched comparison jurisdictions. Thus, the policy effect of PSL laws was associated with a –6.5% to –24.5% decrease in foodborne illness rates for more supportive laws, and a –5.1% decrease to 4.3% increase in rates for the less supportive laws.

Combining all laws into one adjusted analysis suggested that laws were associated with a statistically-insignificant adjusted DD decrease in monthly foodborne illness rates (Table 2). However, rates diverged depending how supportive the laws were. More supportive laws were associated with an adjusted DD decrease of 1 case/100,000 per month ($p=0.005$), a –22.3% policy effect. In contrast, less supportive laws were associated with an adjusted DD increase, although this was not statistically significant.

These results appear to be driven primarily by campylobacteriosis. Specifically, the adjusted DD suggested that the PSL law was associated with a decrease in campylobacteriosis in jurisdictions with laws that were more supportive of employees taking sick leave (–0.671,

$p=0.002$), but an increase in campylobacteriosis in jurisdictions with laws that were less supportive of employees taking sick leave (0.930, $p=0.011$).

DISCUSSION

Jurisdictions structured their laws differently, perhaps to address concerns about minimizing the financial cost of PSL laws on businesses. This resulted in laws that vary by how much they empower employees to take PSL. The study hypothesized that laws that were more supportive of employees taking sick leave would be associated with greater decrease in foodborne illness rates. Although the results do find this association, they should be interpreted cautiously.

On one hand, the main analysis suggests some evidence that PSL laws, especially those that are more supportive of employees taking sick leave, are associated with lower rates of foodborne illnesses. First, unadjusted foodborne illness rates decreased in jurisdictions with PSL laws that are more supportive of employees taking leave, and increased in jurisdictions with PSL laws that are less supportive of employees taking leave. When compared with matched comparison jurisdictions (i.e., in unadjusted DD), three of the four jurisdictions with PSL laws were associated with a relative decrease in foodborne illness rates. Second, in adjusted analyses, PSL laws with more supportive provisions were associated with a 22% decrease in monthly foodborne illness rates, whereas laws with less supportive provisions were associated with a non-significant increase in foodborne illness rates.

On the other hand, the above findings are primarily driven by campylobacteriosis. Person-to-person transmission of campylobacteriosis is rare,²⁴ suggesting that the association between PSL laws and foodborne illness rates may not be causal. Although this is not necessarily the case—person-to-person transmission of campylobacteriosis does occur, and has been documented in food handlers,²⁵ sufficiently so that many health departments still recommend or require food handlers diagnosed with campylobacteriosis to be restricted or excluded from working^{26–29}—the campylobacteriosis findings suggest that the association between PSL laws and foodborne illness rates may be explained by other factors. For instance, omitted confounders that were unavailable may have been critical, including the number of part-time food establishment workers, each jurisdiction's commitment to employee health (e.g., Healthy San Francisco or higher health department expenditures on food safety),³⁰ or differences in the implementation/enforcement of these laws.^{31–33} The authors attempted to determine differences in implementation/enforcement through qualitative interviews, but not all jurisdictions collected data about these activities. The results may also reflect regression to the mean. More robust data, such as the origins of the campylobacteriosis cases, would have been helpful in disentangling whether the observed association was causal.

Limitations

Other data limitations may have contributed to the finding of an inconclusive association. For instance, norovirus, a leading cause of foodborne illnesses, is non-reportable, and was therefore excluded from the study. It is possible that there would have been a more clear association between PSL laws and foodborne illness rates had norovirus rates been included.

In addition, foodborne illness rates are likely underreported, such as if people infected with mild cases of foodborne illness do not seek medical attention. Surveillance bias may be less likely to occur in jurisdictions that are part of the Foodborne Diseases Active Surveillance Network (FoodNet) (Connecticut, San Francisco, Portland). Because FoodNet requires active surveillance, jurisdictions that participate may have more accurate surveillance. However, this difference likely does not change this study's results for two reasons. First, the results suggest a nonsignificant increase in foodborne illness rates for laws that are less supportive of employees taking PSL. Because Connecticut is an implementation jurisdiction that has a less supportive law, any bias that existed would be toward finding an effect. Second, the effects of the San Francisco and Portland participation in FoodNet likely cancel each other out. Namely, both of these two jurisdictions are analyzed as having laws that are more supportive of employees taking leave, but the first is an implementation jurisdiction and the second a comparison.

Furthermore, in order to allow for a full year of data in the post period, this study included jurisdictions with the earliest laws. This limited the size of the sample (raising issues of statistical power for salmonellosis or shigellosis). The sample also included one comparison jurisdiction (Portland) that had a law effective after the study period, in order to address concerns about generalizability. The rationale was that to the extent that the early adopters inherently differ from later adopters (particularly in an unobserved way), the analysis would be biased against finding an effect.

Finally, differences in surveillance bias and other unobserved differences may mean the matched pairs are not perfectly comparable. Implementation and comparison jurisdictions had similar baseline foodborne illness rates except for Pair 1, which had an implementation jurisdiction with a higher baseline rate than others. However, trends before the law in the implementation and comparison jurisdiction are similar, suggesting that the parallel slopes assumption of DD was met.

CONCLUSIONS

Proponents of PSL laws claim that the laws improve population health. This claim seems intuitive—PSL is associated with decreased presenteeism and fewer infectious disease outbreaks.^{34,35} However, even if workers provided PSL by employers that voluntarily offer the benefit have improved health, requiring employers to offer PSL may not have the same effects.

This study examines how PSL laws are associated with foodborne illness rates and whether statutory design modified that association. Unfortunately, it is inconclusive. Although PSL laws more supportive of workers taking PSL are associated with decreased foodborne illness rates, this association does not appear to be related to employee presenteeism (because the results are driven by campylobacteriosis).

Although the study does not support the causal mechanism the authors hypothesized, other causal mechanisms might link PSL laws with decreased foodborne illness rates. For example, food establishments that voluntarily provide PSL may be more likely to emphasize

appropriate food handling (which may minimize campylobacteriosis cases). If laws that are more supportive of PSL are more costly to businesses than less supportive laws, perhaps the added costs cause food establishments that had not previously offered PSL to go out of business. This would reduce foodborne illnesses, but through a mechanism other than the hypothesized. Future studies should examine whether this is the case.

If this mechanism does explain the results, one way to maximize the effects of PSL laws on foodborne illnesses is to increase the organizational capacity of health departments to include PSL in food safety regulations. For instance, health departments can promote required postings of PSL law signage by adding this to restaurant inspection checklists. Closer partnerships (including data sharing agreements) between health departments and labor/equity departments can facilitate such activities, particularly if the departments work together to assess the influence of PSL laws.

The number of jurisdictions that have passed PSL laws continue to grow. In addition, since the original passage of the PSL laws, several jurisdictions have strengthened the laws in ways that would likely reduce presenteeism by food service workers, including Washington, DC's law, which now applies to tipped workers, and Seattle's law, which increased employer penalties.

This study suggests that more robust evidence may be needed both to establish the claim that PSL laws can improve health, and to determine under what conditions these improvements may occur. More research is needed to see if PSL laws influence other types of infectious diseases or **industries**.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1Unadjusted Difference-in-Difference, Classified by Extent to Which Law Supports Employees to Actually Take Paid Sick Leave^a

Jurisdiction Pair/Implementation/Comparison	Mean # of foodborne illness cases per month 100K capita (SD)			Change from baseline associated with law, %
	Pre	Post	Difference (Post – Pre)	
Laws that are more supportive ^b				
1				
With PSL law	7.56 (3.31)	6.53 (1.81)	-1.03	-6.5
No PSL law	2.46 (0.96)	1.92 (0.72)	-0.54	
2				
With PSL law	2.77 (0.79)	2.59 (0.67)	-0.18	-24.5
No PSL law	2.96 (1.13)	3.46 (1.33)	0.5	
Laws that are less supportive ^b				
3				
With PSL law	1.97 (0.52)	2.60 (1.22)	0.63	-5.1
No PSL law	1.34 (0.22)	2.06 (0.21)	0.73	
4				
With PSL law	2.57 (0.89)	2.81 (1.04)	0.24	23.0
No PSL law	2.37 (1.06)	2.02 (0.81)	-0.35	

^aUnadjusted mean number of foodborne illness cases per month/100K capita (and SD), in jurisdictions with and without paid sick leave laws, before and after the paid sick leave law was implemented, classified by the extent to which the law supports employees to actually take the sick leave. A negative difference-in-difference indicates that the PSL is associated with a decrease in foodborne illness rates.

^bSan Francisco and Seattle's laws are more supportive of employees taking paid sick leave, and Washington, DC and Connecticut's laws are less supportive (see Methods).
PSL, paid sick leave

Table 2

Unadjusted Baseline Foodborne Illness Rates and Adjusted Difference-in-Differences Models^a

Analysis	Unadjusted baseline rate (SD)	Adjusted difference-in-differences			
		Coefficient	SE	<i>p</i> -value	Policy effect (% change from baseline)
Aggregated foodborne illness cases/100,000					
All jurisdictions	3.660 (2.628)	−0.787	0.737	0.286	
Laws that are more supportive	4.486 (3.098)	−1.002	0.356	0.005	−22.3
Laws that are less supportive ^b	2.570 (0.895)	0.984	0.705	0.162	
Salmonellosis cases/100,000					
All jurisdictions	1.100 (0.529)	0.059	0.084	0.479	
Laws that are more supportive	1.083 (0.529)	0.067	0.117	0.564	
Laws that are less supportive ^b	1.121 (0.529)	0.405	0.416	0.331	
Campylobacteriosis cases/100,000					
All jurisdictions	1.637 (1.22)	−0.266	0.557	0.633	
Laws that are more supportive	1.938 (1.42)	−0.671	0.213	0.002	−34.6
Laws that are less supportive ^b	1.142 (0.508)	0.930	0.366	0.011	81.4
Shigellosis cases/100,000					
All jurisdictions	0.503 (0.828)	−0.221	0.162	0.172	
Laws that are more supportive	0.713 (1.011)	−0.309	0.250	0.217	
Laws that are less supportive ^b	0.205 (0.240)	−0.515	0.504	0.307	

Notes: Boldface indicates statistical significance ($p < 0.05$).

^a Adjusted models use linear regression with random effects (adjusting for correlation of SEs using an AR(1) matrix). A negative difference-in-difference indicates that the PSL is associated with a decrease in foodborne illness rates. Covariates are the difference-in-differences (shown), which is the interaction between being in a jurisdiction with a PSL law and after the law is in effect; the main effects of the difference-in-differences; percent population by age; percent food establishments by number of employees; month; and year. San Francisco and Seattle's laws are more supportive of employees taking paid sick leave, and Washington, DC and Connecticut's laws are less supportive (see Methods).

^b This excludes matched Pair 3, as the comparison jurisdiction for that pair only provided annual foodborne illness cases.

PSL, paid sick leave